2009 Academic Program Review

Department of Atmospheric Sciences

Texas A&M University
2009 Academic Program Review

Department of Atmospheric Sciences
Texas A&M University

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Chapter 1 - Introduction

1.1 Welcome from the Department Head

The Department of Atmospheric Sciences welcomes you to Texas A&M University (TAMU) and thanks you for your service as external reviewers of our academic program. Our previous external review in 2001 formally examined only the Ph.D. program. Under current University policies, external program reviews are conducted every eight years to evaluate all aspects of a department, including undergraduate education, graduate education and training, research, and service. We look forward to this opportunity for a comprehensive evaluation of the Department and its activities.

This report has been prepared specifically for this review. It includes a brief history of Texas A&M and the Atmospheric Sciences Department. This is followed by a comparison of the Department at the time of the last review in 2001 and at the present time, including a summary of current departmental personnel and the administrative organization of the Department. Additional sections provide details on the undergraduate program, the graduate program, and research and service activities in the Department. The concluding section contains our internal assessment of the state of the Department and plans for the future. The appendices include curricula vitae for faculty and research staff; details of the undergraduate and graduate curricula; and lists of grants and publications.

We look forward to receiving your evaluation and recommendations as we strive to continually improve all aspects of the Department. We realize that this is a time-consuming activity, and thank you again for your service. Please feel free to contact me if you have any questions or need information that is not contained in this report.

Kenneth P. Bowman
Professor and Department Head

1.2 Charge to the Review Committee

Prepared August 4, 2008

This letter provides you with background on the Department of Atmospheric Sciences at Texas A&M University, and explains the expectations for the external review. Atmospheric Sciences (formerly Meteorology) has been a separate department at Texas A&M since 1965. The Department offers a B.S. degree in Meteorology, as well as M.S. and Ph.D. degrees in Atmospheric Sciences.

This activity is part of a periodic review of all Texas A&M University academic programs, and offers an opportunity to assess the standards of the programs and to learn from review team members’ experiences with similar programs.

I request that the review team examine the undergraduate, graduate, and research programs of the Department of Atmospheric Sciences using the materials that will be provided, as well as
information you gain through personal interactions while visiting Texas A&M, along with any additional information that you might request. While evaluating the program, please consider the allocation of resources within the department (both human and fiscal) and the absolute level of support the Department receives from the University. Please comment as appropriate on current and potential leveraging of these resources, as well as the current and potential interaction with other departments and groups, both on campus and off.

Also, please address the issue of learning-based outcomes:

- Does the department have ongoing and integrated planning and evaluation processes that assess its programs and services, that result in continuing improvement, and that demonstrate that the department is effectively accomplishing its mission?
- Has the department identified expected outcomes for its educational programs?
- Does the department have evidence of improvement based upon analysis of results?

In addition, I ask that you address the impact of the Faculty Reinvestment Program, started by Texas A&M University in 2003. The reinvestment program has resulted in the hiring of almost 500 new faculty members dispersed throughout the University. The goal is to improve the quality of education for Texas A&M students by having more faculty available for mentoring and advising, whether more courses and sections are available, or by simply being more responsive to student needs. Through this review we plan to track and measure real increases and improvements in the quality of the graduate and undergraduate experiences across all dimensions. We ask that you assess the success of the department in moving their teaching and research agendas forward with these hires. The reinvestment program increased the Department of Atmospheric Sciences faculty through the hiring of seven new faculty members (one has since left).

Enclosed are suggested guidelines for the academic program review final report. I look forward to meeting with you and the entire committee in March 2009. If you have any questions or require additional information, please contact me.
Chapter 2 - Departmental Overview

2.1 History of the Department

Texas A&M University in Brief

The school now named Texas A&M University was established in 1876 as the Agricultural and Mechanical College of Texas (or Texas A.M.C.). Texas A.M.C. was the first public institution of higher education in the state, predating the University of Texas by seven years. For nearly the first century of its existence, the school was an all-male military college with mandatory participation in the Corps of Cadets. However, by the late 1950s the school had begun a broadening of its educational and research missions. In 1963, the college was renamed Texas A&M University (TAMU), and shortly thereafter became coeducational. Subsequent years saw a period of rapid growth, with total enrollment increasing nearly six fold between 1960 and 2000.

Today Texas A&M ranks as the sixth largest university in the nation, with over 38,000 undergraduates and more than 9,000 M.S. and Ph.D. students. The University boasts more than 2,700 faculty members, giving a student-to-faculty ratio of less than 18:1. TAMU is among a select handful of universities to be triply designated as a land grant, sea grant, and space grant institution. Annual research expenditures exceed $550M, placing TAMU among the top 25 research universities nationally, and second among universities without a medical school. The University endowment is valued at more than $5 billion, fourth largest among public universities and 10th overall. In the most recent U.S. News and World Report survey, TAMU is listed as 64th among all universities and 23rd among public schools.

The past five years have seen a period of unprecedented faculty growth and investment in infrastructure at Texas A&M. Following the University’s Vision 2020 plan, more than 400 new faculty have been hired since 2003, with the total scheduled to reach 450 by the end of the current year. As of 2008, this expansion had been matched by over $500M in new construction projects. Efforts have also been made to increase the diversity of both the student body and the faculty.

The Department’s Early Years: 1950–1986

Meteorology at Texas A&M has its roots in the Department of Oceanography, established in 1949 as the first university oceanography department in the country. Meteorological instruction began shortly thereafter with the additions of Robert Reid and John Freeman, each of whom brought several soft-money meteorologists to the Department. In 1953 the Air Force began to send its Basic Training officers to TAMU for a one-year intensive meteorology education, and the number of courses taught in the subject increased rapidly thereafter. To reflect this growth, the department was renamed the Department of Oceanography and Meteorology in 1956.

Earth sciences at Texas A&M underwent a major reorganization in the mid-1960s with the formation of the College of Geosciences. Part of this reorganization was the creation of an independent Department of Meteorology with nine founding faculty members. Planning was
initiated for a new 11,500 square meter Oceanography and Meteorology (O&M) building, and by 1973 the Department had taken up permanent residence in its current location.

The main research areas of the faculty during these early years were synoptic meteorology, climatology, and the development of radar as an operational tool. The Department also played a role in cloud seeding and weather modification programs through much of the 1970s. However, for the first 35 years or so of its existence, the meteorology graduate program was mostly centered on the training of Air Force officers. This officer training and the associated student credit hours played a key role in the Department’s economic health.


Until the mid-1980s, most of the graduate students in the Department were Air Force officers supported by the military. While the Air Force connection was vital to departmental economics, it also had detrimental effects on the graduate research program. Since the military officers required no financial support, the incentive for proposal writing was low and external research funding dwindled. Indeed, as late as 1986 the level of outside research support in the Department was as low as $100k/year. During this same period, the number of peer-reviewed research publications had dropped nearly to zero.

The decade following the mid-1980s brought a marked transformation to the Department as a dedicated effort was made to revitalize the graduate research program. Under the leadership of Associate Dean Worth Nowlin and Deans Mel Friedman and Robert Duce, a number of senior faculty members with established research credentials were recruited, including the current Profs. Bowman, North, Orville, Panetta, and Wilheit, along with the former Prof. Ed Zipser. Similarly, as older faculty retired, new junior faculty with demonstrated research promise were hired as replacements. The effort proved successful, and by the mid-1990s, external funding levels in the Department had recovered to the $2-3M range.

By the end of the 1990s, research interests in the Department had broadened considerably and included fields such as satellite and remote sensing studies, climate studies, and atmospheric chemistry, in addition to the traditional radar, dynamic, and synoptic interests. To reflect this broadening, the department was renamed the Department of Atmospheric Sciences in 1998.

Recent Expansion: 2001–Present

At the time of our most recent self-study report in 2001, the Department consisted of 9.5 faculty members (the half member indicating a joint position with oceanography). Since then, the Department has more than doubled in size, with the current faculty totaling 21.5 members. An additional assistant professor is scheduled to start in September 2009, with one replacement position expected in the next year or two. Thus, the final total after the current round of hiring is expected to be about 22 faculty members.

Rapid expansion of the Department was driven by several factors. First, roughly half (six) of the new positions were tied directly to overall faculty expansion at the University level as part of the Vision 2020 plan (as described above). A seventh position was created by transforming a
A lectureship into a new tenure-track hire, and an eighth was created as part of the Integrated Ocean Drilling Project’s (IODP) program in Ocean Drilling and Sustainable Earth Sciences (ODASES). The remaining four positions were part of an earlier departmental expansion and replacement, and were all completed by 2003, prior to rapid growth at the University level.

Under Department Heads North, Orville, and Bowman, the Department’s hiring strategy during this growth period has been to build and maintain a comprehensive program. As a result, the new hires reflect research interests in virtually every sub-discipline of the field. Most positions have been filled at the Assistant Professor level, with a few the notable exceptions being Prof. Saravanan (Full Professor) and Profs. Dessler, Lemmon, and Szunyogh (Associate). Particularly noteworthy is the fact that in all cases except one, the first choice candidate for the position was successfully recruited.

With this latest round of expansion, the Department of Atmospheric Sciences has progressed well beyond its earlier reputation as a synoptic training school. Indeed, in terms of faculty size the Department is currently one of the largest in the nation, with research activities covering virtually all branches of the discipline.

### 2.2 Statement of Department Mission and Goals

Texas A&M University is a comprehensive teaching and research university of the State of Texas, and is the flagship institution of the Texas A&M University System. The overarching goal of the University is to serve the public good through teaching, research, and service to society.

The Department of Atmospheric Sciences is dedicated to advancing scientific understanding of the atmosphere and imparting that knowledge for the benefit of society. Our most fundamental mission is to help students at all levels – from undergraduate to postdoctoral – acquire and develop scientific knowledge, critical thinking skills, the ability to continue to learn, and the potential to contribute to society. We also serve students in other disciplines through survey courses, which give students a better understanding of nature and of scientific methods, and through specialized courses for students in fields that require applied knowledge of meteorology.

Our research efforts serve two purposes: to expand the frontiers of atmospheric science, and to give students experience and training in conducting research. The knowledge gained from research may be fundamental, or applicable to a particular societal need. Research results are communicated through journals or other appropriate media to other scientists and the public. As a Department, we seek to maintain the highest standards of excellence in the research we perform.

We have a duty to contribute to society through our educational and research activities. This public service includes administrative and educational efforts both inside and outside the University proper, such as assisting in University governance, developing and disseminating teaching materials, or improving pre-college education, as well as research-related efforts, such as serving on committees of scientific societies, providing advice to state and federal governments, acting as reviewers and editors, organizing meetings, and assisting industry. Research and service activities should not be allowed to adversely affect our educational
mission, but should be encouraged where they improve the quality of our teaching and of the scientists we train.

We are committed to assisting Texas A&M University and the State of Texas to carry out their broader missions.

2.3 Summary of 2001 External Program Review

The Department of Atmospheric Sciences last underwent external review in 2001. That review evaluated only the Ph.D. program, including departmental research activities. This section briefly reviews the state of the Department at that time and the principal conclusions of the review process.

Faculty and Research Staff

In 2001 the Department was near a long-term low in terms of faculty numbers as a result of a series of retirements and departures (Table 2.1). The Department had 9.5 tenured and tenure-track faculty, three lecturers (generally with less than full-time salary support), and two modified retirees teaching undergraduate courses. There were four postdoctoral research scientists in the Department at the time.

<table>
<thead>
<tr>
<th>Name</th>
<th>2001 Title</th>
<th>Field</th>
<th>2009 Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marion Alcorn</td>
<td>Lect.</td>
<td>Synoptic meteorology and forecasting</td>
<td>retired</td>
</tr>
<tr>
<td>Michael Biggerstaff</td>
<td>Assoc. Prof.</td>
<td>Mesoscale and radar meteorology</td>
<td>left A&amp;M</td>
</tr>
<tr>
<td>Kenneth Bowman</td>
<td>Prof.</td>
<td>Dynamics and climate dynamics</td>
<td>Dept. Head</td>
</tr>
<tr>
<td>Don Collins</td>
<td>Asst. Prof.</td>
<td>Aerosol physics</td>
<td>Assoc. Prof.</td>
</tr>
<tr>
<td>P.M. Das (0.5)</td>
<td>Prof.</td>
<td>Physical meteorology</td>
<td>retired</td>
</tr>
<tr>
<td>Dennis Driscoll (0.5)</td>
<td>Assoc. Prof.</td>
<td>Climatology</td>
<td>retired</td>
</tr>
<tr>
<td>Robert Duce (0.5)</td>
<td>Prof.</td>
<td>Atmospheric chemistry</td>
<td>retired</td>
</tr>
<tr>
<td>James McGuirk</td>
<td>Prof.</td>
<td>Tropical meteorology</td>
<td>retired</td>
</tr>
<tr>
<td>John Nielsen-Gammon</td>
<td>Prof.</td>
<td>Synoptic meteorology and forecasting</td>
<td>Interim Assoc.</td>
</tr>
<tr>
<td>Gerald North</td>
<td>Dist. Prof.</td>
<td>Climate and statistics</td>
<td>Dean</td>
</tr>
<tr>
<td>Richard Orville</td>
<td>Dist. Lect.</td>
<td>Physical meteorology and lightning</td>
<td>Dist. Prof.</td>
</tr>
<tr>
<td>Lee Panetta</td>
<td>Assoc. Prof.</td>
<td>Geophysical fluid dynamics</td>
<td>Prof.</td>
</tr>
<tr>
<td>Gary Sickler</td>
<td>Lect.</td>
<td>Introductory and synoptic meteorology</td>
<td>left A&amp;M</td>
</tr>
<tr>
<td>Thomas Wilheit</td>
<td>Prof.</td>
<td>Remote sensing</td>
<td>Prof.</td>
</tr>
<tr>
<td>Renyi Zhang</td>
<td>Asst. Prof.</td>
<td>Atmospheric chemistry</td>
<td>Prof.</td>
</tr>
</tbody>
</table>
Eight members of the tenure-track faculty from 2001 are still in the Department (names in bold in Table 2.1). Two lecturers and the two modified retirees have fully retired or left the University, along with one full-time and one half-time tenured professor. One Distinguished Lecturer has become a tenured Full Professor. Curricula vitae for faculty and research staff are provide in Appendix C.

The areas identified as research strengths in the 2001 report were:

- Synoptic meteorology and weather forecasting
- Mesoscale meteorology
- Atmospheric chemistry
- Climate
- Large-scale dynamics and the stratosphere
- Atmospheric physics and satellite remote sensing

_Technical Staff_

The technical staff consisted of one radar/computer engineer and two computer system administrators.

_Administrative Staff_

The office staff consisted of an administrative assistant, two staff assistants, and a part-time administrative secretary.

_Highlights of 2001 Report_

At the time of the 2001 review, the University had recently completed a long-range planning effort known as _Vision 2020_ with the goal of making Texas A&M a top-ten public university in national rankings by the year 2020. The _Vision 2020_ plan enumerates twelve priorities for the University:

1. Elevate our faculty and their teaching, research, and scholarship.
2. Strengthen our graduate programs.
3. Enhance the undergraduate academic experience.
4. Build the letters, arts, and sciences core.
5. Build on the tradition of professional education.
6. Diversify and globalize the A&M community.
7. Increase access to knowledge resources.
8. Enrich our campus.
10. Demand enlightened governance and leadership.
11. Attain resource parity with the best public universities.
12. Meet our commitment to Texas.
The 2001 Atmospheric Sciences internal assessment report was driven in large part by this statement of TAMU goals and priorities, and it identified the following important challenges for the Department:

**Recruiting and retaining excellent faculty** – In 2001 we had two unfilled faculty positions. Some offers had been made for these positions and were declined, while others had resulted in no acceptable candidate being identified. The report found the following factors to be significant obstacles to recruiting new faculty:

- Low salaries (by 6 and 14%) relative to peer universities
- Spousal placement problems
- Competition from government labs with 12-month salaries
- Less attractive location

**Recruiting excellent graduate students** – Despite major improvements in the Department over the previous decade, its reputation continued to lag. New efforts were initiated at that time to recruit into Atmospheric Sciences from science departments at universities and colleges within Texas (primarily physics, chemistry, and mathematics).

**Increasing grant funding** – In addition to aiming to increase total individual investigator grant funding, the Department set a goal of trying to attract block funding from the federal or state government to a center or government lab.

**Maintain a critical mass of faculty** – In order to be able to offer comprehensive and high-quality undergraduate and graduate curricula, and to maintain a research environment that encourages the development of collaborative research programs, it was estimated that the Department should have at least fourteen tenure and tenure-track faculty. A substantial part of the report was dedicated to justifying an increase in the size of the Department.

The 2001 report also identified several important positive events and opportunities for the Department:

**Haynes Chair** – The Department had recently received an endowed chair ($1M) that returns a nominal $50k/year to the chair holder.

**Center for atmospheric chemistry** – Efforts were beginning to establish an atmospheric chemistry center.

**Mesonet and modeling system** – Efforts were underway made to establish an Oklahoma-like mesoscale observing network, which would be coupled to a forecasting system for use in weather and air quality research and provide services to weather sensitive industries and activities around the state (transportation, water resources planning, power generation and transmission, etc.)

The Summary and Conclusions section of the 2001 internal assessment report is quoted below in its entirety:

“The Department of Atmospheric Sciences has come a long way from its sleepy military teaching role of fifteen years ago to the viable full-service program of today. The Department is now near critical mass for growing into competition with the best departments in the country. To become more competitive it needs to continue its pursuit of excellence in faculty hiring and
retention. The department needs to grow at a healthy rate over the next twenty years by proving step-by-step that it can pay for itself in service courses that provide stability to its graduate program by making it slightly less dependent on the vagaries of grant income to support graduate students. Filling the Haynes Chair with an outstanding atmospheric chemist could lead to a major programmatic thrust in that area, perhaps taking the department to a new level in fulfilling its dream of entering the group of top departments in the nation. As the department grows it will need more facilities, and these investments can only come from the state. For example, chemists need laboratory space and a new radar system is inevitable in the next decade. It might be located at the Riverside Campus. As the program grows, a dedicated research aircraft may be necessary. Comprehensive modeling programs need world class computing facilities. Most of the things being called for can be part of a long-term strategy involving a federal laboratory facility on or next to our campus.”

2.4 Changes since 2001 and Current State of the Department

University Priorities and the Faculty Reinvestment Program

Soon after Dr. Robert Gates became President of Texas A&M in 2002, he chose to focus on four priorities from the Vision 2020 list, and one new goal. These are:

1. Elevate faculty (priority 1)
2. Improve facilities (new priority 13)
3. Diversity and globalization (priority 6)
4. Improve graduate and undergraduate programs (priorities 2 & 3)

This focus on a smaller set of goals led directly to a major effort to improve both the quantity and quality of TAMU faculty that became known as the Faculty Reinvestment Program. This program was driven in part by a desire to improve the comparatively high student-to-faculty ratio of Texas A&M relative to its peer universities.

Historically, tuition at public universities in Texas has been low relative to national averages. While this helped to make a university education affordable to Texas residents, it also led to compromises in quality through high student-to-faculty ratios, extensive deferred maintenance on university buildings and facilities, and little new construction, despite a continuing increase in enrollment.

The ability of the University to hire more faculty was made possible, in large part, by a timely decision of the state legislature to shift the responsibility for setting tuition levels at public universities from the legislature to the universities themselves. Thus, the University was able to raise tuition closer to national norms and invest the additional funds in new faculty hires. The University has also striven to keep administrative costs as low as possible.

Current Faculty and Research Staff

Because our faculty numbers in 2001 were at a low point, we were highly motivated to carry out successful searches. Additionally, the external program review made the case for increasing the
size of the Department; therefore, we were well prepared to take advantage of the Faculty Reinvestment Program. Departments were asked to write short proposals for new faculty positions. Initially, four new positions were approved for Atmospheric Sciences. Through a combination of circumstances, including our ability to make prompt, high-quality hires, several additional reinvestment positions were given to the Department. The end result has been a rapid increase in both the size and quality of the Department’s faculty.

The number of tenured and tenure-track faculty has increased from 9.5 to 21.5 (Table 2.2). One of these positions is currently vacant due to the departure of Fuqing Zhang. We hope to fill that position during the 2009-10 academic year. At the same time, however, the number of lecturers and semi-retired faculty has decreased from five to one.

**Table 2.2. Atmospheric Sciences Department Faculty in March 2009.**

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
<th>Field</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kenneth Bowman</td>
<td>Prof.</td>
<td>Dynamics, climate dynamics</td>
<td>Dept. Head</td>
</tr>
<tr>
<td>Sarah D. Brooks</td>
<td>Asst. Prof.</td>
<td>Aerosol physics</td>
<td>reinvestment</td>
</tr>
<tr>
<td>Ping Chang</td>
<td>Prof.</td>
<td>Climate variability, GFS</td>
<td>OCNG, joint appt.</td>
</tr>
<tr>
<td>Don Collins</td>
<td>Assoc. Prof.</td>
<td>Aerosol physics</td>
<td></td>
</tr>
<tr>
<td>Don Conlee</td>
<td>Instructional</td>
<td>Weather analysis, forecasting</td>
<td>replacement</td>
</tr>
<tr>
<td>Andrew Dessler</td>
<td>Prof.</td>
<td>Climate change</td>
<td>reinvestment</td>
</tr>
<tr>
<td>Craig Epifanio</td>
<td>Assoc. Prof.</td>
<td>Mesoscale dynamics</td>
<td>replacement</td>
</tr>
<tr>
<td>Robert Korty</td>
<td>Asst. Prof.</td>
<td>Paleoclimate, hurricanes</td>
<td>IODP position</td>
</tr>
<tr>
<td>Mark T. Lemmon</td>
<td>Assoc. Prof.</td>
<td>Planetary atmospheres</td>
<td>reinvestment</td>
</tr>
<tr>
<td>Rebecca Miller</td>
<td>Lecturer</td>
<td>Broadcast meteorology</td>
<td>part-time</td>
</tr>
<tr>
<td>Shaima L. Nasiri</td>
<td>Asst. Prof.</td>
<td>Radiative transfer, remote</td>
<td>reinvestment</td>
</tr>
<tr>
<td>John W. Nielsen-Gammon</td>
<td>Prof.</td>
<td>Synoptic met., forecasting</td>
<td></td>
</tr>
<tr>
<td>Gerald R. North</td>
<td>Dist. Prof.</td>
<td>Climate and statistics</td>
<td></td>
</tr>
<tr>
<td>Richard Orville</td>
<td>Prof.</td>
<td>Physical meteorology, lightning</td>
<td></td>
</tr>
<tr>
<td>Lee Panetta</td>
<td>Prof.</td>
<td>Geophysical fluid dynamics, mathematics</td>
<td></td>
</tr>
<tr>
<td>R. Saravanan</td>
<td>Prof.</td>
<td>Climate dynamics</td>
<td>reinvestment</td>
</tr>
<tr>
<td>Gunnar W. Schade</td>
<td>Asst. Prof.</td>
<td>Biogeochemical cycles</td>
<td>reinvestment</td>
</tr>
<tr>
<td>Courtney Schumacher</td>
<td>Asst. Prof.</td>
<td>Tropical and radar meteorology</td>
<td>replacement</td>
</tr>
<tr>
<td>Russ Schumacher</td>
<td>Asst. Prof.</td>
<td>Mesoscale modeling</td>
<td>replacement (Sept. 2009)</td>
</tr>
<tr>
<td>Istvan Szunyogh</td>
<td>Assoc. Prof.</td>
<td>Data assimilation, forecasting</td>
<td>replacement</td>
</tr>
<tr>
<td>Thomas Wilheit</td>
<td>Prof.</td>
<td>Remote sensing</td>
<td></td>
</tr>
<tr>
<td>Ping Yang</td>
<td>Prof.</td>
<td>Radiative transfer, remote</td>
<td>replacement</td>
</tr>
</tbody>
</table>
As faculty numbers and research activities have increased, the number of research scientists in the Department has expanded as well. From four postdoctoral-level scientists in 2001, the Department now has seventeen M.S. and Ph.D. research staff (Table 2.3).

**Table 2.3. ATMO Research Scientists in 2009.**

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kaycee Bevers</td>
<td>Research Associate</td>
</tr>
<tr>
<td>Yiwei Diao</td>
<td>Postdoctoral Research Associate</td>
</tr>
<tr>
<td>Shouguo Ding</td>
<td>Postdoctoral Research Associate</td>
</tr>
<tr>
<td>Juan Fang</td>
<td>Associate Research Scientist</td>
</tr>
<tr>
<td>Gang Hong</td>
<td>Assistant Research Scientist</td>
</tr>
<tr>
<td>Xiaoming Hu</td>
<td>Postdoctoral Research Associate</td>
</tr>
<tr>
<td>Alexei Khalizov</td>
<td>Assistant Research Scientist</td>
</tr>
<tr>
<td>Runjun Li</td>
<td>Senior Research Associate</td>
</tr>
<tr>
<td>Atilla Mutlu</td>
<td>Postdoctoral Research Associate</td>
</tr>
<tr>
<td>Steve Schroeder</td>
<td>Postdoctoral Research Associate</td>
</tr>
<tr>
<td>Chance Spencer</td>
<td>Research Associate</td>
</tr>
<tr>
<td>Lin Wang</td>
<td>Postdoctoral Research Associate</td>
</tr>
<tr>
<td>Richard Weitz</td>
<td>Research Associate</td>
</tr>
<tr>
<td>Yonghui Weng</td>
<td>Research Associate</td>
</tr>
<tr>
<td>Sun Wong</td>
<td>Research Scientist</td>
</tr>
<tr>
<td>Sarah Zedler</td>
<td>Postdoctoral Research Associate</td>
</tr>
<tr>
<td>Jun Zheng</td>
<td>Postdoctoral Research Associate</td>
</tr>
</tbody>
</table>

How did the Department overcome the difficulties listed in the 2001 report to attract high-quality faculty? No single factor can explain this; it is the beneficial outcome of several convergent trends. First, a growing institution with a strong emphasis on improving quality can be an attractive environment for a young scientist. Second, the senior faculty had succeeded in establishing a productive, collegial, and collaborative work environment with a much improved research program, so the Department was viewed as a rising place to work. Finally, external factors, such as rapidly rising housing prices on both the east and west coasts, attractive and inexpensive local housing, and a growing local economy, all may have made the region more attractive. This trend also follows a long-term shift in the U.S. population and economy toward the south.

*Facility and Space Improvements*

The 2001 report identified new laboratory space for chemists as a high priority for the Department. Two new laboratory chemists were hired as part of the faculty reinvestment initiative (Brooks and Schade), and both required laboratory space that did not exist when they were hired. Fortunately, remodeling funds were provided by the University as part of the Faculty Reinvestment Program and space was released on the 11th floor in the Eller Building by closing
the joint Atmospheric Sciences/Oceanography reading room, known as the Working Collection. This closure was made possible by the continuing move toward electronic access to the scientific literature. Essential materials not available elsewhere were transferred to the main University Library, which is a few-minutes’ walk from the Eller Building. The space on the 11th floor formerly occupied by the Working Collection was converted into two high-quality laboratories for Drs. Brooks and Schade.

Until 2007, most Atmospheric Sciences courses, other than large service courses, had been taught in three classrooms on the 12th floor of the Eller Building. Although not entirely ideal (two of the rooms had significant noise problems from building exhaust vents), these classrooms served the Department well for both undergraduate and graduate classes. These rooms also served as large meeting and conference rooms when needed. New University policies, however, decree that for safety and foot-traffic reasons, classrooms should not be located above the third floor. This policy led to the conversion of the classrooms, along with work space and a portion of the old radar equipment room, into new office space for faculty, staff, and students. The remodeling added several high-quality offices for faculty and research staff, cubicles for students, a smaller radar room that doubles as a broadcast television studio, and a conference room large enough for faculty meetings, small seminars, and thesis defenses. The loss of classroom space has had some impact on our teaching, as discussed in the graduate and undergraduate sections of this report.

To summarize the main changes in the Department since the last external review, as a result of being well positioned to take advantage of the Faculty Reinvestment Program and other opportunities that have developed, the Department’s achievements since the last program review far outstripped what in retrospect were relatively modest goals. Faculty and research staff numbers have increased roughly by factors of 2 and 4, respectively. The Department has a thriving research program which is detailed later in this report. Office and laboratory space has been remodeled and improved. As described in more detail below, the undergraduate and graduate programs have had stable enrollments, and, we believe, improvements in quality. In short, we believe that the Department is poised to become one of the top atmospheric science departments in the country.
Chapter 3 - Departmental Administration and Management

3.1 Department Head

The Department Head is appointed by and reports to the Dean of the College of Geosciences. The appointment is usually made through a formal search process that includes input from the members of the Department. The Dean determines whether the search should be internal or external. The last three heads (North, Orville, and Bowman) were selected through internal searches. The Dean appoints a search committee, and its chairperson is usually one of the other department heads from within the College. After applications are sought through the usual channels, interviews are conducted, with opportunities to visit with all faculty members, staff, and students. Comments are solicited from all interested parties and sent to the search committee and the Dean; subsequently, the committee makes a recommendation to the Dean, usually in the form of a ranked short list. The Dean normally begins negotiations with candidates on the short list, although the final choice is at his or her discretion. The Department Head receives a twelve-month salary.

Department heads have broad discretionary powers as to how they conduct departmental affairs, although faculty and administrative staff positions are controlled by the College. The Department of Atmospheric Sciences does not have a formal set of bylaws at this time, but informal guidelines have evolved concerning the important matters of hiring, promotion, course adoption, curriculum, and conduct of exams. There are, of course, written policies in many areas of university activities at the University, College, and Department levels. Academic policies pertaining to students, such as degree requirements and the procedure for administering the Ph.D. qualifying exam, are maintained on the Department web site for easy access by all concerned.

Because the Department remains relatively small, final decisions on most matters are made either by the Department Head or by a vote of the whole faculty. For example, changes in degree requirements are first discussed by the appropriate committee (graduate or undergraduate). The committee forwards a proposal to the faculty for discussion and possible amendment. The entire faculty then votes on the amended recommendation.

3.2 Departmental Executive Committee

Administrative and committee organization within the Department is largely up to the Department Head. For the past two years, the College has provided $30k in supplemental operational funds to be used, with approval of the Dean, at the Department’s discretion. Some departments in the College use the funds to provide three months of summer salary for an assistant department head. In ATMO, because of heavy research commitments by the faculty, no one is eager to have a twelve-month appointment with a heavy administrative load. Therefore, we have chosen instead to provide one month of summer salary to the heads of the two most burdensome committees, the Undergraduate Program Committee (UPC) and the Graduate Program Committee (GPC). These positions are currently held by Drs. Dessler and Saravanan, respectively. Remaining funds have been used to provide additional office and IT support by hiring student workers. The chairs of the UPC and GPC, along with the chair of the Facilities Committee (FC) and the Department’s business coordinator, act as a Departmental executive
committee and serve to advise the Department Head on administrative, academic, and financial matters.

3.3 Departmental Meetings and Committees

The Department as a whole usually meets once per month, or on an as-needed basis, such as for qualifying exams or hiring decisions. The Department Head chairs the meetings, which are normally attended by the Department’s business coordinator and the academic advisor, who acts as secretary, as well as representatives of the graduate and undergraduate students.

Much of the Department’s academic business is organized into faculty committees. The Department Head appoints the members and chairs of committees on an annual basis. Chairs typically serve two to four years. It is a longstanding Department policy that untenured faculty should not chair departmental committees.

Undergraduate Program Committee (UPC) – This committee has responsibility for overseeing advising, curriculum, and course content for the undergraduate program, both for meteorology majors and for service courses. Recommendations by the committee are brought before the faculty as a whole for a vote. Current membership: Conlee, Dessler (chair), Epifanio, Schade, Arnold (academic advisor), and Torres (student representative).

Graduate Program Committee (GPC) – This committee oversees the recruitment and admission of new graduate students. Matters of graduate curriculum, course content, and advising also come under the purview of this committee. Current membership: Brooks, Collins, Lemmon, Saravanan (chair), Szunyogh, Yang, Arnold (academic advisor), and Mason (student representative).

Teaching Committee – Teaching assignments are made by the Department Head after consulting with the individual faculty members and the teaching committee, which consists of the chairs of the UPC and GPC. Within the constraints of the course schedule, the committee tries to allow faculty members to teach courses in their areas of interest, at both the undergraduate and graduate level. Professors do not “own” a course, although they receive preference for teaching a course that they develop, at least for the first few years. The committee seeks to minimize the number of different courses that new faculty teach prior to tenure. The committee also tries to have all faculty take their turn at teaching the large introductory course sections, including full professors.

Qualifying Exam Committee – This committee meets once per year in the spring to prepare and administer the Ph.D. qualifying exam. Current membership: Panetta (chair) and recent instructors for the graduate core curriculum courses (ATMO 601, 602, 606, 611, 612, 613).

Recruiting Committee – The Recruiting Committee is charged with activities to recruit graduate and undergraduate students. Current membership: Brooks, Collins (chair), and Panetta.

Computing and Facilities Committee – The Computing and Facilities Committee oversees Departmental computing and facilities issues, although much of this is currently handled by the
Tenure and Promotion (T&P) Committee – The Tenure and Promotion Committee is busiest between May and September, when packages for tenure and promotion are prepared and submitted. Due to the relatively small size of the Atmospheric Sciences Department, the T&P Committee consists of all qualified faculty members, excluding the Department Head; thus, cases for tenure and promotion to associate professor are evaluated by all tenured faculty. Cases for promotion to full professor are evaluated by all tenured full professors. T&P cases follow detailed University and College procedures.

Under University rules, the T&P Committee also carries out annual evaluations of all assistant and associate professors. These evaluations are provided to the individual faculty and are input for annual evaluations conducted by the Department Head. The goal of this process is to improve the T&P process by communicating progress, or lack thereof, to faculty who will be considered for tenure or promotion in the future.

Finally, the T&P Committee also provides evaluations of research staff and faculty as needed for promotion and salary decisions.

Awards Committee – The Awards Committee seeks out internal and external award possibilities and nominates faculty, staff, and students for those awards. Current membership: Dessler, Epifanio, and Orville (chair).

3.4 Administrative and Technical Services

Administrative Staff

The current office staff consists of a business coordinator, two business associates, and an academic advisor (Table 3.1).

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barbara Straube</td>
<td>Business Coordinator III</td>
</tr>
<tr>
<td>Carria Collins</td>
<td>Business Associate II</td>
</tr>
<tr>
<td>Christine Arnold</td>
<td>Academic Advisor II</td>
</tr>
<tr>
<td>Tara Jackson</td>
<td>Business Associate II</td>
</tr>
<tr>
<td>Caitlin Nichols</td>
<td>Student worker (half time)</td>
</tr>
<tr>
<td>Stacy Ehrig</td>
<td>Student worker (half time)</td>
</tr>
</tbody>
</table>

Table 3.1. ATMO Administrative Staff in 2009.

The administrative staff is responsible for processing all administrative, business, and academic matters. In the administrative and business area, this includes employment, immigration, payroll, purchasing, travel, and management of returned indirect cost funds and some scholarship funds. The business administrator is the primary liaison between principal investigators and research administration agencies within the University (see discussion of research administration in the
following section). Business administration requires the use of a number of different university information systems, as well as knowledge of many different State and University rules and policies. Training to use these systems is lengthy, and new employees typically require at least a year before they are comfortable and competent at the range of tasks required.

The academic advisor handles student advising (in conjunction with faculty), course scheduling, course catalogs, student records, and graduate student applications. The University is currently in midst of changing from one student information management system to another. The administrative staff works closely with their counterparts in the Dean’s office.

When the four administrative staff positions allotted to ATMO are filled with experienced people, the staffing level is sufficient to handle the administrative workload of the Department. All four office staff, however, work very hard; and there is little, if any, slack. This means that when vacancies occur, the remaining staff members are quickly overloaded. This year we had an open business position for almost six months due to slowness in the hiring process. Despite a considerable amount of overtime, Department business operations fell behind in some areas during this period, such as processing travel reimbursement requests.

There are significant differences between position classifications, workloads, and salaries within the College, which affect morale and job satisfaction. University and College employment policies and procedures for classified staff are quite burdensome. Reclassifying staff positions and providing appropriate raises as staff members learn new skills is very difficult. The rules and policies have the effect of encouraging staff to move between departments and colleges in order to improve their job titles and salaries. As a result, retention of trained staff is a problem.

When vacancies occur, it is possible to hire staff with good basic skills, but they often have little experience with Texas A&M administrative systems and procedures, which have become increasingly complex. The long-term trend has been for more and more administration to be done at the department level. As a result, it typically takes between one and two years for newly hired staff to acquire the necessary training and experience. The University’s career ladder works to force administrative staff to change positions in order to receive promotions or appropriate raises. It is poor economic practice to repeatedly spend one to two years training new staff when relatively small raises would serve to keep their experience and expertise within the Department.

Technical Staff

Information Technology (IT) staff and administration have been removed from departments and consolidated in the Dean’s Office of the College of Geosciences, although day-to-day interaction with the IT staff remains in the departments (Table 3.2). The College has assumed management and operations of College and Department web sites. The College is also constructing a server room in the basement of the Eller Building to be used for both administrative and research computing needs. The facilities managed by the IT staff are discussed further in the Facilities section below.
Table 3.2. ATMO Technical Staff in 2009.

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neil Smith</td>
<td>Computer System Manager</td>
</tr>
<tr>
<td>Chris Mouchyn</td>
<td>Microcomputer specialist</td>
</tr>
<tr>
<td>Vacant</td>
<td>Radar engineer/technician</td>
</tr>
</tbody>
</table>

Our previous radar engineer left Texas A&M in 2007; that position remains unfilled and is an important issue for the Department’s future.

The Department uses an online trouble-ticket system to submit and track IT service requests (help requests). Requests can be submitted via e-mail or a web interface. These requests can range from very minor (e.g., replace printer cartridge) to major (e.g., install new hardware or software). Currently, we estimate that about half of all help requests are submitted through the ticketing system. The remainder are submitted over the phone, in person, or via direct e-mail. We are encouraging Department personnel to use the trouble-ticket system rather than informal communication to improve response time and to better track the workload.

In 2008, 1280 help requests were submitted via the trouble-ticket system. The average resolution time was about 6 days, but ranged from 1 minute to 9.5 months. The majority of the workload can be classified as research (graduate student and faculty desktop and server computers), followed by teaching (teaching labs and classroom AV equipment), and then by administration (primarily Department office computers). These statistics suggest that we need to review the IT workload and customer satisfaction, and then consider how we can provide additional IT staff.

3.5 Financial and Academic Summary

Overview

Table 3.3 is a summary of Department personnel, enrollment, and research funding over the last four years. These numbers are from the Fall of 2008, so headcounts, for example, are slightly out of date. In 2005 the Department was part way through the Faculty Reinvestment Program, with 16.5 FTE faculty positions. This has currently grown to approximately 21 FTEs. This year, two faculty members are leaving and there are three new hires, one of whom will be starting in September 2009.

Two Departmental IT staff positions were transferred to the College in 2007. Graduate teaching assistant funding for the Department is allocated by the College using a formula based on number of laboratory sections and students taught. The formula ignores differences in stipend rates across departments. The radar engineering/technician position remains vacant.

Undergraduate and graduate enrollment numbers have been relatively stable, with a slight decline over the last four years in both categories.

Research expenditures have expanded significantly during the period, from approximately $2.6M to $4.2M. Atmospheric Sciences is currently the smallest department in the College of
Geosciences in terms of tenure track FTEs, but the Department generates the largest returned indirect cost.

Table 3.3. Statistical summary of personnel, enrollment, and research activities for the period 2005-2008.

<table>
<thead>
<tr>
<th></th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PERSONNEL (FTEs)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faculty (9 mos.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full Professors</td>
<td>5.5</td>
<td>7.0</td>
<td>6.5</td>
<td>8.5</td>
</tr>
<tr>
<td>Associate Professors</td>
<td>2.0</td>
<td>5.0</td>
<td>6.0</td>
<td>4.0</td>
</tr>
<tr>
<td>Assistant Professors</td>
<td>8.0</td>
<td>7.0</td>
<td>7.0</td>
<td>6.0</td>
</tr>
<tr>
<td>Lecturers</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td><strong>Total Budgeted Faculty</strong></td>
<td>16.5</td>
<td>20.0</td>
<td>20.5</td>
<td>19.5</td>
</tr>
<tr>
<td><strong>Faculty Salaries</strong></td>
<td>$1,187,889</td>
<td>$1,449,838</td>
<td>$1,519,737</td>
<td>$1,519,737</td>
</tr>
<tr>
<td><strong>Staff (12 mos.)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Administration/IT</td>
<td>6.0</td>
<td>7.0</td>
<td>7.0</td>
<td>4.0</td>
</tr>
<tr>
<td>Research</td>
<td>9.0</td>
<td>15.0</td>
<td>15.0</td>
<td>15.0</td>
</tr>
<tr>
<td><strong>Total Budgeted Staff</strong></td>
<td>15.0</td>
<td>22.0</td>
<td>22.0</td>
<td>19.0</td>
</tr>
<tr>
<td><strong>Staff Salaries</strong></td>
<td>$198,931</td>
<td>$233,247</td>
<td>$218,970</td>
<td>$218,970</td>
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<tr>
<td><strong>Graduate Assistants</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teaching Assistants (9 mos.)</td>
<td>6.5</td>
<td>6.5</td>
<td>6.5</td>
<td>6.5</td>
</tr>
<tr>
<td>Research Assistants (12 mos.)</td>
<td>50.0</td>
<td>53.0</td>
<td>53.0</td>
<td>45.0</td>
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<tr>
<td><strong>Total Grad Assistants</strong></td>
<td>56.5</td>
<td>59.5</td>
<td>59.5</td>
<td>51.5</td>
</tr>
<tr>
<td><strong>Total Teaching Asst. Budget</strong></td>
<td>$99,302</td>
<td>88,218</td>
<td>$88,218</td>
<td>$110,048</td>
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<tr>
<td><strong>ACADEMICS</strong></td>
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<tr>
<td>Undergraduate</td>
<td>150</td>
<td>148</td>
<td>144</td>
<td>140</td>
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<tr>
<td>Graduate - M.S.</td>
<td>34</td>
<td>33</td>
<td>34</td>
<td>28</td>
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<tr>
<td>Graduate - Ph.D.</td>
<td>26</td>
<td>26</td>
<td>28</td>
<td>24</td>
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<tr>
<td><strong>Total Majors (Fall 2004)</strong></td>
<td>210</td>
<td>207</td>
<td>206</td>
<td>192</td>
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<tr>
<td>Student Credit Hours (2004)</td>
<td>3,886</td>
<td>4032</td>
<td>4558</td>
<td>4446</td>
</tr>
<tr>
<td>Weighted SCHs*</td>
<td>20,009</td>
<td>19,863</td>
<td>22,374</td>
<td>22,482</td>
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<tr>
<td>U/G lab courses</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>U/G lab sections</td>
<td>24</td>
<td>26</td>
<td>26</td>
<td>28</td>
</tr>
<tr>
<td>Lab course enrollment</td>
<td>513</td>
<td>612</td>
<td>612</td>
<td>653</td>
</tr>
<tr>
<td>GA stipend (M.S.)</td>
<td>$1,600</td>
<td>$1,650</td>
<td>$1,700</td>
<td>$1,750</td>
</tr>
<tr>
<td>GA stipend (Ph.D. pre-qual)</td>
<td>$1,700</td>
<td>$1,750</td>
<td>$1,800</td>
<td>$1,850</td>
</tr>
<tr>
<td>GA stipend (Ph.D. post-qual)</td>
<td>$1,800</td>
<td>$1,900</td>
<td>$1,950</td>
<td>$2,000</td>
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<tr>
<td><strong>RESEARCH</strong></td>
<td></td>
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<td></td>
</tr>
<tr>
<td><strong>Research Accounts</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TAMRF</td>
<td>37</td>
<td>46</td>
<td>54</td>
<td>50</td>
</tr>
<tr>
<td>TEES</td>
<td>22</td>
<td>22</td>
<td>23</td>
<td>11</td>
</tr>
<tr>
<td>TAMU-RS</td>
<td>2</td>
<td>8</td>
<td>22</td>
<td>15</td>
</tr>
<tr>
<td><strong>Total accounts</strong></td>
<td>61</td>
<td>76</td>
<td>99</td>
<td>76</td>
</tr>
</tbody>
</table>
Table 3.3 (Con’t.)

<table>
<thead>
<tr>
<th>Research expenditures</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>TAMRF</td>
<td>$2,154,292</td>
<td>$2,947,096</td>
<td>$3,271,539</td>
<td>$3,607,216</td>
</tr>
<tr>
<td>TEES</td>
<td>$352,079</td>
<td>$305,271</td>
<td>$182,406</td>
<td>$109,094</td>
</tr>
<tr>
<td>TAMU-RS</td>
<td>$64,783</td>
<td>$364,230</td>
<td>$780,824</td>
<td>$461,767</td>
</tr>
<tr>
<td>Total Research Expenditures $2,571,154 $3,616,597 $4,234,769 $4,178,078</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Research Per Faculty FTE</td>
<td>$155,828</td>
<td>$180,830</td>
<td>$206,574</td>
<td>$214,260</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indirect Cost Return to Dept.</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>TAMRF</td>
<td>$130,587</td>
<td>$155,228</td>
<td>$196,165</td>
<td>$233,721</td>
</tr>
<tr>
<td>TEES</td>
<td>$6,361</td>
<td>$645</td>
<td>$645</td>
<td>$128</td>
</tr>
<tr>
<td>Total ICR</td>
<td>$136,949</td>
<td>$155,873</td>
<td>$196,810</td>
<td>$233,849</td>
</tr>
</tbody>
</table>

* Weighted student credit hours are the result of a state-mandated weighting formula that is used to determine state funding for institutions of higher education. It weights student credit hours in technical courses, upper-level undergraduate courses, and graduate courses more heavily than other courses.

**Operations Budget**

Within the last decade, there were periods when the Department’s operations budget could barely cover routine expenses; however, in recent years the financial condition of the Department has substantially improved. For many years the budget depended on indirect cost return (ICR) and salary contributions from faculty. Salary contributions from senior faculty were particularly important to help fund start-up costs for new faculty hired under the Faculty Reinvestment Program. Some details of the Department budget will be discussed in more detail below.

**Research Funding and Administration**

The Department currently has a diverse and well-funded research program. A list of research contracts awarded during the last four years is included in Appendix E.

Texas A&M has multiple agencies and offices that administer research grants and contracts. The majority of ATMO projects are administered by the Texas A&M Research Foundation (TAMRF). The Research Foundation is a non-profit corporation created in 1944 specifically to manage externally-funded research at TAMU. The Research Foundation also provides research administration services for some other universities within the Texas A&M University System.

Additionally, there are independently funded state research agencies attached to the Colleges of Agriculture and Engineering: Texas AgriLife Research (known by its former acronym, TAES) and the Texas Engineering Experiment Station (TEES). When acting as the lead-PI on a grant or contract, faculty in the Colleges of Agriculture and Engineering are generally required to have their projects managed by their local agency.

Finally, the University has an internal Office Research Services (TAMU-RS). This office generally manages grant and contract funds from the State of Texas and other sources that pay less than the standard University indirect cost rate of 46.5%.
Because of the variety of funding sources and collaborations by ATMO faculty, the Department ultimately deals with all four project management offices (TAMRF, TAES, TEES, and TAMU-RS). This places a burden on office staff because the different project management offices have variable policies and procedures and use dissimilar software systems to administer contracts. Attempts to consolidate research administration at the Texas A&M University System level have met with strong resistance from various groups accustomed to dealing with their local agency or office. Within ATMO, researchers tend to prefer to work with the Research Foundation because of their higher level of service, both at the proposal preparation stage and during project administration.

The various research management agencies at Texas A&M pass portions of the generated indirect cost funds to the colleges. Within the College of Geosciences, the funds received are divided so that $\frac{2}{7}$ths are retained at the College level and $\frac{5}{7}$ths are passed to the departments, in proportion to the funds generated by each department. Within ATMO, division of the returned indirect cost funds between the Department and individual PIs is decided each year by the faculty based upon estimated Department needs. This year (2008-09), ICR funds were divided 50/50 between the Department and PIs. During the previous year, the Department retained $\frac{2}{3}$rds of ICR funds to help pay for furniture and student office remodeling.

Indirect cost return formulas have been changed in recent years so that they are based on a percentage of direct costs, rather than a percentage of indirect costs. This has caused problems for grants with low indirect cost return rates, such as those involving primarily students or equipment. The University is still working out an equitable system for this kind of grant.

### 3.6 Facilities

#### The Eller Oceanography and Meteorology Building

The Eller Oceanography and Meteorology Building is a 15-story, 11,500 square meter facility built between 1970 and 1973. The building houses the Departments of Oceanography, Atmospheric Sciences, and Geography, as well as offices for the Dean of the College of Geosciences. Geography also has space in an adjacent building. Atmospheric Sciences occupies most of floors 10 through 12 and about one third of the 9th floor. Atmospheric Sciences and Oceanography share space on the 12th floor for department offices.

#### Classrooms and Student Computing Labs

Most ATMO classes are now taught on the lowest two floors of the Eller Building, with a handful of classes taught in other buildings around campus. Most classrooms offer typical modern instructional technology, including overhead projectors, DVD players, and computer and internet access. A few classrooms have interactive drawing/note-taking tools and document cameras. The larger lecture halls have personal/audience response (or clicker) systems for evaluating student comprehension. The College also offers one TTVN classroom for videoconferencing and distance teaching.
The Department houses two student computer laboratories that are used for undergraduate and graduate classes. The laboratories have 20 and 25 computers, respectively, along with ceiling-mounted computer projectors and at least one printer. One of the two labs features relatively new 2.4 GHz dual-core iMac systems; the other is a bit dated by comparison but is scheduled for hardware upgrades within the next year. The lab computers are networked to a 500 GB file server.

**Computational Resources**

Most research groups in the Department maintain a number of desktop computers and workstations. Several groups have rack-mounted computer servers and RAID storage, with a few maintaining high-performance clusters. All systems are compatibly networked. Network equipment and wiring are installed and managed by University Computing and Information Services (CIS). There are one-time charges to install network jacks. Campus network speed and capacity typically lag behind commercially available standards. Only part of the Eller Building has gigabit Ethernet, and some research groups have set up their own private networks for high-performance clusters. The Department also has a common-use file server with 12 TB of disk space.

At least one common-use network printer is available on every floor, along with one poster printer courtesy of Professor Orville's group. Copiers on the 10th and 12th floors double as scanners and printers.

The Department's workstations and server racks are scattered about the Department, most notably in room 1016. Unfortunately, most of the rooms used for this purpose are unequipped to handle the power and cooling requirements. Room 1016, in particular, often overheats. In part to address this problem, the College has constructed a new 100 square meter server room (or data center) in the basement of the Eller Building. The new facility has dedicated cooling, power distribution, and uninterruptable power supplies. Faculty will pay a one-time installation charge to install computer resources in the facility. The server room is expected to handle the growth in College computing resources for at least the next five to ten years.

In addition to the Department and College resources, faculty members also have free access to the TAMU Supercomputing Center. This facility has a 48 node (768 cpu) IBM p575+ cluster with 1.5 TB of memory and 20 TB of disk space, as well as a 128 cpu shared memory SGI Altix with 256 GB of memory and 10 TB of disk space. In exchange for a financial contribution to purchase the IBM p575, the College of Geosciences has priority access to two nodes (32 cpus). The Supercomputing Center is currently planning expansion of its resources to include a Linux cluster that may have as many as 5000 cpus, with at least 2 GB of memory per cpu. In addition to these hardware resources, the Center offers training sessions to faculty and students on machine use, programming techniques, and use of scientific software. Staff members at the Center are available for individual consultation (again at no expense) on matters of code debugging and optimization.

*Aggie Doppler Radar (ADRAD)*
The Department houses the Aggie Doppler Radar (ADRAD) on the roof of the Eller Building. ADRAD is an S-band (10-cm) radar that regularly obtains quantitative full volume data within 150 km of campus and surveillance data out to 250 km from campus. ADRAD is primarily a teaching tool, but it is also used for limited research purposes.

Each fall, approximately 20 undergraduates take a senior-level radar meteorology course that relies heavily on ADRAD for hands-on lab activities. Graduate radar courses using ADRAD are offered occasionally as well. ADRAD has also played a central role in Professor Schumacher's NSF CAREER grant, which each spring involves 30 undergraduates to semi-operationally run the radar. Two graduate students are supported by the grant, one of whom is actively using ADRAD data in his research. There are two more years left in the project with strong potential for follow-on studies. ADRAD is unique in that no other undergraduate program in the country has access to an S-band radar on campus.

Texas A&M has a long history of work in radar meteorology, but the ADRAD radar dates from construction of the Eller Building in the early 1970s. The radar underwent upgrades in 1992 and 1997, but it is no longer state-of-the-art. Its use as a research facility is limited by the size of the dish (which determines beamwidth), and its fixed location on the roof of the building. At present, only one faculty member (Professor Schumacher) is using the ADRAD radar as a research tool, and over the years, very few research papers have been written using data from the ADRAD radar. Routine maintenance costs are shared between the Department and Dr. Schumacher’s NSF CAREER grant; they currently amount to about $20k/year. Because there is little research use of the radar, it generates little revenue, either through direct research expense (such as an hourly operations charge) or through returned indirect costs. The Department does not have a reserve fund to handle large expenses that will result when the radar needs major repairs, such as to the transmitter or dish. Each year, the Department and Dr. Schumacher together invest substantial resources (both time and money) in an expensive facility that is currently used to teach one undergraduate course and support one research project. It does not appear that a large investment to modernize the radar would be worthwhile due to factors mentioned above. It is likely that the Department will face a decision about what to do with the radar within the next few years or when a major failure occurs.

Broadcast Studio

A number of our undergraduate majors are interested in broadcast meteorology, and as part of 12th-floor renovations, a portion of the radar operations room was set aside for broadcast practice space. The Department offers a broadcast meteorology class every spring that is taught by a professional broadcaster. The class currently uses studios at the University's PBS station, KAMU, but our students do not have regular access to KAMU to practice or make demo tapes. At the end of 2008, we were successful in obtaining a matching grant of $14,000 from the University Classroom Instructional Technology Fund (an additional $2500 and $5300 were provided by the College of Geosciences and by the Department, respectively) for needed broadcast equipment, and the studio should be operational during the Spring of 2009.

SMART-R Program
Texas A&M is also part of the Shared Mobile Atmospheric Research & Teaching Radar (SMART-R) program. The SMART-R program was originally a coalition between TAMU, Texas Tech University (TTU), the University of Oklahoma (OU), and the National Severe Storms Laboratory (NSSL). The coalition maintained two research-quality, truck-mounted C-band (5-cm) Doppler radars that can be used to study convective and mesoscale atmospheric processes. We are in the process of negotiating a new five-year Memorandum of Agreement covering operation of one of the radars. TTU and NSSL will not be a part of the new agreement. The other radar will be taken out of the coalition to be upgraded to dual-polarimetric capability by OU and NSSL. TAMU will have full access to the remaining radar, and parts belonging to TAMU from the other radar will be returned for use as spare parts for the remaining radar or in future radar projects. SMART-R operating costs are paid through usage fees charged to grants, while annual insurance costs are paid by the coalition member institutions.

*The Houston LDAR Network*

The Houston lightning detection and ranging (LDAR) network is an installation of twelve geographically dispersed lightning sensors established by cooperative effort between the National Science Foundation, Vaisala Corporation, and the Department of Atmospheric Sciences. The network began in 2005 and represents a cumulative investment of approximately $1.2 million. Installation and ongoing maintenance of the network are provided by graduate students in Atmospheric Sciences under the direction of Professor Orville.

Each sensor site consists of an array of antennas, a Global Positioning System (GPS) receiver, a GPS-based timing circuit, digital signal processing equipment, and a means to both transmit and store acquired data. When a lightning flash occurs, each sensor records the precise time (within several nanoseconds) when the signal reaches the antenna array and then sends data via the internet to a central server in College Station. Based on arrival times of the signal for each site, it is possible to determine the latitude, longitude, and altitude of the associated lightning channel. This information is ultimately displayed graphically, allowing the user to view the lightning channel in three dimensions.

The LDAR network provides TAMU researchers with a unique opportunity to study lightning characteristics in ways that were not previously possible in southeast Texas. More information on the network is available at:

http://www.met.tamu.edu/ciams/ldar/index.html

*Chemistry Laboratories and Field Sites*

The Department houses four major (greater than 100 square meters each) atmospheric chemistry laboratories. Two of these labs were added in 2005 and 2006 as part of major renovations to the Eller Building (see Eller Building above). The new labs are located on the 11th floor and are currently occupied by Professors Brooks and Schade. An additional laboratory on the 11th floor is occupied by Professor Zhang, while Professor Collins has a lab on the 10th floor.
Standard equipment in the labs includes fixed and movable work benches, fume hoods, high-purity water systems, distributed vacuum systems, de-ionized water and compressed air and gas connections, and secure hook-ups for gas cylinders. Professor Collins’ lab also has an optics table and a window inlet for sampling ambient air. Professor Schade’s lab features an additional fixed chemistry bench intended for future teaching purposes.

The four labs feature a wide range of specialty equipment, mostly acquired by the individual research groups. Examples include several chemical ionization mass spectrometers and a proton transfer reaction mass spectrometer (Professor Zhang’s group), several Fourier Transform Infrared Spectrometers equipped with attenuated total reflection, a Raman microscope (Professor Brooks’ lab), a number of tandem differential mobility analyzers, and gas chromatographs. Professor Brooks’ lab has a unique cloud and aerosol spectrometer with polarization built specifically for the lab. Most of the groups have specialized equipment developed in-house as well. This is particularly true of Professor Collins’ lab, which houses several one-of-a-kind instruments for studying aerosols.

Instruments in these labs have been used to study a wide range of problems, including gaseous photochemical oxidation of hydrocarbons; ice nucleation; the optical properties of non-spherical particles and ice crystals; and the nucleation, growth, and transformation of aerosols.

In addition to the laboratories, Professor Schade’s group maintains a micrometeorological field installation that measures trace gas fluxes in the turbulent boundary layer. The equipment is mounted on a 91 m communications tower near downtown Houston.
Chapter 4 - Centers and Affiliations within Texas A&M University

4.1 Office of the State Climatologist

In the 1950s the U.S. Weather Bureau (now the National Weather Service) instituted the concept of State Climatologists (SCs). Generally, there was one SC per state who was responsible for preparing relevant publications, quality-controlling data, and acting as an interface with state agencies and the general public. The office of Texas SC was held in succession by Richard D. W. Blood, Hoye S. Dunham, and Robert B. Orton. In early 1973 the SC positions were abruptly eliminated as the NWS de-emphasized climate services.

In the early 1970s, Professor John Griffiths worked very closely with Robert Orton. Because of his interest, training, and experience in climatology, it was suggested that he assume the SC duties. This suggestion was met with enthusiastic support from the TAMU President, Dr. Jack K. Williams, and the Dean of Geosciences, Dr. Earl Cook. This arrangement was approved in late February 1973 by the National Oceanic and Atmospheric Administration (NOAA) and its relevant component, the National Climatic Center (now the National Climatic Data Center, or NCDC), and by the Office of the Governor of Texas, Dolph Briscoe. Two points stressed were that Texas A&M University was established as a Land Grant institution to serve the State, and that the Office of the State Climatologist (OSC, http://atmo.tamu.edu/osc/) could continue this tradition of service and practical assistance. Following the retirement of John Griffiths in 1999, John Nielsen-Gammon was appointed as his successor by Gov. George W. Bush in 2000.

For about 15 years, the OSC was supported solely by the College of Geosciences and the then-Department of Meteorology, which funded a 12-month graduate assistant position and occasionally gave small grants to obtain data and vital equipment. In 1988, with much support from the then-Vice President for Academic Affairs, Dr. Gordon Eaton, the Office of University Research Services initiated a small annual grant to supplement the graduate assistant position. This annual funding, later from the Office of the Vice President for Research, continued until 2006. Additional occasional support for sponsored projects has come from state and federal agencies, such as the Texas Commission on Environmental Quality, the Texas Water Development Board, and NOAA.

Over the years, the OSC has published five components of the Agroclimatic Atlas of Texas; four monographs that cover the weather of Texas from 1834 to 1989; ongoing, regular monthly and annual weather summaries for Texas that are posted online at http://atmo.tamu.edu/osc; a monograph on historic Texas weather events; a chapter on weather and climate for the Texas “Master Naturalist” curriculum; and a chapter on changing Texas climate for a book on the impact of global warming in Texas. Recent research has focused on historical climate data, causes of summertime droughts, and air pollution climatology. The State Climatologist is a designated member of the Texas Drought Preparedness Council and participates in drought assessment for the US Drought Monitor. The OSC provides weather and climate expertise to state agencies, the Texas Legislature, Texas industry, researchers, students, and the general public.
The Department does not presently include an applied climatologist, and the current State Climatologist wishes to step down from this position soon. A suitable replacement may reside in the Department of Geography (see section 4.5), but the loss of this position from ATM would need to be carefully considered. The establishment of a stable source of funding from the University and from state agencies would make this position more attractive and the office more effective.

### 4.2 Center for Atmospheric Chemistry and the Environment

The Center for Atmospheric Chemistry and Environment (CACE, [http://cace.tamu.edu/](http://cace.tamu.edu/)) was established by the Board of Regents of Texas A&M University in 2003, under the auspices of the Vice President for Research (VPR). Professor Renyi Zhang is currently serving as Director of CACE.

One of the most important objectives of the CACE is to provide the highest quality information based on laboratory, field, and calculation relevant to sustaining our environment and maintaining air quality. The latter is particularly concerned with the ability to accurately predict the formation, transportation, and mitigation of air pollution from the molecular to regional scale using state-of-the-art modeling capabilities, and to predict air pollution’s effect on climate. A most important purpose for CACE at Texas A&M University is to develop the expertise and infrastructure necessary to achieve such objectives so that policy makers can be provided with the best quality information in order to make the most informed policy decisions for solving pressing societal issues at local, national, and global levels. CACE members have been assembled from participating faculty in the Colleges of Engineering, Science, Geosciences, and from the Institute of Science, Technology and Public Policy, The Bush School, with associate membership from faculty in the Colleges of Liberal Arts, Architecture, and other units of the University. The Center, by nature of its participant membership, has been multidisciplinary from the start. It provides a positive contribution to solving societal problems associated with atmospheric pollution and the environment. CACE has improved its infrastructure and enhanced its capabilities, through collaborations with universities, industrial interactions, and the participation of other institutions. During the first three years following its establishment (2004-2007), funded research projects through CACE exceeded $3 million.

CACE has an external advisory committee with the following members:

- Dr. Robert Harris, President of Houston Advanced Research Center (HARC)
- Dr. Peter H. McMurry, Head, Department of Mechanical Engineering, University of Minnesota
- Dr. A.R. Ravishankara, Director, Chemical Sciences Division, Earth System Research Laboratory, NOAA, R/CSD, member of National Academy of Science (NAS)

Currently, the total budget of the center on an annual basis is $55,000 as follows:

1. Graduate Student Recruitments
   - Undergraduate Summer Research Programs: $20,000/yr
   - To bring in five students for a period of 10 weeks to work on CACE-related projects.
   - Contribution from individual PIs will be 50%
(2) Visit by External Committee
   Travel expenses for visits by external advisory committee members: $10,000/yr
(3) Administrative Assistant
   Support for an administrative assistant: $10,000/yr
(4) CACE Symposium and Colloquium
   CACE Symposium: $10,000/yr
   Two plenary speakers each year
   CACE colloquium: $5000/yr
   One colloquium speaker each year

The VPR and various college contributions to the center are:

| Office of the Vice President for Research: | $27500/yr |
| Dean, College of Science: | $9166/yr |
| Dean, College of Geosciences: | $9166/yr |
| Dean, College of Engineering: | $9166/yr |
| **Total:** | **$55000/yr** |

The Bush School Institute for Science, Technology, and Public Policy (ISTPP) will provide an in-kind effort, such as grant administration support for CACE proposals or other appropriate activities.

Below is a list of CACE participating faculty members:

**College of Science**
John W. Bevan, Chemistry
George W. Kattawar, Physics
Robert R. Lucchese, Chemistry
Simon W. North, Chemistry
Joseph H. Newton, Statistics

**College of Geosciences**
Kenneth P. Bowman, Atmospheric Sciences
Sarah D. Brooks, Atmospheric Sciences
Luis Cifuentes, Oceanography
Don Collins, Atmospheric Sciences
Andrew Dessler, Atmospheric Sciences
Shari Yvon-Lewis, Oceanography
John W. Nielsen-Gammon, Atmospheric Sciences
Gerald R. North, Atmospheric Sciences
Richard Orville, Atmospheric Sciences
Gunnar W. Schade, Atmospheric Sciences
Renyi Zhang, Atmospheric Sciences

**College of Engineering**
Tony Cahill, Civil Engineering
4.3 Cooperative Institute for Applied Meteorological Studies (CIAMS)

CIAMS (http://atmo.tamu.edu/ciams/) is affiliated with the Fort Worth-based headquarters office of the Southern Region of the National Weather Service. The Institute employs research scientists and graduate students in a broad program of applied research and service to Texas and surrounding states in agricultural meteorology; marine meteorology and air-sea interactions over the Gulf of Mexico; lightning and severe weather; and Doppler radar studies from the installations in the Texas A&M Department of Atmospheric Sciences and at the Houston Weather Forecast Office.

4.4 Department of Oceanography

Contributed by Piers Chapman, Head, Department of Oceanography

From the early 1950s until 1966, when ATMO was founded as a separate department within the College of Geosciences, the Oceanography Department (http://ocean.tamu.edu/) housed all research and teaching activities for both oceanography and atmospheric sciences at TAMU. This history naturally led to a large degree of collaboration and cooperation between the two departments over the last 40 years, and the relationship remains close and cordial.

Historically, the strongest research connections have been in the areas of climate and atmosphere-ocean dynamics. More recently, new collaborations have developed in chemistry. Both departments currently provide faculty members to the Center for Atmospheric Chemistry and the Environment (CACE), which also has members from the Departments of Chemistry, Civil Engineering, Nuclear Engineering, Statistics, Physics, and the Bush School of Government. There are multiple grants in both scientific research and education, with co-PIs from Oceanography and Atmospheric Sciences. We are presently scheduling outside seminar speakers to come to the campus who will appeal to members of both departments.

The departments collaborate on teaching in many ways. Atmospheric Sciences’ undergraduates take a course in physical oceanography taught by the Department of Oceanography, and both departments participate in the Environmental Programs in Geosciences by providing advisors and teaching courses. At the graduate level, students frequently take courses from the other department, and it is very common to have M.S. and Ph.D. committees with members from both. Graduate student committees, in particular, have proven to be an important channel for communication between the departments. Five Oceanography faculty members presently serve
on 11 different Atmospheric Sciences graduate student committees, while eight Atmospheric Sciences faculty serve on 11 different Oceanography graduate student committees. Although administrative barriers to collaboration between faculty members are few, formal joint appointments help maintain the strong relationship between the two departments. Distinguished Professors Gerald North and Robert Duce have held joint appointments since their arrivals at TAMU in 1986 and 1991, respectively. Recently, Ping Chang from Oceanography was also appointed to the faculty in Atmospheric Sciences. In all three cases, salary and teaching loads reside 100 percent in the primary department. Such appointments serve to recognize close and ongoing collaboration and to simplify administrative processes for research grants and graduate student supervision. There are currently no appointments with faculty salary and teaching split between the two departments, although there have been in the past. Both departments prefer that untenured faculty not have split appointments, as this only complicates the tenure process and potentially makes life more difficult for the untenured faculty member.

Mentoring is another area where the two departments interact. A faculty member from ATMO is mentoring a junior faculty member in OCNG as she prepares for tenure and promotion. This is not expected to be a major area of interaction, but still serves to bring the two departments closer together.

### 4.5 Department of Geography

*Contributed by Doug Sherman, Head, Department of Geography*

The Department of Geography has been forging closer ties with the Department of Atmospheric Sciences as a result of a mutual decision, in 2004, to support development of a climatology program in geography. The first tangible step in this process was the hiring of Dr. Steven Quiring as an Assistant Professor in September 2005. His interactions with ATMO include participation on faculty search committees and graduate student committees. ATMO faculty members have served on committees for Dr. Quiring’s graduate students. He has collaborated on research projects with John-Nielsen Gammon, and is assisting the State Climatologist’s Office. In January 2008 Dr. Brendan Roark joined the Department as an Assistant Professor with expertise in paleoclimate reconstruction. His interactions have primarily been with the Integrated Ocean Drilling Program, but he shares research interests with several ATMO faculty. At present, Geography is searching for an Assistant Professor with research interests in land-atmosphere interactions and hydroclimatology. Interviews are underway, and ATMO’s Dr. Robert Korty serves on that search committee.

The Department of Geography offers several climate-related courses: two undergraduate courses, GEOG 324 - Global Climate Regions and GEOG 443 - Past Climates; and two graduate courses, GEOG 689 - Applied Climatology, and GEOG 643 (proposed) - Past Climates (to be co-taught with GEOG 443). The Geography Department intends to develop additional undergraduate and graduate courses, in consultation with ATMO, to capitalize upon interests of our climate-oriented faculty.
4.6 Environmental Programs in Geosciences

Contributed by Andrew Millington, Director, Environmental Programs

One of the more successful educational efforts in the College of Geosciences has been the establishment of degrees in Environmental Geosciences (ENGS) and Environmental Studies (ENST). These are jointly administered by an environmental faculty drawn from the four Geoscience departments, with a Director appointed by the Dean. They operate under the title “Environmental Programs in Geosciences.” The Programs have a separate academic advisor who works in collaboration with advisors in the other departments. At the onset of the Spring 2009 semester, these programs have 70 and 58 majors, respectively, and present another teaching opportunity for ATMO. ATMO faculty serve on the Program’s advisory committee (currently Dr. Don Collins), and also serve as faculty advisors for ENST undergraduates (currently Drs. Collins, Schumacher, and Brooks).

Our Department has created two new courses for the program. The first, GEOS 444 - The Science and Politics of Climate Change, is an upper-level course requirement for ENGS majors in the climate track and an environmental policy elective for ENST majors. This class has been taught three times with enrollments of 12, 11, and 18. ATMO has also introduced a lower level climate change course in this degree, GEOS 210 - Climate Change. This will become a core course in the climate-change track under revisions to the ENGS degree proposed for the next academic year. It is hoped this degree will attract majors to the College from elsewhere in the University, and that they will be encouraged to enroll as ATMO, ENGS, or ENST majors. In addition, ATMO faculties have also taught GEOS existing classes, such as GEOS 105 in the past. Dr. Brooks is revising the introductory course – GEOS 105 – and is scheduled to teach it this coming fall. We expect to enter into the teaching rotation for GEOS 410 - Global Change, at some point in the future. ATMO faculties have also been very active in revising the ENGS degree. Dr. Dessler led the revision of the climate change track, and Dr. Nielsen-Gammon did the same for the water track.

4.7 Department of Chemistry

Professor Renyi Zhang has held a joint appointment with the Department of Chemistry (http://www.chem.tamu.edu/) since 2007. Presently, he chairs one graduate committee in Chemistry. The student will complete all course work and obtain a degree in Chemistry, but take ATMO 691 directed research study.

4.8 Department of Mathematics

Dr. Lee Panetta has a joint appointment in the Department of Mathematics (http://math.tamu.edu/). He collaborates with faculty in that department in areas (functional analysis and partial differential equations) related to research on the theory of long-time integrations of geophysical models, as well as in the area of numerical methods for radiative scattering calculations. The collaborative work involves both theory and numerical simulation. He has taught two courses in the Department of Mathematics at the graduate level on aspects of geophysical fluid dynamics, and he regularly participates in two departmental seminars.
(numerical analysis and applied mathematics). He has co-advised one Ph.D. student in the Mathematics Department, and has been a member of five other Ph.D committees, and a member of a smaller number of M.S. committees.

4.9 Department of Physics

Dr. Ping Yang has established close research collaborations with the Department of Physics (http://www.physics.tamu.edu/) in Applied Physics, particularly in the areas of light scattering, radiative transfer, and remote sensing of the atmosphere and oceans. A total of 35 of Dr. Yang’s 143 peer-reviewed papers were co-authored with faculty and graduate students in the Department of Physics. Dr. Yang’s research group has weekly group meetings with members of the Department of Physics. A Joint appointment for Dr. Yang in the Department of Physics is currently under review but has not received final approval at this time. Dr. Yang co-advised two Ph.D. dissertations in Applied Physics and is currently serving as a co-chair on two thesis committees in the Department of Physics.

4.10 Department of Statistics

The Atmospheric Sciences department maintains an active collaborative research program with the Statistics Department in the College of Science. Dr. Gerald North, who has made significant research contributions to the application of statistical concepts to climate data analysis, initiated this collaboration. Over the past four years, this collaboration has expanded to include several other faculty members, as well their graduate students. In Fall 2006, we were awarded an NSF Collaborations in Mathematics Geosciences (CMG) grant to study the application of non-Gaussian methods to climate data analysis. The PIs for the grant were Drs. Bowman, Saravanan, and F. Zhang (now at Penn State) from Atmospheric Sciences, and Drs. Marc Genton, Bani Mallick, and Mikyoung Jun of the Statistics department. As part of this NSF-sponsored research, we hold joint bi-weekly research meetings, alternating between the two departments. Several joint research projects are in progress, covering topics such as statistical modeling of precipitation variability, statistical El Niño forecasting, and paleoclimatic data analysis. Drs. Bowman and Saravanan serve on the Ph. D. committees of two students from the Statistics department involved in this project. During Spring 2007, a reading course entitled "Advanced Statistical Methods in Geosciences" was offered jointly by the Atmospheric Science and Statistics departments, with Drs. Saravanan and Jun serving as co-instructors. The course served to facilitate interaction between atmospheric scientists and statisticians and led to discussions of many research topics of common interest.

4.11 Supercomputing Center

The Texas A&M Supercomputing Center (http://sc.tamu.edu/) provides advanced computing resources and support to Texas A&M faculty and students engaged in all aspects of large-scale computation. Specifications for the current and planned supercomputers are given above in the Facilities section.

Dr. Lee Panetta is the current Chairman of the Faculty Steering Committee for the Supercomputer Facility at Texas A&M. This committee reports through the Vice President for Information Technology to the Provost of the University. It sets policies regarding access to the
resources of the Facility, makes recommendations regarding improvement and upgrades of those resources, reviews major requests by faculty and students for allocations of computational resources, organizes user meetings, and plans for major infrastructure acquisitions.
Chapter 5 - Undergraduate Program

5.1 Program Goals

The Department of Atmospheric Sciences offers the B.S. degree in Meteorology. Most who receive the degree intend to follow one of four different career paths: forecasting (with either the National Weather Service or a private company), broadcast meteorology, graduate school in atmospheric sciences, and the emerging field of air quality. A fraction of our students leave the field of atmospheric sciences entirely, in which case we believe that the general science education that they receive here will serve them well. In the past we have not made a strong attempt to track our students after graduation. As part of an ongoing assessment effort under the University’s accreditation process, we are putting in place new mechanisms to evaluate the success of our program and to better understand both students’ goals and their paths after leaving Texas A&M.

Our undergraduate curriculum is designed to train students for the four broad career paths listed above. The varying requirements of the different paths can create some tension in curricula design; therefore, we offer students a range of upper-level electives so that they can tailor course selections according to their personal career goals. Students who wish to work for the National Weather Service, for example, should choose technical electives that will fulfill the U.S. Civil Service employment requirements for meteorologists.

5.2 Program for Meteorology Majors

Degree requirements for the B.S. degree, as listed in the Undergraduate Catalog, are displayed in Table 5.1. Course descriptions of all ATMO undergraduate courses in the current course inventory, again as displayed in the Catalog, are provided in Appendix A1.

The curriculum includes five semesters of math (calculus, differential equations, and topics in applied math), two semesters of physics (mechanics, and electricity and optics), and two semesters of introductory chemistry with accompanying labs. Required ATMO classes include an introductory atmospheric sciences class, weather analysis labs, thermodynamics, climatology, atmospheric dynamics, introduction to atmospheric chemistry and air pollution, physical meteorology, and an instrumentation or remote sensing course. In addition, 15 hours of electives are also required, which can include severe weather and mesoscale forecasting, dynamic and synoptic meteorology, satellite meteorology and remote sensing, radar meteorology, numerical weather prediction, practical weather forecasting, tropical meteorology, broadcast meteorology, air pollution meteorology, and the science and politics of climate change. The degree also has University core curriculum (distribution) requirements, such as English, communications, visual and performing arts, citizenship, social science, and kinesiology.

Our program is currently one of the largest in the United States. In terms of enrollment, it probably ranks third behind Penn State and the University of Oklahoma. Enrollment numbers are listed in Table 5.2. Total enrollment shows some variability, but has generally remained stable over the last few years at around 140-150 students. Most of this variation is in the number of freshmen; the number of students graduating shows less variation.
Table 5.1 B.S. Degree Requirements 2007-2008 Undergraduate Catalog.

### FRESHMAN YEAR

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<th>First Semester</th>
<th>Th-Pr</th>
<th>Credit</th>
<th>Second Semester</th>
<th>Th-Pr</th>
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<td>3</td>
<td>CHEM 102 - Fund. of Chemistry II</td>
<td>(3-0)</td>
<td>3</td>
</tr>
<tr>
<td>ATMO 203 - Wea. Forecast. Lab</td>
<td>(0-1)</td>
<td>1</td>
<td>CHEM 112 - Fund. Chem. II Lab</td>
<td>(0-3)</td>
<td>1</td>
</tr>
<tr>
<td>CHEM 101 - Fund. Of Chemistry I</td>
<td>(3-0)</td>
<td>3</td>
<td>MATH 172 - Calculus</td>
<td>(4-0)</td>
<td>5</td>
</tr>
<tr>
<td>CHEM 111 - Fund. Of Chem. I Lab</td>
<td>(0-3)</td>
<td>1</td>
<td>PHYS 218 - Mechanics</td>
<td>(3-3)</td>
<td>5</td>
</tr>
<tr>
<td>Engl 104 Comp. and Rhetoric</td>
<td>(3-0)</td>
<td>3</td>
<td>US History elective *</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>MATH 171 Anal. Geom. &amp; Calc.</td>
<td>(4-0)</td>
<td>4</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>15</td>
<td>15</td>
<td></td>
<td></td>
<td>15</td>
</tr>
</tbody>
</table>

### SOPHMORE YEAR

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Th-Pr</th>
<th>Credit</th>
<th>Second Semester</th>
<th>Th-Pr</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATMO 251 - Wea. Obs. &amp; Anal.</td>
<td>(2-2)</td>
<td>3</td>
<td>ATMO 335 - Atmos. Thermodyn.</td>
<td>(3-0)</td>
<td>3</td>
</tr>
<tr>
<td>ATMO 363 - Atmos. Chemistry</td>
<td>(3-0)</td>
<td>3</td>
<td>MATH 308 - Differential Equa.</td>
<td>(3-0)</td>
<td>3</td>
</tr>
<tr>
<td>MATH 251 - Engin. Math. III</td>
<td>(3-0)</td>
<td>3</td>
<td>Computer Science elective ^</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>PHYS 208 - Electricity &amp;Optics</td>
<td>(3-3)</td>
<td>4</td>
<td>US Hist. or Pol. Sci. elective ^</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>US Hist. or Pol. Sci. elective</td>
<td>3</td>
<td>3</td>
<td>KINE 198 - Health &amp; Fitness</td>
<td>(0-2)</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>16</td>
<td>13</td>
<td></td>
<td></td>
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</tr>
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### JUNIOR YEAR

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Th-Pr</th>
<th>Credit</th>
<th>Second Semester</th>
<th>Th-Pr</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATMO 324 - Phys. &amp; Regional Climatology</td>
<td>(2-2)</td>
<td>3</td>
<td>ATMO 336 - Atmos. Dynamics</td>
<td>(3-2)</td>
<td>4</td>
</tr>
<tr>
<td>MATH 311 - Topics App. Math. I</td>
<td>(3-0)</td>
<td>3</td>
<td>Atmos. Sci. or tech. electives</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>STAT 211 - Principles of Stat. I</td>
<td>(3-0)</td>
<td>3</td>
<td>Communication elective ^</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Life Sciences elective ^</td>
<td>3</td>
<td>3</td>
<td>Humanities elective ^</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>General elective ^</td>
<td>3</td>
<td>3</td>
<td>US History/ Pol. Sci. elective ^</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>KINE 199 - Req. Phys. Activity</td>
<td>(0-2)</td>
<td>1</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>16</td>
<td>16</td>
<td></td>
<td></td>
<td>16</td>
</tr>
</tbody>
</table>

### SENIOR YEAR

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Th-Pr</th>
<th>Credit</th>
<th>Second Semester</th>
<th>Th-Pr</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atom 446 - Phys. Meteorology 2</td>
<td>(3-0)</td>
<td>3</td>
<td>Atmos. Sci. or tech. electives</td>
<td></td>
<td>12</td>
</tr>
<tr>
<td>ATMO - Inst/Rem. Sensing elec^</td>
<td>2</td>
<td>2</td>
<td>General electives ^</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>General elective ^</td>
<td>3</td>
<td>3</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Social &amp; behave. Sci. elective ^</td>
<td>3</td>
<td>3</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Visual &amp; performing arts elec. ^</td>
<td>3</td>
<td>3</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>14</td>
<td>15</td>
<td></td>
<td></td>
<td>15</td>
</tr>
</tbody>
</table>

**TOTAL HOURS = 120**

**Notes:**
1. A grade of C or better is in MATH 171, 172, 251, and 308 (or equivalent).
2. Course work to be selected from the University Core Curriculum.
3. ATMO 321 recommended; CPSC 203, 206 also acceptable.
4. Select from AGRO 301; BESC 201; BIOL 101, 107, 113; FRSC 302.
5. Select in consultation with faculty academic advisor.
6. Select from ATMO 441 or ATMO 489 Radar Meteorology.
7. General electives MAY NOT include BUAD100; CAEN 101-499; CAEX 101-499; DEV 101-499; ENGL 100, 103; KINE 1980199; LBAR 201; MATH 102-103, 131, 151-142, 150-152, 166, 171-172, 221, 253; PHYS 101, 201-202, 208, 218-219; AERS 100-499; MLSC 100-499; NVSC 100-499; SOOMS 100-499.
Table 5.2. Undergraduate enrollment in the ATMO program.

<table>
<thead>
<tr>
<th>Year</th>
<th>Freshman</th>
<th>Sophomore</th>
<th>Junior</th>
<th>Senior</th>
<th>Postbac UG</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001-2</td>
<td>45</td>
<td>38</td>
<td>40</td>
<td>28</td>
<td>3</td>
<td>154</td>
</tr>
<tr>
<td>2002-3</td>
<td>65</td>
<td>22</td>
<td>35</td>
<td>46</td>
<td>1</td>
<td>169</td>
</tr>
<tr>
<td>2003-4</td>
<td>49</td>
<td>21</td>
<td>29</td>
<td>39</td>
<td>0</td>
<td>138</td>
</tr>
<tr>
<td>2004-5</td>
<td>50</td>
<td>37</td>
<td>29</td>
<td>33</td>
<td>1</td>
<td>150</td>
</tr>
<tr>
<td>2005-6</td>
<td>53</td>
<td>25</td>
<td>33</td>
<td>36</td>
<td>1</td>
<td>148</td>
</tr>
<tr>
<td>2006-7</td>
<td>45</td>
<td>32</td>
<td>29</td>
<td>34</td>
<td>4</td>
<td>144</td>
</tr>
<tr>
<td>2007-8</td>
<td>41</td>
<td>24</td>
<td>37</td>
<td>34</td>
<td>4</td>
<td>140</td>
</tr>
</tbody>
</table>

Overall, the Department is satisfied with the size of the undergraduate program. Owing to the zero-sum nature of teaching loads, increasing the number of undergraduates would require us to divert resources from either the graduate program or our service courses – a result we feel would not help the Department, the College, or the University.

Table 5.3 provides a demographic summary by year for undergraduates in Atmospheric Sciences, including gender, ethnicity, and whether they are Texas residents (in-state), from other parts of the U.S. (out-of-state), or international students. The Department, together with the College and University, is working to increase our undergraduate diversity by actively recruiting students from across the state of Texas.

The Department has an active chapter of the American Meteorological Society (TAMSCAMS), which is very popular with the undergraduates. During TAMSCAMS monthly meetings, guest speakers are often featured. Last semester, for example, TAMSCAMS invited Bill Read, graduate of our program and Director of the National Hurricane Center. TAMSCAMS was named Student Chapter of the Year by the American Meteorological Society (AMS) in 2001-2 and 2003-4, and has been on the Chapter Honor Roll several times over the past decade.

Meteorology majors participate in co-op, independent study, and undergraduate research programs for course credit. Table 5.4 summarizes enrollment in these courses for the last four years. Students who plan to continue on to graduate school are encouraged to participate in research projects, and students who plan to pursue careers in forecasting or broadcast meteorology often do co-op work. These courses normally satisfy undergraduate technical elective requirements. In the past students have typically registered for ATMO 485 – Directed Studies for all of these course types. In recent years we have created additional course numbers: ATMO 491 for research and ATMO 484 for co-ops to allow us to track student participation better.

5.3 Program Offerings for Non-Majors

In addition to our degree program for meteorology majors, the Department offers service courses for non-majors, both inside and outside of the College of Geosciences. The Department's main service course, ATMO 201 - Atmospheric Science, is a three-hour course focusing on fundamental atmospheric science and meteorological concepts. It requires little math, and therefore attracts many non-science majors. There is also an accompanying one-hour lab,
Table 5.3. Demographics of Undergraduate Majors.*

<table>
<thead>
<tr>
<th>Student Headcount</th>
<th>Spring 2005</th>
<th>Spring 2006</th>
<th>Spring 2007</th>
<th>Spring 2008</th>
<th>Spring 2009 *</th>
<th>Percent Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>186</td>
<td>201</td>
<td>193</td>
<td>186</td>
<td>171</td>
<td>100.0%</td>
</tr>
<tr>
<td><strong>Sex</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>71</td>
<td>85</td>
<td>69</td>
<td>69</td>
<td>72</td>
<td>42.1%</td>
</tr>
<tr>
<td>Male</td>
<td>115</td>
<td>116</td>
<td>124</td>
<td>117</td>
<td>99</td>
<td>57.9%</td>
</tr>
<tr>
<td><strong>Ethnic Origin</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White-Non-Hispanic</td>
<td>146</td>
<td>155</td>
<td>146</td>
<td>133</td>
<td>120</td>
<td>70.2%</td>
</tr>
<tr>
<td>Black-Non-Hispanic</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>0.6%</td>
</tr>
<tr>
<td>Hispanic</td>
<td>13</td>
<td>16</td>
<td>14</td>
<td>25</td>
<td>22</td>
<td>12.9%</td>
</tr>
<tr>
<td>Asia or Pacific Islander</td>
<td>3</td>
<td>5</td>
<td>3</td>
<td>–</td>
<td>–</td>
<td>0.0%</td>
</tr>
<tr>
<td>American Indian or Alaskan Native</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>1</td>
<td>0.6%</td>
</tr>
<tr>
<td>International</td>
<td>21</td>
<td>21</td>
<td>25</td>
<td>24</td>
<td>24</td>
<td>14.0%</td>
</tr>
<tr>
<td>Unknown or Not Reported</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>1.8%</td>
</tr>
<tr>
<td><strong>Entry Status</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>First-Time in College</td>
<td>–</td>
<td>–</td>
<td>1</td>
<td>–</td>
<td>1</td>
<td>0.6%</td>
</tr>
<tr>
<td>First-Time Transfer</td>
<td>3</td>
<td>6</td>
<td>4</td>
<td>8</td>
<td>3</td>
<td>1.8%</td>
</tr>
<tr>
<td>First-Time Graduate</td>
<td>3</td>
<td>2</td>
<td>–</td>
<td>3</td>
<td>2</td>
<td>1.2%</td>
</tr>
<tr>
<td>Other</td>
<td>180</td>
<td>193</td>
<td>188</td>
<td>175</td>
<td>165</td>
<td>96.5%</td>
</tr>
<tr>
<td><strong>Classification</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Undergraduate:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freshman</td>
<td>35</td>
<td>32</td>
<td>33</td>
<td>25</td>
<td>23</td>
<td>13.5%</td>
</tr>
<tr>
<td>Sophomore</td>
<td>23</td>
<td>38</td>
<td>27</td>
<td>31</td>
<td>22</td>
<td>12.9%</td>
</tr>
<tr>
<td>Junior</td>
<td>30</td>
<td>28</td>
<td>36</td>
<td>32</td>
<td>32</td>
<td>18.7%</td>
</tr>
<tr>
<td>Senior</td>
<td>38</td>
<td>44</td>
<td>35</td>
<td>42</td>
<td>44</td>
<td>25.7%</td>
</tr>
<tr>
<td>Postbac UG</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>1.8%</td>
</tr>
<tr>
<td>Undergraduate</td>
<td>128</td>
<td>144</td>
<td>135</td>
<td>133</td>
<td>124</td>
<td>72.5%</td>
</tr>
<tr>
<td>Masters:</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PB Nondegree</td>
<td>1</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>0.0%</td>
</tr>
<tr>
<td>Masters</td>
<td>31</td>
<td>31</td>
<td>29</td>
<td>26</td>
<td>22</td>
<td>12.9%</td>
</tr>
<tr>
<td>GR, Conditional</td>
<td>–</td>
<td>–</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>0.6%</td>
</tr>
</tbody>
</table>

* Spring 2009 numbers are preliminary. Numbers are from the Office of Institutional Studies and Planning.

Table 5.4. Undergraduate participation in independent study, co-op, and research courses.

<table>
<thead>
<tr>
<th>Academic Year</th>
<th>Number of students enrolled</th>
<th>ATMO 485</th>
<th>ATMO 491</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008-09</td>
<td>10 *</td>
<td>31</td>
<td></td>
</tr>
<tr>
<td>2007-08</td>
<td>20</td>
<td>29</td>
<td></td>
</tr>
<tr>
<td>2006-07</td>
<td>22</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>2005-06</td>
<td>42</td>
<td>not offered</td>
<td></td>
</tr>
</tbody>
</table>

* Does not include summer 2009.
ATMO 202. Total enrollment in ATMO 201 in 2006, 2007, and 2008 was 574, 564, and 614, respectively. Total enrollment in ATMO 202 over these same three years was 399, 386, and 464.

During the last year, we began offering focused sections of ATMO 201 where the faculty member spends the last month of the class focusing on one particular problem. We have offered focused sections on climate change, air pollution, and clouds and radiation.

Faculty in the Department are also working on a new course, GEOS 210 - Climate Change. Because climate change is one of the most important problems presently facing our society, it is imperative that students understand and be able to evaluate the competing claims made in the public debate over climate change. The general focus of this class will be on anthropogenic climate change. Specific objectives of this class include: develop an understanding of the physics of climate change; understand how the scientific method has been used to construct our current understanding of the problem; evaluate the ethical, financial, and environmental implications of climate change to our society; and understand the major policy options available to us.

This class was taught in Spring 2008 and is presently being taught again this semester using a temporary course number, GEOS 289. In these two semesters, it has had enrollment of 16 and 13 students, respectively. A permanent course number, GEOS 210, has been assigned and it was recently approved for Tier-2 status in the University’s Core Curriculum. All Texas A&M students are required to take a Tier-2 science class, so this designation should lead to a significant increase in enrollment. With Tier-2 status, it is our expectation that this class can teach as many students as we have seats for.

In the next year, with the addition of two new faculty and a new lecturer, we plan to increase our offerings of the large ATMO 201 and GEOS 210 classes. The limit here is likely to be classroom availability at reasonable times.

5.4 Environmental Programs in Geosciences

In recent years, the College has successfully established two new degree programs – one in Environmental Geosciences (ENGS) and one in Environmental Studies (ENST). The Environmental Programs now have a permanent director, Dr. Andrew Millington. Specific Environmental Program courses (designated as GEOS courses) are taught by Geosciences faculty. Teaching credits accrue to the department of the instructor teaching the course. Students also take courses from among the regular curricula of the four departments.

This program and its interactions with our Department are discussed in Section 4.6.

5.5 Administration

Undergraduate admissions are handled by the University with no input from the Department. The Department works with the College undergraduate recruiter, Dr. Sonia Garcia, on undergraduate recruitment.

The Undergraduate Curriculum Committee (currently chaired by Professor Andrew Dessler)
oversees the degree requirement and course inventory. Ms. Christine Arnold, Academic Advisor II, divides her time providing guidance to graduate and undergraduate students, and is one of the primary interfaces between the Department and our students. Junior and senior meteorology majors are assigned to faculty members serving as academic advisors.

5.6 Program Assessment

As part of the overall University academic accreditation process, the Department has developed an assessment plan for undergraduate and graduate programs. Program assessment will be an ongoing process with regular annual reports submitted to the University.

We have identified the following outcomes/objectives for our BS-degree graduates: being able to communicate ideas and thoughts clearly; be prepared for advanced studies in atmospheric sciences; have an adequate knowledge of meteorology, mathematics, and programming; be able to analyze, interpret, and make forecasts; understand appropriate values and ethical standards of practice; and have a familiarity with environmental policies and practices.

We have recently begun giving graduating seniors an exit survey that assesses their satisfaction with the department and their education, their opinions about how the educational process could be improved, and their future plans. Results from this survey will also allow us to determine where our graduates go after graduation and to strengthen the Department’s alumni network.

We will also be sending surveys to those outside the University who serve as mentors to our undergraduates when they intern. This will give us a second perspective on the quality and effectiveness of our educational system. We will evaluate the performance of students at key points during their undergraduate education. To do this, an ad hoc committee of faculty will evaluate presentations (both verbal and written) in various upper-level classes in order to judge the students’ ability to communicate, mathematical ability, and forecasting ability. The full assessment plan is provided in Appendix A2.

5.7 Summary

Our undergraduate program is generally healthy and stable. With our new hires, we have adequate depth to cover virtually any course in our curriculum. In addition, we are expanding our service courses (ATMO 201 and GEOS 210) and are on track to increase our student credit hours over the next few years.

We currently have only one staff advisor (Christine Arnold) who handles both the undergraduate and graduate programs. She does an exceptional job, but is underpaid relative to other Departments with similar or smaller advising loads. In order to ensure retention of qualified advisors, an appropriate professional ladder needs to be available with opportunities for advancement in title and salary.

Our Department has had limited involvement in the University Honors Program. Our only honors class is a section of ATMO 201. That section was cancelled in Fall 2008 due to lack of enrollment. Honors courses are tightly restricted in terms of enrollment, and with pressure to
increase the student credit hours generated by the Department, there is little incentive to teach these sections instead of sections with larger enrollments.
Chapter 6 - Graduate Program

6.1 Overview

The Department offers M.S. and Ph.D. degrees in Atmospheric Sciences. The graduate student body is roughly evenly split between M.S. and Ph.D. students, with a total of 52 enrolled in 2008. The M.S. degree includes both thesis and non-thesis options, although the vast majority of M.S. students choose the thesis option. Our graduate students come from a variety of academic backgrounds such as physics, chemistry, math, and several fields of engineering, in addition to atmospheric sciences.

6.2 Recruitment and Admissions

The prerequisite for the graduate program is a basic knowledge of physics and calculus. A Bachelor’s degree is required in order to apply to the M.S. or the Ph.D. program. A prior Master’s degree is not necessary in order to apply for the Ph.D. program. The minimum undergraduate course work expected of graduate applicants is 12 hours of calculus and differential equations and 8 hours of calculus-based physics. Although there is no minimum GPA requirement, incoming students typically have GPA’s exceeding 3.00. GRE scores and three letters of recommendation are required, as well as a Statement of Purpose essay. International applicants whose native language is not English are required take the TOEFL.

Recruitment of graduate students is a year-round process. Primary recruitment tools are the Department’s web site and word-of-mouth knowledge of departmental faculty and their research. The Department’s Recruiting Committee also contributes to this process. It has prepared a recruitment flier for the graduate program that is mailed to various colleges and universities. The Department sponsors a recruitment booth at the AMS annual meeting, and in some years hosts a reception. The Department, in conjunction with the College of Geosciences, is also represented at career fairs held on the Texas A&M University campus. Faculty members are encouraged to give seminars and colloquia at several Texas universities and small undergraduate colleges on general topics such as climate change. Notable goals of this outreach program are to publicize the Department’s research and to encourage science and math majors to apply to our graduate program.

About 12-15 graduate students are admitted every year, with most starting in the fall semester. The Department’s Graduate Program Committee oversees the admissions process. It meets during spring and fall to review applications. All departmental faculty are invited to review and comment on the applications, and identify potential candidates for financial support. During early spring, the committee draws up a shortlist of about 6-10 domestic applicants who are invited to visit the campus. The invitation letter includes an offer of admission and financial support for the first year. During their visit, these applicants are given a tour of the Department’s facilities and the University campus, and have the opportunity to meet with the faculty.
6.3 Financial Support

Almost all admitted students have financial support for the first year, either as Graduate Assistants in Research (GAR) or as Graduate Assistants in Teaching (GAT). New domestic students may be supported either as GATs or as GARs, but new international students are only supported as GARs. International students are required to pass an English Language Proficiency test administered by the University before they can be employed as GATs. There are also a small number of Graduate Assistant Non-Teaching (GANT) positions, where the graduate student is not the primary instructor, but assists in grading and lab instruction. GANT positions are open to all graduate students. GAT/GANT students typically handle two or three 2-hour lab sections a week.

Decisions to support a student as a GAR are made by individual faculty members based upon the research interests and potential of the applicants, as well as their academic credentials. The Graduate Program Committee decides which applicants are offered GAT/GANT support, based primarily upon their academic credentials. About six or seven GAT/GANT positions are available each semester, with about half of them offered to newly admitted students who receive priority. The remaining GAT/GANT positions are awarded to other students, some of whom are interested in obtaining teaching experience, and others whose faculty advisors need temporary bridging support (i.e., between research grants).

The Department has access to a Regents Fellowship which can be used to provide $18,000 a year for a single student or $9,000/year for two students. The Graduate Program Committee typically awards one half of the Regents Fellowship to one or two of the top applicants, in addition to the regular GAR/GAT stipend, as an additional incentive.

The monthly stipend for all types of assistantships (GAR/GAT/GANT) is the same and is fixed by the Graduate Program Committee. The current monthly stipends are:

- $1,800 for students with only a bachelor’s degree
- $1,900 for students who hold a master’s degree
- $2,050 for students who have passed the Ph.D. qualifying exam

Stipend rates are reviewed each year to adjust for increases in the cost of living and to remain competitive with other university’s graduate programs in atmospheric sciences. Our departmental stipend rates are the highest among all departments in the College of Geosciences.

In addition to the stipend, full tuition support is provided to all students with assistantships. In the case of GAT/GANT positions, the University pays for tuition. One important development since the previous departmental review is the University’s mandate that tuition must be paid for all GARs directly from faculty research grants when such grants include graduate student support. This means that in-state tuition costs must be included in all research proposals when graduate student support is specified in the proposal budget. (There is a University requirement that graduate students who have accumulated more than 99 credit hours must pay out-of-state tuition, but this typically affects only students who have been in residence for longer than four years.)
In addition to tuition, the University also charges mandatory fees which the student pays out of his/her stipend. Assistantship stipends also include a contribution to health care costs, which is typically sufficient to cover the health insurance premium for an individual. Additional costs associated with insuring a spouse or a family are borne by the student.

### 6.4 Student Profiles

The number of M.S. students enrolled in the Department of Atmospheric Sciences reached a peak of 45 in 2002 (Figure 6.1). The number of Ph.D. students has increased since 2001, from 14 to its current value of 26. The Department has made substantial progress toward the goal set in the last external review of increasing the number of Ph.D. students relative to M.S. students. Because many of our M.S. students continue on to the Ph.D. program, while some choose to enter the workforce, we may be nearing the optimum ratio of M.S. to Ph.D. students.

**Figure 6.1. Graduate enrollment trends for 2001-2008.**

International students make up the bulk of the Ph.D. enrollment (about 70%), a fraction that has remained steady over the years (Figure 6.2). Domestic students make up about 70-80% of the M.S. enrollment.
Figure 6.2. International student enrollment trends for 2001-2008.

The ratio of female to male students has decreased in the last few of years, after increasing from 2001 to 2004 (Figure 6.3). During 2004 to 2006, the ratio was about 1:2, but is currently about 1:3. The number of minority students, defined as the count of domestic students who are African-American, Hispanic, or Native American, has usually hovered between 0 and 3.

Figure 6.3. Diversity trends for 2001-2008.
The number of applications received for the graduate program shows an overall increasing trend since 2001, although there is significant year-to-year variability (Figure 6.4). Over 60 applications were received in 2008, evenly split between domestic and international applicants. Most domestic applicants opt for the M.S. track, whereas international applicants tend to opt for the Ph.D. track. The verbal+quantitive GRE scores of admitted students have remained roughly constant since 2001, in the range of 1000-1450 (Figure 6.5). The pool of domestic applicants tends to be a little weaker (as measured by total GRE scores) and they seem to be more interested in weather-related research. The international applicant pool is spread over a broad range of research areas and tends to be dominated by applicants from China and South Korea.

**Figure 6.4. Graduate application trends for 2001-2008.**

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6.5 Advising

Advising of graduate students is primarily the responsibility of the student’s M.S. or Ph.D. thesis adviser, with the student’s Advisory Committee having secondary responsibility. Each Advisory Committee consists of no fewer than three faculty members, with at least one member from outside the department. The thesis adviser chairs the Advisory Committee. Each student develops a degree plan in consultation with Advisory Committee. It is common for students to have co-chairs for their committees, usually because of joint research projects between faculty members both inside and outside the Department.
6.6 Curriculum

Core Courses

The six core courses in the list below present the atmospheric sciences at an appropriate graduate level and give students from other technical disciplines (e.g. physical sciences, mathematics, engineering, statistics) the required background to proceed to more advanced graduate courses. The complete graduate curriculum is listed in Appendix B1.

ATMO 601 - Atmospheric Dynamics I
ATMO 602 - Atmospheric Physics I (Thermodynamics/cloud physics)
ATMO 606 - Atmospheric Chemistry I
ATMO 611 - Atmospheric Dynamics II
ATMO 612 - Atmospheric Physics II (Radiative transfer/remote sensing)
ATMO 613 - Advanced Atmospheric Chemistry

Masters candidates take ATMO 601, 606, and either 602 or 612, while doctoral students must also take one additional core course.

Advanced graduate elective courses are typically taught every other year.
Master of Science

The University requires a minimum of 32 semester credit hours of approved coursework and research for the thesis option Master of Science degree. At least 23 hours are devoted to formal coursework. Students must pass each course with a C or better, and must complete an acceptable thesis.

Department Requirements

Core courses (9 hours)
Other ATMO courses (6 hours minimum)
Out-of-department courses (3 hours minimum)
ATMO 681 - Seminar (2 hours)
ATMO 691 - Research (8 maximum)
Thesis Defense

Master of Science (non-thesis option)

A non-thesis option requiring a minimum of 36 credit hours is also available to students. Non-thesis option degree candidates must successfully pass, in place of the thesis defense, the comprehensive written exam taken by Ph.D. candidates, although there is a different threshold for passing.

Doctor of Philosophy

A minimum of 64 semester credit hours beyond a master’s degree is required for the degree of Doctor of Philosophy. A minimum of 96 hours is required of those who have completed only a baccalaureate degree. Students must complete the coursework listed below, any additional coursework deemed necessary after consultation with the advisor, an appropriate amount of research hours, pass the qualifying exam, pass the dissertation defense, and complete an acceptable dissertation.

Core courses (12 hours)
ATMO 681 - Seminar (2 hours)
Two to four out-of-department courses are typically part of Ph.D. coursework

6.7 Ph.D. Qualifying Exam

The qualifying exam is a departmental requirement with the following objectives: (1) to provide information to help faculty predict which students will be successful in our Ph.D. program; (2) to establish a minimum foundational knowledge and integrative analysis requirement for our Ph.D. students that broadly distributes responsibility among the faculty; and (3) to require students to demonstrate an adequate knowledge of literature and an ability to carry out bibliographical research. The qualifying exam results, along with grades in courses, are used to decide who should be admitted to Ph.D. candidacy. The expectation is that all Ph.D. students have demonstrated the potential to carry out independent and original research and communicate the results of that research both in writing and orally.
The qualifying exam consists of two parts: a written comprehensive exam to test breadth and technical knowledge, and an oral exam in the form of a research seminar to test research potential.

**Written Exam**

The written portion of the exam is typically taken at the end of the student’s second semester, once core coursework is completed, followed by the seminar. For students who enroll in the fall, both the written and oral parts of the qualifying exam must be completed within 24 months – that is, by the end of the second August after graduate study begins. Students who begin their study during the summer are considered to have enrolled in the fall. For students who enroll in the spring semester, both the written and oral must be completed within 32 months.

The written exam covers three fields: dynamical meteorology, physical meteorology, and atmospheric chemistry. The Department’s core curriculum has two courses in each field. Ph.D. students are required to take both courses in their field of interest and at least one course in each of the other two fields. Students should identify the primary field in consultation with their advisor. The exam measures the students’ mastery of each field within the scope of the core courses. The written exam has both a short-answer and long-answer section, composed of questions from each of the three fields.

The departmental exam committee examines each student’s performance in the core courses and written exams and makes a recommendation to the full faculty. The full faculty then votes on each student based on the written exams. Students who do not pass the exam may attempt it a second time the following year.

**Research Presentation**

The second part of the qualifying examination is a public research presentation that is open to the whole Department. Students present their research ideas in the context of the background and recent developments in their field of research, including the project’s relevance to the atmospheric sciences. The Master’s thesis defense can be used as the research presentation.

Presentations should include the research project’s objectives and may include preliminary data and/or model calculations from ongoing activities that show potential or actual progress towards those objectives. Students may be questioned as part of their research presentation. Presentations are evaluated based on several criteria, including:

- Was the presentation clear and easy to follow?
- Did the student demonstrate the ability to conduct independent research?
- Did the student demonstrate adequate knowledge of the literature?
- Does the student understand how his/her research fits into the general body of scientific knowledge?
- Does the student understand the principles of scientific inquiry?
Each research presentation is evaluated by an ad hoc committee consisting of the student’s Advisory Committee plus two other faculty members selected by the Department Head in consultation with the student’s advisor. The student’s advisor collects written evaluations from the ad hoc committee and makes a recommendation to the full faculty. The full faculty votes on each student based on the oral exams.

6.8 Seminar

The Department has an active weekly seminar series, featuring both internal and external speakers, which is also offered as a 1-hour graduate course. Graduate students are required to enroll in the seminar course for at least two semesters, and are encouraged to attend even if not enrolled. Students attend these seminars regularly, and some actively participate by asking questions and entering the discussion. A number of additional seminars are given during the semester, as well as the occasional internal seminar series. During Fall 2008, a bi-weekly Climate Seminar Series was initiated to encourage graduate students doing climate-related research to make a presentation to their peers and faculty.

6.9 Assessment

The department has developed assessment plans for the M.S. and Ph.D. programs as part of the university-wide re-accreditation process. Each assessment plan includes a mission statement, a list of student learning outcomes and program outcomes, and an enumeration of methods used to assess these outcomes. The salient features of the assessment plans are summarized below, and the complete M.S. and Ph.D. assessment plans can be found in Appendix B2.

The student learning outcomes are somewhat different for the M.S. and Ph.D. programs, but the program outcomes are common to the programs. The program outcomes include increasing student diversity, attracting students from non-atmospheric science educational backgrounds, and timely completion of the graduate degrees.

M.S. Program

The mission of the Master of Science program is to provide students with a broad knowledge of atmospheric science and prepare graduates for careers with both government agencies and the private sector. Important learning outcomes of the M.S. program are that graduates will have in-depth knowledge of at least one area of atmospheric science, and have the ability to present their supervised research work in oral and written forms.

Ph. D. Program

The mission of the Ph.D. program is to provide students with a broad knowledge of atmospheric sciences as well as in-depth knowledge and research experience in one or more specialty areas, and prepare graduates for research and teaching careers, both in higher education and in government or private labs. An important Ph.D. learning outcome is that graduates will have broad knowledge of the major areas of atmospheric science, including dynamical and physical meteorology, as well as atmospheric chemistry. Additionally, graduates are expected to have
sufficient in-depth knowledge of at least one of these areas to carry out independent research in that area, and disseminate their research to a broader audience, both in oral and written forms.

Assessment Methods

We plan to use a variety of metrics and statistics to assess if the student learning and program outcomes have been achieved. The metrics will include course evaluations and qualifying exam performance. We will also maintain records of presentations made and publications authored by graduate students, gather detailed statistics regarding graduate applications and admissions to the program, and keep track of completion times for MS/PhD students. We have developed a new Postgraduate Exit Survey for graduate students exiting the program, to track employment statistics as well as the general level of satisfaction with the graduate program.

6.10 Successes

Graduate Recruitment

The number of applicants to our graduate program has increased significantly since 2001, and we attract applicants with a broad range of scientific backgrounds, well beyond traditional meteorology or atmospheric sciences undergraduates. The faculty outreach program targeted at smaller undergraduate institutions in Texas has helped somewhat in increasing the domestic applicant pool.

Graduate Enrollment

We have significantly increased the size of our Ph.D. graduate program since 2001, although the M.S. program has had declining numbers. The range of research areas covered by our graduate students has also expanded significantly since 2001, with a growing number in areas such as atmospheric chemistry and climate.

Graduate Placement

Many of our graduate students find placement in government agencies and private industry, especially in the areas of weather forecasting and wind energy. Many of our Ph.D.s move on to post-doctoral appointments at well-regarded universities and research institutions (such as NOAA and NASA).

6.11 Challenges

Graduate Recruitment

Graduate recruitment remains an ongoing challenge. The Department receives about 60-70 applications, about evenly split between domestic and international students (Figure 6.4). A fair number of our top-rated domestic applicants choose to accept competing offers from peer institutions such as Colorado State University, University of Washington, etc., even though we offer a competitive stipend and incentives such as the Regents Fellowship. Our geographical
location (and climate) may play some role in this, but improving our overall academic reputation may be the best way to increase the acceptance rate for our offers to the top applicants. Below the top tier of applicants, most of our admission offers are usually accepted.

**Graduate Enrollment**

The recent decline in graduate enrollment, mostly among M.S. students, is a cause for some concern. One contributing factor may be that the Department currently has few faculty offering GAR positions in areas of interest to M.S. students. Most M.S. applicants are domestic students who are interested areas such as severe weather and synoptic meteorology, rather than atmospheric chemistry or climate research. The addition of Dr. Istvan Szunyogh, whose research is in numerical weather prediction and data assimilation, and Dr. Russ Schumacher, who studies mesoscale meteorology and severe storms, will definitely help in this context.

Another factor that limits graduate enrollment is the small number of GAT positions available in our Department, especially in comparison to other departments within the College. We are able to offer a maximum of four or five GAT positions to incoming students each year. If we are able to obtain more GAT positions (presumably by teaching more service courses with labs), we should be able increase our enrollment. Even if such positions were to become available, we would need to actively recruit to improve the pool of domestic applicants so that we can offer the additional GAT positions to qualified domestic candidates. (International applicants cannot be offered GAT positions.)

**Minority Enrollment**

Minority enrollment in the graduate program has remained low (ranging from 0 to 3) since 2001. There are usually some minority candidates in the applicant pool, but as is often the case with domestic applicants, their research interests tend to be weather-related. Having additional faculty in these research areas can indirectly contribute to minority enrollment by improving overall domestic student enrollment.

**Graduate Placement**

One of our goals has been to have our Ph.D.s join the ranks of tenure-track faculty at research universities. We have not had very much success in this regard.

**Graduate Electives**

The Department typically offers one or two graduate elective courses each semester. The pressures of having to teach the required core courses in the undergraduate meteorology program, and the undergraduate service courses for non-majors, have limited the Department’s ability to offer more graduate elective courses, especially in the past couple of years. The arrival of two new faculty (Drs. Szunyogh and R. Schumacher) should ease this pressure somewhat. Another factor that limits the number of graduate electives is the overall graduate enrollment, as a minimum enrollment of five students is needed for each graduate course. If faculty teaching loads permit, the Department should consider developing and offering more graduate elective
courses that attract students from outside the Department and College, such as ATMO 629 - Climate Change.
Chapter 7 - Research Activities

Many details of the Department’s research activities have been covered in several earlier sections of this report, primarily in Chapters 3, 4, and 6. This Chapter summarizes other aspects of our research and service activities.

Research Publications

Books and refereed research publications are listed in Appendix D by year of publication.

Research Grants and Contracts

Grant and contract numbers and dollar amounts for the last four years are listed in Table 3.3. In 2008, the Department had 76 active grants and contracts generating $4.2M in research expenditures. Research grants and contracts since 2004 are listed by year in Appendix E.

We are proud of our record of collaborative and interdisciplinary research. Table 7.1 shows interactions between ATMO faculty both inside and outside the Department. Data in the table indicate the number of funded proposals on which the two faculty members in the respective row and column share a funded research grant or contract. The values on the diagonal are the number of sole-investigator grants.

Editorships

Current editorships
- Journal of Climate
- Reviews of Geophysics

Current associate editorships
- Journal of Geophysical Research – Atmospheres
- Journal of the Atmospheric Sciences (2)
- Meteorological Monographs
- National Weather Digest
- AGU Editors Choice on Atmospheric and Space Electricity
- Journal of Spectroscopy and Radiative Transfer
- Journal of Applied Meteorology and Climatology.

External Research Collaborations

Because of the breadth of disciplines within the Department, faculty and research staff have active research projects in the areas of theory, observation and experiment, and numerical modeling. Many of these projects involve large facilities, such as aircraft, satellite, and supercomputers, which necessarily require cooperative efforts. Many collaborations are also underway at the personal level.
Table 7.1. Faculty collaboration on joint grants and contracts.

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53
A list of external institutions with whom our faculty are collaborating is provided below. In some cases, multiple faculty have active collaborations with the same institution.

Aarhus University, Denmark
Applied Physics Lab
Arizona State University
Colorado State University
Cornell University
Dalhousie University
Harvard University
Imperial College
Institute for Environmental Physics, Bremen, Germany
Lamont Doherty Geophysical Observatory, Columbia University
Max Planck Institute for Solar System Research
Massachusetts Institute of Technology
NASA Goddard Space Flight Center
NASA Jet Propulsion Laboratory
NASA Johnson Space Center
National Center for Atmospheric Research
New York University
Riso DTU National Laboratory for Sustainable Energy, Denmark
Space Science Institute
United States Geological Survey
University of Arizona
University of California, Berkeley
University of Central Florida
University of Colorado
University of Copenhagen
University of Edinburgh
University of Houston
University of Miami
University of Michigan
University of Texas, Austin
University of Wisconsin, Space Science and Engineering Center
Washington University
York University, Canada
Recent Awards and Honors

Table 7.2 lists recent awards for teaching and research received by ATMO faculty and staff.

Table 7.2. Recent research, teaching, and service awards.

<table>
<thead>
<tr>
<th>Year</th>
<th>Award</th>
<th>Recipient</th>
</tr>
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<tbody>
<tr>
<td>2009</td>
<td>Fellow of the American Geophysical Union</td>
<td>Richard Orville</td>
</tr>
<tr>
<td></td>
<td>Bush Excellence Award for Faculty in International Research</td>
<td>Renyi Zhang</td>
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<tr>
<td></td>
<td>American Meteorological Society Verner Suomi Award</td>
<td>Thomas Wilheit</td>
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<tr>
<td></td>
<td>American Meteorological Society Meisinger Award</td>
<td>Fuqing Zhang</td>
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<tr>
<td>2008</td>
<td>Association of Former Students College Teaching Award</td>
<td>Ping Yang</td>
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<tr>
<td></td>
<td>Dean’s Distinguished Achievement Award for Faculty Teaching</td>
<td>Courtney Schumacher</td>
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<td></td>
<td>Dean’s Distinguished Achievement Award for Administrative Staff</td>
<td>Barbara Straube</td>
</tr>
<tr>
<td></td>
<td>Sigma Xi Distinguished Scientist Award</td>
<td>Richard Orville</td>
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<td></td>
<td>American Meteorological Society Jule G. Charney Award</td>
<td>Gerald R. North</td>
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<td></td>
<td>NCAR Outstanding Publication Award</td>
<td>Fuqing Zhang</td>
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<tr>
<td>2007</td>
<td>Association of Former Students College Teaching Award</td>
<td>Craig Epifanio</td>
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<tr>
<td></td>
<td>Dean’s Distinguished Achievement Award for Faculty Research</td>
<td>Don Collins</td>
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<tr>
<td></td>
<td>College of Geosciences Robert C. Runnels Excellence in Advising Award</td>
<td>Courtney Schumacher</td>
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<tr>
<td></td>
<td>Presidential Early Career Award for Scientists and Engineers</td>
<td>Sarah Brooks</td>
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<tr>
<td>2006</td>
<td>Fellow of the Oceanographic Society</td>
<td>Robert Duce</td>
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<td></td>
<td>Aldo Leopold Leadership Fellow</td>
<td>Andrew Dessler</td>
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<tr>
<td></td>
<td>NSF CAREER Award</td>
<td>Sarah Brooks</td>
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<tr>
<td></td>
<td>American Meteorological Society Award for Outstanding Contribution to the Advancement of Applied Meteorology</td>
<td>Richard Orville</td>
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</tbody>
</table>
Career awards

Table 7.3 lists CAREER awards received by ATMO faculty.

Table 7.3. Career award recipients.

<table>
<thead>
<tr>
<th>Recipient</th>
<th>Year</th>
<th>Award</th>
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</thead>
<tbody>
<tr>
<td>John Nielsen-Gammon</td>
<td>1996</td>
<td>NSF White House Presidential Faculty Fellow</td>
</tr>
<tr>
<td>Andrew Dessler</td>
<td>1999</td>
<td>NASA New Investigator Program Award</td>
</tr>
<tr>
<td>Renyi Zhang</td>
<td>1999</td>
<td>NASA New Investigator Program Award</td>
</tr>
<tr>
<td>Don Collins</td>
<td>2001</td>
<td>NSF CAREER Award</td>
</tr>
<tr>
<td>Don Collins</td>
<td>2001</td>
<td>NASA New Investigator Program Award</td>
</tr>
<tr>
<td>Ping Yang</td>
<td>2003</td>
<td>NSF CAREER Award</td>
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<tr>
<td>Fuqing Zhang</td>
<td>2004</td>
<td>Office of Naval Research Young Investigator Award</td>
</tr>
<tr>
<td>Courtney Schumacher</td>
<td>2005</td>
<td>NSF CAREER Award</td>
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<tr>
<td>Courtney Schumacher</td>
<td>2006</td>
<td>NASA New Investigator Program Award</td>
</tr>
<tr>
<td>Sarah Brooks</td>
<td>2006</td>
<td>NSF CAREER Award</td>
</tr>
<tr>
<td>Sarah Brooks</td>
<td>2007</td>
<td>Presidential Early Career Award in Science and Engineering (PECASE, USDA)</td>
</tr>
</tbody>
</table>

Faculty mentoring

In order to assist new faculty members with the establishment of their research and teaching programs, the Department assigns mentors to each untenured professor. Mentors are encouraged to meet and talk informally with the new employees. Mentors are available to answer questions about any aspect of university life. In order to provide the best help with research issues, mentors are normally chosen who have similar research interests with new faculty. In addition to having an identified mentor, new faculty are encouraged to talk with any faculty and staff, both within ATMO and outside, when they need assistance or advice. The current list of untenured faculty and mentors is given below in Table 7.4.

Table 7.4. Faculty mentors.

<table>
<thead>
<tr>
<th>Untenured faculty</th>
<th>Primary mentor</th>
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<tbody>
<tr>
<td>Sarah Brooks</td>
<td>Don Collins</td>
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<tr>
<td>Rob Korty</td>
<td>Saravanan</td>
</tr>
<tr>
<td>Mark Lemmon</td>
<td>Gerald North</td>
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<tr>
<td>Shaima Nasiri</td>
<td>Andrew Dessler</td>
</tr>
<tr>
<td>Gunnar Schade</td>
<td>Don Collins</td>
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<tr>
<td>Courtney Schumacher</td>
<td>Kenneth Bowman</td>
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<tr>
<td>Istvan Szunyogh</td>
<td>N/A</td>
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<tr>
<td>Shari Yvon-Lewis (OCNG)</td>
<td>Renyi Zhang</td>
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</table>
Chapter 8 - Summary

8.1 Departmental Strategic Plan

The last major revision of the Departmental Strategic Plan was completed in 2005. This section summarizes the goals and progress for the previous strategic plan. Much of that plan dealt with planning for the Faculty Reinvestment Program hires. That process has now been completed very successfully and very much in line with the goals established at the time. This summary has been updated where appropriate in response to circumstances that have changed since the plan was completed.

The College is currently in the process of searching for a Dean to succeed Dr. Kjerfve, who steps down in May 2009. With the appointment of a new Dean and the completion of this Departmental Review, Fall 2009 will be a good time to review the Department’s direction and revise our strategic plan.

Departmental Composition and Research Priorities

As a relatively large atmospheric science department at a large public university, our goal is to maintain a broad range of teaching and research interests in the atmospheric sciences rather than to focus on one or two sub-fields within the discipline. While we recognize that there are many ways that atmospheric science research can be subdivided, our goal is to have significant expertise within the following four broad areas:

* Atmospheric chemistry, air quality, aerosols, and physical meteorology*
  
  Brooks
  Collins
  Orville
  Schade
  Zhang

* Remote sensing and satellite meteorology*
  
  Lemmon
  Nasiri
  Wilheit
  Yang

* Climate, paleoclimate, large-scale dynamics, synoptic meteorology*
  
  Bowman
  Conlee
  Dessler
  Korty
  Nielsen-Gammon
  North
  Panetta
  Saravanan
  Szunyogh
There is a great deal of overlap between these primary areas, and many faculty work, either individually or through collaborations, in more than one area. For example, at least one faculty member in each area is a substantial user of satellite data, although they may not work directly in remote sensing.

We anticipate several retirements within the next five years, distributed among the different areas.

Summary of Findings and Recommendations from the 2005 Strategic Plan

1. Faculty Reinvestment – The faculty hiring goals laid out in the strategic plan were completed very successfully. The research areas and interests of current faculty are well aligned with the goals of the plan.

2. Administrative staffing – Since the time of the 2005 strategic plan, the office staffing has increased from 3.5 to 4 full-time staff.

3. Competition – In 2005 we identified our local competition as the small programs at Texas Tech University and the University of Houston. The University of Houston has requested permission from the State of Texas to establish a Ph.D. program in atmospheric sciences concentrating on atmospheric chemistry and air quality. To the best of our knowledge, that request is still pending at the Texas Higher Education Coordinating Board, but it is likely to be granted at some point in the future. Additionally, following a massive (~$150M) gift to the School of Geosciences at the University of Texas, UT has undertaken to expand their climate-related research. Eric Barron was hired as Dean, but has since left to be director of NCAR. Several faculty have been hired in the climate area, including Robert Dickinson from Georgia Tech and Kerry Cook from Cornell.

4. Faculty mentoring – Following the recommendation of the 2005 plan, a formal faculty mentoring system was established.

5. Research goals – We believe that we have successfully hired faculty who can adapt to changing research priorities in the years to come.

6. Space needs – Renovation of existing space for laboratory and office use have resolved most space issues. The loss of classroom space on the 12th floor has affected our teaching program. We now compete with the Departments of Oceanography and Geography for classroom assignments. Because they are effectively ‘grandfathered in’ to existing classroom slots, our classroom assignments are less than ideal.

7. Research staff support – The Department has an open position for a radar engineer/technician. This position is being held to provide support for a possible future radar or observational meteorologist. The Department needs to decide on existing and future radar and technical needs and proceed accordingly.

8. Teaching strategies – We are continuing to work to develop service courses that will appeal to students outside the Department and the College. Our new introductory course
on Global Climate Change (ATMO 221) has been added to the University Tier 2 science distribution list. This should lead to significant increases in enrollment.

9. **Web page** – The Department’s web site has improved greatly since the strategic plan was completed. Because the web site is the primary public face of the Department, we need to continue to improve its content and operation.

10. **Undergraduate program** – Undergraduate enrollment is approximately steady with a total enrollment of about 150 students. Enrollment increases will require us to expand some courses for our majors to two sections.

11. **Centers and Laboratories** – It has been a long-time goal of the Department to develop a federally funded research center or laboratory at Texas A&M. This would still be a worthwhile goal, although from conversations with colleagues at other universities who have such facilities, it is not clear how much they directly benefit the academic departments (although they can substantially increase the visibility of the Department). It is possible, however, that the era of new federal laboratories in the atmospheric sciences is past. Additionally, other universities, such as Penn State, maintain excellent programs without collocated federal labs. Our best prospect in this area is likely to be a smaller-scale cooperative institute in the areas of remote sensing or atmospheric chemistry.

12. **Graduate student salaries** – We need to remain competitive in terms of graduate student salaries.

13. **Graduate program composition** – We have made good progress toward realigning the graduate program with a greater emphasis on Ph.D.-level research and teaching.

**8.2 Summary**

Since the time of the last external review in 2001, the Department of Atmospheric Sciences has made quite remarkable progress on many fronts:

- Faculty numbers have more than doubled from 9.5 to 22. The quality of the new hires is very high. In most cases we successfully hired our first choice in each search.
- Research funding has increased to more than $4M per year (approximately $200k per professor per year).
- The undergraduate and graduate programs are stable. Undergraduate enrollment has remained steady at 140 to 150 students, while graduate enrollment is 50 to 60 students.
- Graduate enrollment has shifted toward a higher fraction of Ph.D. students relative to M.S. students.
- Department space has been remodeled into new research laboratories; faculty, staff, and student offices; and a new radar teaching lab. Some student offices have been renovated with new office cubicles. Department labs and office space are generally in good condition.

Despite these accomplishments, the Department faces a number of challenges, some of which were previously identified in the last report.

- Several senior faculty members may retire in the next few years, and recruiting high quality faculty will remain a challenge.
• Many of our young and mid-career professors are becoming national and international leaders in their fields, and faculty retention is likely to be a greater challenge than recruitment of young faculty.
• Graduate student numbers have not increased to match increases in faculty numbers. Much of this can be attributed to the expected lag in funding as young faculty start their research programs, and to senior faculty who are reducing their graduate student advising.
• Graduate student quality has increased, but not in proportion to the increase in the quality of the Department.
• If undergraduate enrollment increases, we will need to begin offering two sections of many of our undergraduate courses. This will substantially increase the teaching commitment required of faculty in the undergraduate program.
• Remodeling has eliminated classrooms that were dedicated to Atmospheric Sciences teaching. The available alternative classrooms are impacting our teaching numbers and our ability to teach effectively due to classroom size and scheduling.
• Continued deferral of routine maintenance by the University leads to a slow deterioration of the physical plant. Improvements and significant maintenance generally only occur at rare intervals when space is remodeled.
• Promoting, rewarding, and retaining trained administrative staff is made very difficult by University and College policies. This puts high loads on a small staff and causes morale and efficiency problems. While faculty numbers have doubled, administrative staff has only increased from 3.5 to 4 positions.
• IT staff are overburdened, leading to delays in dealing with routine IT issues. While faculty numbers have doubled, the IT staff assigned to Atmospheric Sciences has remained constant at two individuals.

At a research university like Texas A&M, faculty are the keys to a department’s success. The issues in the list above are all directly related to faculty recruitment and retention. The most important factor in recruiting and retaining qualified faculty is having an exciting and productive research and teaching environment within which to work. This kind of environment is created by having good colleagues, good students, and the facilities and administrative structure that allow everyone to carry out their mission effectively, whether it is learning, teaching, research, or service.

Departments are rarely static for long, and we anticipate continuing changes in the faculty’s composition. We have demonstrated that we can successfully hire outstanding young faculty and are prepared to continue to recruit at the top level. In order to maintain a satisfactory demographic balance within the Department and cope with the possible retirement of some high-profile faculty members, it would be very beneficial to the Department if we could seek to fill at least one retirement position over the next few years at the senior level with someone who is an established international leader in the discipline.

Salary is rarely the only issue when faculty choose to leave Texas A&M, but it is often an important factor. Table 8.1 compares average ATMO faculty salaries at Texas A&M with the averages in Atmospheric Science at UCAR (University Corporation for Atmospheric Research) member universities.
Table 8.1. Comparison of average monthly salaries at Texas A&M with UCAR member universities.

<table>
<thead>
<tr>
<th>Level</th>
<th>Texas A&amp;M</th>
<th>UCAR Members</th>
<th>Differences</th>
<th>Percentile</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Monthly</td>
<td>Annual</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full professor</td>
<td>$10,853</td>
<td>$13,115</td>
<td>-$2,262</td>
<td>25th</td>
</tr>
<tr>
<td>Associate professor</td>
<td>$8,256</td>
<td>$8,786</td>
<td>-$530</td>
<td>38th</td>
</tr>
<tr>
<td>Assistant professor</td>
<td>$6,896</td>
<td>$7,524</td>
<td>-$628</td>
<td>30th</td>
</tr>
</tbody>
</table>

As Table 8.1 shows, TAMU salaries lag substantially behind other UCAR member universities. Percentiles are estimated using the UCAR average salaries and standard deviations assuming a Gaussian distribution. These differences cannot be explained by salary differences between public and private universities. For full professors the average salary difference between public and private universities is only about $250 per month. Senior faculty have frequently taken smaller raises than the average in order to make a larger portion of the raise pool available to junior faculty. The cumulative effect of this is apparent. In the long run, this salary gap will make us vulnerable to losing experienced faculty in whom the Department and University have made large investments. This situation will have to change unless we want to be a ‘farm team’ where professors develop top-ranked research and teaching programs only to move on ‘major league’ departments.

While our graduate student quality has improved, we have not reached the level we are capable of. Faculty work very hard to bring in research funding, and virtually all of our graduate students are supported as research assistants. Graduate research assistants in ATMO are paid slightly more than the UCAR averages. It would be a tremendous boost to the Department if the University endowment could be used to fund recurring graduate fellowships of $5k to $10k per year to be added on top of research assistantships funded by grants and contracts. Such fellowships would help raise our national and international visibility through advertisements and competition for fellowships. We will also continue to increase graduate recruitment at the departmental level, and this will be an important issue to address when we revisit our strategic plan later this year.

In order to keep our working environment up to date, the Department plans to continue to invest funds, when available, to replace old and outmoded furnishings, beginning with student offices.

Current administrative staffing levels are restraining our productivity by slowing business operations, such as hiring, purchasing, and reimbursement. The College is currently evaluating administrative staffing levels within the four academic departments. This evaluation needs to be completed promptly and appropriate staffing levels determined.

Current IT staffing levels are causing delays in IT services that are directly affecting research activities. Our first response will be to hire one, and possibly two, student workers using Department funds to assist the College’s IT staff who are assigned to Atmospheric Sciences. We
also need to evaluate whether additional permanent full-time staff are required and determine the appropriate funding mechanism.

In summary, the Atmospheric Sciences Department at Texas A&M has undergone a complete renaissance in the last two decades. While we face challenges, the state of the Department is good, and we believe that we are well positioned to continue our advancement.
Appendix A1. Undergraduate Courses

The numbers in parenthesis, (X-Y), are the number of lecture hours (X) and lab hours (Y) per week. “I” designates a fall course, “II” designates a spring course, and “S” designates a summer course. Also listed is the total number of credits.

ATMO 201. Atmospheric Science. (3-0). Credit 3. I, II, S
Structure, energy, and motions of the atmosphere; climate; fronts and cyclones; atmospheric stability; clouds and precipitation; severe storms.

ATMO 202. Atmospheric Science Laboratory. (0-2). Credit 1. I, II, S
Practical laboratory experiments and exercises, conducted by students in the meteorology and computer laboratories, concerning the fundamental physical processes underlying atmospheric phenomena, and the collection, display and interpretation of meteorological information. For non-majors only. Prerequisite: Concurrent enrollment in ATMO 201.

ATMO 203. Weather Forecasting Laboratory. (0-2). Credit 1. I, II
Short-range weather forecasting practice; numerical guidance; weather map analysis and discussions. Prerequisite: Concurrent enrollment in ATMO 201.

ATMO 251. Weather Observation and Analysis. (2-2). Credit 3. I
Standard and experimental weather observing techniques; subjective and objective analysis; application of conceptual models; simple kinematic and dynamic constraints. Prerequisite: ATMO 203 or registration therein.

Offered to enable majors in meteorology to undertake and complete with credit in their particular fields of specialization limited investigations not covered by any other courses in established curriculum. Prerequisite: Freshman or sophomore classification.

ATMO 289. Special Topics in… Credit 1 to 4.
Selected topics in an identified area of meteorology. May be repeated for credit. Prerequisite: Approval of instructor.

Research conducted under the direction of faculty member in atmospheric sciences. May be repeated 2 times for credit. Prerequisites: Freshman or sophomore classification and approval of instructor.

ATMO 321. Computer Applications in the Atmospheric Sciences. (2-2). Credit 3. II
Introduction to technical computing methods in the atmospheric sciences. Students learn to use specialized software and data analysis systems for meteorological applications.
ATMO 324. Physical and Regional Climatology. (2-2). Credit 3. I
Climate causes; global and surface energy balance; hydrologic cycle; general circulation; climate change; climate data analysis. Prerequisites: ATMO 201 and 203; MATH 172; course that satisfies departmental computer science requirement.

ATMO 335. Atmospheric Thermodynamics. (3-0). Credit 3. II
Application of thermodynamics to Earth’s atmosphere; phase changes of water; stability concepts; introduction to physical chemistry. Prerequisites: CHEM 102; MATH 251; PHYS 218.

ATMO 336. Atmospheric Dynamics. (3-2). Credit 4. II
Kinematic concepts and relationships; equations of motion; geostrophic and accelerated motions; the vorticity equation and Rossby waves. Prerequisites: ATMO 335, MATH 311 or registration therein.

ATMO 352. Severe Weather and Mesoscale Forecasting. (2-2). Credit 3. II
Parcel theory for dry and moist convection; sounding diagrams and their application to atmospheric convection; organization of midlatitude convection and severe weather; thunderstorm forecasting. Prerequisite: MATH 172.

ATMO 363. Introduction to Atmospheric Chemistry and Air Pollution. (3-0). Credit 3. I
Descriptive introduction of the composition and chemistry of natural and pollutant compounds in the atmosphere; transport, cycling and reactivity of atmospheric material; atmospheric measurements, data processing, air quality and human health issues; air pollution trends and climate change. Prerequisites: CHEM 101 and 102 or approval of instructor.

ATMO 435. Synoptic-Dynamic Meteorology. (3-0). Credit 3. I
Dynamics and diagnosis of synoptic-scale systems; perturbation theory and baroclinic instability; wave energetics, frontogenesis. Prerequisite: ATMO 336 or equivalent.

Introduction to satellite orbit dynamics, atmospheric radiative transfer, atmospheric remote sensing methods, and analysis and application of remotely-sensed meteorological data. Prerequisites: ATMO 324, MATH 308; junior or senior classification.

ATMO 446. Physical Meteorology. (3-0). Credit 3. I
Physics and meteorology of clouds and precipitation; atmospheric electricity; radiative transfer. Prerequisite: ATMO 335.

ATMO 455. Numerical Weather Prediction. (2-2). Credit 3. II
Basic principles of computer models of the atmosphere; parameterizations; use and critical evaluation of models and model output. Prerequisites: MATH 308; ATMO 336 or registration therein.

ATMO 456. Practical Weather Forecasting. (1-4). Credit 3. II
Advanced weather forecasting techniques with application to a variety of forecasting problems, both public and private sector. Prerequisites: ATMO 336 or 455; junior or senior classification.
ATMO 459. Tropical Meteorology. (3-0). Credit 3. I
Tropical climatology; structure, evolution, and motion of tropical cyclones; tropical cyclone hazards; large-scale tropical phenomena. Prerequisites: ATMO 336; ATMO 352 or registration therein.

ATMO 461. Broadcast Meteorology. (0-2). Credit 1. II
Instruction in the practice of broadcast meteorology; practice in and preparation of weather forecast products and demonstration videotapes. Prerequisites: ATMO 455 or approval of instructor; senior classification.

ATMO 463. Air Pollution Meteorology. (3-0). Credit 3. II
Problems of air pollution in our global atmosphere; environmental cycles; waste products in the biosphere; atmospheric pollution; natural concentrations of atmospheric constituents; pollution sources; atmospheric transport; pollution sinks; effects of pollution; monitoring and surveillance; and management of air quality. Prerequisite: ATMO 335 or approval of instructor.

ATMO 485. Directed Studies. Credit 1 or more each semester. I, II, S
Offered to enable majors in meteorology to undertake and complete with credit in their particular fields of specialization limited investigations not covered by any other courses in established curriculum. Prerequisite: Junior or senior classification.

ATMO 489. Special Topics in… Credit 1 to 4.
Selected topics in an identified area of meteorology. May be repeated for credit.

ATMO 491. Research. Credit 1 to 4.
Research conducted under the direction of faculty member in atmospheric sciences. May be repeated 2 times for credit. Prerequisites: Junior or senior classification and approval of instructor.

GEOS 444. The Science and Politics of Global Climate Change. (3-0). Credit 3. I
Examination of the policy and scientific debate over climate change; how scientific debates produce “knowledge”; how political debates produce policies; how policy debates use science; scientific evidence for climate change; impacts of climate change; possible responses to climate change; the political debate over climate change. Prerequisite: One semester of physics or one science core course.
Appendix A2. Undergraduate Program Assessment Plan

Bachelors of Science Program

Mission Statement

The department of Atmospheric Sciences is dedicated to advancing our scientific understanding of the atmosphere and imparting that knowledge for the benefit of society. The BS in Meteorology program develops students' professional, intellectual, and ethical capabilities in preparation for careers in government agencies or the private sector or as a basis for graduate study.

Learning Outcomes

A. Graduates will have an ability to express thoughts and ideas in a clear and logical manner, both orally and in writing.

B. Graduates will be well prepared to continue with advanced studies in atmospheric science.

C. Graduates will have sufficient knowledge of meteorology, mathematics, computer programming and other sciences to be well prepared to work in the area of atmospheric science.

D. Graduates will have an ability to analyze and interpret meteorological data and to prepare and present a weather forecast of expected weather conditions as a team and/or individually.

E. Graduates will have an ability to use mathematics to express the processes occurring in the atmosphere.

F. Graduates will have an understanding of the value of adhering to ethical standards of practice.

G. Graduates will have an understanding of how the environmental policies and practices of a nation can affect the global environment.

H. Graduates will have an understanding that to remain current with their understanding of the atmosphere, they must continue their studies after graduation.

I. Graduates will have positive and helpful experiences when interacting with department personnel; especially in the area of academic advising, and will find the curriculum has well prepared them for work or advanced studies in the field of atmospheric sciences.
Assessment

1. Students will work as a team or individually to analyze and interpret meteorological data and to prepare and present a weather forecast of expected weather conditions. Use a rubric for assessing. Intern Supervisor Surveys will be used to assess students abilities as compared with the supervisor’s knowledge of interns from other institutions.

2. The Undergraduate Committee will evaluate the number of students that took and received an acceptable GRE score and were accepted to graduate school.

3. The Undergraduate Committee will evaluate the Graduating Senior Exit Survey which is designed to assess the students career goals and whether the undergraduate program prepared the student well for entering their chosen area of atmospheric science.

4. The Undergraduate Committee will evaluate Intern Supervisor Surveys to assess students abilities as compared with the supervisor’s knowledge of interns from other institutions. The survey will also ask for suggestions to improve the curriculum.

5. A summary of student grades in required mathematics and science classes will be evaluated to assess students academic achievement.
Appendix B1. Graduate Courses

The numbers in parenthesis, (X-Y), are the number of lecture hours (X) and lab hours (Y) per week. Also listed is the total number of credits.

**ATMO 601. Fundamentals of Atmospheric Dynamics.** (3-0). Credit 3.
Basic concepts of fluid dynamics; meteorological approximations and coordinate systems; simple models and wave motion; barotropic models. Prerequisite: Approval of instructor.

Integrated treatment of fundamental aspects of physical meteorology and atmospheric chemistry; ultraviolet and infrared absorption and emission; radiative transfer; cloud and precipitation microphysics and thermodynamics. Prerequisite: ATMO 601.

**ATMO 603. Quantitative Methods for the Atmospheric Sciences.** (3-0). Credit 3.
Mathematical and numerical methods applied to ODE’s, PDE’s and statistical methods; methods of analysis and modeling of atmospheric phenomena. Prerequisite: Concurrent registration in ATMO 601 and CPSC 203 or equivalents.

**ATMO 604. General Circulation and Climate.** (3-0). Credit 3.
Observed large scale circulation and climate of the earth; physical processes which maintain relevant budgets; models and theories explaining mean observations. Prerequisite: ATMO 601.

**ATMO 605. Atmospheric Phenomena.** (3-0). Credit 3.
Observed patterns of circulation in the atmosphere; physical basis of weather development. Prerequisites: ATMO 601 and 602.

**ATMO 611. Atmospheric Dynamics II.** (3-0). Credit 3.
Continuation of ATMO 601; flow in planetary boundary layer; balanced flows; atmospheric instabilities; tropical dynamics. Prerequisite: ATMO 601 or approval of instructor.

**ATMO 612. Atmospheric Physics II.** (3-0). Credit 3.
Fundamentals of physical meteorology; includes cloud physics, atmospheric electricity and atmospheric chemistry. Prerequisite: Graduate classification or approval of instructor.

**ATMO 613. Advanced Atmospheric Chemistry.** (3-0). Credit 3.
An advanced survey of fundamental atmospheric processes involving biogeochemical cycles, air pollution, tropospheric chemistry, atmospheric aerosols and stratospheric chemistry. Prerequisite: ATMO 602.

**ATMO 621. Atmospheric Science.** (3-0). Credit 3.
An introduction in Atmospheric Sciences for teachers and military professionals; structure, behavior and processes of weather with climate systems; access to atmospheric data. Prerequisites: Undergraduate degree in related field; graduate classification.
ATMO 629. Climate Change. (3-0). Credit 3.
Climate of the geological and recent past; methods of assessing climate and climatic change; mechanisms, models, theories, impact and prediction of climatic change. Prerequisites: ATMO 324 or equivalent; approval of instructor.

A study of mathematical models used in the simulation of climate. Development and structure of selected members of the hierarchy of models ranging from energy balance models to general circulation models. Applications to paleoclimate and future climate scenarios. Prerequisite: Approval of instructor.

Advanced techniques especially applicable to climatology; space-time random field analysis applied to stochastic models, parameter estimation, statistical forecasting, data interpolation and signal detection; applications to real data and climate model output. Prerequisites: STAT 601 or equivalent; approval of instructor.

ATMO 635. Atmospheric Thermodynamics. (3-0). Credit 3.
Thermodynamic principles applied to the atmosphere; vertical structure and stability; weather processes; interpretation of vertical soundings. Prerequisites: MATH 308, PHYS 218; graduate classification.

ATMO 636. Dynamic Meteorology. (3-0). Credit 3.
General circulation; stratospheric dynamics; tropical systems. Prerequisite: ATMO 611.

ATMO 638. Dynamics of Convective Clouds. (3-0). Credit 3.
Parcel, slice and entrainment concepts; bubble and plume theories; spherical vortex; the starting plume; one-dimensional models; selected topics of current interest. Prerequisite: ATMO 611.

Physics of atmospheric condensation nuclei, ice in the atmosphere; precipitation processes; artificial modification of clouds; precipitation. Prerequisite: ATMO 612 or approval of instructor.

ATMO 655. Satellite Data in Meteorology. (3-0). Credit 3.
Meteorological satellite programs of the United States and other countries; theory of meteorological measurements from artificial satellites; applications of satellite data in determinations of atmospheric structure and in forecasting; recent and current research studies; future programs. Prerequisite: ATMO 251 or approval of instructor.

ATMO 656. Tropical Meteorology. (3-0). Credit 3.
Role of the tropics in global circulation; structure and dynamics of the tropical zone; local and diurnal phenomena; synoptic components; tropical cyclones; role of cumulus-scale convection; current topics. Prerequisite: ATMO 251 or approval of instructor.
ATMO 657. Mesometeorology. (3-0). Credit 3.
Theory and structure of mesoscale weather systems and their relation to larger and smaller scale systems. Prerequisite: ATMO 251 or approval of instructor.

ATMO 658. Synoptic Meteorology. (3-0). Credit 3.
Mechanism and energetics of general circulation. Structure of large-scale systems. Persons desiring practice in analysis techniques should enroll for 1 hour or more of ATMO 685. Prerequisite: ATMO 251 or approval of instructor.

ATMO 659. Tropical Cyclones. (3-0). Credit 3.
Tropical climatology; structure evolution and motion of tropical cyclones; tropical cyclone hazards; large scale tropical phenomena. Prerequisite: ATMO 251.

ATMO 661. Atmospheric Turbulence. (3-0). Credit 3.
Classical turbulence theories and statistical approaches; closure models; effects of rotation and stratification; interpretations of atmospheric observations. Prerequisite: ATMO 611 or suitable background in fluid dynamics.

ATMO 666. Agricultural Meteorology. (3-0). Credit 3.
Application of physical concepts of meteorology to problems arising in agriculture; meso- and micro-climates and their modification. Prerequisite: ATMO 324 or approval of instructor.

Presented by students and faculty based upon their research work and upon surveys of the literature.

ATMO 685. Directed Studies. Credit 1 or more each semester.
Offered to enable majors in meteorology to undertake and complete, with credit, in their particular fields of specialization, limited investigations not covered by any other courses in established curriculum.

ATMO 689. Special Topics in... Credit 1 to 4.
Special topics in an identified area of meteorology. May be repeated for credit.

ATMO 691. Research. Credit 1 or more each semester.
For thesis or dissertation. Topic subject to approval of department head.
Appendix B2. Graduate Program Assessment Plan

Master of Science Program

Mission Statement

The Department of Atmospheric Sciences is dedicated to advancing our scientific understanding of the atmosphere and imparting that knowledge for the benefit of society. The Master of Science program provides students with a broad knowledge of atmospheric sciences and prepares graduates for careers with both government agencies and the private sector.

Learning Outcomes

A. Graduates will have sufficient in-depth knowledge of at least one area of atmospheric sciences to be able to carry out supervised research in that area.

B. Graduates will have the ability to make oral presentations of their research in a clear and concise manner at seminars and conference presentations.

C. Graduates will have the ability to disseminate their research in written form, in a clear and logical manner, through conference posters and journal papers.

D. Graduates will have the knowledge and experience required for employment in atmospheric science-related professional positions in government agencies or in the private sector.

Assessment

1. 75% percent of graduates will have made an oral presentation to the department.
   Assess learning outcomes A, C
   Academic Advisor will keep track of student presentations to the department.

2. 50% percent of graduates will have made an oral or poster presentation at a scientific conference.
   Assess learning outcomes A, B, and C
   Academic Advisor will keep track of student presentations at conferences.

3. 50% percent of graduates will have a paper accepted for publication in a refereed journal at the time of graduation.
   Assess learning outcome A and C
   Academic Advisor will track student-authored papers.

4. 75% percent of graduates will find employment as atmospheric science professionals in universities, government agencies and private sector companies.
   Assess learning outcome D
Department will keep track of employment history of recent graduates through Postgraduate Exit Surveys and follow-up Alumni Surveys.

Doctor of Philosophy Program

Mission Statement

The Department of Atmospheric Sciences is dedicated to advancing our scientific understanding of the atmosphere and imparting that knowledge for the benefit of society. The Doctorate of Philosophy program provides students with a broad knowledge of atmospheric sciences as well as in-depth knowledge and research experience in one or more specialty areas; and prepares graduates for research and teaching careers, both in higher education and in government or private labs.

Learning Outcomes

A. Graduates will have the instructional skills and dedication needed to teach, or assist in teaching, courses in atmospheric science to undergraduate students.

B. Graduates will have a broad knowledge of the major areas of atmospheric science, including dynamical meteorology, physical meteorology, and atmospheric chemistry.

C. Graduates will have sufficient in-depth knowledge of at least one area of atmospheric sciences to be able to carry out independent research in that area.

D. Graduates will have the ability to make oral presentations of their research in a clear and concise manner at seminars and conference presentations.

E. Graduates will have the ability to disseminate their research in written form, in a clear and logical manner, through conference posters and journal papers.

F. Graduates will have the knowledge and experience required for employment as faculty or research scientists at universities or research labs.

Assessment

1. 75% percent of graduates will have demonstrated proficiency in teaching, or assisting in teaching, courses in atmospheric science.
   Assess learning outcome A
   Grad Committee will collect data from instructor course evaluations.

2. 75% percent of students will have demonstrated a broad knowledge of major areas of atmospheric science.
   Assess learning outcome B
   Grad Committee will collect data on performance in written qualifying exam.
3. 75% percent of graduates will have made an oral or poster presentation at a scientific conference.
   *Assess learning outcomes C, D and E.*
   Academic Advisor will keep track of student presentations at conferences.

4. 75% percent of graduates will have a paper accepted for publication in a refereed journal at the time of graduation.
   *Assess learning outcome C and E*
   Academic Advisor will track student-authored papers.

5. 75% percent of graduates will find employment as faculty, postdoctoral researchers, or research scientists in atmospheric science or related fields.
   *Assess learning outcome F*
   Department will keep track of employment history of recent graduates through Postgraduate Exit Surveys and follow-up Alumni Surveys.

*Program outcomes (applies to both Masters and PhD programs)*

Program Outcome #1: Increase the diversity of the graduate applicant pool and of the admitted applicants.

Assessment methods for Outcome #1:
Department keeps track of diversity statistics among applicants and admitted students.

Program Outcome #2: Increase the number graduate applicants with non-atmospheric science educational backgrounds.

Assessment methods for Outcome #2:
Department keeps track of statistics of undergraduate majors of graduate applicants.

Program Outcome #3: Expect MS students to complete their degree requirements within 2 years and PhD students to complete within 5 years.

Assessment methods for Outcome #3:
Department keeps track of completion times for MS and PhD students.

*Assessment Methods*

1. Course evaluations: Used to assess teaching proficiency of GATs/GANTs.

2. Qualifying Exam performance: Used to assess broad knowledge of atmospheric science

3. Record of conference presentations by students: Used to assess presentation skills of students.
   *(Will need to create departmental database)*
4. Record of student co-authored publications: Used to assess research and writing skills of students. (*Will need to create departmental database*)

5. Graduate application and admission statistics: Used to track Program Outcome goals regarding diversity and undergraduate majors.

6. Record of completion times for MS/PhD students: Used to track Program Outcome goals regarding graduation times.

7. Postgraduate Exit Survey: Used to track employment statistics and general degree of satisfaction with the graduate program. (*Graduate Committee will develop the survey. Academic Advisor will ensure that students fill it out prior to leaving campus.*)

8. Alumni Survey: Used to track employment statistics. (*Could be developed jointly with Undergraduate Committee. Department will need to manage the process of regular follow-ups to track former students.*)
Appendix C. Curricula Vitae

This appendix contains short CVs for all faculty and research scientists in the Department of Atmospheric Sciences.
Kenneth P. Bowman
Professor

Education
1984  Geophysical Fluid Dynamics, Ph.D., Princeton University
1981  Geophysical Fluid Dynamics, M.A., Princeton University
1979  Environmental Design, B.S., University of Colorado, Boulder

Professional experience
2007-present  Head, Department of Atmospheric Sciences
2004  Long-term visitor, National Center for Atmospheric Research, Atmospheric Chemistry Division (six months)
1998-present  Professor, Department of Atmospheric Sciences, Texas A&M University
1994-1998  Associate Professor, Department of Meteorology, Texas A&M University
1992-1994  Associate Research Scientist, Climate System Research Program, Department of Meteorology, Texas A&M University
1985-1992  Assistant Professor, Department of Atmospheric Sciences, University of Illinois
1983-1985  National Research Council Resident Research Associate, Laboratory for Atmospheres, NASA Goddard Space Flight Center
1979-1983  Research Assistant, Geophysical Fluid Dynamics Laboratory, Princeton University
1976-1979  Research Assistant, Institute of Arctic and Alpine Research, University of Colorado

Honors and awards
Texas A&M University Association of Former Students, College of Geosciences Distinguished Teaching Award, 1998

Graduate students since 2001 (chair or co-chair)
Dalon Stone, M.S., in progress
Cameron Homeyer, M.S., in progress
Matthew Rigney, M.S., in progress
Aditya Murthi, Ph.D., in progress
Jeremy DeMoss, M.S., Changes in TRMM Rainfall Due to the Orbit Boost Estimated from Buoy Rain Gauge Data, 2006
Craig Collier, Ph.D., Tropical Precipitation Simulated by the NCAR Community Climate Model (CCM3): An Evaluation Based on TRMM Satellite Measurements, 2005
Darielle Dexheimer, M.S., Lagrangian Methods For Climatological Analysis Of Regional Atmospheric Transport With An Emphasis On Texas Ozone Exceedances, 2004
Hye-Kyung Cho, Ph.D., Analysis of Rainfall Data from the Tropical Rainfall Measuring Mission (TRMM), 2002

Courses taught
ATMO 201 - Introduction to Atmospheric Science
ATMO 321 - Computer Applications in Atmospheric Science
ATMO 324 - Physical and Regional Climatology
ATMO 336 - Atmospheric Dynamics
ATMO 435 - Synoptic-Dynamic Meteorology
ATMO 441 - Satellite Meteorology and Remote Sensing
ATMO 485 - Directed Studies
ATMO 601 - Fundamentals of Atmospheric Dynamics
ATMO 602 - Principles of Atmospheric Physics and Chemistry
ATMO 685 - Directed Studies
ATMO 681 - Seminar

Service Activities

*Internal*
- Department Head, 2007-present
- Undergraduate program committee chair
- Tenure and promotion committee chair

*External*
- Member, START08/pre-HIPPO project team
- Member, Progressive Science project team
- Member, Program Committee, Joint European Geophysical Society/American Geophysical Union Spring Meeting, 2003
- Member, Publications Committee, American Geophysical Union, 2000-2002
- Secretary, Atmospheric Sciences Section, American Geophysical Union, 1998-2000
- Chair, American Meteorological Society Committee on the Middle Atmosphere, 1998-2001
Sarah D. Brooks  
Assistant Professor

Education  
2002  Analytical Chemistry, Ph.D., University of Colorado, Boulder  
1995  Chemistry, B.S., Massachusetts Institute of Technology

Professional Experience  
2005-present  Assistant Professor, Department of Atmospheric Science, Texas A&M University  
2002-2004  Postdoctoral Research, Colorado State University; Advisors: Drs. Paul DeMott and Sonia Kreidenweis  
1997-2002  Graduate Research, University of Colorado; Advisor: Dr. Margaret A. Tolbert  
1995-1997  Senior Research Technician, Dupont Corporate Catalysis Center; synthesized new metal oxide materials for catalytic oxidation chemistries.  
1993  Undergraduate Research, Massachusetts Institute of Technology; Advisor: Dr. Robert Field

Honors and Awards  
National Atmospheric Deposition Program Student Travel Award (student, Naruki Hiranuma), 2008  
PECASE 2007, Presidential Early Career Award in Science and Engineering (nominated by USDA)  
AMS Student Travel Award (student, Naruki Hiranuma), 2007  
AMS Student Conference Presentation (student, Naruki Hiranuma), 3rd place, 2007  
National Science Foundation CAREER Award, 2006  
Texas A&M Regents' Fellowship (student, Andrew Glen)  
Texas A&M Faculty Travel Award, 2006  
Pathways to the Doctorate Fellowship (with student, Naruki Hiranuma)  
Texas A&M International Research Travel Award Grant (IRTAG), 2005  
Field project participation in ISDAC, NASA SOLVE, CRYSTAL-FACE, IDEAS III, AIRS II, and INSPECT II.  
ACCESS nomination (Atmospheric Chemistry Colloquium for Emerging Senior Scientists), 2003  
NASA CRYSTAL-FACE and SOLVE Group Achievement Awards, 2002 and 2001  
European Aerosol Conference, Student Travel Award, September 2001  
ICNAA Student Travel Award, August 2000

Current Graduate Students  
Naruki Hiranuma  
Laura Mason  
Adam Fornea  
Andrew Glen  
Jianxu Lu (co-advising with Dr. Ping Yang)

Undergraduate Research Supervised  
Marissa Gonzales (current)
Cameron Moore
Leah Cheek
Christina Barron
Roberto Farias
Jonathan Gramann
Alicia Moore
Duncan Axisa (Master's student)

Courses Taught
ATMO 689/489 - Laboratory Methods in Atmospheric and Environmental Chemistry (designed and taught new lecture and laboratory course)
ATMO 446 - Physical Meteorology
ATMO 201 - Introduction to Atmospheric Science
GEOS 105 - Introduction to Environmental Sciences (Guest lecturer for 2 weeks)
GEOS 689/489 - International Polar Year (Guest lecturer)

Professional and Service Activities
Department of Atmospheric Sciences
  Recruitment Committee, 2008-present
  Graduate Committee, 2005-present
  Faculty Advisor to the Atmospheric Science Graduate Council, 2008
  GEOS Advisor, Member of GEOS Faculty, 2008-present
  Faculty Search Committee, 2006
  Project Mentor, NSF Diversity Workshop May 15-20, 2006
  Reinvestment Space Renovation Committee, 2006
  Seminar Committee Co-chair, 2005

Texas A&M University
  Participated in filming of University Communications recruitment video, 2008
  Keynote Speaker for Texas Junior Science and Humanities Symposium (a state-wide high school competition), 2008
  Featured Faculty in Aggieland Yearbook, 2008
  Collegewide Graduate Recruitment Committee member, 2007
  Panelist, CAREER and Young Investigator Workshop - 2 times
  Member, Center for Atmospheric Chemistry and the Environment (CACE)
  Member, Geochemistry of the Earth, Sea, and Atmosphere (GESA)
  Geosciences Faculty Advisory Council, member

National
  Served on USDA-CSREES Air Quality review panel, 2008
  Served on NSF Polar Programs review panel, 2007
  Served on NASA review panel, 2006

National Memberships
  American Geophysical Union (AGU)
  American Association of Aerosol Research (AAAR)
  American Meteorological Society (AMS)
Ping Chang
Professor of Oceanography and Atmospheric Sciences

Education
1988 Atmospheric and Oceanic Sciences, Ph.D., Princeton University, Princeton, NJ
1986 Atmospheric and Oceanic Sciences, M.A., Princeton University, Princeton, NJ
1984 Mechanical Engineering, M.E., City College of New York, New York, NY
1982 Applied Mathematics, B.S., East China Engineering Institute, Nanjing, China.

Professional Experience
2007-present Joint Appointment, Professor, Department of Atmospheric Sciences, Texas A&M University, College Station, TX
2002-present Adjunct Senior Research Scientist, The International Research Institute for Climate and Society, Columbia University, New York
2000-present Co-Director, The Joint Center for Ocean Circulation and Climate/Environment Studies, Institute of Oceanology, Chinese Academy of Sciences
2000-present Adjunct Professor, Institute of Oceanology, Chinese Academy of Sciences
1998-present Professor, Department of Oceanography, Texas A&M University, College Station, TX
1995-1998 Associate Professor, Department of Oceanography, Texas A&M University, College Station, TX
1990-1995 Assistant Professor, Department of Oceanography, Texas A&M University, College Station, TX
1988-1990 Postdoctoral Research Associate, Joint Institute for the Study of the Atmosphere and Ocean, University of Washington, Seattle, WA

Awards and Honors
The Association of Former Students Distinguished Achievement Awards of Texas A&M University, 2003
Chinese Academy of Sciences Outstanding Overseas Young Scientist Award, 2001
Faculty Fellow, Texas A&M University, 2000
College Award for Outstanding Research, Texas A&M University, 1998
National Science Foundation Young Investigator Award, 1993

Graduate/undergraduate students advised (2000 to present)
JoAnn A. Lysne (1994-2000), Ph.D, Oceanography, Co-Chairman
Susan Bates (1997-2000), MS, Oceanography, Chairman
Duke Min (1995-2001), Ph.D, Oceanography, Chairman
Faming Wang (1998-2003), Ph.D, Oceanography, Chairman
Marcelo Barriero (1999-2004), Ph.D, Oceanography, Chairman
Meyre Silva (1999-2005), Ph.D, Oceanography, Chairman
Li Zhang (2000-2005), Ph.D, Oceanography, Chairman
Yue Fang (2000-2005), Ph.D, Oceanography, Chairman
Wei Wu (2001-2005), Ph.D, Oceanography, Co-Chairman
Ciahong Wen (2003-present), Ph.D, Oceanography, Chairman
Xianquan Wan (2003-present), Ph.D, Oceanography, Chairman
Xiaohui Tang (2006-present), Ph.D, Oceanography, Chairman
Karthik Balaguru (2006-present), Ph.D, Oceanography, Chairman
Nick Petro (2008-present), MS, Atmospheric Sciences, Chairman
Zhao Xue (2008-present), Ph.D, Oceanography, Chairman

Service (2000 to present)
1998-2004, member, U.S. CLIVAR Atlantic Program Panel
1999-2004, member, U.S. PAGES/CLIVAR Working Group
2000, panelist, NASA Oceanography Review Panel
2001-2003, member, NCAR's Community Climate System Model Scientific Steering Committee
2003, co-chair, Organizing Committee of a Joint US CLIVAR-CCSM Workshop on "Reducing Biases in Coupled Model Simulations of the Tropical Oceans on Seasonal and Longer Timescales"
2003, panelist, NSF Climate Process Team review panel
2003, panelist, NOAA CLIVAR ATL and PAC review panel
2004, panelist, NSF Committee of Visitors (COV) for LARS of the Division of ATM
2005, member, NSF Climate Process Team review panel
2005-present, member, the modeling panel of the Tropical Atlantic Circulation Experiment, the International CLIVAR program
2006, member, NOAA Climate Variability and Predictability Program Review Panel
2007-present, member, the AMOC Science Team, U.S. CLIVAR program
2008-present, member, International CLIVAR Atlantic Implementation Panel

Editorships
2004-present  Member of editorial board of Chinese Journal of Oceanology and Limnology
2008-present  Editor, International Journal of Geophysics
Don R. Collins  
Associate Professor

Education
1999  Environmental Engineering Science, Ph.D., California Institute of Technology, Pasadena, CA  
1994  Civil Engineering, B.S., Virginia Tech, Blacksburg, VA

Professional Experience
2005-present  Associate Professor of Atmospheric Sciences, Texas A&M University  
1999-2005  Assistant Professor of Atmospheric Sciences, Texas A&M University

Editorships
2007-present  Associate Editor of the Journal of Geophysical Research - Atmospheres

Honors and Awards
Texas A&M Dean’s Distinguished Achievement Award for Faculty Research, 2007  
Texas A&M Association of Former Students College-Level Faculty Distinguished Award in Teaching, 2003  
Texas A&M Center for Teaching Excellence Montague Scholar Award, 2003  
National Science Foundation CAREER Award in Physical Meteorology and Atmospheric Chemistry, 2001  
National Aeronautics and Space Administration New Investigator Program (NIP) Award in Earth Science, 2001

Current Research Group
Graduate students
- Jason Tomlinson (Ph.D)
- Crystal Reed (Ph.D)
- Aparupa Chatterjee (Ph.D)

Duncan Axisa (M.S.)
Nathan Taylor (M.S.)

Post-docs
- Atilla Mutlu

Research Associates
- Runjun Li
- Chance Spencer

Courses Taught
- ATMO 201 - Atmospheric Science
- ATMO 335 - Atmospheric Thermodynamics
- ATMO 363 - Introduction to Atmospheric Chemistry and Air Pollution
- ATMO 446 - Physical Meteorology
- ATMO 463 - Air Pollution Meteorology
- ATMO 489 - Special Topics in Field Measurements in the Atmospheric Sciences
- GEOS 105 - Introduction to Environmental Geosciences (team taught with 3 others)
- ATMO 602 - Atmospheric Physics and Chemistry
- ATMO 613 - Advanced Atmospheric Chemistry (team taught with 2 others)
- ATMO 681 - Seminar in Atmospheric Sciences
- ATMO 685 - Seminar Course in Atmospheric Chemistry (team taught with 2 others)
Don T. Conlee  
Instructional Associate Professor

Education
1994  Meteorology, Ph.D., Texas A&M University  
1991  Meteorology and Physical Oceanography, M.S., Naval Postgraduate School  
1983  Atmospheric Sciences, B.S., University of Louisiana, Monroe

Professional experience
2009– Instructional Associate Professor, Department of Atmospheric Sciences  
2007-2008  Gulf Region Manager, NortekUSA, Stennis Space Center, Mississippi  
2003-2007  Chief Scientist, National Data Buoy Center, Stennis Space Center, Mississippi  
2001-2003  Commanding Officer, Naval Technical Training Unit, Keesler AFB, Mississippi  
1999-2001  Director of Remote Sensing Programs and Fleet Systems, Naval Meteorology and Oceanography Command, Stennis Space Center, Mississippi  
1997-1999  Meteorology, Oceanography, and Strike Warfare Officer, U.S. Navy, Enterprise Battle Group Staff  
1994-1997  Satellite and Environmental Data Department Head, Fleet Numerical Meteorology and Oceanography Center, Monterey, California  
1987-1989  Meteorologist, USS Iwo Jima (LPH-2)  
1983-1986  NWP Quality Control/Project Development Officer, Fleet Numerical Oceanography Center, Monterey, California  
1979-1982  Observer/Meteorological Technician, National Weather Service, Agricultural Weather Service Center, Stoneville, Mississippi

Honors and awards
  Hall-of-Fame Inductee, Fleet Numerical Meteorology and Oceanography Center, 2007  

Graduate students since 2001 (chair or co-chair)
  Not Applicable

Courses taught
  ATMO 203 – Weather Forecasting Lab (Scheduled Fall 09)  
  ATMO 251 - Weather Observation and Analysis (Scheduled Fall 09)  
  ATMO 352 – Severe Weather and Mesoscale Forecasting  
  ATMO 456 - Practical Weather Forecasting

Service Activities
  Internal
    Undergraduate program committee member  
    Student Chapter, American Meteorological Society, Assistant Advisor
  External
    Member, Gulf Coast Ocean Observing System (GCOOS) Observing Systems Committee, 2006-2009
Member, CARO-COOPS and CORMP (Academic observation network operators) Science Advisory Boards, 2005-2006
Member, GOES-R Cal/Val steering group, 2004-2007
Co-Organizer, Wave Sensor Workshop, Alliance for Coastal Technologies, 2007
Co-Organizer, Meteorological Observations Workshop, Alliance for Coastal Technologies, 2006
Andrew E. Dessler
Professor

Education
1994 Chemistry, Ph.D., Harvard University
1990 Chemistry, M.A., Harvard University
1986 Physics, B.A., Rice University

Professional Experience
2007 Professor, Department of Atmospheric Sciences, Texas A&M University
2005-2007 Associate Professor, Department of Atmospheric Sciences, Texas A&M University
2000 Senior Policy Analyst, White House Office of Science and Technology Policy, Environment Division, Washington, DC
1998-2005 Associate Research Scientist, Earth System Science Interdisciplinary Center (ESSIC), Univ. of Maryland, College Park, MD
1996-1998 Assistant Research Scientist, ESSIC and the Dept. of Meteorology

Honors and Awards
Aldo Leopold Leadership Program Fellowship, 2006
NASA New Investigator Award Recipient, 1999
AGU Atmospheric Sciences Section Outstanding Student Paper Award, 1993
NASA Graduate Student Fellowship in Global Change Research, 1991-1994

Graduate Students
Sean Casey, Ph.D., expected 2009
Joonsuk Lee, Ph.D., 2007
Hyun Cheol Kim (Univ. of Maryland), 2005
Jeremy Solbrig, M.S., expected 2009
Allison Cardona, M.S., 2008
2 masters degrees from University of Maryland

Postdoctoral Associates
Wei Wu, 2005-2006
Likun Wang, 2004-2005
Sun Wong, 2003-2005
Christian Alcala, 2001-2002
**Research Scientist**  
Sun Wong, 2005- Present

**Classes Taught**  
GEOS 289 - Climate change  
GEOS 489 (now GEOS 444) - The science and politics of global climate change  
ATMO 201 - Atmospheric science  
ATMO 685 - Climate modeling

**Service Activities**  
Chair, TAMU Atmospheric Sciences Undergraduate Program Committee, 2008-Present  
TAMU Atmospheric Sciences Awards Committee (Chair 2005-2008), 2005-Present  
TAMU Atmospheric Sciences Computer Committee, 2005-2008  
Associate Editor, *Journal of Geophysical Research*, 2002  
Editor, AGU Books Board (Head Editor, 1998), 1997-2002  
AGU Publications Committee, 1996-2000  
AGU Committee on Education and Human Resources, 1994-1996
Shouguo Ding
Research Associate

Education
2004 Atmospheric Sciences, Ph.D., Institute of Atmospheric Physics, Chinese Academy of Sciences, Beijing, China
2001 Atmospheric Sciences, M.S., Department of Geophysics, Peking University, Beijing, China
1992 Atmospheric Sciences, B.S., Department of Atmospheric Sciences, Lanzhou University, Lanzhou, China

Professional Experience
2007-present Research Associate, Department of Atmospheric Sciences, Texas A&M University, College Station, Texas, USA
2007 Postdoctoral Research Associate, Department of Atmospheric Sciences, Texas A&M University, College Station, Texas, USA
2005-2006 Postdoctoral Researcher, Department of Atmospheric Sciences, Peking University, Beijing, China
1992-1998 Assistant engineer, Hebei Meteorological Bureau, Shijiazhuang, China

Awards
Xie Yibing Award, Peking University, Beijing, China, 1999
Outstanding Ph.D. Candidate Award, Chinese Academy of Science, Beijing, China, 2004
Robert A. Duce
Distinguished Professor Emeritus

Education
1964 Nuclear Chemistry, Ph.D., Massachusetts Institute of Technology
1957 Chemistry, B.A., Baylor University

Professional Experience
2006- Distinguished Professor Emeritus
2004-2006 Distinguished Professor, Oceanography and Atmospheric Sciences, Texas A&M University
1991-1997 Dean, College of Geosciences, Texas A&M University
1991-2004 Professor, Oceanography and Atmospheric Sciences, Texas A&M University
1987-1991 Dean, Graduate School of Oceanography, University of Rhode Island
1970-1991 Associate Professor/Professor, Oceanography, University of Rhode Island
1965-1970 Assistant/Associate Professor, Chemistry, University of Hawaii
1964-1964 Post-doctoral Fellow, Massachusetts Institute of Technology

Honors and Awards
Rosenstiel Award in Marine and Atmospheric Chemistry, 1990
Fellow, AMS, 1983
Fellow, American Association for the Advancement of Science, 1990
Fellow, American Geophysical Union, 1991
Fellow, The Oceanography Society, 2006

Graduate Students Chair Since 2001
Kim Mace, PhD (Oceanography)
Tae Siek Rhee, PhD (Oceanography)

Courses Taught at Texas A&M
Introduction to Oceanography (undergraduate)
Atmospheric Chemistry (graduate)

Professional Service
Member, National Sea Grant Review Panel, 2000-present
Member, Steering Committee, International Geosphere-Biosphere Program, 2004-present,
President, ICSU Scientific Committee on Oceanic Research (SCOR), 2000-2004, Past-
President, 2004-present; Member, Executive Committee, 1995-present
Member, Program Advisory Committee for the NSF Ocean Observatories Initiative, 2008-
present
Chair, United Nations GESAMP, 2000-2002; Vice Chair, 1998-2000, Member, 1986-present
Member, National Research Council Ocean Studies Board, 2001-2007
Member, US National Committee for IUGG, 2000-2007
Chair, UCAR SPEC Review Panel, 2000-2004
President, International Association of Meteorology and Atmospheric Sciences (IAMAS), 1995-
1999
President, The Oceanography Society, 1996-1998
Member, Board of Governors, Joint Oceanographic Institutions Inc., 1987-1997
Member, Board of Governors, Consortium for Oceanographic Research and Education, 1994-1997
Member, Executive Committee, Ocean Drilling Program, 1987-1997
Member, National Science Foundation Advisory Committee for Geosciences, 1993-1997
Member, American Association for the Advancement of Science (AAAS) Council, 1990-1993
Member, American Meteorological Society Council, 1988-1991
Member, Director's Advisory Committee, National Center for Atmospheric Research, 1993-1999
Member, Executive Committee, NASULGC Board on Oceans and Atmospheres, 1993-1997
President, IAMAS Commission on Atmospheric Chemistry and Global Pollution, 1983-1990
Member, National Science Foundation Advisory Committee for Ocean Sciences, 1991-1994
Member, NRC Board on Atmospheric Sciences and Climate, 1982-1986; 1989-1993
Member, Board of Trustees, University Corporation for Atmospheric Research, 1986-1993
Member, Steering Committee, International Global Atmospheric Chemistry Program, 1987-1993
Member, NRC Committee on Atmospheric Chemistry, 1987-1990
Member, National Science Foundation Advisory Committee for Atmospheric Sciences, 1984-1987
Chairman, NRC Panel on Global Tropospheric Chemistry, 1982-1985
Member, World Meteorological Organization, Committee on Atmospheric Sciences, 1982-1987
Member, National Science Foundation Advisory Committee for Ocean Sciences, 1980-1983
Craig C. Epifanio  
Associate Professor

Education
1999  Atmospheric Sciences, Ph.D., University of Washington, Seattle, WA  
1994  Physics, B.S. (*summa cum laude*), Williams College, Williamstown, MA

Professional Experience
2002-present  Assistant Professor, Department of Atmospheric Sciences, Texas A&M University  
1999-2001  Postdoctoral Research Fellow, Advanced Study Program, National Center for Atmospheric Research

Awards and Honors
AFS College-Level Teaching Award, College of Geosciences, 2007  
NCAR Advanced Study Program postdoctoral fellowship, 1999  
Best Oral Presentation, Student, Eighth Conference on Mountain Meteorology, Flagstaff AZ, 1998  
National Defense Science and Engineering Graduate Fellowship, 1994  
American Meteorological Society Graduate Fellowship, 1994  
University of Washington graduate school scholarship, 1994  
Phi Beta Kappa, 1994-present  
Barry M. Goldwater Scholarship (for excellence in science), 1992

Graduate Students Supervised
Kevin Viner Ph.D., current  
Tingting Qian Ph.D., current (co-chair with Fuqing Zhang)  
Jamie Smith M.S., 2005  
Kevin Walter M.S., 2004 (co-chair with John Nielsen-Gammon)

Professional Service
Member, AMS Mesoscale Committee, 2007-present  
Associate Editor, Journal of the Atmospheric Sciences, 2006-present  
Session Chair, 12th Conference on Mountain Meteorology, Santa Fe, NM, August 2006  
Selection Committee for Best Student Presentation and Poster,  
11th Conference on Mountain Meteorology, Bartlett, NH, June 2004  
Session Chair, 10th Conference on Mesoscale Processes, Portland, OR, June 2003  
Writing Mentor, SOARS Summer Research Program, NCAR, Summer 2001  
Proposal reviewer for the National Science Foundation, the Norwegian Research Council, and FWF (Austria), 2002-present  
**Academic and University Service**

*Departmental Committees, Department of Atmospheric Sciences*
- Chair, Computer and Facilities Committee, 2008-present
- Chair, Lecturer Search Committee, Weather and Forecasting II, 2008
- Faculty Search Committee, Weather and Forecasting I, 2008
- Awards Committee, 2008-present
- Recruiting Committee, 2007
- Qualifying Exam Committee, 2005-present
- Computer Committee, 2005-2007
- Ad hoc Committee for the Revision of Qualifying Exam, Summer 2005
- Undergraduate Committee, 2003-present
- Chair, Undergraduate Scholarship and Awards Subcommittee, 2003-2008
- Graduate Committee, 2001-2003

*Other Service*
- Graduate Recruiting Initiative, College of Geosciences, Summer 2007
- Advisor, Student Chapter of the American Meteorological Society, 2002-present
- Undergraduate Advisor, Atmospheric Sciences, 5-10 students, 2002-present
- Seminar Coordinator, Atmospheric Sciences, Fall 2003

**Courses Taught**
- ATMO 657/658 - Mesoscale and Synoptic-scale Dynamics (Spring 2004, split with NG)
- ATMO 685 - Directed Studies (Spring 2005, one student)
Gang Hong  
Assistant Research Scientist

**Education**

2004  
Environmental Physics and Remote Sensing, Ph.D. (*magna cum laude*), Institute of Environmental Physics, University of Bremen, Germany

2000  
Graduate Student, Atmospheric Radiation and Remote Sensing, Department of Atmospheric Science, School of Physics, Peking University, China

1995  
Atmospheric Science, B.S., Department of Atmospheric Physics, Nanjing Institute of Meteorology, China

**Professional Experience**

2008- Present  
Assistant Research Scientist, Department of Atmospheric Sciences, Texas A&M University

2006-2008  
Research Associate, Department of Atmospheric Sciences, Texas A&M University

2005-2006  
Postdoctoral Research Associate, Department of Atmospheric Sciences, Texas A&M University

2004-2005  
Postdoctoral Research Associate, Institute of Environmental Physics and Remote Sensing, University of Bremen, Germany

2000-2004  
Research Assistant, Institute of Environmental Physics and Remote Sensing, University of Bremen, Germany

**Professional Activities**


Invited presentation “Detection of tropical deep convective clouds from AMSU-B water vapor channels measurements” by the Atmospheric Physics Group at the Sciences Materials, Department of Lecce University, Italy, 2004

Member of American Geophysical Union; American Meteorological Society; IEEE Geoscience and Remote Sensing Society

**Honors and Awards**

Daimler-Benz Fellowship for Ph.D. Candidate, December 2000- November 2003, Germany

Bremen University Dissertation Fellowship, December 2003-May 2004, Germany

The Award of Chinese Academy of Sciences, 1999-2000, Peking University, China

Hong Kong Dongshi Dongfang Award for Graduate Student, 1998-1999, Peking University, China.
Xiaoming Hu  
Research Associate

Education
2008  Atmospheric Science, Ph.D., North Carolina State University
2004  Atmospheric Physics and Atmospheric Environment, M.S., Peking University, China
2001  Atmospheric Sciences, B.S., Peking University, China

Professional Experience
2008-present  Research Associate (Post-doc), North Carolina State University
2007  Visiting Scholar, National University of Mexico (also called UNAM), Mexico City
2004-2008  Research Assistant, North Carolina State University
2006-2007  Teaching Assistant, North Carolina State University
2003  Intern at a meteorology program in CCTV4 (China centre television channel 4)
2001-2004  Research Assistant, Peking University, Beijing, China
2003-2004  Teaching Assistant, Peking University, Beijing, China
2001  Field Measurement, Suburb of Haidian district, Beijing, China

Invited Presentations
Hu, X.-M., and Zhang, Y., 2007, Model Development and Initial Application of WRF/Chem-MADRID, invited seminar at National University of Mexico (also called UNAM), Mexico City, June 27.
Hu, X.-M., 2007, Preliminary Understanding of 3-D Aerosol Simulation, Guest Lecture for a graduate course entitled Air Quality Modeling and Forecasting, NCSU, Raleigh, April 19

Computer Skills
Fortran, C, NCL, NCO, MATLAB, LINUX, Parallel computing, Cluster building, Shell script, Vis5D, PAVE, LATEX, GNU plot

Awards and Honors
The National Scholars Honor society, 2008
Phi Kappa Phi Honor Society, North Carolina State University, 2005
Certificate for Studying Excellence, Peking University, Beijing, China, Oct. 2003
Guanghua Fellowship, Peking University, Beijing, China, Oct. 2003

Membership/Activities
Reviewer for Monthly Weather Review
Member of American Geophysical Union (AGU), September 2006-present.
Member of American Meteorological Society (AMS), December 2005-present.
Member of Air & Waste Management Association (A&WMA), March 2005-present
Alexei Khalizov  
Assistant Research Scientist

**Education**

1997  
Physical Chemistry, Ph.D., Ufa Research Center of the Russian Academy of Sciences

1994  
Chemistry, M.S./B.S. (honors), Bashkir State University, Ufa, Russia

**Professional Experience**

2005-present  
Assistant Research Scientist, Department of Atmospheric Sciences, Texas A&M University

2002-2005  
Postdoctoral Research Associate, Department of Chemistry, University of Waterloo, ON

2002  
Research Associate, Chemistry Department, McGill University, ON

1999-2002  
NATO-NSERC Postdoctoral fellow, Chemistry Department, McGill University, ON

1997-1999  
Research Scientist, Ufa Research Center of the Russian Academy of Sciences

**Honors and Awards**

NATO-NSERC Science Fellowship, McGill University, QC, 2000-2002

International Soros Science Educational Program Scholarship, Ufa Research Center of the Russian Academy of Sciences, 1997

International Soros Science Educational Program Scholarship, Ufa Research Center of the Russian Academy of Sciences, 1996

Scholarship of the Government of Republic Bashkortostan, Ufa Research Center of the Russian Academy of Sciences, 1996

**Society Memberships and Service**

Member of American Geophysical Union (AGU)

Member of American Association for Aerosol Research (AAAR)

Reviewer for Journal of Geophysical Research

Proposal Reviewer for American Chemical Society (ACS) PRF Fund
Robert Lindsay Korty  
Assistant Professor

Education  
2005  Climate Physics and Chemistry, Ph.D., Massachusetts Institute of Technology  
1999  B.A. with high distinction, University of Virginia  

Professional Experience  
2007-present  Assistant Professor of Atmospheric Sciences, Texas A&M University  
2006-2007  Postdoctoral Scholar in Environmental Sciences and Engineering, California Institute of Technology  
2005  Postdoctoral Fellow, Joint Program on the Science and Policy of Global Change, Massachusetts Institute of Technology  

Awards, Honors, and Recognitions  
Warren G. Klein Fellow, Massachusetts Institute of Technology, 1999-2000  
Michael Garstang Atmospheric Science Award, University of Virginia, May 1999  
Distinguished Major, Department of Environmental Sciences, University of Virginia, May 1999  

Advising and Mentoring  
Advisor to Stephen Cathey, 2008-present  
Thesis committee member for Justin Stachnik (2008-present)  
Postdoctoral advisor to Sarah Zedler, 2007-2008  

Teaching Experience  
ATMO 632 - Statistical Methods in Climate Research (Spring 2008)  
ATMO 601 - Fundamentals of Atmospheric Dynamics (Fall 2008)  
GEOL 658 - Earth System through Deep Time (lecturer, Fall 2008)  

Service Activities  
Reviewer for National Science Foundation  
Department of Atmospheric Sciences Seminar Coordinator, Spring 2008  
Departmental Website Committee Representative  
Departmental Computer Committee Member  
Department of Atmospheric Sciences Library Liaison  
Represented Department Junior Faculty at UCAR meeting, Fall 2007  
External search committee member for faculty position in Georphy, 2008-2009  
Search committee member for IODP Director, 2008-2009  

Invited Lectures  
Harvard University, Equable Climate Workshop, 2008
Purdue University, Department of Earth and Atmospheric Sciences, 2008
Massachusetts Institute of Technology, Program in Atmospheres, Oceans & Climate, 2007
University of California, San Diego, Scripps Institution of Oceanography, 2007
Johns Hopkins University, Department of Earth and Planetary Sciences, 2007
Texas A&M University, Department of Atmospheric Sciences, 2007
New York University, Courant Institute of Mathematical Sciences, 2006
International Research Institute for Climate and Society, Tropical Cyclone Workshop, 2006
Colorado State University, Department of Atmospheric Sciences, 2006
University of Washington, Department of Atmospheric Sciences, 2006
McGill University, Department of Atmospheric and Oceanic Sciences, 2005
California Institute of Technology, Division of Geological and Planetary Sciences, 2005
Princeton University, Atmosphere and Oceanic Sciences Program, 2004
Mark T. Lemmon  
Associate Professor

Education  
1994  Planetary Sciences, Ph.D., University of Arizona.  
1989  Physics, B.S., University of Washington

Professional Experience  
2005-present  Associate Professor, Department of Atmospheric Sciences, Texas A&M University  
2002-2005  Associate Research Scientist, Department of Atmospheric Sciences, Texas A&M University  
2000-2002  Visiting Assistant Professor, Department of Physics, Texas A&M University  
1999-2000  Senior Research Associate, Department of Planetary Sciences, University of Arizona  
1994-1999  Research Associate, Department of Planetary Sciences, University Arizona

Honors and Awards  
ESA award for “outstanding contribution to the Huygens Probe,” 1998  
7 NASA Group Achievement Awards, 1996-2008

Graduate Students  
Stephanie Grounds, M.S., in progress  
Nathan Hall, Ph.D., in progress

Courses Taught  
ATMO 655 - Satellite Data in Meteorology  
ATMO 201 - Introduction to Atmospheric Sciences  
ATMO 485 - Directed Studies  
Teaching release granted Spring 2006, Spring 2008 (bought out time to support spacecraft development and operations commitments)  
PHYS 306 - Basic Astronomy  
PHYS 314 - Survey of Astronomy

Service Activities  
Atmospheric Sciences Computer Committee, 2006-2007  
Reinvestment Space Modification Committee, 2006-2007  
Member: International Astronomical Union, American Astronomical Society (Division of Planetary Sciences), American Geophysical Union, American Meteorological Society  
Proposal Reviewer for: NASA Planetary Atmospheres Program (panel chair 9/02, panelist 9/07), NASA Discovery Program (panelist 10/04), NASA Mars Data Analysis Program

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Review panel member, Mars Phoenix Lander Ground Data System / Mission Operation System Preliminary (4/05) and Critical (2/06) Design Reviews
Member, Mars Human Precursor Science Steering Group - Dust, Soil, and Toxicology Focus Group, 2004
Member, Science Definition Team for 2009 Mars Telecom Orbiter, 2004
Atilla Mutlu
Postdoctoral Research Associate

Education
2007  Biological and Agricultural Engineering, Ph.D., Texas A&M University
1999  Agricultural Engineering, M.Sc., Cukurova University, Adana, Turkey
1996  Agricultural Engineering, B.S., Cukurova University, Adana, Turkey

Professional Experience
2007-present  Post Doctoral Research Associate, Department of Atmospheric Sciences at Texas
              A&M University, College Station, TX
2003-2007  Graduate Research Assistant, Department of Biological and Agricultural
            Engineering Texas A&M University, College Station, TX
2001-2003  Research Scholar, Department of Agricultural Engineering, Bio-Environmental
            Engineering Division, University of Illinois, Urbana-Champaign, IL
1996-2001  Graduate Research & Teaching Assistant, Department of Agricultural
            Engineering, Cukurova University, Adana, Turkey

Honors and Awards
Lone Star Graduate Diversity Colloquium Choice Award, 2006
Texas A&M University, Student Research Week, 2006
Graduate Tuition Pool Award ($1,431), Excellent Performance in Graduate Program, funded by
Biological and Agricultural Engineering Department at Texas A&M University, 2004
Outstanding Graduate Student of 2003, English Language Institute at Texas A&M University

Memberships and Service
American Society of Agricultural and Biological Engineers (ASABE), 2001-present
“Environmental Air Quality” Committee Member (SE-305) of ASABE, 2005-present

Teaching Experience
2007-Spring  Spatial Technologies of Precision Agriculture, Texas A&M University
2006-Fall  Process & Storage of Agricultural Product, Texas A&M University
2006-Spring  Application of Information Technologies, Texas A&M University
  Spatial Technologies of Precision Agriculture, Texas A&M University
2005-Fall  Mechanical Engineering Design, Texas A&M University
1999-2001  Fall Design of Agricultural Structures and Green Houses, Cukurova University
  Mechanics of Engineering, Cukurova University
1997-1999  Spring Advanced Surveying (Field Applications), Cukurova University
Shaima L. Nasiri  
Assistant Professor

**Education**
- 2004  Atmospheric and Oceanic Sciences, Ph.D., University of Wisconsin, Madison
- 1999  Atmospheric and Oceanic Sciences, M.S., University of Wisconsin, Madison
- 1997  Physics and Mathematics, B.S. (*magna cum laude*), University of Denver

**Professional Experience**
- 2006-present  Assistant Professor, Department of Atmospheric Sciences, Texas A&M University
- 2005  Post-doctoral Researcher, University of Wisconsin, Madison, WI.
- 2001-2004  Graduate Research Assistant (Ph.D), University of Wisconsin, Madison
- 1999-2001  Assistant Researcher / Research Intern, University of Wisconsin, Madison
- 1997-1999  Graduate Research Assistant (M.S.), University of Wisconsin, Madison
- 1996  NASA Summer Intern, Goddard Space Flight Center, Greenbelt, MD

**Honors and Awards**
- Suomi-Simpson Graduate Fellowship, UW-Madison and NASA-GSFC Earth Sciences Directorate, 2002
- Best Student Poster Award, 2001, 11th AMS Conference on Satellite Meteorology and Oceanography

**Graduate Students Advised**
- Hongchung Jin, ATMO, Ph.D., current
- Hyoun-Myoun Cho, ATMO, Ph.D., current, co-advised with Ping Yang
- Jeremy Solbrig, ATMO, M.S., current, co-advised with Andrew Dessler
- Christopher Dobbs, M.S., 2006-2007, left without thesis

**Courses Taught**
- ATMO 201 - Introduction to Meteorology, Fall 2006, Fall 2007, Fall 2008
- ATMO 446 - Atmospheric Physics, Spring 2008, radiation section of course (co-taught with Richard Orville)

**Academic Service**
- Department scholarship committee, College scholarship committee, Fall 2008
- Department qualifying exam committee, 2007-2008
- Department physical meteorology courses review committee, 2007
- Department dynamics courses review committee, 2007
- Departmental reinvestment space modification committee, 2006-2007
- Departmental Colloquium Committee, 2006-2007
- University CIRTL (Center for Integrated Research, Teaching, and Learning) Steering Committee, 2006-2007
- 2006-present  Advisor to ATMO undergraduates
Professional Development
AMS Summer Policy Colloquium, Washington, D.C., June 3-12, 2007
Workshop for Early Career Faculty in the Geosciences: Teaching, Research, and Managing Your Career, sponsored by NSF, College of William & Mary, June 7-11, 2006

Society Memberships
American Meteorological Society (AMS), Member
American Geophysical Union (AGU), Member
John William Nielsen-Gammon
Professor

Education
1990 Meteorology, Ph.D., Massachusetts Institute of Technology
1987 Meteorology, S.M., Massachusetts Institute of Technology
1984 Earth and Planetary Sciences, S.B., Massachusetts Institute of Technology

Professional Experience
2008-present Acting Executive Associate Dean and Associate Dean for Research, College of Geosciences, Texas A&M University
2000-present Professor of Meteorology, Texas A&M University
2000-present Texas State Climatologist
2003-2007 Associate Director, The Center for Atmospheric Chemistry and the Environment
1997-1998 Deputy Speaker, Texas A&M Faculty Senate
1996-2000 Associate Professor of Meteorology, Texas A&M University
1991-1996 Assistant Professor of Meteorology, Texas A&M University
1990-1991 Postdoctoral Research Associate, State University of New York at Albany

Honors and Awards
Certificate of Recognition, National Aeronautics and Space Administration, 2007
Editor's Award, American Meteorological Society, 1997
Faculty Distinguished Achievement Award in Teaching, Texas A&M University Association of Former Students, 1996
Presidential Faculty Fellow, National Science Foundation/White House, 1995
Distinguished Teaching Award, College of Geosciences and Maritime Studies, Association of Former Students, 1995
National Collegiate Weather Forecasting Contest, First Place, 1989-1991

Professional and Service Leadership Activities
Texas A&M University
Radar/Mesoscale Faculty Search Committee, Chair, 2007-2008
Promotion and Tenure Committee, Chair, 2003-2005; 2007-present
Undergraduate Program Committee, Chair, 2003-2005
Synoptic/Mesoscale Faculty Search Committee, Chair, 1999-2001
Ad Hoc Peer Teaching Evaluation Committee, Chair, 1993-1996
Data Resources Committee, Chair, 1993-1995
Environmental Studies Program, Water Focus Working Group, Chair, 2008
College Advisory Committee on Promotion and Tenure, Chair, 2001-2002
Ad Hoc Committee on Reconciling the Faculty Reward System with the Multiple Missions of Texas A&M University, Co-Chair, 1998-2000; Cross-College Inventory and Comparison Subcommittee, Chair, 1997-1998
Faculty Senate, Deputy Speaker, 1997-1998; Personnel and Welfare Committee, Member, Chair, 1998-1999

External and Scientific
IAMAS International Commission for Dynamical Meteorology; President, 2007-present, Secretary, 2003-2007

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American Meteorological Society Board on Higher Education: Chair, 2008-present, Program Co-Chair, 2008 AMS Student Symposium, Program Co-Chair, 2007 AMS Student Symposium
Chapter Editor, Handbook of Weather, Climate, and Water, 1999-2003
Texas Commission for Environmental Quality: Chair, Meteorological Modeling Working Group, 2001-present
TexAQS-2 Field Program: Chair, Meteorological Processes Committee, 2004-2006, Lead Forecaster, 2005-2006
Texas and Florida Underflights Experiment, Lead Forecaster, 1998
Genesis of Atlantic Lows Experiment, Lead Forecaster, 1986

Courses Taught
ATMO/METR 151 - Weather Forecasting
METR 201(Honors) - Atmospheric Science (co-instructor)
ATMO 251 - Weather Observation and Analysis
ATMO 435 - Synoptic-Dynamic Meteorology
METR 451 - Weather Observation and Analysis (co-instructor)
METR 452 - Dynamics of Weather Processes
ATMO 455/489/689 - Numerical Weather Prediction
ATMO 456/489 - Practical Weather Forecasting
ATMO 459/659 - Tropical Cyclones (co-instructor)
ATMO/METR 485 - Directed Studies
METR 602 - Principles of Atmospheric Physics and Chemistry
ATMO/METR 658 - Synoptic Meteorology
ATMO 685 - Directed Studies

Student Supervision
Doctoral Dissertations: 6
Master's Theses: 23
Current Graduate Students: 3
Gerald R. North
Distinguished Professor

Education
1966-1968  Postdoctoral Research Associate, University of Pennsylvania,
1996      Physics, Ph.D., University of Wisconsin-Madison
1960      Physics, B.S., University of Tennessee

Professional Experience
1986-present  Distinguished Professor of Meteorology and of Oceanography, Texas A&M
University
1995-2003  Head, Department of Atmospheric Sciences, Texas A&M University
1994      Visiting Scientist, University of Reading, Reading, UK
1986-1999  Director of Climate System Research Program, Texas A&M University
Station, TX
1978-1986  Physical Scientist, AST, Climate/Radiation Branch, NASA/GSFC, Greenbelt, MD
1980-1986  Lecturer/Adjunct Professor, Department of Meteorology, University of Maryland,
College Park
1977-1980  Professor, Department of Physics, University of Missouri, St. Louis
1979      Visiting Professor, Columbia University, Summer Lecture Program,
NASA/Goddard Institute for Space Studies, New York, NY
1972-1977  Associate Professor, Department of Physics, University of Missouri, St. Louis
1977      Visiting Scientist, Main Geophysical Observatory, Leningrad, USSR
1975      Guest Investigator, Woods Hole Oceanographic Institution, Woods Hole, MA.
Summer
1974-1975  Senior Fellow, National Center for Atmospheric Research, Boulder, CO
1968-1972  Assistant Professor, Department of Physics, University of Missouri, St. Louis
1966-1968  Research Associate, Department of Physics, University of Pennsylvania
1957-1961  Technician/Programmer, Oak Ridge National Laboratory, Oak Ridge, TN

Honors and Awards
Jule G. Charney Award, American Meteorological Society, 2008
Fellow: AAAS, AGU, AMS
Editor’s Citation for Outstanding Referee for Geophysical Research Letters, AGU, 2006
Editor in Chief, Reviews of Geophysics, Jan. 2005-
Holder of the Harold J. Haynes Endowed Chair in Geosciences, July 2003-2008
Listed as One of the Most Highly Cited Authors in Geosciences (top 0.5%) by Science Citation
Index, 2002
Member, Board of Trustees, National Institute for Global Environmental Change, 1999-2002,
Chairman, 2001-02
Member, Board of Trustees, Universities Space Research Association, 2001-2007
Chancellor’s Distinguished Lecturer, Louisiana State University, April 1999
Speaker and Moderator, Houston Forum, September 1998
Interim Editor, Journal of Atmospheric Sciences, 1995-1996
Associate Editor, Journal of Atmospheric & Oceanic Technology, 1993-1996
Selected Speaker, Texas A&M University Faculty Lecturer Series, 1993-1994
Distinguished Achievement Award for Research, Association of Former Students, Texas A&M University, 1993
Elected Member (twice), Univ. Corp. of Atmos. Res. (UCAR), Bd of Trustees, 1990-94
Member, Executive Committee, Board on Atmospheric Science and Climate, National Research Council, 1989-96
Editor’s Citation for Outstanding Referee for JGR, American Geophysical Union, 1985
Member, Editorial Board, Climate Dynamics, 1984-
Exceptional Scientific Achievement Medal for NASA, 1983
Exceptional Performance Award (NASA/GSFC), 1982
Associate Editor, Journal Geophysical Research, 1979-1984
Outstanding Publication Award, National Center for Atmospheric Research, 1975
Richard E. Orville  
Professor

Education  
1966  Meteorology, Ph.D., University of Arizona  
1963  Meteorology, M.S., University of Arizona  
1958  Physics, A.B., Princeton University  

Professional Experience  
2003-present  Interim Head and Head (2003-2007) and Professor  
1993-present  Director, Cooperative Institute for Applied Meteorological Studies, Texas A&M University  
1991-2003  Research Scientist and Fellow, Cooperative Institute for Applied Meteorological Studies, and Distinguished Lecturer, Department of Atmospheric Sciences, Texas A&M University  
1983-1988  Chairman, Department of Atmospheric Science, State University of New York at Albany  
1981-1991  Professor of Atmospheric Science, State University of New York at Albany  
1968-1981  Associate Professor of Atmospheric Science, State University of New York at Albany, Albany, New York (1968-1971: Primary association with the Atmospheric Sciences Research Center) [1970-71: Associate Program Director, Physical Meteorology, National Science Foundation, Washington DC, on leave of absence from State University of New York at Albany]  
1966-1968  Senior Scientist, Westinghouse Research Laboratories, Pittsburgh, PA  

Additional Employment  
1979  Visiting Associate Professor, Department of Meteorology and Space Science and Engineering Center, University of Wisconsin, Madison, Wisconsin  
1976  Visiting Senior Scientist, Advanced Study Program, National Center for Atmospheric Research, Boulder, Colorado  
1970-1971  Associate Program Director for Meteorology, National Science Foundation, Washington, DC  

Honors and Awards  
Editors Award, American Geophysical Union, *J. Geophys. Res. –Atmospheres*, 1986  
Sackler Medal in Geophysics, Tel Aviv University, Israel, 1987  
Suomi Distinguished Lecturer (Inaugural lecturer), University of Wisconsin, Madison, 1989  
J. Murray Mitchell Lecturer (Inaugural lecturer), Blue Hill Observatory, Cambridge, MA, 1991  
Editors Award, American Geophysical Union, *J. Geophys. Res. –Atmospheres*, 1992  
Charles Franklin Brooks Award, American Meteorological Society, “For superb leadership as Commissioner for more than a decade,” 1994  
Faculty Distinguished Achievement Award in Teaching, Texas A&M University, College of Geosciences, 2000  
Award for Outstanding Contribution to the Advance of Applied Meteorology, American Meteorological Society, “For distinguished scientific contributions which have greatly
improved our understanding the phenomenology and climatology of the lightning discharge,” 2006
Sigma Xi Distinguished Research Award (TAMU), 2008

Graduate-student Advisory Committees (Texas A&M University) since 2001
Ely, Brandon, Chair, MS, 1999-2002
Ely, Brandon, Chair, PhD, 2002-2008
Phillips, Steven, Chair, MS, 1999-2001
Schulze, Karl, Memer, MS, 1997-2003
Steiger, Scott, Chair, MS, 1999-2001
Steiger, Scott, Chair, PhD, 2001-2005
Smith, Jamie, Chair, MS, 2003-2005
Cocks, Steven, Member, PhD, 2000-2003
Jurecka, Joe, Chair, MS, 2006-2008
Clements, Nathan, Chair, MS, 2005-2007
Hodapp, Charles, Member, MS, 2005-2007
McKinney, Chris, Member, MS, 2006-2008
Seroka, Greg, Chair, MS, 2008-present

Courses Taught at Texas A&M University
ATMO 201 - Introduction to Atmospheric Science
ATMO 446 - Physical Meteorology
ATMO 612 - Atmospheric Physics
ATMO 645 - Cloud and Precipitation Physics

Professional Societies
American Meteorological Society (Fellow, 1979), American Geophysical Union, American Association for the Advancement of Science, Royal Meteorological Society (Foreign Member), National Weather Association, American Optical Society, Institute of Electronic and Electrical Engineers, International Union of Geodesy and Geophysics, Sigma Xi

Professional Service
University Corporation for Atmospheric Research (UCAR), (service since 2001): University Relations Committee, 2004-present; Member's Representative, 2003-2007
American Geophysical Union: President-Elect, Atmospheric Sciences Section, 1986-88; President, Atmospheric Sciences Section, 1988-90; Member: AGU President’s Club, 1988-present
R. Lee Panetta  
Professor

Education
1978    Mathematics, Ph.D., University of Wisconsin-Madison
1972    Mathematics, M.S., University of Wisconsin-Madison
1969    Mathematics, B.S., McGill University

Professional Experience
2007-present   Professor, Department of Atmospheric Sciences, TAMU
1988-2007      Associate Professor, Department of Atmospheric Sciences, TAMU
1985-1988      Research Associate, Joint Institute for the Study of the Atmosphere and Oceans, University of Washington
1982-1985      Visiting Scientist, GFD Program, Princeton University
1979-1982      Project Associate, Space Science and Engineering Center, University of Wisconsin-Madison
1978-1979      Assistant Professor, Department of Mathematics, Occidental College

Professional Service (Selected)
HIPCAT (High Performance Computing Across Texas); Texas A&M Institutional Representative and Executive Committee member, 2002-present
TIGRE (Texas Internet Grid for Research and Education), Steering Committee, 2004-present
Texas A&M Faculty Steering Committee on High Performance Computing, 1995-present, Chair since 2001
User Advisory Committee, National Partnership for Advanced Computational Infrastructure (NSF), 1998-2004

Graduate Students
Onica, C., Ph.D. (2005  w/ C. Foias)
Terez, I.E., Ph.D (1997)
Chen, B., Ph.D. (1994)
Tang, G., M.Sc. (current)
Fox, A K., M.Sc (2001)
Park, S., M.Sc. (1992)

Courses Taught
ATMO 661 - Atmospheric Turbulence
ATMO 636 - Advanced Dynamical Meteorology
ATMO 611 - Atmospheric Dynamics II
ATMO 601 - Fundamentals of Atmospheric Dynamics
ATMO 459 - Tropical Meteorology
ATMO 446 - Physical Meteorology
ATMO 435 - Synoptic/Dynamic Meteorology
ATMO 336 - Atmospheric Dynamics
ATMO 335 - Atmospheric Thermodynamics
ATMO 201 - Atmospheric Science
MATH 689 - Mathematical Introduction to Geophysical Fluid Dynamics
Ramalingam Saravanan
Professor

Education
1990  Atmospheric and Oceanic Sciences, Ph.D., Princeton University
1986  Physics, M.S., Indian Institute of Technology, Kanpur, India

Professional Experience
2005-present  Professor, Department of Atmospheric Sciences, Texas A&M University
2000-2005  Scientist III (equivalent to Associate Professor), Climate & Global Dynamics Division, National Center for Atmospheric Research, Boulder, CO
1993-2000  Scientist I/II, Climate & Global Dynamics Division, National Center for Atmospheric Research, Boulder, CO
1990-1993  Post-doctoral Research Associate, Department of Applied Mathematics and Theoretical Physics, University of Cambridge, Cambridge, England
1986-1990  Graduate Research Associate, Atmospheric and Oceanic Sciences Program, Princeton University

Awards and Scholarships
National Talent Search scholarship awarded by the National Council for Educational Research and Training (India), 1980-1986

Graduate Students Advised
Ph.D., S. Mahajan, Xiaojie Zhu (current)
M.S., K. Borg (current), K. Collins

Courses taught at Texas A&M
ATMO 611 - Atmospheric Dynamics II
ATMO 324 - Physical & Regional Climatology
ATMO 201 - Introduction to Atmospheric Science

External Service
Editor, Journal of Climate, 2007-present
Co-chair, Program Committee for the 14th AMS Conference on Atmospheric and Oceanic Fluid Dynamics, San Antonio, Texas, June 2003
Co-convener, NCAR/ASP Colloquium on the Dynamics of Decadal-to-Centennial Climate Variability, July 2000
Member, AMS Committee on Atmospheric and Oceanic Fluid Dynamics, 2000-2003
Member, U.S. CLIVAR Pacific Sector Implementation Panel, 1999-2000
Member, NASA Seasonal-to-Interannual Predictability (NSIPP) Science Team, 2000-2005
Gunnar Wolfgang Schade
Assistant Professor

Education
1997 Chemistry, Dr. rer. nat. (DSc), magna cum laude, Johannes Gutenberg Universität, Mainz, Germany
1993 Chemistry, Diploma (MSc), Johannes Gutenberg Universität, Mainz, Germany

Professional Experience
2005-present Assistant Professor, Texas A&M University, Department of Atmospheric Sciences
2003-2005 Emmy Noether Research Fellow, University of Bremen, Germany
2001-2002 Assistant Specialist, University of California at Berkeley, Department of Environmental Science, Policy, and Management (ESPM)
1998-2001 Post-doctoral Research Fellow, University of California at Berkeley, ESPM
1997-1998 Post-doctoral Researcher at the Max-Planck-Institute of Chemistry, Air Chemistry Department, Mainz, Germany
1994-1997 Post-Graduate Research Assistant at the Max-Planck-Institute of Chemistry, Air Chemistry Department
1993-1994 Graduate Research Assistant (diploma/masters student) at the Max-Planck-Institute of Chemistry, Air Chemistry Department

Honors and Awards
DAAD, Postdoctoral Research Grant (NATO Program), 1 year, 1999
DFG, Emmy Noether Program Research Grant: 2 years, 2003-2005

Supervised Graduate Students
Before TAMU (graduation month in parenthesis):
   Dr. Sheena Juliet Solomon (Dr. rer. nat. at University of Bremen): 2003-2007 (May 2007)

Faculty Advisor (Advisory Committee Chair):
   Changhyoun Park (PhD candidate ATMO): 2005-present
   Ian Boedeker (MSc candidate ATMO): 2006-present
   Lijun Zhou (PhD candidate ATMO): 2006-present

Member of Advisory Committee:
   Naruki Hiranuma (PhD candidate at Texas A&M University): 2005-present
   Lindsey Visser (MSc candidate, OCNG): 2008
   Lei Hu (MSc candidate, OCNG): 2008
   Yina Liu (MSc candidate, OCNG): 2008

Courses Taught
At the IUP in Bremen:
   Measurement Methods Practical (Lab), co-taught, University of Bremen
   Trace Gas Biogeochemistry, Department of Environmental Physics, University of Bremen
Tropospheric Chemistry, Department of Environmental Physics, University of Bremen

At Texas A&M University:
GEOS489/ATMO689 - Global Biogeochemical Cycles
ATMO613 - Advanced Atmospheric Chemistry
ATMO689 - Introduction to Atmospheric Chemistry
ATMO463 - Air Pollution Meteorology
ATMO485 - directed studies
ATMO691 - Research

Service
Department/College Service
Department of Atmospheric Sciences Undergraduate Committee: Member since 2005
Department of Atmospheric Sciences Qualifying Exam Committee: Member since 2007
College Undergraduate Curriculum Committee: Member since 2007

Outside Service
American Geophysical Union (AGU) member since 1997
Air & Waste Management Association (AWMA) member since 2006
Proposal Reviewer for NSF, DFG, and European Science Foundation
Consultant for the Caddo Lake Institute with respect to greenhouse gas emissions abatement proposals for Caddo Lake, TX
Steven R. Schroeder  
Postdoctoral Research Associate

Education

1998  Meteorology, Ph.D., Texas A&M University,
1979  Operations Research, M.S., Air Force Institute of Technology, Dayton, OH
1973  Mathematics and Physics, B.A., Capital University, Columbus, OH

Professional Experience

1999-present  Postdoctoral Research Associate, Dept. of Atmospheric Sciences, Texas A&M University
1993-1998  PhD Student, Dept. of Meteorology, Texas A&M University
1973-1993  Officer, United States Air Force (retired as Major)
1991-1993  Plans Officer, Air Education and Training Command, Randolph AFB, TX
1989-1991  Wargame Officer, Combined Forces Command, Yongsan Army Installation, Seoul, Korea
1987-1989  Technical Training Officer, Air Training Command, Randolph AFB, TX
1978-1979  M.S. student, Air Force Institute of Technology, Wright-Patterson AFB, OH
1977-1978  Computer Systems Duty Officer, Air Force Global Weather Central, Offutt AFB, NE
1974-1977  Forecaster, Air Force Global Weather Central, Offutt AFB, NE
1973-1974  Basic Meteorology Program, St. Louis University, St. Louis, MO

Courses Taught

ATMO451 - Weather Observation and Analysis
Courtney Schumacher  
Assistant Professor

Education
2003  Atmospheric Sciences, Ph.D., University of Washington  
2000  Atmospheric Sciences, M.S., University of Washington  
1994  Environmental Sciences, B.A., University of Virginia

Professional Experience
2003-present  Assistant Professor, Department of Atmospheric Sciences, Texas A&M University, College Station  
1996-2003  Graduate Research Assistant, University of Washington, Seattle, WA

Awards and Fellowships
College of Geosciences Robert C. Runnels Excellence in Advising Award, 2007  
Texas A&M University Fish Camp Namesake, 2007  
NASA New Investigator Program Award, 2006  
NSF CAREER Award, 2005  
NASA Goddard Space Flight Center Summer Faculty Fellowship, 2004  
NASA Earth System Science Fellowship, 2001-2003

Professional Activities
AMS Committee of Judges for Undergraduate Awards Member (2005-2009) and Chair (2007-2008)  
Committee for the Geotis Prize 2007 (33rd International Conference on Radar Meteorology)  
Max Eaton Committee 2004, 2006 (AMS 26th, 27th Conference on Hurricanes and Tropical Meteorology)  
Reviewer of articles in the following journals: BAMS, GRL, JAM/JAMC, JTECH, JAS, JOC, JGR, MWR, QJRMS, SOLA, WF  
Reviewer of grant applications for the following agencies: DOE, NASA, NSF, Indo-US Science & Technology Forum, Cambridge University Press  
Participant on the following panel: NASA Precipitation Science (2006)

Student Advising
Current graduate students  
Elinor Martin, Ph.D. student since 2008  
Matt Mosier, M.S. student since 2008 (co-chair with Richard Orville)  
Justin Stachnik, Ph.D. student since 2007  
Wei Li, Ph.D. student since 2006  
Larry Hopper, Ph.D. student since 2005, M.S. (2008)  
Effects of baroclinicity on storm divergence and stratiform rain in a precipitating subtropical region  
Sean Casey, Ph.D. student since 2005 (co-chair with Andy Dessler), M.S. (2007)  
The Frequency of tropical precipitating clouds as observed by the TRMM PR and ICESAT/GLAS
Former graduate students
Celina Hernandez, M.S. (2008) *The QBO’s influence on lightning production and deep convection in the tropics*
Karen Brugman, M.S. (2007) *Variations in storm structure and precipitation characteristics associated with the degree of environmental baroclinicity in southeast Texas*
Kaycee Frederick, M.S. (2006) *Anvil characteristics as seen by C-POL during the Tropical Warm Pool International Cloud Experiment (TWP-ICE)*

Supported undergraduate research assistants
Aaron Ferrel, Fall 2007-present
Collin Lawrence, Fall 2007-present
Emily Borchard, Summer 2008
Cameron Homeyer, Summer 2007-Spring 2008

Courses Taught
ATMO 201 - Introduction to Atmospheric Sciences
ATMO 291/491 - Undergraduate Research (Student Operational ADRAD Project
ATMO 443 - Radar Meteorology
ATMO 459 - Tropical Meteorology (undergraduate)
ATMO 656 - Tropical Meteorology (graduate)

Invited Presentations and Seminars (while at Texas A&M University)
City College of New York, CREST, New York NY, September 2008
4th PAN-GCSS Meeting, Toulouse France, June 2008
Monash University, Melbourne Australia, August 2007
Bureau of Meteorology Research Centre, Melbourne Australia, August 2007
DOE ARM 16th Science Team Meeting, Monterey CA, March 2007
NCAR Tropical Convection & The Weather Climate Interface Retreat, Boulder CO, July 2006
UCLA, Dept. of Atmospheric and Oceanic Sciences, Los Angeles CA, June 2005
University of Wisconsin, Dept. of Atmospheric and Oceanic Sciences, Madison WI, Feb 2005
TAMSCAMS (Texas A&M University student AMS chapter), College Station TX, Oct 2004
University of North Dakota, Dept. of Atmospheric Sciences, Grand Forks ND, September 2004
AMS Houston Chapter, Houston TX, September 2004
NASA/GSFC, Greenbelt MD, July 2004
NOAA-Howard University 2nd Annual Instrumentation Workshop, Beltsville MD, June 2004
University of Virginia, Dept. of Environmental Sciences, Charlottesville, VA, January 2004
Lin Wang
Postdoctoral Research Associate

Education
2006  Environmental Toxicology, Ph.D., University of California, Riverside
2002  Environmental Sciences, M.S., Fudan University, Shanghai, China
1999  Applied Chemistry, B.S., Fudan University, Shanghai, China

Professional Experience
2007-present  Postdoctoral Research Associate, Department of Atmospheric Sciences, Texas A&M University
2007  Postdoctoral Researcher, Air Pollution Research Center, University of California, Riverside
2002-2006  Graduate Student Researcher, Department of Environmental Science & Engineering, Fudan University
1998-2002  Research Assistant

Honors and Awards
UC TSR&TP Best Publication Award, 2007
T. Roy Fukuto Fellowship, 2006
DIOXIN/ISPAC 2005 student presenter travel award, co-sponsored by 25th International Symposium on Halogenated Environmental Organic Pollutants and POPs, and 20th International Symposium on Polycyclic Aromatic Compounds, 2005
Graduate student association mini-grant, University of California, Riverside, 2005
Pre-doctoral award (an award of $17,500 annually), UCLA/UCR/LANL Lead Campus Program, Mechanisms of Toxicity component of the University of California Toxic Substances Research and Teaching Program, 2003-2004
Dean’s fellowship, University of California, Riverside, 2002-2006
Distinguished student, Shanghai, China, 2001
Miscellaneous fellowships from Fudan University, 1995-2002
Distinguished student, Fudan University, 1997, 1999, 2000
Distinguished student, Suzhou, China, 1995
**Shuguang Wang**  
Postdoctoral Research Associate

**Education**
- 2008   Atmospheric sciences, M.S. and Ph.D., Texas A&M University
- 2003   Atmospheric Sciences, B.S. and M.S., Nanjing University, China

**Professional Experiences**
- 2008-present  Postdoctoral Research Associate, Department of Atmospheric Sciences, Texas A&M University
- 2003-2008  Graduate Assistant Research, Department of Atmospheric Sciences, Texas A&M University

**Honors and Awards**
- People’s Scholarships from Nanjing University, 1996 to 2000
- Graduate Scholarship, College of Geosciences, Texas A&M University, 2005

**Conference and Workshop Presentations**
- Ray tracing of gravity waves in vortex dipoles, Spontaneous Imbalance workshop, Seattle, WA, August 2006
- Sensitivity of mesoscale gravity waves to the baroclinicity of jet-front systems, 11th Conference on Mesoscale Processes, Albuquerque, NM, October 2005
Richard A. Weitz
Software Engineer and System Administrator

Education
1992 C programming, Texas A&M University
1986 Tropical Meteorology and Meteorological Satellite Imagery Interpretation, Chanute AFB, Illinois
1983 Air Force Institute of Technology (AFIT) Basic Meteorology Program, Texas A&M University
1981 Aeronautical Science, B.S. Bache, Embry-Riddle Aeronautical University, Prescott, Arizona

Professional Experience
1998- Research Associate, Texas A&M University
1991-1998 Research Assistant, Texas A&M University

Texas A&M University
1997- Meteorology Department
1997- Microwave Remote Sensing Group: Develop, maintain, and improve C programs, Unix shell scripts, and FORTRAN programs to process large sets of Meteorological data collected by satellites and from special field experiments which include aircraft collected data. System Administrator for the group's NFS connected Linux and Unix machines.
1993-1997 Oceanography Department
1994-1997 Physical Oceanography Section: Develop, maintain, and improve C programs to view and analyze cat scan images of sea floor cores on a PC. Transfer raw and finalized cat scan data to CD's using a PC
1993-1994 Geological Oceanography Section: Develop, maintain, and improve C programs, Unix shell scripts, and FORTRAN programs to process large sets of oceanographic transmissometer data. Process collected data from raw binary data files into finalized data matrices for use with, and direct input into, Microsoft Excel. Help graduate students understand the data reduction programs and made these programs more user friendly. Used finalized individual files with the GMT system of C programs to produce postscript gray shaded graphical displays of all finalized data. Used GMT to make multiple x-axis postscript plots of several parameters for each decimated raw data file. Also used GMT to make postscript maps of the data collection locations and ship tracks.
1991-1993 Physics Department
1993 Assistant system manager for a VAX 3200 with VMS 5.5, and an IBM RISC Station 6000 with a UNIX operating system. Develop database management software for the Project 2061 Curriculum
1991-1993 Development and Resource System. This is a PC based relational database and graphical user interface software development project aimed at science education curriculum reform. This software is designed to conform to the kindergarten
through twelfth grade curriculum development philosophy of the American Association for the Advancement of Science (AAAS) Project 2061. This relational database software is intended to be networked throughout the US. The project sponsor is AAAS and the National Science Foundation. Within the first month I developed a database application impressive enough to secure an annually renewed software development contract.

Skills
Programming in C, FORTRAN, Unix shell scripting, and Generic Mapping Tools (GMT)
Certified Single/Multi-Engine Land Airplane, Commercial/Instrument Rated Pilot
Practical meteorology and meteorological satellite data interpretation

Air Force Security Clearance
Top Secret
Yonghui Weng
Research Associate

Education:
2003 Atmospheric Science, Ph.D., Institute of Atmospheric Physics, Chinese Academy of Science
1997 Atmospheric Science, M.S., Chinese Academy of Meteorological Sciences, China Meteorological Administration
1994 Atmospheric Science, B.S., Nanjing Institute of Meteorology

Professional Experience:
2006-present Visiting Scholar, Department of Atmospheric Science, Texas A&M University, College Station, TX
2004-2005 Associate Professor, Chinese Academy of Meteorological Sciences, China Meteorological Administration
2000-2004 Assistant Professor, Chinese Academy of Meteorological Sciences, China Meteorological Administration
1997-2000 Graduate Research Assistant, Chinese Academy of Meteorological Sciences, China Meteorological Administration

Research Experience
Ensemble Kalman Filter assimilation of radar radial velocity, 2006-
Exploitation of the operational system for the mesoscale heavy rainfall through mesoscale numerical models, 2003-2005
Analysis and study on the mechanism of the forming, causing and transporting of the sand storm by using the retrieved TOVS data and a mesoscale numerical model Study of the dynamic and thermodynamic impact of the city buildings and underlying surface on the boundary layer in city areas, 2000-2002
Research on the characteristics of the mesoscale systems in the heavy rainfall over the middle and lower reaches of the Yangtze River Basin in 1998 by using the above-mentioned technique, 1990-2000
Assimilation of the TOVS data by using variational technique and its application on the analysis and numerical simulation of the initial field over the Tibetan Plateau, 1996-1998
Designing an environmental protection scheme by using the atmospheric diffusion model, 1995-1996
Thomas T. Wilheit, Jr.
Professor

Education
1970 Physics, Ph.D., Massachusetts Institute of Technology
1967 Physics, M.A., Washington University
1963 Physics, B.A. (cum laude), University of the South

Professional Experience
1989-present Professor, Department of Meteorology Atmospheric Sciences, Texas A&M University
1997-2006 Brockett Professor of Geosciences, Department of Atmospheric Sciences, Texas A&M University
1985-1989 Head of the Microwave Sensors and Data Communication Branch of NASA/GSFC
1971-1985 Research Scientist NASA/GSFC
1970-1971 NAS/NRC Resident Research Associate, GSFC

Other Credentials
Commercial Pilot: Airplane: Single Engine Land, Instrument
Private Pilot: Glider, Airplane Single Engine Sea

Honors and Awards
Verner E. Suomi Award of the American Meteorological Society, 2009
Fellow of the Institute of Electrical and Electronics Engineers, 2004
Texas A&M University Faculty Distinguished Achievement Award in Research, 2000
Fellow of the American Meteorological Society, 1997
NASA Exceptional Service Medal, 1989
Japan Trust Fellow, 1989
NASA Medal for Exceptional Scientific Achievement, 1974

Society Memberships
American Geophysical Union (AGU), 1991-present
Committee on Space Research (COSPAR) Commission-A, 1979-present
Fellow, American Meteorological Society (AMS), 1975-present
Fellow, Institute of Electrical and Electronic Engineers (IEEE), 1975-present
American Association for the Advancement of Science, (AAAS), 1970-present
Phi Beta Kappa, 1963-present

Selected Special Assignments
Visiting Professor at Nagoya University (Japan), Jan-Apr 2004
P.I. Wakasa Bay Experiment (flown out of Yokota AFB, Japan), Jan-Feb 2003
Lecturer, AMS Short Course on Satellite-Derived Precipitation Estimates, 1999
Co-Chief Editor (Atmospheres) Journal of Atmospheric and Oceanic Technology, 1998-2001
Instrument Scientist, Large Aperture Multifrequency Microwave Radiometer (LAMMR) on the National Oceanic Satellite System (NOSS) satellite, 1979-1981
Member of the experiment teams for the Scanning Multichannel Microwave Radiometers (SMMR's) on Nimbus 7 and Seasat, 1974-1985
Principal Investigator, Electrically Scanned Microwave Radiometers (ESMRs) on Nimbus 5 and 6, 1971-1980

Research Activities
Member of the Science Advisory Group for the Advanced Microwave Scanning Radiometer on AQUA (NASA/ESA/NASDA (Japan), 1993-present
Retrieval of Water Vapor Profiles from SSM/T-2 Data (USAF/NOAA), 1993-present
Radiometer Team Leader on the Project Science Team for the Tropical Rain Measuring Mission (NASA), 1993-present
Co-propoer (along with North and Thiele) of the Tropical Rainfall Measurement Mission (NASA), 1986
Member of the Science Steering Group for the Tropical Rainfall Measurement Mission (NASA), 1987-1991
Development of passive microwave techniques (NASA Global Weather Program), 1977-1989
SMMR Algorithm Refinements (NASA Oceanic Processes Program), 1978-1985

Courses Taught at TAMU
Metr. 616 - Remote Sensing of the Atmosphere
Metr 655 - Satellite Data in Meteorology
Metr 445 - Radiation in the Atmosphere
Metr 685 - Problems (Electromagnetic Theory)
Metr 306 - Atmospheric Science Workshop
Metr 689 - Special Topics on Radiation in Models
Metr 485/489 - Aviation Weather
Metr 201H - Atmospheric Science (Honors section)
ATMO 612 - Atmospheric Physics II
Dr. Sun Wong  
Research Scientist

Education
1999    Physics, Ph.D., Columbia University
1995    Physics, M.A. and M.Phil., Columbia University
1992    Physics, B.S. (with honor), The Chinese University of Hong Kong

Professional Experience
2005    Assistant Research Scientist, Department of Atmospheric Science, Texas A&M University, College Station, TX
2003-2005  Postdoctoral Research Associate, Earth System Science Interdisciplinary Center, University of Maryland, College Park, MD
1999-2003  Postdoctoral Research Associate, Atmospheric Science Research Center, State University of New York at Albany, Albany, NY

Other Activities
Convener and chair of the session “The Role of Dust in the Global Climate System” in 2007 AGU spring meeting in Acapulco, Mexico, 2007
Building a coupled tropospheric climate-chemistry model based on NCAR CCM3 and UiO chemistry module, 2000-2003
Conducted long-term climate simulation in SUNY at Albany for the Atmospheric Model Intercomparison Project 2 (AMIP2), 1999-2000

Award
Ping Yang
Professor

Education
1995 Meteorology, Ph.D., University of Utah, Salt Lake City, Utah
1988 Atmospheric Physics, M.S., Lanzhou Institute of Plateau Atmospheric Physics, Chinese Academy of Science, Lanzhou, China
1985 Theoretical Physics, B.S., Lanzhou University, Lanzhou, China

Appointments
2008-present Professor, Department of Atmospheric Sciences, Texas A&M University
2005-2008 Associate Professor, Department of Atmospheric Sciences, Texas A&M University
2001-2005 Assistant Professor, Department of Atmospheric Sciences, Texas A&M University
2001-2001 Associate Research Scientist, Goddard Earth Sciences and Technology Center, University of Maryland Baltimore County, Baltimore, Maryland
1999-2001 Research Scientist, Science and System Application, Inc. Lanham, Maryland (worked on-site in code 913, NASA Goddard Space Flight Center, Greenbelt, Maryland)
1997-1999 Assistant Research Scientist, Department of Atmospheric Sciences, University of California, Los Angeles
1996-1997 Research Associate, Department of Meteorology/Center for Atmospheric Remote Sensing Study, University of Utah

Awards
Best Paper Award, Climate and Radiation Branch, NASA Goddard Space Flight Center, 2000
National Science Foundation (NSF) CAREER Award, 2003
NASA Group Achievement Award to CRYSTAL-FACE Science Team, 2003
Dean’s Distinguished Achievement Award for Faculty Research, College of Geosciences, Texas A&M University, 2004

Editorship

Graduate Student Theses and Dissertations Supervised

Master’s Degree Theses
Zhibo Zhang, M.S., “Computation of the Scattering Properties of Nonspherical Crystals,” 2004
Christopher Yost, M.S., “Use of AIRS and MODIS Thermal Infrared Channels to Retrieve Ice Cloud Properties,” 2006
Yu Xie, M.S., “The Effect of Ice Crystal Surface Roughness on the Retrieval of Ice Cloud Microphysical and Optical Properties,” 2007
Kevin Garrett, M.S., “Hyperspectral and narrowband remote sensing of cirrus clouds using infrared spectral data.” Thesis defense: June 1, 2007

Ph.D. Dissertations
Kerry Meyer, Ph.D., “Global ice cloud observations: radiative properties and statistics from Moderate-resolution Imaging Spectroradiometric Measurements,” 2007 (supervised by P. Yang)
Guang Chen, Ph.D., “Modeling of the optical properties of nonspherical particles in the atmosphere,” 2007 (supervised by P. Yang)

Current Graduate Students (Chair or co-chair)
Qian Feng, Ph.D., Chair, in progress
Hyoun-Myoung Cho, Ph.D., Co-Chair, in progress
Yu Xie, Ph.D., Chair, in progress
Lei Bi, Dept. of Physics, Ph.D., Co-chair, in progress
Feng Zhang, Ph.D., Chair, in progress
Yue Li, Ph.D., Chair, in progress
Jianxu Lu, Ph.D., Chair, in progress
Zhaokai Meng, Dept. of Physics, Ph.D., Co-chair, in progress
Bingqi Yi, Ph.D., Chair, in progress
Kai Lu, M.S., Chair, in progress
Guanglin Tang, M.S., Co-chair, in progress

Research Staff (support and supervisory role)
Dr. Zhibo Zhang, Dr. Guang Hong and Dr. Shouguo Ding

Courses Taught
METR 335 - Atmospheric Thermodynamics, Spring 2002
ATMO 612 - Atmospheric Physics II, Spring 2003
ATMO 446 - Physical Meteorology, Fall 2003
ATMO 612 - Atmospheric Physics II, Spring 2004
ATMO 446 - Physical Meteorology, Spring 2005
ATMO 612 - Atmospheric Physics II, Spring 2005
ATMO 655 - Satellite Data in Meteorology, Fall 2005
ATMO 612 - Atmospheric Physics II, Spring 2006
ATMO 655 - Satellite Data in Meteorology, Fall 2006
ATMO 689 - Special Topic on Light Scattering, Spring 2007
ATMO 689 - Special Topic on Advanced Radiative Transfer, Fall 2007
ATMO 441 - Satellite Meteorology and Remote Sensing, Spring 2008
Renyi Zhang
Professor

Education
1993  Atmospheric Chemistry, Ph.D., Massachusetts Institute of Technology
1989  Physics, M.S., University of Nevada-Reno
1983  Atmospheric Science, B.S., Nanjing Institute of Meteorology

Experience
2007-present  Director, Center for Atmospheric Chemistry and Environment, Texas A&M University
2007-present  Professor, Department of Chemistry, Texas A&M University
2006-present  Tepin Professorship, Fudan University, China
2006-present  Adjunct Professor, Nanjing University of Information Science and Technology, China
2005-present  Professor, Department of Atmospheric Sciences, Texas A&M University
2002-2005  Associate Professor, Department of Atmospheric Sciences, Texas A&M University
1997-2002  Assistant Professor, Department of Atmospheric Sciences, Texas A&M University
1996-1997  Research Associate, Department of Chemistry and Department of Earth, Atmospheric, and Planetary Sciences, MIT
1993-1996  Post Doctoral Research Associate, Chemical Kinetics and Photochemistry Group, Jet Propulsion Laboratory, California Institute of Technology

Honors and Awards
Outstanding Oversea Young Researcher Award, China National Science Foundation, 2007
Distinguished Achievement Award for Faculty Research, College of Geosciences, Texas A&M University, 2002
NASA New Investigator Program Award, 1999-2002
Invited speaker in Atmospheric Chemistry Colloquium for Emerging Senior Scientists (ACCESS), Harvard University, 1993
NASA Graduate Fellowship, 1990-1993

Patents

Current Graduate Students
Chair, Keun-Hee Lee, ATMO, supported since 2008
Chair, Yuan Wang, ATMO, supported since 2007
Chair, Miguel Cruz-Quíñones, CHEM, supported since 2008
Chair, Huaxin Xue, ATMO, supported since 2007

Former Ph.D. Students
Chair, Guohui Li, Ph.D., “Investigation of the aerosol-cloud interaction using the WRF framework,” 2008 (Post doc at Molina Center/MIT)
Chair, Jun Zhao, Ph.D., “Experimental and theoretical investigation of nucleation and growth of atmospheric aerosols,” 2007 (Post doc at the National Center for Atmospheric Research)
Chair, Jiwen Fan, Ph.D., “Effects of aerosols on deep convective cumulus clouds,” (Post doc at the Pacific Northwest National Laboratory)
Chair, Edward C. Fortner, Ph.D., “Airborne and ground based measurements of volatile organic compounds using proton transfer reaction mass spectrometry in Texas and Mexico City”, 2006 (Post doc in the Department of Chemistry, Montana State University)
Chair, Dan Zhang, Ph.D., “Laboratory investigation of physical and optical properties of soot-containing aerosols,” 2005 (Post doc at the Jet Propulsion Laboratory, California Institute of Technology)
Chair, Inseon Suh, Ph.D., “Photochemistry of aromatic hydrocarbons: Implications for ozone and secondary organic aerosol formation,” 2004 (Senior Research Scientist, Samsung Electronics Inc.)
Chair, Wenfang Lei, Ph.D., “Ozone formation in the Houston-Galveston area: A regional chemical transport model study,” 2003 (Post doc at MIT and UCSD)

Former M.S. Students
Chair, Nick P. Levitt, M.S., “Heterogeneous organic acid uptake on soot surfaces,” 2007 (Shield Environmental, Kentucky)
Chair, Donald W. Bond, M.S., “NOx production by lightning in the continental U.S. and its impacts on tropospheric chemistry,” 2001 (Scientist with Atmospheric Radiation Program ARM, Department of Energy)
Chair, Dan Zhang, M.S., “Experimental and theoretical studies of OH-initiated reactions of isoprene,” 2001
Chair, Inseon Suh, M.S., “Atmospheric oxidation reactions of isoprene initiated by the hydroxyl radical and chlorine,” 2000

Current Postdoctoral Students/Research Scientists
Dr. Lin Wang, Post Doctoral Research Associate, Ph.D., University of California-Riverside, 9/2007 - present
Dr. Jun Zheng, Post Doctoral Research Associate, Ph.D., SUNY-Stony Brook, worked at Brookheaven National Lab, 7/2005-present
Dr. Alexei Khalizov, Assistant Research Scientist, Ph. D., Russian Academy of Sciences, worked in the Department of Chemistry at University of Waterloo and at McGill University, 8/2005-present
Dr. Yiwei Diao, Post Doctoral Research Associate, Ph.D., Chinese Academy of Science, China, 11/2007-10/2008

Former Postdocs/Research Scientists
Dr. Sang-Deuk Lee, Research Scientist, 1/2003-7/2004, now Professor and Head, Department of Environmental Engineering, Mokpo National University, South Korea
Appendix D. Publications, 2001 – Present

In Progress


2008


**Hong, G., G. Heygster, J. Notholt, and S. A. Buehler, 2008:** Interannual to diurnal variations in tropical and subtropical deep convective clouds and convective overshooting from seven years of AMSU-B measurements. J. of Climate, 21, 4168-4189.


**2007**


2006


2005


Brugman, K. E., and C. Schumacher, 2005: Variations in drop-size distributions associated with the degree of baroclinicity of the environment. 11th Conf. on Mesoscale Processes, 24-29 October, Albuquerque, NM.


2004


*Zhao, J., and R. Zhang, 2004: Proton transfer reaction rate constants between hydronium ion (H$_3$O$^+$) and volatile organic compounds (VOCs). *Atmos. Environ.*, 38, 2177-2185.


2003


**2002**


2001


Appendix E. Research Grants and Contracts, 2004-Present

2008

Nielsen-Gammon, John; Urban- Scale Meteorological Modeling for the Corpus Christi Area; University of Texas at Austin; 09/01/08 to 08/31/12; $400,000.

Orville, Richard and Courtney Schumacher; Lightning in the Nowcasting and Warning Process: Cooperative Research Applied to NWS Needs and Priorities; 08/01/08 to 07/31/11; $373,030.

Brooks, Sarah; Physical and Chemical Characterization of Agricultural Emissions: Single Particle Analysis; U.S. Dept. of Agriculture – Air Quality Program; 08/01/09 to 07/30/2010; $332,840.

North, Gerald; NOAA/ NESDIS- Metadata Collaboration to Provide References, Instrument Names, and Formatted Events to IGRA; National Oceanic and Atmospheric Administration; 08/01/08 to 07/31/09; $10,000.

North, Gerald and Steven Schroeder; Development of Adjustments to Compensate for Instrument Biases in Radiosonde Temperature and Moisture Data Using Complete...; DOC- National Oceanic and Atmospheric Administration; 07/01/08 to 06/30/09. $43,691.

Yang, Ping; Estimation of Cloud Microphysics from MODIS Infrared Observations; NASA-Goddard Space Flight Center; 06/04/08 to 05/3/09; $67,000.

Yang, Ping; Investigation of the Optical Properties of Horizontally Oriented Ice Crystals in Support of NASA’s CALIPSO Project; NASA-Langley Research Center; 01/06/08 to 05/31/11; $92,319.

Dessler, Andrew and Kenneth P. Bowman; Using Aura TES Isotopic Data to Trace Water Transport in the Troposphere to Interpret Global Environmental Change; NASA; 06/01/08 to 05/31/11.

Dessler, Andrew; A Study of Tropospheric Water Vapor Using Aura MLS and TES Measurements; NASA-Shared Services Center; 06/01/08 to 05/31/11; $399,531.

Yang, Ping; Studying Dust Optical and Radiative Properties Using Optimal Morphological Sets; National Science Foundation; 06/01/08 to 05/31/09; $138,978.

Zhang, Renyi; Surface-Induced Oxidation of Organics in the Troposphere (SOOT); Houston Advanced Research Center; 03/01/08 to 12/31/09; $555,000.

Nielsen-Gammon, John; Sources and Trends of Background Ozone; Houston Advanced Research Center; 05/21/08 to 04/30/09; $40,000.
Nielsen-Gammon, John; Validation and Improvement of Vertical Mixing and Surface Fluxes; Houston Advanced Research Center; 05/21/08 to 8/31/09; $160,000.

Yang, Ping; Synergy of Satellite/Surface Observations and Light-Scattering/Radiative-Transfer Modeling for Aerosol Research; NASA-Goddard Space Flight Center; 05/07/08 to 05/06/11; $155,459.

Nielsen-Gammon, John and Fuqing Zhang; Ensemble Kalman Filter (EnKF) Implementation and Testing in Support of Air Quality Mod; Texas Commission on Environmental Quality; 04/24/08 to 08/31/09; $185,000.

Brooks, Sarah; Deployment of the CDFC on NRC Convair 580 Flights in Support of the DOE ISDAC Field Campaign; Battelle-Pacific N.W. Division; 2/28/08 to 03/31/09; $69,161.

Collins, Donald; Participation in the DOE ISDAC Field Campaign; Battelle- Pacific N.W. Division; 02/28/08 to 03/31/09; $42,000.

Yang, Ping; Study of the Properties and Radiative Forcing of Global Ice Clouds Using the Synergetic MODIS Airs, and CERES Products and…; NASA-Stennis Space Center; 01/14/08 to 01/13/11; $300,000.

North, Gerald; Nara- Consolidated Facility Management (CFM) Support Service for Bush Presidential Library; National Oceanic and Atmospheric Administration; 01/01/08 to 12/31/08; $2,430,235.

Nielsen-Gammon, John; Review and Update Book Chapter; Houston Advanced Research Center; 01/01/08 to 12/31/08; $2,500.

Dessler, Andrew; NASA Atmospheric Composition: Aura Science Team, A Study of Tropospheric Water Vapor Using Aura Measurements; NASA; 01/09/08 to 12/31/11; $499,000.

2007

Brooks, Sarah and Donald Collins; Airborne Measurement of Cloud Condensation Nuclei and Ice Nuclei Over Saudi Arabia; University Corporation for Atmospheric Research; 12/10/07 to 09/30/08; $574,074.

Wilheit, Thomas; Maintenance of the AMSR-F Level-3 Oceanic Precipitation Algorithm; NASA-Goddard Space Flight Center; 12/03/07 to 12/02/10; $367,999.

Collins, Donald; Collaborative Research: Feasibility Study for the Augmentation of Rain in Istanbul, Turkey; Seeding Operation and Atmospheric Research (SOAR); 12/01/07 to 12/31/08; $150,000.

156
Yang, Ping; *Develop Subject-Specific White Paper on the Climate Impacts of Contrails and Contrail-Cirrus*; DOC- Research and Innovative Technology Administration; 10/12/07 to 08/31/08; $45,079.

Bowman, Kenneth P., and Fuqing Zhang; *Collaborative Research: Stratosphere-Troposphere Analyses of Regional Transport (START) Experiment (2008)*; National Science Foundation; 09/15/07 to 08/31/09; $200,002.

Carey, Lawrence and Courtney Schumacher; *Measurements of the Size Distribution of Hydrometeors Through Surface Based Instruments*; University of Maryland, Baltimore County; 09/01/07 to 03/05/09; $13,982.

Schade, Gunnar; *Relating Urban Flux Turbulence and Trace Gas Flux Measurements from a Tall Tower*; Lamar University- TARC; 09/01/07 to 08/31/09; $34,000.

Zhang, Renyi; *Field Measurements of Gaseous Inorganic and Organic Compounds During TexAQS II—2006*; Environmental Protection Agency; 09/01/07 to 08/31/09; $47,142.

Khalizov, Alexei; *An Integrated Experimental and Modeling Study for Improving Mercury Chemical Mechanism in…*; Lamar University- TARC; 09/01/07 to 08/31/09; $43,000.

Dessler, Andrew; *Analysis of Tropopause Level Clouds Using CALIPSO, AIRS, and MIS Data*; NASA-Stennis Space Center; 08/15/07 to 08/14/10; $355,609.

Yang, Ping; *Enhancement of the Capabilities of CRTM for Simulation Radiative Transfer in Ice-Cloudy Atmospheres*; DOC- National Oceanic and Atmospheric Administration; 08/14/07 to 08/31/08; $79,964.

Collins, Donald; *Tandem Differential Mobility Analysis to Study the Size-Resolved Adsorption of CWA onto Sub-Micron Aerosol Particles*; Johns Hopkins University; 08/02/07 to 09/30/07; $25,000.

Collins, Donald, Sarah Brooks, John Nielsen-Gammon, Simon North, Gunnar Schade, Renyi Zhang and Fuqing Zhang; *Characterization of Eastern Texas Air Quality for the TexAQS II Experiment*; Environmental Protection Agency (through the University of Houston); 05/01/07 to 05/31/09; $320,216

Saravanan, R.; *Hierarchical Coupled Modeling and Prediction of Regional Climate Change in the Atlantic Sector*; DOE- Chicago; 08/01/07 to 07/31/09. $363,856.

North, Gerald; *NOAA/NESDIS- Upper Air Metadata Procedures*; National Oceanic and Atmospheric Administration; 07/01/07 to 06/30/08; $10,000.

Collins, Donald; *UT- Austin- TexAQS II- Monitoring Clinton Site- Enhanced Particulate Monitoring at the Clinton Site*; The University of Texas; 07/24/07 to 08/31/07; $15,995.
Zhang, Renyi; *Investigation of Urban and Regional Aerosol Formation and Transformation in China and Associated Climate Effects*; China National Science Foundation; 07/01/07 to 06/01/10; $3,248.

Epifanio, Craig; *Idealized Topographic Testing for the RF-NM and WRF-ARW Cores*; NCAR; 06/01/07 to 08/01/08; $23,250.

Nielsen-Gammon, John; *Analysis of TexAQS II Meteorological Data*; Texas Commission on Environmental Quality; 05/02/07 to 04/14/08; $211,082.

Collins, Donald; *Central American Smoke Transport*; The University of Texas at Austin; 05/01/07 to 08/31/07; $20,000.

Nielsen-Gammon, John; *Technical Oversight and Peer Review*; Texas Commission on Environmental Quality; 05/01/07 to 08/31/07; $30,425.

Nielsen-Gammon, John; *Boundary Layer Parameterization Improvement*; Environmental Protection Agency; 05/01/07 to 05/31/09; $47,000.

Zhang, Renyi; *Chemical Kinetics and Mechanism of Hydrocarbon Oxidation Reactions*; The Welch Foundation; 05/01/07 to 04/30/10; $180,000.

Collins, Donald; *SGP Cloud and Land Surface Interaction Campaign (CLASIC) Intensive Operation Period*; Battelle-Pacific N. W. Division; 04/25/07 to 12/31/07; $51,964.

Nielsen-Gammon, John; *Development of Databases and Characterization of Meteorological Conditions for the TexAQS II Intensive Period*; Houston Advanced Research Center; 04/08/07 to 11/30/07; $75,000.

Zhang, Fuqing; *Flow and Regime Dependent Mesoscale Predictability*; Office of Naval Research; 09/01/07 to 08/31/12; $600,000.

Bowman, Kenneth P. and Gerald North.; *Ground Truth and Model Validation Studies with TRMM, SSM/I, and TMPA Data*; NASA-Goddard Space Flight Center; 02/08/07 to 02/07/10; $433,578.

Wilheit, Thomas; *Uncertainties in the Retrieval of Oceanic Rainfall from Passive Microwave Data*; NASA-Goddard Space Flight Center; 02/08/07 to 02/07/10; $289,008.

Yang, Ping; *Development of a Fast Forward Cloudy Radiative Transfer Model and Retrieval Algorithms for Inferring Cloud Properties from…*; NASA-Langley Research Center; 02/01/07 to 01/31/10; $153,254.

Dessler, Andrew; *NASA CloudSat and CALIPSO Science Team and Modeling/Analysis of A-Train Related Data*; 01/01/07 to 12/31/10; $356,000.
Lemmon, Mark, and H. Detloff; *A History of Scientific Ballooning*; NASA’s History of Scientific Exploration of Earth and Space Program; 01/01/07 to 12/31/13; $104,000.

**2006**

Collins, Donald; *UT Austin- Air Pollutant Concentration Near Roadways Study*; University of Texas at Austin; 11/09/06 to 08/31/07; $55,000.

Zhang, Fuqing; *Dynamics and Impacts of Mesoscale Gravity Waves*; National Science Foundation; 11/01/06 to 10/31/09; $399,961.

Bowman, Kenneth P.; *Flight Planning and Meteorological Analysis in Support of the HIAPER Start Progressive Science Mission*; National Science Foundation; 10/05/06 to 12/31/06; $45,712.

Yang, Ping; *Research in Light Scattering and Radiative Transfer in Support of NASA Langley Research Center’s Effort on Retrieving Cloud…*; NASA-Langley Research Center; 10/01/06 to 09/30/09; $153,075.

Dessler, Andrew; *The Frequency of Tropical Precipitation as Observed by the TRMM PR and ICESTAT/GLAS*; NASA-Stennis Space Center; 09/19/06 to 08/31/09; $78,000.

North, Gerald; *NOAA/NCDC- Development of Station History (Metadata)*; National Oceanic and Atmospheric Administration; 09/15/06 to 09/14/07; $10,000.

Bowman, Kenneth P., Fuqing Zhang, R. Saravanan, M. G. Genton, B. K. Mallick and M. Jun; *Non- Gaussian Statistical Analysis of Large Climate Datasets and Simulations*; National Science Foundation; 09/13/06 to 09/12/09; $1,030,000.

Yang, Ping; *Development of Consistent Lookup Libraries for Retrieving the Microphysical and Radiative Properties of Water, Mixed- Phase…*; DOC- National Oceanic and Atmospheric Administration; 06/08/06 to 09/07/09; $187,985.

Saravanan, R. and Ping Chang; *Collaborative Research: Towards an Understanding of the Role of the Atlantic Thermohaline and Wind Driven Circulation in…*; National Science Foundation; 09/05/06 to 08/31/09; $51,164.

Zhang, Renyi; *Laboratory Investigation of Mixing States and Physical and Optical Properties of Soot- Containing Aerosols*; Duke University; 09/01/06 to 08/30/09; $278,740.

Zhang, Renyi; *Improving the Chemical Mechanism of Aromatic Hydrocarbons in Photochemical Modeling*; Lamar University- TARC; 01/01/06 to 08/31/08; $150,000.

Schade, Gunnar; *Urban Flux Measurement of Volatile Organic Compounds and Other Trace Gases from Tall…*; Lamar University- TARC; 09/01/06 to 08/31/07; $14,331.
Collins, Donald; *Direct Measurement of Transformation Particles During TexAQS II*; Lamar University- TARC; 09/01/06 to 08/31/08; $24,871.

Schumacher, Courtney; *Inter-Annual Variations in Tropical Convection: The Long- Term TRMM Precipitation Radar Data Set*; NASA-Stennis Space Center; 08/01/06 to 07/31/09; $242,895.

Brooks, Sarah and Donald Collins; *Airborne Measurement of Cloud Condensation Nuclei and Ice Nuclei Over Saudi Arabia*; University Corporation for Atmospheric Research; 08/01/06 to 09/30/07; $404,981.

Collins, Donald and Renyi Zhang. *Ground-Based Measurements of Volatile Organic Compounds (VOCS) and Nitrogen Reservoir Species during TexAQS II—2006*; Houston Advanced Research Center; 07/13/06 to 08/31/07; $272,041.

Collins, Donald; *Advanced Improve Studies*; Electric Power Research Institute; 06/15/06 to 05/31/09; $157,702.

Dessler, Andrew; *Aqua Analysis of Longwave Radiative Forcing in the Tropics and Subtropics: Effects of SST, Water Vapor, and…*; NASA-Goddard Space Flight Center; 06/01/06 to 05/31/07 $34,201.

Yang, Ping; *Cloud Object Analysis and Modeling of Cloud Aerosols Interactions and Cloud Feedbacks with the Combined CERES and…*; NASA-Langley Research Center; 06/01/06 to 05/31/09; $268,601.

Zhang, Renyi; *Ground-based Measurements of Volatile Organic Compounds During TexAQS II—2006*; Texas Commission on Environmental Quality; 06/01/06 to 08/31/07; $211,500.

Nielsen-Gammon, John; *Operation, Removal, and Data Validation of a Suite of Meteorological Instruments*; Texas Commission on Environmental Quality; 05/01/06 to 12/31/07; $275,785.

Dessler, Andrew; *Investigations of the Tropical Tropopause Layer*; NASA-Goddard Space Flight Center; 04/01/06 to 03/31/08; $304,132.

Dessler, Andrew; *Validation of Aura Measurement of Water Vapor and Odd- Cholorine Species by Comparisons to UARS and in situ Constraints and…*; NASA-Goddard Space Flight Center; 03/15/06 to 03/14/09; $157,403.

Dessler, Andrew; *Investigations of Water Isotopes in the Tropical Upper Troposphere*; NASA-Goddard Space Flight Center; 01/01/06 to 12/31/08; $162,000.

Brooks, Sarah; *Physical and Chemical Properties of Articulate Matter Emission from Large Animal Feed Lots*; USDA-Cooperative State Research, Education, and Extension; 01/01/06 to 08/31/10; $332,840.
Yang, Ping; *Research in Support of Goes-R Risk Reduction Project*; University of Wisconsin-Madison; 01/01/06 to 12/31/07; $150,000.

Collins, Donald; *Investigation of the Evolution of Aerosol Hygroscopicity, Mixing State, and Cloud Activation Efficiency During Mirage-MEX*; National Science Foundation; 01/01/06 to 12/31/07; $289,535.

Brooks, Sarah and Gunnar Schade; *Physical and Chemical Properties of Particulate Matter Emissions for Large Animal Feed Lots*; 01/01/06 to 12/31/08; $499,259.

Zhang, Renyi; *Improving the Chemical Mechanism of Aromatic Hydrocarbons in Photochemical Modeling*; Lamar University-TARC; 01/01/06 to 12/31/07; $41,495.

Collins, Donald; *Direct Measurement of Transformation of Particles During TexAQS II*; Lamar University-TARC; 01/01/06 to 12/31/07; $24,673.

Nielsen-Gammon, John; *Summertime Mixing Heights in Southeast Texas*; Lamar University-TARC; 01/01/06 to 12/31/07; $17,089.

Dessler, Andrew; *Validation of Aura Measurements of Water Vapor and Odd-Chlorine Species by Comparisons to UARS and in situ Constraints and Climatologies*; NASA Aura Validation Program; 01/01/06 to 12/1/09; $164,000.

Brooks, Sarah; *Career: Chemical Processing and Cloud Nucleation Activity of Soot Aerosols*; National Science Foundation; 01/01/06 to 12/31/10; $627,645.

Zhang, Renyi and S. North; *Measurements of NO₃ Using Cavity-Ring Down During TexAQS II*; Texas Air Research Center; 01/01/06 to 12/31/07; $82,000.

2005

Nielsen-Gammon, John; *Near Real-Time Mixing Height Derivation*; Texas Commission on Environmental Quality; 12/20/05 to 02/28/06; $27,000.

Nielsen-Gammon, John; *Subjective Validation and Review of Upper Air Meteorological Data*; Texas Commission on Environmental Quality; 12/20/05 to 02/28/06; $60,000.

Schumacher, Courtney; *Hydrometeors Injected into the Large-Scale Environment by Tropical Cloud Systems*; DOE- Washington; 12/08/05 to 01/31/09; $191,938.

Nielsen-Gammon, John; *H45 D: Real-Time Meteorological Modeling and Forecasting*; Houston Advanced Research Center; 11/15/05 to 08/31/06; $140,000.

Collins, Donald; *Tandem Differential Mobility Analyzer Support*; Argonne National Laboratory; 10/14/05 to 09/30/06; $64,367.
Quiring, Steven, John Nielsen-Gammon, R. Srinivasan, and Travis Miller; *Drought Monitoring Index for Texas*; Texas Water Development Board; 10/06/05 to 12/31/06; $99,000.

Srinivasan, R., Travis, John Nielsen-Gammon, and Steven Quiring; *Digital Climatic Atlas for Texas*; Texas Water Development Board; 10/01/05 to 01/31/07; $60,000.

Collins, Donald and William Saric; *Airborne Sampling in Texas of Ozone and Precursors*; The University of Texas at Austin; Capital Area Council of Governments; 09/06/05 to 08/31/06; $2,573.

Dessler, Andrew; *Investigations of the Tropical Tropopause Layer*; University of Maryland; 09/01/05 to 08/31/06; $50,796.

Vedlitz, Arnold, Sarah Brooks, John Nielsen-Gammon, and William Marlow; *Climate Change, Drought and Policymaking in the U.S. Southern Region*; National Oceanic and Atmospheric Administration- Climate and Global Change; 09/01/05 to 08/31/07; $720,560.

Collins, Donald, and William Saric; *Technical Work Plan for the Victoria Near Non-Attainment Area*; The University of Texas at Austin; 09/01/05 to 08/31/06; $8,387.

Zhang, Renyi; *Laboratory Investigation of Mixing States and Physical and Optical Properties of Soot-Containing Aerosols*; Tulane University; 09/01/05 to 08/31/06; $90,921.

Collins, Donald; *Advanced Mobile Monitoring Station*; Texas Commission on Environmental Quality; 09/01/05 to 08/31/06; $125,000.

Collins, Donald; *DMAS and TDMAS (Differential Mobility Analyzers and Tandem Differential Mobility Analyzers)*; Texas Commission on Environmental Quality; 09/01/05 to 08/31/06; $94,500.

Nielsen-Gammon, John; *Nielsen-Gammon- Data Assembly and Analysis*; Texas Commission on Environmental Quality; 09/01/05 to 08/31/06. $23,000.

Carey, Lawrence; *C-Band Radar*; Texas Commission on Environmental Quality; 09/01/05 to 08/31/06; $86,406.

Zhang, Renyi; *Proton Transfer Reaction Mass Spectrometer (PTRMS)*; Texas Commission on Environmental Quality; 09/01/05 to 08/31/06; $85,300.

Nielsen-Gammon, John; *Procurement of Offshore Platform for Operation of a Suite of Meteorological…*; Texas Commission on Environmental Quality; 08/12/05 to 08/31/05; $11,973.

Nielsen-Gammon, John and Gunnar Schade; *A Rural Air Quality Monitoring Tower Site in East Central Texas*; Texas Commission on Environmental Quality; 07/14/05 to 05/31/06; $94,000.
Zhang, Renyi; *Proton Transfer Reaction Mass Spectrometer (ptms)*; Texas Commission on Environmental Quality; 07/12/05 to 08/31/05; $43,700.

Lawrence Carey, Fuqing Zhang; *Doppler Radar Observations of Boundary Layer Winds over Houston and Dallas Forth Worth in Support of TexAQS II*; Texas Commission on Environmental Quality; 01/01/05 to 01/31/06; $120,000.

Nielsen-Gammon, John; *Data Assembly and Analysis*; Texas Commission on Environmental Quality; 07/06/05 to 08/31/05; $35,150.

Yang, Ping; *Retrieve Cirrus Reflectance Using Visible and 1.38-UM Water Absorption Bands*; NASA-Goddard Space Flight Center; 07/01/05 to 06/30/08; $126,725.

Carey, Lawrence; *H56: Deployment of the C-Band Radars to Dew and GHB for the 2005 Ozone Season*; Houston Advanced Research Center; 06/15/05 to 08/31/05; $134,586.

Collins, Donald; *Deployment of an Advanced Monitoring Trailer in Support of the TexAQS II Study*; Texas Commission on Environmental Quality; 06/07/05 to 08/31/05; $125,000.

Collins, Donald; *Surface and Aircraft- Based Measurements of Haze During the TexAQS II Study*; Texas Commission on Environmental Quality; 06/07/05 to 08/31/05; $157,600.

Carey, Lawrence; *C- Band Radar*; Texas Commission on Environmental Quality; 06/07/05 to 08/31/05; $221,289.

Orville, Richard, Mary Jo Richardson, K. Price-Blount, L. Cifuentes, J. Norwine and Ken Tobin; *Opportunities for Enhancing Diversity in the Geosciences Program, Track 1: Proof-of-Concept*; National Science Foundation; 06/01/05 to 05/31/07; $66,099.

Nielsen-Gammon, John; *Radar Profiler Central Texas*; Capital Area Council of Governments; 05/12/05 to 12/31/06; $74,977.

Schumacher, Courtney; *Career: Diabatic Heating in the Subtropics*; National Science Foundation; 05/01/05 to 04/30/10; $562,274.

Zhang, Renyi; *Ground-Based Measurements of Volatile Organic Compounds using Proton Transfer Reaction- Mass Spectrometry*; Texas Commission for Environmental Quality; 05/01/05 to 04/30/06; $100,000.

Nielsen-Gammon, John; *Installation and Support of Radar Profiler in Central Texas*; Alamo Area Council of Governments/Capital Area Council of Governments; 05/01/05 to 11/30/05; $90,000.

Lemmon, Mark, Boyle, Combs, J. Hurtado and L. Hurtado; NASA-Marshall Space Flight Center (Huntsville, AL); 03/15/05 to 02/28/06; $24,829.
Collins, Donald; *Construction of a Tandem Differential Mobility Analyzer for Continuous Operation at the ARM SGP Site*; Battelle- Pacific N. W. Division; 03/10/05 to 03/09/06; $190,619.

Collins, Donald; *Aircraft and Surface Observation of Aerosol and Cloud Properties During Heat*; National Science Foundation; 01/15/05 to 12/31/05; $187,014.

Collins, Donald; *The Use of a Cloud Aircraft for the Mapping of Pollution Aerosols Detrimental to Winter Orographic Precipitation Over the California…*; Woodley Weather Consultants; 01/15/05 to 01/31/06; $33,982.

Orville, Richard; *LDAR II Operations, Evaluation, and Analysis in the Houston Environmental Aerosol Thunderstorm (HEAT) Project*; National Science Foundation; 01/01/05 to 12/31/08; $843,371.

2004

Collins, Donald; *Data Collection at Guadalupe Mountains- Optical- Related Aerosol Properties*; Texas Commission on Environmental Quality; 12/16/04 to 08/31/05; $66,000.

Zhang, Renyi; *H48 T3 2004: Aircraft Measurements of Highly Reactive Volatile Organic Compounds Using Proton Transfer Reaction Mass*; Houston Advanced Research Center; 12/01/04 to 08/31/05; $261,500.

Nielsen-Gammon, John and Fuqing Zhang; *HT1: Modeling in Support of TexAQS II and 8-Hour Ozone Assessment (TAMU Component)*; Houston Advanced Research Center; 11/05/04 to 11/30/05; $329,995.

Yang, Ping; *Data Processing, Modeling and Analysis of Ice Clouds and in situ Cloud Data*; Science Applications International Corporation; 11/01/04 to 11/30/06; $291,497.

Zhang, Renyi; *Collaborative Research: Demonstration of a New Framework for Studying Aerosol Indirect Effects*; National Science Foundation; 09/01/04 to 8/31/08; $177,419.

Yang, Ping; *Survey of Tropical Cirrus Cloud Optical Thickness Using MODIS Data*; NASA-Goddard Space Flight Center; 09/15/04 to 09/14/07; $24,000.

Zhang, Renyi; *Oxidation Mechanism or Aromatic Hydrocarbons Relevant to Urban and Regional Air Pollution*; Texas Air Research Center; 09/01/04 to 02/28/06; $35,682.

Zhang, Renyi, and Donald Collins; *Investigation of New Particle Formation in Houston*; Texas Air Research Center; 09/01/04 to 08/31/05; $56,021.

Nielsen-Gammon, John; *Summertime Mixing Heights in Southeast Texas*; Texas Air Research Center; 09/01/04 to 08/31/05; $33,297.
North, Gerald, L. Alston, E. Lindquist, Liu, Arnold Vedlitz; U. S. Department of Commerce; 09/01/04 to 08/31/07; $23,390.

Zhang, Renyi; *Investigation of Urban Aerosols and Their Impact on Cloud Microphysics*; NASA-Goddard Space Flight Center; 09/01/04 to 08/31/07; $72,000.

Zhang, Renyi, and J. Bevan; *Development of Submillimeter/Terahertz Instrumentation for Spectroscopy and Dynamics*; National Science Foundation MRI; 09/1/04 to 08/31/06; $398,483.

Carey, Lawrence; *Validation of Satellite Cloud Phase Algorithms Using Aircraft Observations of Mixed Phase Clouds*; Colorado State University; 07/15/04 to 04/30/06; $77,115.

Nielsen-Gammon, John; *A Conceptual Model for 8 Hour Ozone Exceedances in East Texas*; Houston Advanced Research Center; 06/30/04 to 1/31/05; $47,684.

Yang, Ping, and Andrew Dessler; *Investigation of the Spatial and Temporal Distributions of Cirrus Clouds Over Tropics and Radiative Forcing Using MODIS and CERES*; NASA-Goddard Space Flight Center; 06/01/04 to 05/31/08; $469,777.

Zhang, Fuqing; *Flow and Regime- Dependent Mesoscale Predictability*; DOD- Navy- Office of Naval Research; 06/01/04 to 09/30/09; $299,978.

Collins, Donald; *TDLR-Measure CCN Concentrations Throughout Texas Relating To the Provision of Differential Mobility Analyzer (DMA) and Tandem*; Texas Department of Licensing and Regulation; 05/27/04 to 12/31/04; $27,395.

North, Jerry, and Steven Schroeder; *Completing Cards Radiosonde Metadata from 1940’s- 2005 and Developing Global Precipitable Water Trends Adjusted for Instrument Channels*; DOC-NOAA- National Marine Fisheries Service- Silver Spring; 05/01/04 to 04/30/06; $40,775.

Carey, Lawrence; *Rain Maps Inferred From Polarimetric Radar Observations Over Coastal Locales*; University of Maryland; 05/01/04 to 08/31/06; $15,309.

Yang, Ping; *Radiative Properties of Ice Clouds and Water Clouds: Model Development in Support of University of Wisconsin GIFTS/IOMI MURI Project*; Office of Naval Research-University of Wisconsin; 05/01/04 to 04/30/06; $219,965.

Lemmon, Mark and M. Malin; *Mars Descent Imager, MARDI*; NASA’s Mars Exploration Program; 01/01/04 to 12/31/11; $280,000.

Lemmon, Mark and M. Malin; *Mast Camera for the Mars Science Lander*; NASA’s Mars Exploration Program; 01/01/04 to 12/31/13; $520,000.