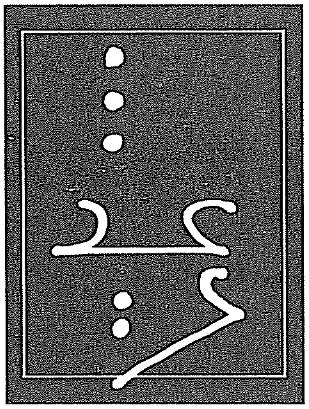
DEPARTMENT OF ATMOSPHERIC SCIENCES

UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

The Department of Atmospheric Sciences at the University of Illinois at Urbana-Champaign (UIUC) offers graduate education leading to the degrees of Master of Science and Doctor of Philosophy. This graduate program was initiated in 1973 and departmental status was established in 1981 as the great potential and increasing importance of the atmospheric sciences as an academic discipline were recognized. Rapid advances in the atmospheric sciences have resulted from recent developments on several fronts: atmospheric sensors and data-gathering platforms, computer technology, observational analysis techniques, and theoretical modeling. The faculty of the department use these new technologies in their research on a wide range of atmospheric phenomena and engage in innovative analyses of various atmospheric data sets and rigorous analytical and numerical modeling with the aid of supercomputers. Such research activities apply the basic principles of physics, chemistry, and mathematics to atmospheric problems. The department welcomes applicants with academic backgrounds in any branch of pure and applied physical sciences, as well as in computer science and mathematics. Financial support is generally provided to all qualified applicants.

The courses offered in the department are comprehensive, covering all major areas in the atmospheric sciences. The planning of a specific curriculum has enough flexibility to take into account the needs and interests of the individual student. Students may also benefit from the course offerings of other departments at UIUC, which is a nationally and internationally known center of excellence in higher education. Many departments are ranked among the best in the nation. Students can enjoy the cultural, educational, and research activities available at UIUC. We hope you will take the time to read through the following material and learn about our department.

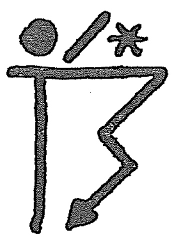


EDUCATIONAL AND RESEARCH RESOURCES IN THE DEPARTMENT

The department occupies a newly completed building dedicated exclusively to education and research in atmospheric sciences. It has a specially designed laboratory for displaying and analyzing current weather and climatological charts provided daily by the National Weather Service. Maps and satellite photos are received continuously through the departmental satellite link.

Another laboratory houses the departmental computer system, which consists of two high-speed minicomputers with ample input-output and disk storage devices: an HP-835S and a DEC microVAX-II. The HP-835S is a powerful mid-range computer based on the principles of Reduced Instruction Set Computing (RISC) and is ideally suited to both the computing-intensive jobs and the graphics applications often encountered in the atmospheric sciences.

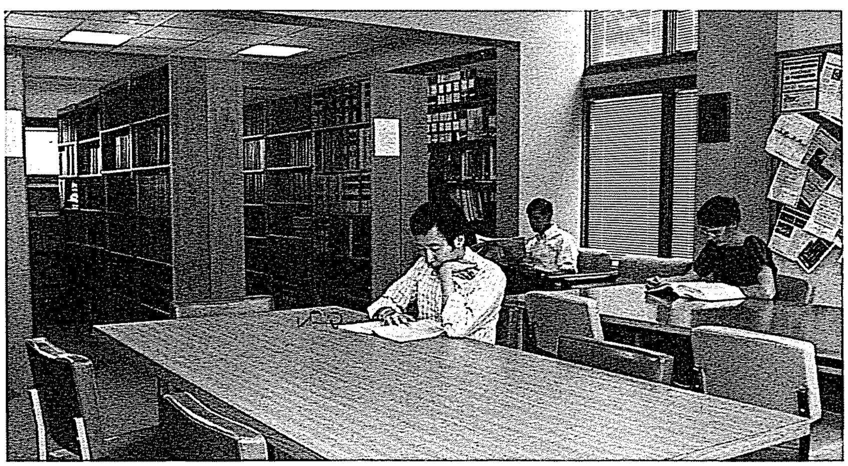
Heavy thunderstorm without hail, but with rain and/or snow at time of observation



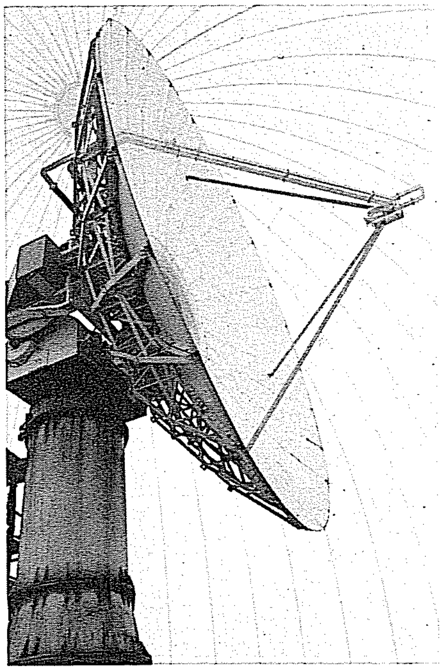
These computers enable departmental personnel to routinely make diagnostic and prognostic analyses of real-time weather data for teaching and research. An additional laboratory serves as the central computer use area for research activities and contains a number of workstations, microcomputers, and graphic terminals all networked to the departmental computer system. The latter is also connected to the mainframe computers of the university, as well as to national supercomputers such as the one at the National Center for Atmospheric Research in Boulder, Colorado.

The department has a well-maintained library, containing a substantial collection of books on meteorology, oceanography, geophysics, fluid dynamics, and mathematics. It subscribes to all the major meteorological and oceanographic journals and has an up-to-date collection of technical reports from other research institutions. Departmental personnel have access to additional materials from libraries of the various departments of the physical sciences on campus. Moreover, the highly acclaimed library of the university is a valuable resource for all researchers. Its collection is the largest among all public universities, and it is the third largest university library in the nation.

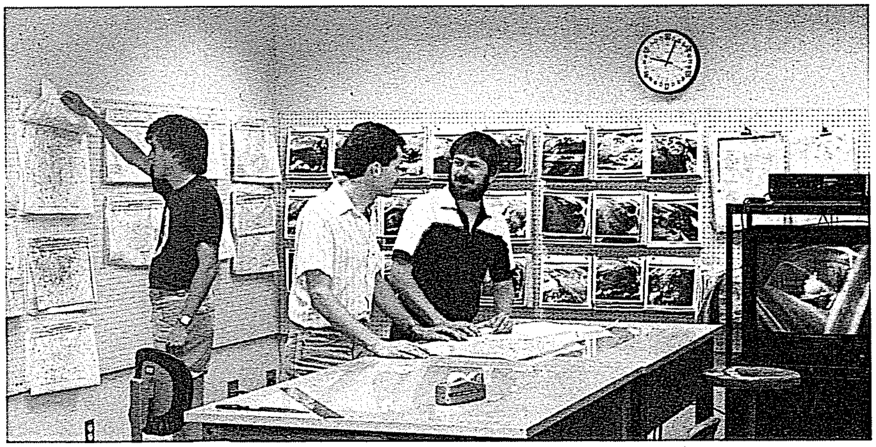
The department maintains a close association with other atmospheric scientists on campus, especially those in the Illinois State Water Survey (ISWS). The faculty of the department and the scientists at ISWS collaborate actively on research projects. Students may do their thesis research under the supervision of the adjunct faculty from ISWS. They have opportunities to use the most modern facilities, such as the CHILL Doppler radar, a technologically superior cloud physics laboratory, and the wide variety of data sets at ISWS.

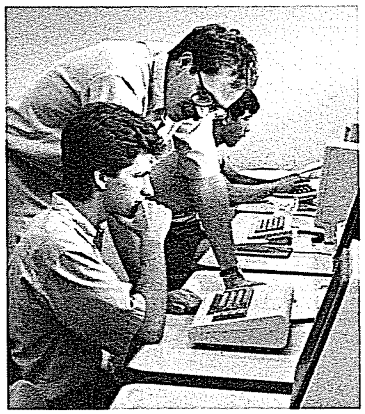


Atmospheric Sciences library



LEFT: Antenna, pedestal, and radome of the CHILL Doppler, dual-polarization radar
BELOW: Atmospheric sciences map room





ABOVE: Atmospheric sciences terminal room
LEFT: Atmospheric sciences building

The department also has a close association with the National Center for Supercomputing Applications (NCSA), which is located on campus. NCSA has distinguished itself by continually upgrading its supercomputers to the most powerful and useful systems currently available. It has provided for local use a variety of other computers, including personal and advanced workstations. Its participating scientists thus have state-of-the-art computing tools for working on their challenging problems. NCSA also has a strong software development program. Faculty and students are in an excellent position to make full use of the unique computational opportunities offered by NCSA and participate in NCSA activities such as training and seminars.

Slight rain, intermittent

Precipitation not reaching ground

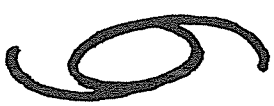
DEGREE REQUIREMENTS

Master of Science in Atmospheric Sciences

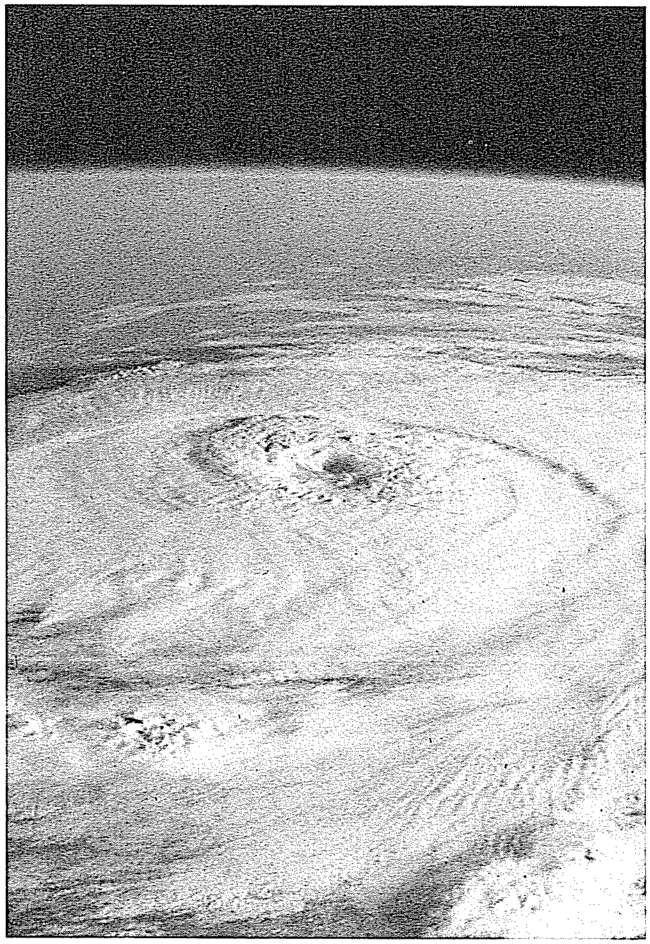
The requirements for the degree of Master of Science in Atmospheric Sciences correspond to the general requirements of the Graduate College for the degree with the additional requirement that a minimum of 4 units must be graduate courses in atmospheric sciences, excluding thesis credit. Therefore the total requirements are: 8 units, of which 3 units must be from courses numbered in the 400 series, and of which 4 units must be in atmospheric sciences. A written thesis, which may account for 1 or 2 units of credit, is also required. In general, it is expected that students will take ATMOS 301 and 302, since these are prerequisites for more advanced courses, unless equivalent courses have been taken elsewhere.

Doctor of Philosophy in Atmospheric Sciences

The Graduate College requires 24 units of credit for the PhD of which a MS may account for 8 units. At least 16 units, which may include research (thesis) units, must be in courses meeting on the Urbana-Champaign campus. Most atmospheric sciences students with half-time assistantships take 3 to 3-1/2 units per semester plus 1 to 2 units in the summer, so that the unit requirement may be satisfied in three years.

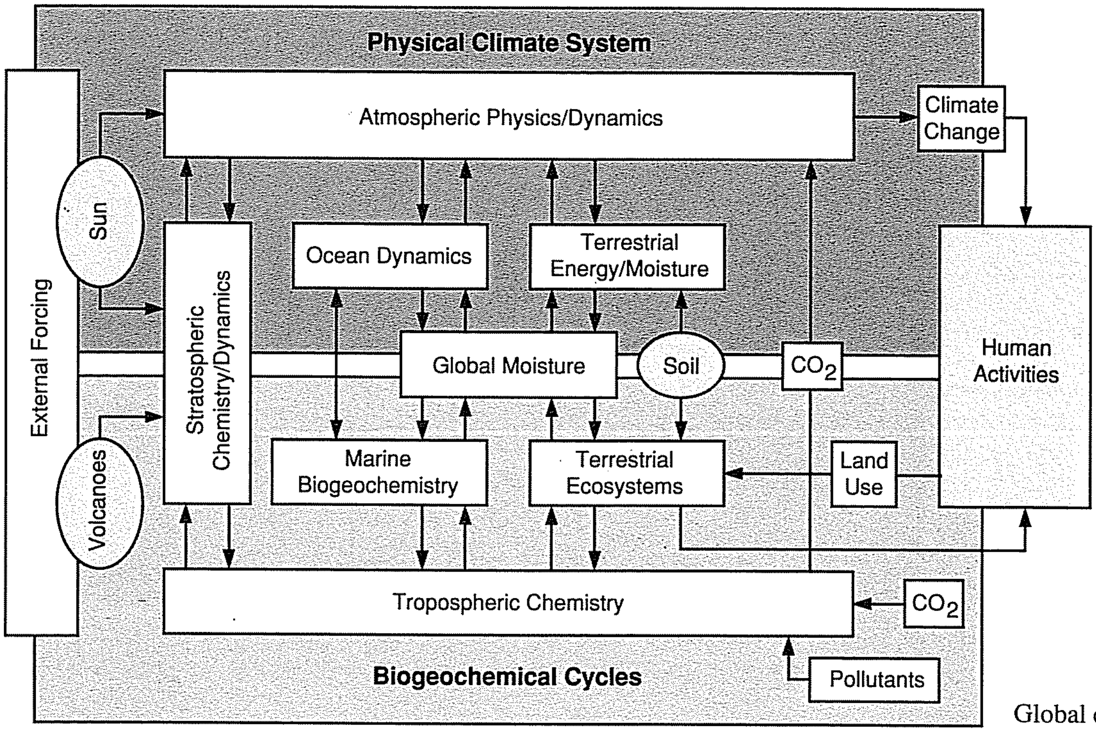


Hurricane



All candidates for the PhD in atmospheric sciences must pass a qualifying examination. This examination consists of a written part and an oral part, and covers basic principles of observational and theoretical meteorology. The object of this examination is to determine whether the candidate should be allowed to proceed toward the doctoral degree, and the university regulations require that such an evaluation take place before the end of the second year after the student enters the Graduate College. The qualifying examination is given near the end of each semester. Students without an MS degree in meteorology are normally scheduled to take the examination after one academic year in the Department of Atmospheric Sciences. They must take this examination following their completion of 8 units of credit. Students with an MS are encouraged to take the qualifying examination as soon as possible. In the event of a failure on the first try, a student is normally allowed one further attempt to pass the next time the examination is offered.

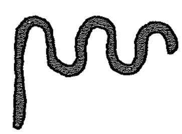
LEFT: An oblique view of Hurricane Elens



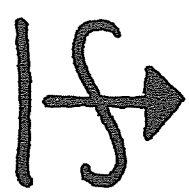
Global climate system

After the candidate has passed the qualifying examination, a thesis adviser must be selected. The student then, in consultation with the thesis adviser, prepares a written thesis proposal, that forms the basis for the oral preliminary examination. The latter must be scheduled within four semesters of completing the qualifying examination. It is expected that doctoral candidates will take at least one course per semester until they have passed the preliminary examination.

The final requirement for the doctoral degree program is to pass an oral examination on the doctoral dissertation. The dissertation must be an original and significant research contribution to the field of atmospheric sciences. A student intending to study for the PhD may choose to do a master's thesis and receive an MS degree enroute to the PhD.

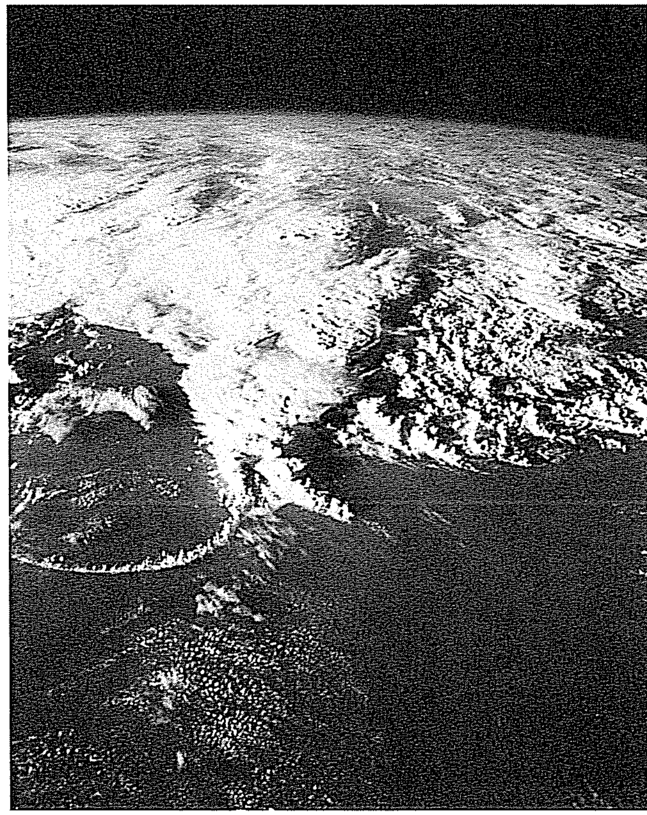


Visibility reduced by smoke



Slight or moderate dust storm or sand storm has begun or increased during past hour

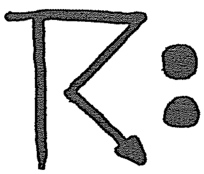
Moderate or heavy snow, or rain and snow mixed, or hail at time of observation; thunderstorm during past hour

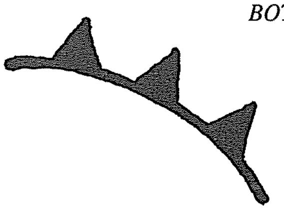


COURSES

Courses for Undergraduates:

ATMOS 100	Introduction to Meteorology
ATMOS 101	Weather Analysis Laboratory
ATMOS 120	Severe and Unusual Weather
ATMOS 199	Undergraduate Open Seminar
ATMOS 222	Weather Processes
ATMOS 301	Principles of Atmospheric Physics
ATMOS 302	Principles of Atmospheric Dynamics
ATMOS 310	Satellite Meteorology
ATMOS 397	Topics in Atmospheric Sciences • Planetary Atmospheres • Statistical Methods in Meteorology

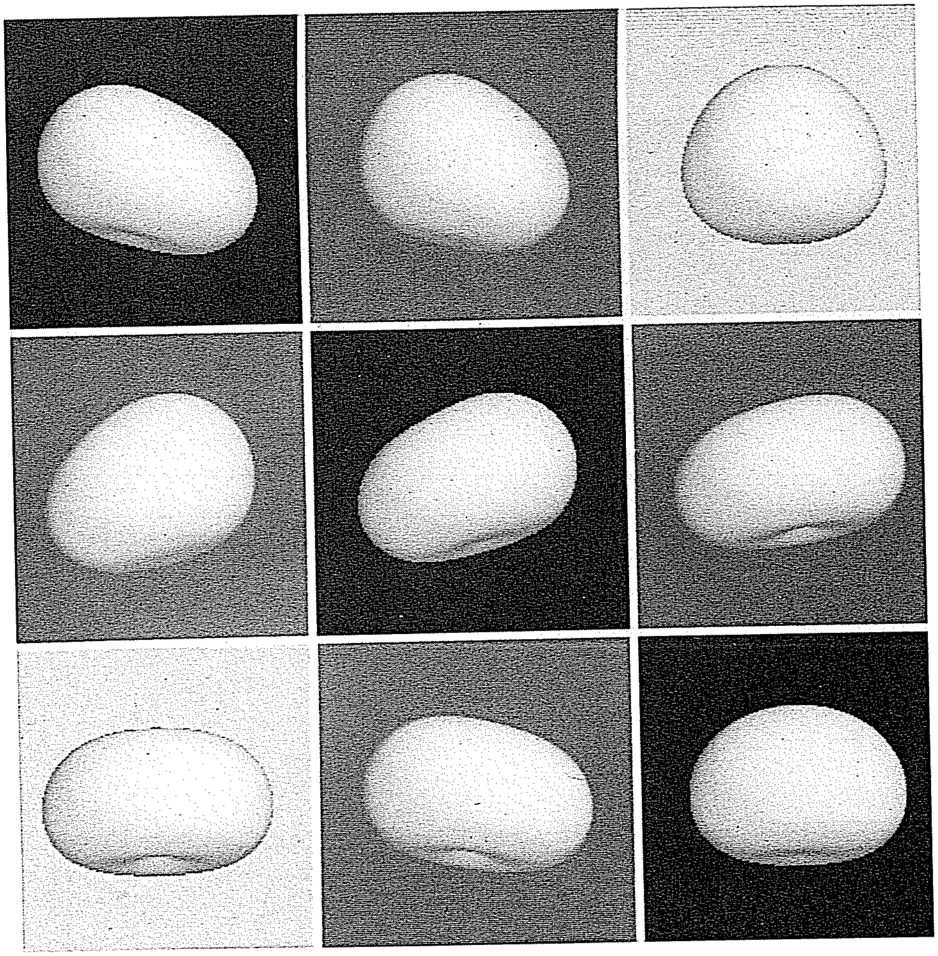




TOP: Thunderstorm, moderate or heavy rain
BOTTOM: Cold front

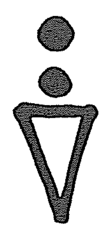
Courses for Graduates:

ATMOS 401	Synoptic Meteorology
ATMOS 405	Numerical Methods in Fluid Dynamics
ATMOS 406	Dynamical Weather Prediction
ATMOS 408	Atmospheric General Circulation
ATMOS 411	Atmospheric Convection
ATMOS 421	Precipitation Physics
ATMOS 431	Boundary Layer Meteorology
ATMOS 441	Dynamics of Climate and Climate Change
ATMOS 451	Atmospheric Radiation
ATMOS 490	Individual Study
ATMOS 491	Seminar in Atmospheric Sciences
ATMOS 497	Special Topics in Atmospheric Sciences • Tropical Meteorology • Aerosol Physics • Geophysical Fluid Dynamics • Arctic Meteorology • Physical Oceanography • Global Change
ATMOS 499	Thesis Research

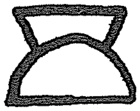


FAR LEFT: Storm and arc clouds over the Black Sea, taken on the Apollo/Soyuz mission
LEFT: Computer-generated shapes for a 5-mm diameter raindrop. The eight pictures from top left to bottom center show an oscillation sequence of two primary modes, 90 degrees out of phase. The lower right square depicts the static shape.

In addition to the offerings listed above, many courses offered by other units of the university are useful supplements to a program in atmospheric sciences. Among these are courses in aeronautical and astronautical engineering (basic aerodynamics of compressible and incompressible fluids, aerodynamic heat transfer), computer science (numerical analysis, computer programming), electrical engineering (basic aeronomic processes, physics of the upper atmosphere and space), geography (climatology, atmospheric ecology, remote sensing), mathematics (differential equations, advanced calculus, statistics, vector and tensor analysis, mathematical methods of physics), physics (thermodynamics, mechanics, electromagnetic wave theory), theoretical and applied mechanics (theory of ideal and viscous fluid flow, turbulence), and civil engineering (air resources engineering, pollution dispersal).



Violent rainshower(s)



Cumulonimbus having a clearly fibrous top

ADMISSIONS POLICY

Applications are encouraged from students with a bachelor's degree in physics, mathematics, computer science, geography, engineering, and related fields, as well as meteorology and oceanography. But students who are genuinely interested in studying the atmosphere and who have some deficiencies in their physical science or mathematics background will also be considered.

Applicants must satisfy the general requirements for admission to the Graduate College and must have an equivalent grade-point average of at least 4.0 out of a possible 5.0. Averages are computed from the last 60 hours of undergraduate and graduate work completed. Students with an equivalent grade-point average between 3.75 and 4.0 are considered on an individual basis. Applicants whose native language is not English are required to take the Test of English as a Foreign Language (TOEFL) and receive a minimum score set by the university (currently this is 520).

Prospective students who wish to begin their programs in the fall semester should submit their applications by March 1 for full consideration. Admission decisions are made as soon as possible, after an applicant's file is complete. Initial assistantship offers are made no later than April 15.

Heavy rain, intermittent

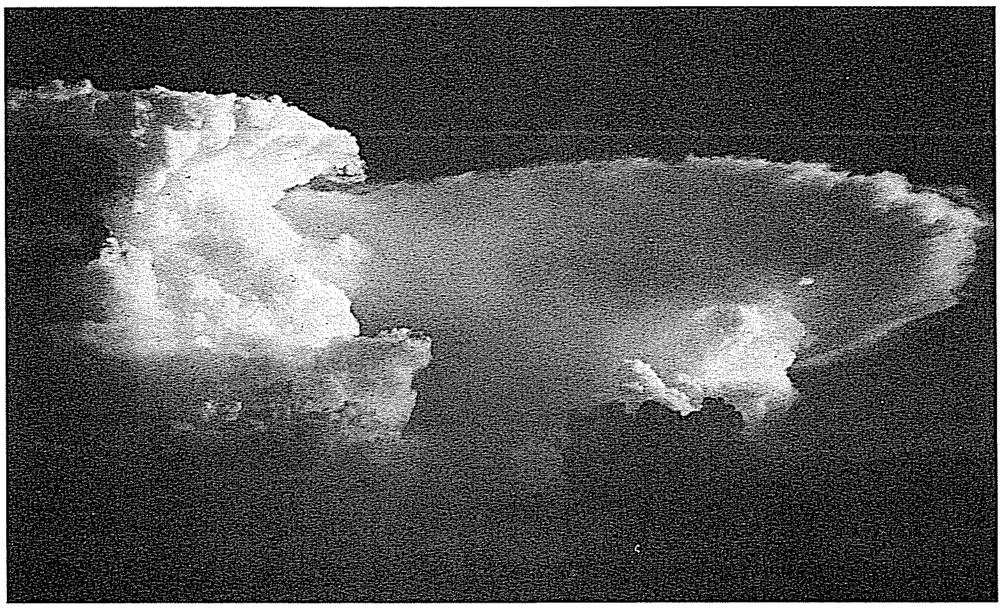
FINANCIAL AID

It is the policy of the Department of Atmospheric Sciences to offer research or teaching assistantships to most of the graduate students accepted into the program. Students may also apply for other aid including graduate fellowships from federal agencies or from the university. Fellowships and teaching assistantships are often supplemented with a part-time research assistantship. Tuition and service fees are waived for most students who are receiving support.

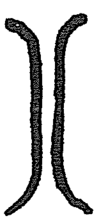
Research assistantships are 9-month appointments with a separate summer appointment. They are usually half time, requiring 20 hours of service per week. Typical responsibilities include data analysis, simple computer programming, and related work in the department. Often the responsibilities are related to the student's thesis work.

LEFT: Thunderstorms over Central Africa

Photograph of tornado and wall cloud taken by member of the student chase team



Aircraft view of thunderstorm taken during Illinois field project

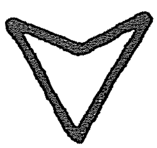


Funnel cloud(s) within sight

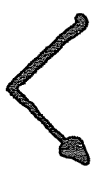
RESEARCH PROGRAM

The atmospheric sciences involve the application of physics, mathematics, and chemistry to problems ranging from the formation of small water droplets to transitions among global climate regimes. Recent technological developments in computing and atmospheric measurement have made modern meteorology a blend of science and engineering. The broad spectrum of activities within the atmospheric sciences is reflected in the following summary of the department's current research projects.

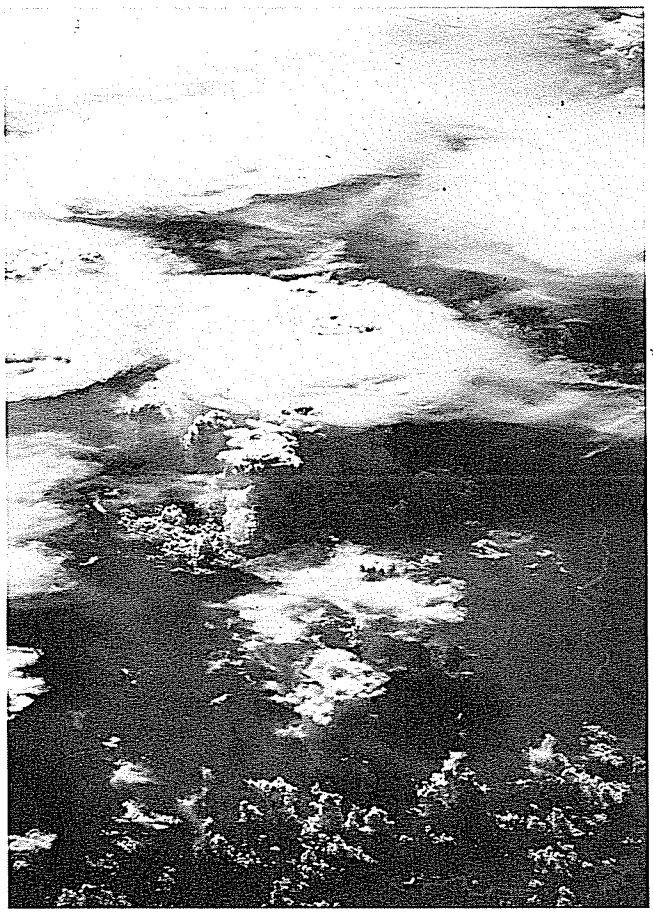
From its inception in 1969, the department has been a leader in the analysis and modeling of mesoscale weather systems, especially severe convective storms. Mesoscale research remains today a cornerstone of the department's activities. As the department expanded during the 1970s and 1980s, faculty expertise was added in the areas of large-scale dynamics, physical meteorology (especially cloud microphysics), climate dynamics, and numerical weather prediction. The department's growth and research foci have been planned in such a way that they mesh with the distinctive opportunities offered by UIUC: the most advanced computing environment available, the proximity of the Illinois State Water Survey, world-renowned programs in physics and engineering, and a geographical location that experiences a wide variety of convective and synoptic-scale weather systems.



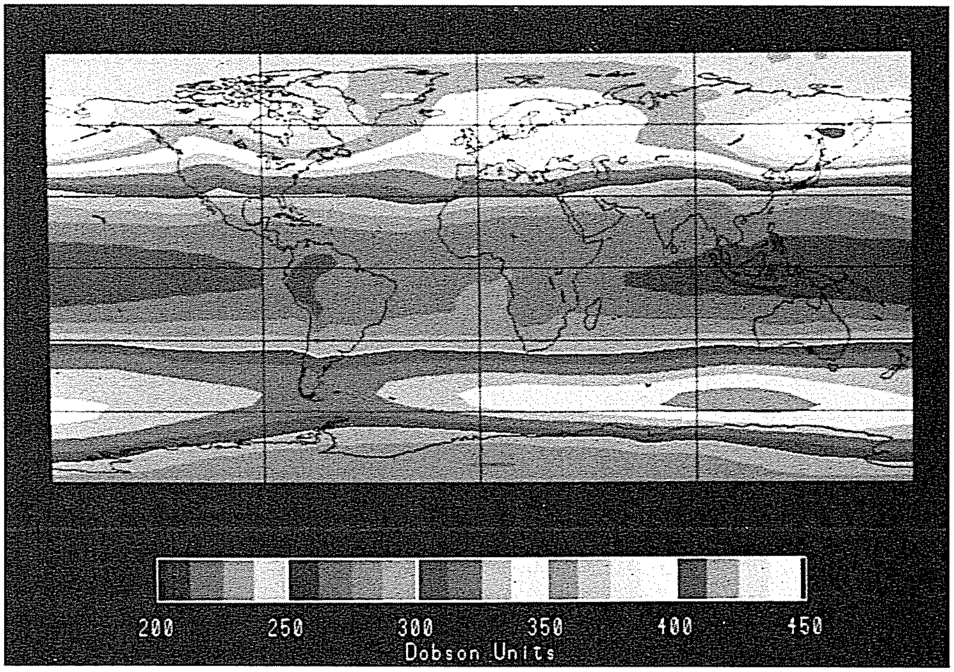
Squalls within sight



Lightning visible, but no thunder heard



Brazilian thunderstorm complex



Computer display of ozone data obtained with the satellite Total Ozone Mapping Spectrometer. These daily global measurements help us to understand the transport and chemistry of the ozone, and possible trends in ozone amounts.

CLIMATE DYNAMICS

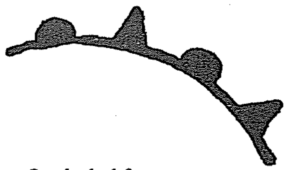
Research on climate dynamics has as its objectives the understanding and prediction of atmospheric changes over time scales of several months to millenia. Climate dynamics has taken on added importance in view of the recently detected decline of stratospheric ozone, drought in large areas of Africa and North America, and the possibility that increasing carbon dioxide concentrations may result in a significant warming of the global atmosphere. Studies of these topics require a strong background in atmospheric physics, dynamics, and chemistry. Oceanography is also an important part of climate dynamics because interactions between the atmosphere and the ocean become increasingly important as the time scales increase. Even the biosphere may have significant feedback effects on the climate.

Global atmospheric models have become valuable tools in the study of climate dynamics. On the shorter time scales, atmospheric models are providing increasingly useful input to long-range weather forecasts. On the longer time scales, these models permit controlled experiments that address the atmosphere's sensitivity to trace gases (CO_2, ozone), surface boundary conditions, and other atmospheric characteristics.

Topics now under investigation at UIUC include:

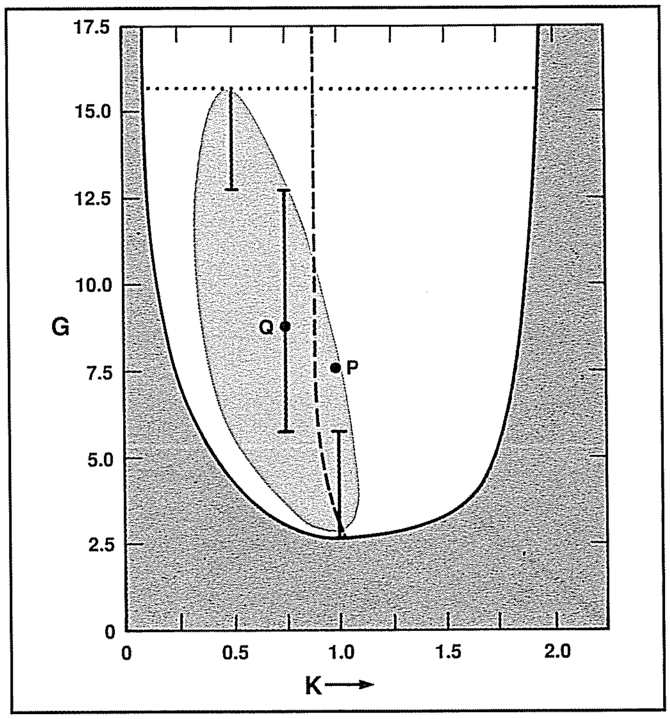
— recent changes of stratospheric ozone deduced from satellite data; model-based studies of ozone transport,
— the impact of surface boundary variables (sea surface temperature, snow cover) on long-range weather forecasts,
— patterns and causes of growing season rainfall variability in central North America,
— energy-balance modeling of climate variability, feedbacks and paleoclimate,
— role of the polar regions in climate change, and
— relation of drought in northern Africa to large-scale atmospheric and oceanic conditions.

Continuous drizzle, moderate at time of observation



Occluded front

A portrait of the nonlinear scale selection and hysteresis properties of an unstable barotropic jet (stippled area). G is the forcing parameter and k is the wave number.



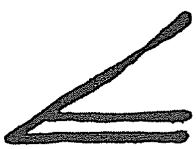
LARGE-SCALE DYNAMICS

Research on large-scale dynamics inquires about the physical nature of all atmospheric phenomena with characteristic dimensions ranging from hundreds to thousands of kilometers, the scales at which the rotation of the earth plays a crucial role. It seeks answers to questions such as: What are the physical factors and mechanisms giving rise to each phenomenon? What determines the evolution of its structure throughout its life cycle? How does it interact with its immediate environment, and with the global circulation? How predictable are these phenomena? Investigations of large-scale dynamics are motivated not only by our natural curiosity about how the atmosphere works, but also by the practical need of building a foundation for developing incisive data analyses and accurate forecasts under different conditions of weather and climate.

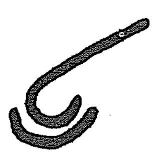
Among the phenomena under consideration are fronts, cyclones, stormtracks, planetary waves, easterly waves, hurricanes, and the monsoonal circulations. Investigations are carried out using tools from theoretical fluid mechanics and the theory of dynamical systems. The use of analytic and numerical models of widely different complexity has proven both fruitful and necessary in improving our understanding of the intricate dynamics of the atmosphere.

Topics of active research include:

— instability studies of different atmospheric flows,
— the role of condensational heating in large-scale disturbances,
— the nonlinear equilibration of barotropic and baroclinic waves in forced dissipative atmospheric systems,
— atmospheric blocking, storm tracks, and low frequency variability,
— the influence of orography on the large-scale circulation, and
— stratospheric planetary-scale waves and their role in the transport of chemical tracers.

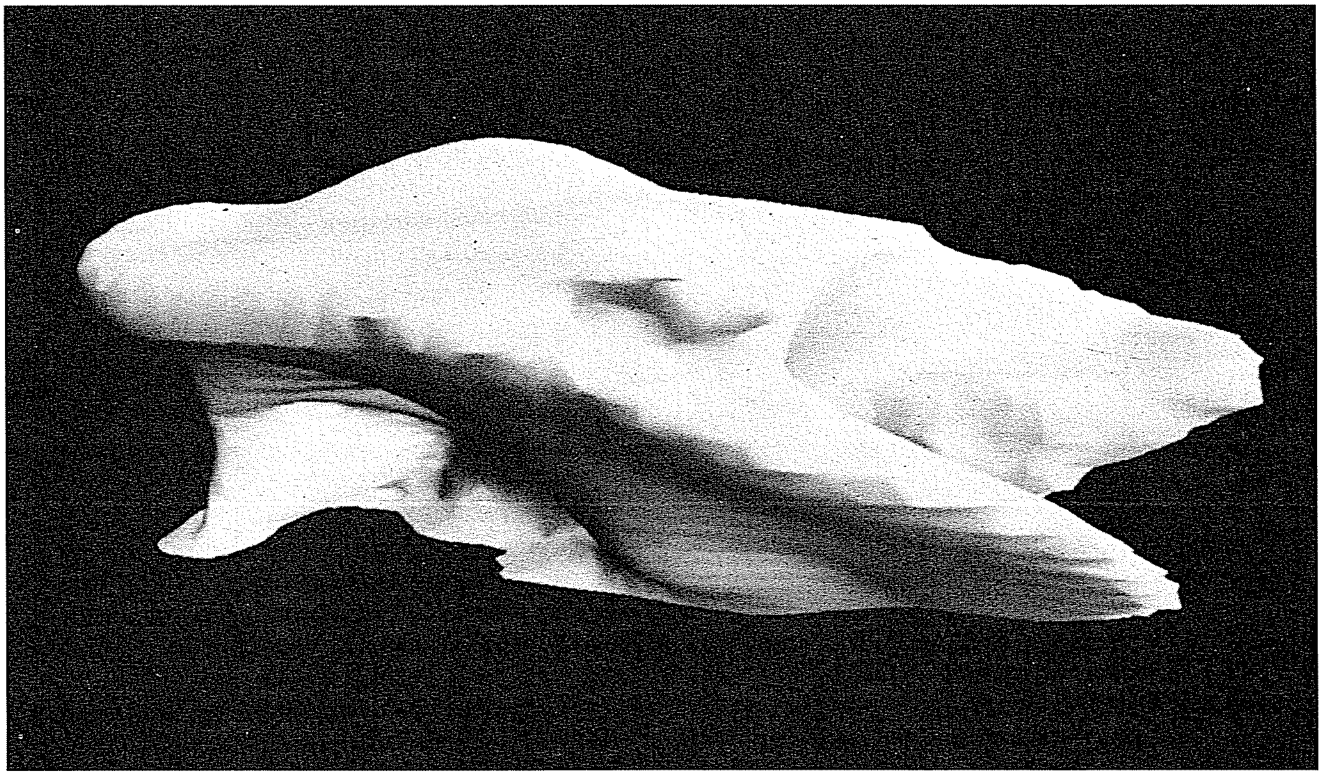


Thick altostratus, greater part sufficiently dense to hide sun or moon



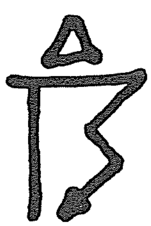
Altocumulus of chaotic sky

Severe storm from 3-D numerical model



MESOSCALE AND CONVECTIVE DYNAMICS

Over the last decade interest has grown in the study of atmospheric phenomena ranging in scale from 1 to 1000 kilometers. Convection often plays an important role in the evolution of mesoscale systems that produce flash floods, high winds, and hail. Objectives include the study of the initiation, structure, evolution, and intensity of mesoscale and convective systems, the identification of key physical processes responsible for the development and maintenance of mesoscale systems such as the lifting associated with orography, the determination of the interaction of the mesoscale with the larger synoptic scale and the smaller cloud scale, and the improvement in local weather prediction.

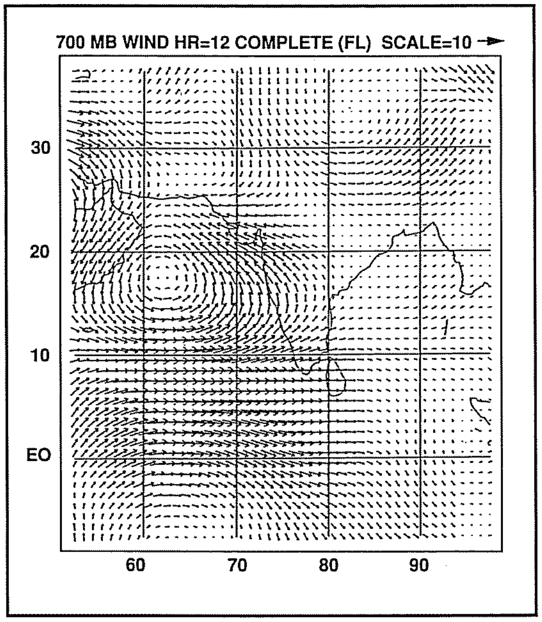


Heavy thunderstorm with rain

Research interests in the department include:

— the wintertime study of mesoscale systems,
— the role of hills and mountains in convective cloud development,
— the interaction of individual clouds within squall lines and other storm systems,
— the impact of cloud systems on their larger scale environment,
— the study of thunderstorm features such as downbursts, gust fronts, and tornadoes,
— the investigation of convective turbulent motions, and
— the development of methods to use computers with many processors and different computers in a networked computer environment to simulate mesoscale and convective scale flows.

Numerical simulation of onset cyclone over the summer monsoon region near India.



NUMERICAL WEATHER ANALYSIS AND PREDICTION

The field of numerical weather prediction is concerned with the solution of general hydrodynamic and thermodynamic equations as they pertain to the atmosphere, starting with given initial conditions and subject to certain boundary conditions. This task is accomplished with the help of "models" that describe a closed set of appropriate physical laws expressed in mathematical terms and are integrated using various numerical procedures. Because of their immense computational needs, the level of complexity and the degree of sophistication of weather prediction models is constantly changing as advances are made in the field of computer technology. Accompanying these changes is the need for the design of efficient and accurate numerical schemes for integrating models that depict increasingly wider ranges of atmospheric processes.

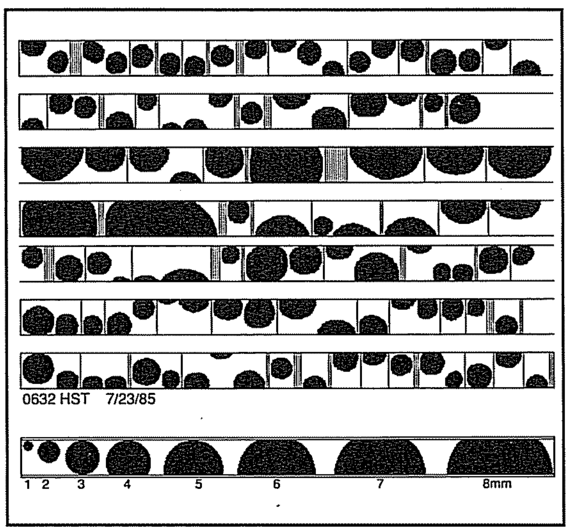
One of the greatest challenges of numerical weather prediction is to formulate adequately the various physical processes that are otherwise not resolvable, given the coarseness of the model's spatial resolution. These include processes such as precipitation (both convective and nonconvective), radiation, fluxes of heat and moisture from the surface, and turbulent diffusion.

The research activities at UIUC within the area of numerical weather prediction include the following:

- preparation of initial conditions for numerical prediction models using observations from widely different observational platforms,
- examination of model performances and forecast skills and understanding of the inherent limitations of prediction models, and
- efficient use of modern day supercomputers for numerical modeling and innovative forms of displaying model output.

PHYSICAL METEOROLOGY

Physical meteorology is the discipline of the atmospheric sciences concerned with the structure of the atmosphere and its storm systems, cloud and precipitation physics, atmospheric chemistry, and the transfer of radiation. Research programs in physical meteorology involve diverse meteorological phenomena, with size scales ranging from cloud droplets to midlatitude storm systems and time scales ranging from a fraction of a second to days.



Raindrop images from a shower containing a giant raindrop (> 8 mm diameter). The sequence at the bottom shows relative size. The data were obtained using an optical array laser probe near Hilo, Hawaii, during the 1985 Joint Hawaiian Warm Rain Project.

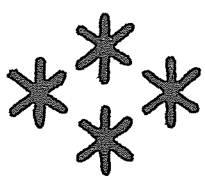
Research in physical meteorology provides important information that has broad applications. Rainfall and severe weather prediction with radar, aircraft icing, pollutant transport and dispersion, precipitation formation and evolution, structure of fronts and rainbands, and atmospheric measurements: these and many other applications are within the discipline of physical meteorology.

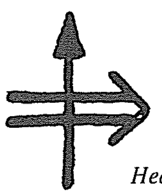
The faculty in the Department of Atmospheric Sciences and scientists at the Illinois State Water Survey (ISWS) are involved in a wide array of field, laboratory, and modeling research focused on cloud and precipitation physics, mesoscale and microscale storm structure, and atmospheric chemistry. The Cloud and Aerosol Physics Laboratory at the ISWS on the university campus is the center for research on a wide variety of topics concerned with cloud physical processes. The CHILL 10 cm radar, a national radar facility operated by the ISWS, is based at the university and is used in local and national research programs.

Topics of active research include:

— dynamics of drop collisions and collision efficiency,
— theoretical and experimental investigations of raindrop shape,
— the effect of electric charge on raindrop shape,
— dynamics of drop oscillations,
— rain formation in warm (> 0°C) convective clouds (Hawaii),
— mesoscale organization and precipitation development in continental winter cyclonic storms (midwestern U.S.),
— precipitation development and microphysical processes in orographic storms (Sierra Nevada in California),
— ice initiation in mixed phase summertime convective clouds (midwestern U.S.), and
— 4-D visualization of radar and other databases.

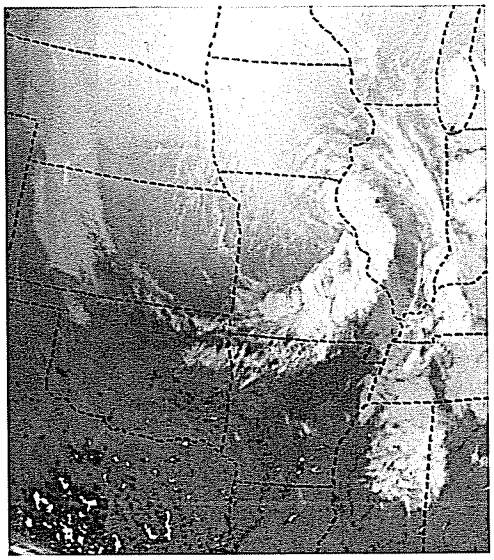
Continuous fall of snowflakes, heavy at time of observation





Heavy blowing snow, generally high

Satellite photograph of winter mesocyclone in Midwest

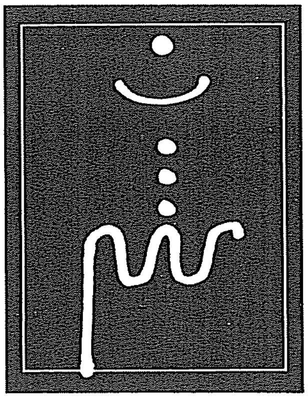


SYNOPTIC METEOROLOGY

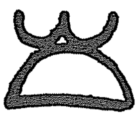
In synoptic meteorology, studies are made of the structure and behavior of atmospheric phenomena in the lower atmosphere on a time scale of several hours to several days—typical of processes most directly responsible for changes in our daily weather. Extensive use is made of daily weather maps and observations provided by the UNIDATA system. Since research in synoptic meteorology is directly related to weather forecasting, it is one of the most important areas of study within the atmospheric sciences.

The atmospheric sciences faculty at UIUC are engaged in a wide range of research activities within this discipline. These include:

— observational and numerical investigations of precipitation patterns associated with winter cyclones in the midwestern United States;
— analyses of fronts and their relation to extratropical cyclones;
— study of cyclogenesis in cold air, commonly known as polar low development;
— climatological study of cyclones in the context of surface boundary variations.

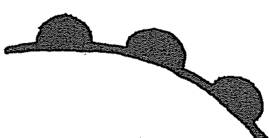


Faculty



Altocumulus formed by spreading of Cu or Cb

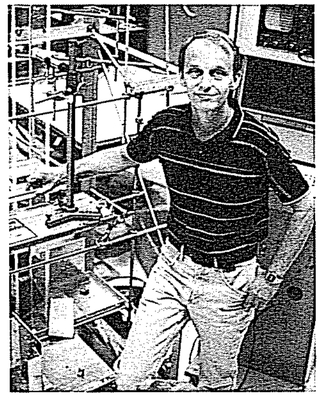
Slight snow showers



Warm front

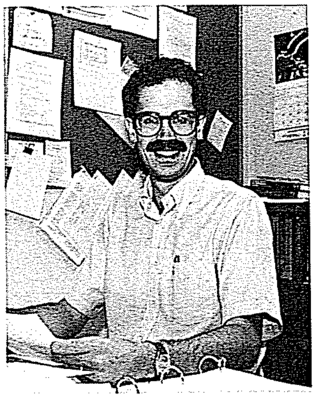
Mankin Mak

Mankin Mak, head of the Department of Atmospheric Sciences and professor of meteorology, received his PhD in meteorology from MIT in 1968. He serves as a member of the American Meteorological Society Committee on Atmospheric Dynamics and has served as the editor of the *Journal of Atmospheric Sciences.* His research experience and interests are mainly concerned with the dynamical nature of the large-scale atmospheric phenomena. One area of his research activities has been concerned with the circulation in the tropics, such as the genesis and transformation of the Atlantic easterly waves, the structure of the trade-wind boundary layer, the origin of the mid-tropospheric cyclone and monsoonal onset-vortex, and the character of dynamic coupling between the tropical and extratropical circulation. Another area of his research has been about the dynamics of frontogenesis and cyclogenesis with or without moist convective processes. His current research interests have focused on the nonlinear dynamics of large-scale geophysical systems and the applications to various atmospheric phenomena. The latter include regional cyclogeneses, atmospheric blocking, low-frequency variability, and statistical relationship among the atmospheric waves of different scales. These theoretical works are supplemented with analysis of the observational atmospheric data.



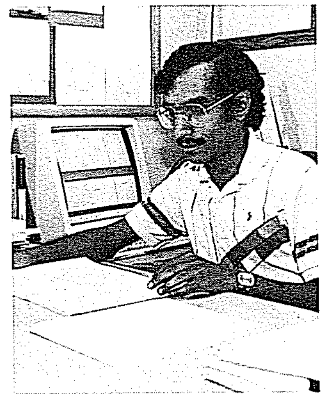
Ken Beard

Ken Beard is a professor and a principal scientist at the Illinois State Water Survey. Before coming to UIUC in 1974 he received his PhD in meteorology from UCLA in 1970, and was a visiting scientist at the National Center for Atmospheric Research. His major research areas are cloud and aerosol physics with a focus on precipitation development and radar measurements. His current research includes theoretical and numerical modeling of drop dynamics and precipitation physics, experimental studies of drop interactions and oscillations using the Cloud Physics Lab at the ISWS, and analysis of field data.



Kenneth Bowman

Peter Lamb



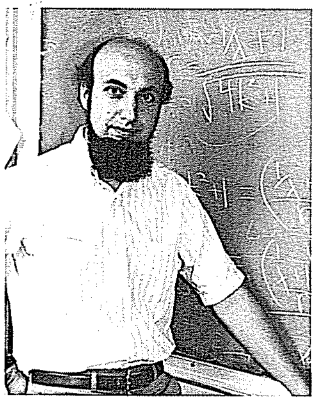
Mohan Ramamurthy

Kenneth Bowman received his PhD in 1983 from the Geophysical Fluid Dynamics Program at Princeton University, where he studied the interaction between large ice sheets and climate by using simple numerical climate and ice sheet models. He was an NRC postdoctoral fellow at NASA's Goddard Space Flight Center from 1983 to 1985, where he analyzed satellite observations of atmospheric ozone and worked on problems in the statistical analysis of global observations. He joined the faculty of UIUC in 1985 as an assistant professor. His research interests include the climatology of atmospheric ozone and the dynamics of the polar stratosphere, as well as long-term climatic variability, especially problems related to the ice ages.

Peter Lamb is an adjunct professor who received his PhD in meteorology from the University of Wisconsin in 1976. He is also head of the Climate and Meteorology Section of the Illinois State Water Survey, which he joined in 1979 following postdoctoral experience at the universities of Wisconsin, Adelaide (Australia), and Miami. He recently became chief editor of the American Meteorological Society's *Journal of Climate*. His primary research interest is in the physical and dynamical processes responsible for climate and its year-to-year variations. Before coming to Illinois, he was involved in substantial investigations of the long-term average surface climate and atmospheric circulation, and the hydrospheric and atmospheric heat budgets, of the tropical oceans. Related research has documented the secular variation of rainfall in sub-Saharan West Africa and its relation to atmospheric-oceanic conditions. His recent work has focused on midwestern climatic variability, particularly the intraseasonal and interannual fluctuations of the growing season. A secondary research interest concerns the applied issue of how the products of this basic physical-dynamical research might be used for the benefit of society.

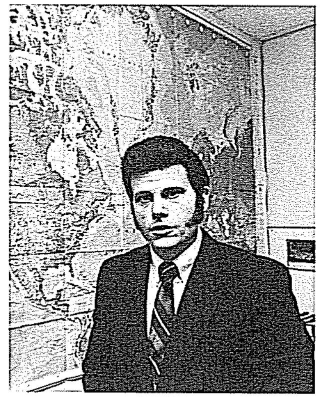
Mohan Ramamurthy is an assistant professor and comes to UIUC following a post-doctoral stint with the Supercomputer Computations Research Institute at the Florida State University. He received his PhD in meteorology from the University of Oklahoma in 1986, where he worked on problems related to numerical weather prediction in the tropics. His recent research has been focused in the area of data assimilation in numerical weather prediction models and observing system experiments to incorporate observations from diverse data platforms and to examine their impact on dynamical predictions. His research interests also include synoptic and dynamical analysis of both tropical and midlatitude disturbances and mesoscale modeling. He also has a strong interest in the application of supercomputers to meteorology—specifically, in designing algorithms and developing codes to take advantage of the various architectural features of the present and future generation of supercomputers.

Robert Rauber



Walter Robinson

Takashi Sasamori



Michael E. Schlesinger

Robert Rauber recieved his PhD from Colorado State University in 1985. His primary research interest has been the study of scale interactions within wintertime storms. His research has focused on synoptic, mesoscale, and microscale storm system structure, as determined from remote sensing, aircraft, and ground-based data systems. Before coming to Illinois, he was involved for nine years in cloud physics and weather modification field experiments in the Rocky and Sierra Nevada Mountains. He joined the faculty of UIUC in 1987 as an assistant professor. His current research interests concern studies of the mesoscale and microscale structure of storm systems in various geographic regions. His research interests also include instrumentation, radar studies of cloud structure, and cloud modeling.

Walter Robinson received his PhD from Columbia University in 1985, investigating the nonlinear interactions among planetary waves in the stratosphere. He continued his research into stratospheric dynamics at the University of Washington, using both linear and nonlinear numerical models of planetary waves, as well as analyzing data from satellites. He joined the faculty at UIUC in 1988. Currently he is developing models of the low-frequency (times longer than 10 days) variability of the troposphere, research relevant to the issue of long-range forecasting. He also maintains an active interest in fundamental geophysical fluid mechanics as it relates to the large-scale dynamics of the earth's lower and middle atmosphere.

Takashi Sasamori received an ScD in 1959 from Tohoku University in Japan. He is interested in radiative transfer in the atmosphere, boundary layer meteorology, and dynamics of the atmospheric general circulation. Before he joined the department in 1977 he participated in a study of the atmospheric general circulation using a numerical model at the National Center for Atmospheric Research. In the last few years he has published several papers that investigated large-scale circulation based on the baroclinic instability theory. Currently he is involved in the analysis of unstable atmosphere/ocean interactions with specific application to the midlatitude storm tracks and the intertropical convergence zone in the tropics.

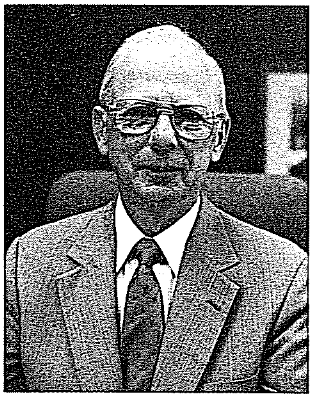
Slight freezing rain

Moderate or heavy freezing rain

Michael E. Schlesinger, professor of meteorology, received his Ph.D. in 1976 from the University of California, Los Angeles.

He is one of the world's leading experts in the numerical modeling of climatic change, with interests in the climates of the geologic past and in predicting future climates resulting from increased concentrations of "greenhouse" gases. He carried out the first detailed comparison of the changes in climate predicted by different atmospheric general circulation models. His research currently focuses on the role of the ocean in climatic change, on how clouds amplify or reduce changes in the climate, and on generating useful predictions of regional climatic changes.

He is an active participant in international efforts to predict coming changes in the global climate as a director of NATO conferences in England and Italy and as a leading participant in activities arising from the U.S. - U.S.S.R. cooperative agreement on the protection of the environment.



Dick Semonin

John Walsh

Robert Wilhelmson

Dick Semonin received his BS in meteorology from the University of Washington in 1955. Upon graduation, he was employed by the Illinois State Water Survey as a research assistant and he has worked through the ranks to become the chief. He is also an adjunct professor in the Department of Atmospheric Sciences and has served as an editor for the *Journal of Applied Meteorology*. His research interests have included weather radar, cloud physics, weather modification, urban effects on local climate, and atmospheric chemistry. Work in these areas has involved laboratory studies as well as extensive field measurements.

John Walsh, professor, came to Illinois after receiving his PhD in meteorology from the Massachusetts Institute of Technology in 1974. He has recently served as the chair in Arctic Marine Science at the Naval Postgraduate School and is presently a member of the Climate Research Committee of the National Academy of Sciences. He has done research on the interannual variability of sea ice and snow cover in the northern hemisphere. The ultimate goal of his work is to improve our understanding of the roles of ice and snow in short-term climatic variability, particularly in the climatically sensitive high latitudes. Related work has included an examination of the patterns of year-to-year variability of weather elements over the United States. Statistical and dynamical studies of these patterns, in conjunction with surface boundary data, may ultimately permit the incorporation of variables such as soil moisture and snow cover into strategies for long-range weather forecasting.

Robert Wilhelmson, professor and research scientist at the National Center for Supercomputing Applications (NCSA), received his PhD (1972) in computer science from UIUC in the areas of computer software and numerical analysis, respectively. He has been involved in the study of numerical techniques for solving fluid flow problems since then at UIUC and has used some of these techniques in building two- and three-dimensional models to study the behavior of convection, including severe storms and squall lines and their attendant features including gust fronts and tornadoes. Simulations have and are being carried out with improved resolution made possible by increases in supercomputer power and memory and with the use of nested grids in order to study the region in which large tornadoes form. Other studies include the impact of low-level environmental conditions on convective characteristics such as the development of strong low-level rotation and the orientation and behavior of convective lines. In order to view and interpret the ever increasing set of numbers that come out of a simulation, he maintains an active involvement in the development of techniques and software to visualize them, including the use of advanced workstations for interactive interrogation, display, and animation. Other interests include mesoscale dynamics, parallel processing, distributed computing, and databasing. He also has a keen interest in computational science as a whole, having served as assistant and associate director at NCSA and currently is serving on the editorial board for the *International Journal for Supercomputer Applications*.

Fractostratus, fractocumulus (scud) clouds

The Community

The twin cities of Urbana and Champaign are located 130 miles south of Chicago and have a combined population of about 100,000. Indianapolis and St. Louis are also within three hours driving time. The land surrounding Urbana and Champaign is primarily farmland, although there are beautiful rivers and woods in the area, including the university's 1500-acre Allerton Park.

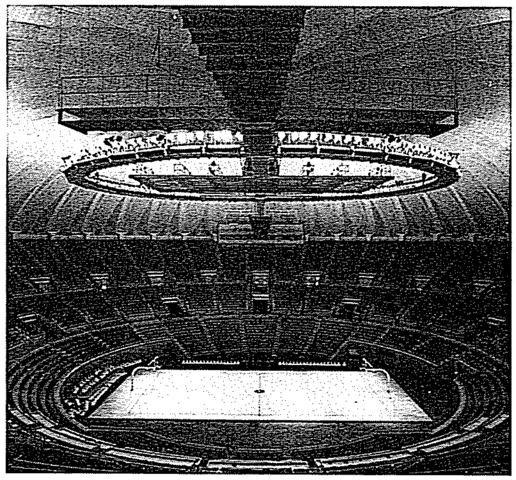
The campus is a major midwestern center for the arts. The Krannert Center for the Performing Arts features world-renowned entertainers and philharmonic orchestras. It contains five separate and specialized theaters for orchestra, opera, choral music, theater, and dance. Krannert Art Museum is second only to the Art Institute of Chicago in size, value of collections, and number of public service programs.

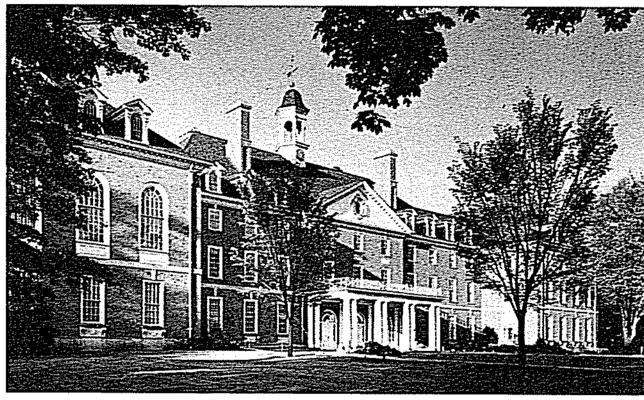
The university has tremendous athletic programs and facilities for students and staff. It is the home of the Fighting Illini teams, who are members of the Big Ten athletic conference.

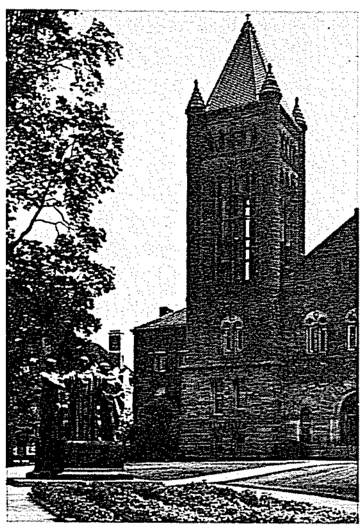
Housing costs are considerably lower than in the major urban areas of the east and west coasts. A variety of campus and community housing is available at costs ranging from $250 to $400 per month in 1988–89. Food and entertainment are also moderate.

Filaments of cirrus, or "mares tails"

The Assembly Hall hosts varied entertainments as well as sports events.







ABOVE: The Illini Union
LEFT: Altgeld Hall and Leorado Taft's Alma Mater bronze are familiar sights on the UIUC campus.

For Further Information

Prospective students should address their questions to:

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University of Illinois at Urbana-Champaign
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Urbana, IL 61801

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