



ANNOUNCEMENTS

Congratulations... to Susan Solomon, who has been selected to receive the 2000 Carl-Gustaf Rossby Research Medal from the American Meteorological Society. The award honors Susan “for fundamental contributions to understanding the chemistry of the stratosphere and unraveling the mystery of the Antarctic ozone hole.” She will be presented with the award on January 12 at the AMS Annual Meeting.

Reformulated gasoline revisited... The report *Ozone Forming Potential of Reformulated Gasoline* is now published. It is a product of a National Research Council committee that was formed in response to a request (from the Environmental Protection Agency) to evaluate the technical soundness of various approaches to determining the relative ozone-forming potentials of different reformulated gasoline blends. Fred Fehsenfeld served on the committee and was coauthor of two of

the report’s chapters that deal with the atmospheric chemistry associated with reformulated gasoline.

About our new mail code (R/AL)... Organizational changes have taken place within our NOAA line office, the Office of Oceanic and Atmospheric Research (OAR). Effective October 1, the Environmental Research Laboratories (ERL) will no longer be designated as a separate entity within OAR. The research components of OAR are unchanged and will continue to include the 12 laboratories and centers of the former ERL and their Joint Institutes (which include the Aeronomy Lab and CIRES), the National Undersea Research Program and their Centers, the National Sea Grant College Program and their member colleges, and the Office of Global Programs.

Thanks... are in order for Jim Burkholder and Roger Jakoubek, who have agreed to manage and to help plan and oversee improvements to the Aeronomy Lab’s staff machine shop.



HOME and AWAY

ACCENT Intercepts Rocket Plume

The Atmospheric Chemistry of Combustion Emissions Near the Tropopause (ACCENT) experiment was in full swing in September. Researchers returned late that month from an eventful series of Houston-based flights of the NASA WB-57F high-altitude research aircraft. Scientists capitalized on several unique opportunities, including a flight above Hurricane Floyd as it moved up the Atlantic coast of Florida, a trip to 5°N that crossed into the intertropical convergence zone (ITCZ), and an intercept of the plume of a solid propellant rocket that was launched from Vandenberg Air Force Base in California.

The rocket plume sampling was especially challenging, requiring a close coordination of ACCENT mission scientists with Air Force launch personnel to achieve the precise timing needed. It also involved a bit of luck; engine problems developed with the aircraft, but not until after the intercept was achieved. After a safe landing in California and an engine replacement, the WB-57F returned to Houston a week later. As a result of the delay, the ACCENT team is evaluating possibilities for additional flights in October.

ACCENT is a multi-agency experiment to study the effect of aircraft and rocket exhaust on the ozone layer, aerosols, and cirrus cloud formation. Partners in the effort include NOAA (AL and CMDL), NASA, and NCAR. The Aeronomy Lab’s Meteorological Chemistry group is providing several instrument packages for the mission, including a pressure-temperature-wind sensor, ozone and methane instruments, a Lyman- α instrument to measure water, the Particle Analysis by Laser Mass Spectrometry (PALMS) instrument for the chemical characterization of individual aerosol particles, and a new instrument for the measurement of nitric acid by chemical ionization-mass spectrometry. The group also is providing the meteorological forecasting used in the flight planning for the mission. ♣

Wind Profilers Work Overtime in the Pacific

The Aeronomy Lab Doppler radar profilers and scientists in the Tropical Dynamics and Climate group had a busy summer this year with their participation in two field missions. Both missions were focused in the tropical Western Pacific, a key area in worldwide climate that is often referred to as the Earth’s “heat engine.” In June and July, the “S-band” cloud/precipitation profilers were on the west-central Pacific island of Nauru and on the NOAA research vessel *Ronald H. Brown* for the

CAVITY RING-DOWN SPECTROSCOPY: HIGH-TECH "PHOTON PING-PONG" AT WORK

Photons are getting some high mileage in the Atmospheric Chemical Kinetics laboratory these days, in a new instrument that uses a technique called cavity ring-down spectroscopy (CRDS).

The technique puts some new twists on more traditional approaches in absorption spectroscopy. CRDS begins in a familiar way, with a pulse of laser light entering a cell that contains an absorbing gas of interest. The light pulse reflects off of mirrors at opposing ends of the cell, yielding multiple passes through the absorber and a gradual decay in the intensity of the light. What's new is that instead of measuring the magnitude of the absorption of the decaying light pulse, the technique measures the *time* it takes for the light to decay. This decay time is not sensitive to variations that occur from one laser pulse to the next, so a major source of noise in traditional absorption spectroscopy is averted. The payoff: sensitivity skyrockets, and extremely small quantities of the absorbing gas can be detected.

Another aspect of the technique that enhances sensitivity even further is the use of ultra-high reflectance mirrors in the cell. The mirrors are

coated with thin films of dielectric material that yield an astounding number of passes through the cell—for the 1-meter cell of the Aeronomy Lab instrument, the effective path length for a rebounding light pulse is in the range of 75 kilometers.

The Aeronomy Lab instrument, which uses a pulsed dye laser in the visible-near infrared and a photomultiplier detector, was built by Steve Brown over the course of the last year. Thus far, Steve has studied the very weak vibrational overtone absorptions of nitric acid, hydrogen peroxide, and pernitric acid. His work will show whether these molecules could photodissociate in the atmosphere from these absorptions, a result that would have implications for atmospheric budgets of odd-hydrogen radicals. Different sets of mirrors and different laser/detector combinations enable the technique to be used in other spectral regions, such as the ultraviolet region where many chemically active atmospheric species absorb. Kinetics applications and even field deployments may lie in the future for this versatile newcomer to the Lab's arsenal of instruments.

Nauru99 field campaign. The profilers measured vertical motions of hydrometeors in precipitating cloud systems during the experiment. Nauru99 is associated with the Department of Energy's Atmospheric Radiation Measurement program, which is examining climatological and radiative factors that affect meteorology in the tropics. NOAA's Environmental Technology Lab was a partner with DOE and the Japan Marine Science and Technology Center in this summer's experiment.

Aeronomy Lab scientists then geared up for the KWJEX experiment, which took place in August and September on the Kwajalein atoll in the Marshall Islands and surrounding waters. The experiment was the fourth field campaign associated with the NASA-sponsored Tropical Rainfall Measuring Mission (TRMM) Ground Validation Program, which is aimed at getting data to compare to the TRMM satellite's measurements of precipitation (previous ground validation campaigns occurred in Florida, Texas, and Brazil). Latest word is that the joint US/Japanese TRMM satellite is expected to outlive its originally projected three-year lifetime by at least two years, so there may yet be future installments of the ground validation work. ♣



WHAT'S UP WITH PEOPLE

With **Tom Van Zandt's** retirement earlier this year, the members of the former Atmospheric Dynamics group have moved into other research programs. **Wally Clark** has joined the Tropical Dynamics and Climate group, where he is analyzing atmospheric

wind profiler measurements for climate-related signals. **Alison Grimsdell** and **Wayne Angevine** have joined the Theoretical Aeronomy group, where they will continue their work on boundary layer meteorology. Tom continues to work with the Aeronomy Lab under "Emeritus" status... Susan Solomon's Middle Atmosphere program has been renamed the **Chemistry and Climate Processes** program, reflecting the full range of research interests of the group. Group member **Darren Miller** completed his bachelor's degree at CU and is continuing his research with the group. **Klaus Pfeilsticker**, of Heidelberg University, is visiting the group for a year to do research on climate/clouds/radiation issues and on stratospheric ozone... **Chuck Brock** is joining the Tropospheric Chemistry group to do research on tropospheric aerosols. He will maintain a half-time appointment with Denver University. **Andreas Stohl** has been visiting the group since mid August, working on analysis of the North Atlantic Regional Experiment (NARE) data. He returns to the University of Munich in mid October. **Matt Warshawsky** is with the group and is analyzing data from the Particle Analysis by Laser Mass Spectrometry (PALMS) instrument... In August, **Rob Harley** began a one-year visit with the Theoretical Aeronomy group, where he is doing research on the modeling of air quality and the role of volatile organic compounds. He is on sabbatical from the faculty at the University of California at Berkeley. **Susan McCaffery** has joined the group and is working on characterization of transport during the North Atlantic Regional Experiment. She was formerly with the Colorado School of Mines... In the Atmospheric Chemical Kinetics group, **Harald Stark** has arrived from the University of

Göttingen to begin a postdoctoral position. Visitor **Tomasz Gierczak** returned to the University of Warsaw on October 1. **Cheryl Longfellow** has left the group to take a faculty position at Bryn Mawr College in Pennsylvania... **Peter Popp** has joined the Meteorological Chemistry group and will participate in the upcoming SAGE III Ozone Loss and Validation Experiment (SOLVE) missions. He recently received his Ph.D. from Denver University. Joining the group from the University of Chicago is **Dan Cziczo**, who will do postdoctoral research using the PALMS instrument. **Danny McKenna**, of Forschungszentrum Jülich, visited the group for two weeks this summer to collaborate on research concerning polar ozone behavior.

We wish everyone the best in their new endeavors, whether here or elsewhere!

COMMUNICATING OUR SCIENCE



To Decisionmakers: Fred Fehsenfeld participated in a September 24th briefing of Congressional staffers on the topic of air quality. Michael Uhart of NOAA/OAR was also on the panel. The briefing was arranged by the office of Rep. Sherwood Boehlert of New York... Dan Albritton and Susan Solomon attended the second drafting meeting of the Intergovernmental Panel on Climate Change (IPCC) Third Assessment Report, held in September in Tanzania... In July, Carl Howard attended a NRC Panel Review Meeting in Boston to review the Mobile Source Emissions Factor (MOBILE) model that is used by the EPA in its air quality regulatory activities... On July 8, NOAA and the Southern Oxidants Study sponsored an open house for Congressional staffers, media, and others to visit the Nashville 1999 air quality study.

To the Scientific Community: Venues included:

- **Scientific Conferences and Symposia:** Jim Meagher gave an invited lecture about the connections between climate change and regional/urban air quality at the U.S.-China Symposium on Climate, Environmental Change, and Regional Impacts, which was held in Beijing on September 21-22. NOAA co-hosted the Symposium with the Chinese Meteorological Agency, and NOAA Administrator D. James Baker led the U.S. delegation to the meeting... In September, several scientists in the Tropospheric Chemistry program and the Chemistry and Climate Processes program presented talks and posters at the Sixth Scientific Conference of the International Global Atmospheric Chemistry Project (IGAC) in Bologna, Italy. Dave Parrish chaired a session on atmospheric photooxidants at the meeting... Dan Murphy gave an invited presentation about aerosol chemical composition at the Goldschmidt Conference in Boston in August... Adrian Tuck participated in the 25th International Symposium on Free Radicals held in Flagstaff on August 15-20... Several AL scientists were participants and organizers of sessions at the 1999 meeting of the International Union of Geodesy and Geophysics, held in July at the University of Birmingham, UK...

Several scientists in the Tropical Dynamics and Climate group gave presentations at the 29th International Conference on Radar Meteorology, held in Montreal on July 12-16... Dave Fahey participated in the International Symposium on Aviation and the Global Atmosphere, held June 23-24 in The Netherlands. He was a member of the Symposium Steering Committee... Several AL scientists were participants at the June 14-17 Gordon Research Conference on Atmospheric Chemistry in West Kingston, Rhode Island.

- **Research Workshops:** The Aeronomy Laboratory hosted a meeting of OAR program managers of NOAA's Health of the Atmosphere air quality research on September 29-30... In September, Ravi participated in a meeting in the U.K. of the working panel of the Ozone Photochemistry activity of the international Stratospheric Processes and their Role in Climate (SPARC) program... Several AL scientists and staff participated in the Planning Workshop for Integration of Satellite Calibration/ Validation and Research-Oriented Field Missions in the Next Decade, held in Snowmass on August 22-27... Victor Dvortsov was an invited participant at the Climate System Model Workshop held in Breckenridge in June.

- **Invited Lectures and Seminars:** On August 12, Dave Parrish presented a talk about the summer 1999 Nashville air quality research to the EPA in Atlanta... Ravi gave an invited talk at the 1999 International Photochemistry Meeting held at Duke University in August... George Reid gave the opening review talk at a workshop on Solar Variability and Climate held at the International Space Science Institute in Bern, Switzerland, in early July. The workshop brought together representatives from the solar and meteorological communities.

To the Public: Several members of the Aeronomy Lab participated in the Open House activities for the David Skaggs Research Center, held July 9-10. AL and CMDL were co-hosts of a tour stop about the ozone layer; contributing for AL were Chris Ennis (presenter), Debe Fisher (graphics preparation), and Dave Fahey, Ru-Shan Gao, Megan Northway, Rich McLaughlin, and Steve Ciciora (NO_x instrument preparation and information). Carl Howard was a tour guide for the Open House, Claire Granier hosted a lobby computer display about the ozone layer, Joanne Mordhorst and her daughter Katie helped with distributing informational material to the public, and Mary Gilles and Deb Wilson helped with decorations. It is estimated that 800 to 1000 people attended the event.

To Media: Dave Fahey was quoted extensively in an article that appeared in the August 30 issue of *Aviation Week and Space Technology*. The article described the science findings of the 1999 IPCC Special Report on *Aviation and the Global Atmosphere*, for which Dave served as a chapter lead author... Dan Albritton was interviewed by a reporter from the *Tampa Tribune* for an article about the role of the agricultural fumigant methyl bromide in stratospheric ozone depletion... A news article about the 1999 Nashville Air Quality Study appeared

in the *Christian Science Monitor* in July. The reporter had made a visit to the experiment site.

To Industry: Dan Albritton was one of about 15 NOAA participants who attended an August 4 NOAA/private sector workshop on the Potential Implications of Department of Commerce Climate Research and Services for the Private Sector. Participants discussed how NOAA can better provide global change information to the private sector... As part of the wind profiler Cooperative Research and Development Agreement (CRADA) agreement between NOAA and Radian Corp., David Carter and Ken Gage participated in an Engineering Review Board Meeting held in Austria for the wind profiler users in several European countries. Information was exchanged on technological capabilities and needs related to the wind profilers.

To Students and Teachers: On September 20-24, Susan Solomon and Rolando Garcia (NCAR) were in Argentina to teach a short course on stratospheric dynamics and chemistry to a group of South American graduate students and young scientists... George Kiladis was an invited organizer and lecturer for a one-day short course on "Tropical-Extra-tropical Interaction and Prediction", held on September 12 in conjunction with the American Meteorological Society's annual meeting in Denver. Students, operational meteorologists, researchers, and consultants were in attendance... Susan Solomon gave a talk to 30 high-school age Girl Scouts from around the country interested in science careers. The event was called "Earth Tunes" and was organized by the Girl Scouts Mile Hi Council, on August 6th in Denver... In June, Leslie Hartten helped to plan and design a one-week "Earthworks" teacher's workshop organized through CIRES. The aims of the workshop were to provide the teachers with experience in operating and gathering data from meteorological instruments and to give them ideas for future projects they could design for their students... Over the course of several weeks, Ravi has been working with a high school student on a project related to the ozone layer. He is also teaching an undergraduate physical chemistry course at CU this semester.

To Our Visitors: Louisa Koch, Deputy Assistant Administrator of OAR, visited the Aeronomy Lab and others in the David Skaggs Research Center on July 19... Dan Albritton described the Aeronomy Laboratory's research to a group of visitors from Japan's Institute for Environmental Sciences in July... On July 15, the Aeronomy Lab hosted the visit of over 30 staff members of the local Mountain Administrative Support Center (MASC, who manage areas such as procurement, shipping, personnel, health services, and the library). The presentation and tour of the laboratories were enthusiastically received.

Through Service on Scientific Panels and Boards: On September 8, Dan Albritton described NOAA's atmospheric chemistry research and the perspectives of the Air Quality Research Subcommittee of the

Federal Committee on Environment and Natural Resources (CENR) to the National Research Council's Committee on Atmospheric Chemistry. Dave Fahey serves on the NRC Committee... In September, Adrian Tuck was at Imperial College to chair a meeting of the UK National Environmental Research Council committee that is dealing with funding proposals under the new Core Strategic Measurements in Atmospheric Sciences (COSMAS) initiative... Susan Solomon chaired the committee that assisted the National Science Foundation's search for a new head of its Geoscience Directorate... In August, the Aeronomy Lab hosted a meeting of the NASA Panel for Data Evaluation for atmospheric photochemical and kinetics data. Ravi serves on the Panel... Dan Albritton and Susan Solomon attended the August 11-13 panel meeting of the NOAA Climate and Global Change program... Ken Gage is serving on the program committee for the 2000 Mesosphere-Stratosphere-Troposphere (MST) Radar Workshop that will be held in Toulouse in March.

DOWN THE ROAD



October 12-15: Chapman Conference on Water Vapor in the Climate System, Potomac, Maryland. AL scientists will participate.

October 11-15: Annual Conference of the American Association for Aerosol Research, Tacoma, Washington. AL scientists are giving invited talks and organizing sessions at the meeting.

October 18-20: NARSTO ozone assessment drafting meeting, Washington, DC. AL scientists are contributing to preparation of the assessment report.

October 24-29: Meeting of the Federation of Analytical Chemistry and Spectroscopy Societies (FACSS), Vancouver. AL scientists will present talks at the meeting.

December 13-17: Fall Meeting of the American Geophysical Union. Several AL scientists will present talks and posters, and Tom Ryerson is organizing a poster session on the Nashville '99 power plant plume studies.

December 1999-March 2000: Field missions of the SAGE III Ozone Loss and Validation Experiment (SOLVE), based out of Sweden. Members of the Meteorological Chemistry group will participate.

Upcoming AL Seminar Speakers: Mel Shapiro, NCAR (10/13); Mathew Evans, MIT (11/17); Rob Harley, UC-Berkeley (12/1).

On the Air! is a quarterly publication of the NOAA Aeronomy Laboratory. It is posted on the World Wide Web at www.al.noaa.gov. Please send comments, suggestions, or questions to: Chris Ennis (phone 303-497-7538; email Christine.A.Ennis@noaa.gov).

