# Atmospheric Sciences Section of AGU Newsletter

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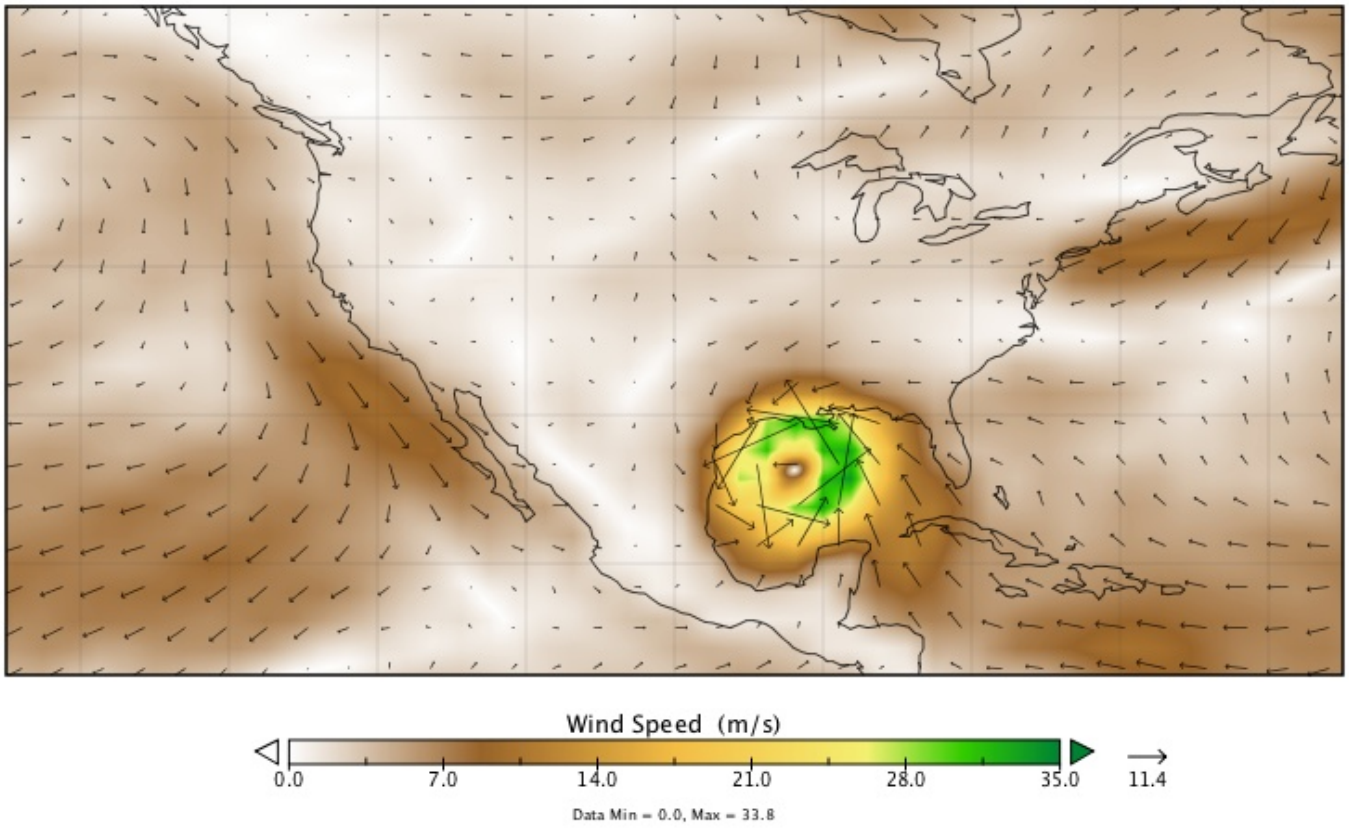
Wind Speed at 10 meters above surface Sep 8, 1900 Galveston Hurricane




**Considered the deadliest natural disaster to affect the United States, the 1900 Galveston Hurricane resulted in approximately 8,000 deaths. Landfall occurred on September 8, 1900, with wind speeds estimated at 135 miles per hour. NCAR Research Data Archive staff used 20th Century Reanalysis V2 data to create an animation of the hurricane's wind speed, 10 meters above surface level over Galveston, Texas on September 8. (Page 6).**

**PICTURES** **ANIMATION**

## AS Newsletter - Editorial -

*Dear Readers,*

*First of all, I would like to apologize for the delay in this issue. All of us contributors have many commitments and it is not always easy to have a good newsletter ready on time. So this is a good opportunity to ask for your collaboration and contribution. You can send us an email with your articles, news and materials.*

*Secondly, I would like to make a special mention to the article honouring Joanne Simpson, written by Peggy LeMone.*

*There are other interesting contents in this issue. Among them you will find an article about the EUCAARI projects, remarks from the EGU 2010 meeting and the first part of a contribution about the study and research of atmospheric sciences in the military. Happy reading,*

*Juan A. Añel, Editor-in-Chief*
*EPhysLab, Univ. of Vigo at Ourense, Spain*



*Contributors to this issue:*
* *Rachel Hauser - NCAR - USA.*
* *Margaret LeMone - NCAR - USA.*

# Section News

*Alan Robock*

Dear Atmospheric Sciences Section members:

This will be my last missive to you as Atmospheric Sciences President. I have very much enjoyed serving you on the AGU Council for the past four years, as President-Elect and President, and I am proud of my contribution to several accomplishments, including removing ExxonMobil, an anti-science organization in the field of climate change, from control of the AGU student breakfast at the Fall Meeting and serving on the task force to reorganize AGU governance. For our section, working with Past President Warren Wiscombe, we have established the Yoram Kaufman Award, our section newsletter, a third section secretary, and a successful annual banquet with recognition of awards and entertainment, including Christine Lavin. Let's welcome Anne Thompson, who will take over as President on July 1, and Peter Webster, who will take over as President-Elect, to continue our section leadership.

I would like to thank several people who contributed to the success of our section. First is Warren Wiscombe, who preceded me as President, showed me the ropes, and led the establishment of the Kaufman Award and the newsletter. Warren will continue to serve as a judge of award applications. I thank Anna Harper, who served as the founding Editor of the Atmospheric Sciences Section Newsletter, and Juan Antonio Añel Cabanelas, who serves as our current Editor. I thank Russ Dickerson, Eric Jensen, and Natasha Andronova, who have served as section secretaries and performed the onerous task of organizing sessions for the annual meetings. Natasha will continue as a secretary, and I welcome Surabi Menon and Sasha Madronich as our new secretaries. I thank Lin Chambers for her excellent work as our Education Chair for the past four years, and welcome Vickie Connors as our new chair.

## Announcement

### AGU Fellow and Holton and Kaufman Awards

*Remember, now is the time to submit nominations for AGU Fellow and the James R. Holton Junior Scientist Award and the Yoram J. Kaufman Award. For more details, see: http://atmospheres.agu.org*

# *New Education Chair for the Atmospheric Sciences Section.*

*Morgan Yarker*

A big welcome to our new Education Chair, Dr. Vickie Connors!

Dr. Connors is excited about the opportunities in the area of education. As the new education chair, she would like to emphasize that students receive the best education they can. Through her work at VCU, she explains that she has "become more aware of what undergraduate students are facing today….they want to memorize for the test, but in this field they need to be able to make links [between concepts] and understand what happens." To accomplish this, she believes students need to be involved in research.

**Vickie Connors, Education Chair.**

Prior to retirement from NASA Langley Research Center, Dr. Connors worked with students measuring CO using remote sending and high-flying aircraft. After retiring, she took a position at Virginia Commonwealth University (VCU), working mainly on developing coursework for the Center for Environmental Studies. Through generous donations, she helped secure a NOAA weather tower for the University. She works with students in her program on measuring and contributing to weather databases. She hopes this can expand research opportunities for the students in the program.

In her free time, Dr. Connors enjoys spending time on her farm, riding horses and working in the garden. She is very excited to be involved in AGU as the atmospheric science education chair and hopes to expand on the work already accomplished by Lin Chambers.

# Memories of Joanne Simpson

*Excerpts from remarks at Joanne Simpson's memorial service, Foundry United Methodist Church, Washington, D.C., 23 March 2010*

*Margaret A. (Peggy) LeMone*

My first sight of Joanne was on the flickering black-and-white television set in my brother Charlie's bedroom. She was talking about clouds, with the image shifting between a field of cumulus clouds and her stirring coffee. I was fascinated by weather, and wanted to make the study of weather my life's work. But until then, I didn't know if it was possible. Joanne gave me the courage to pursue my dream - to become a meteorologist.

Fast forward to around 15 years later, when I met Joanne for the first time, at Ed Zipser's house in Boulder, Colorado. We greeted each other like long-lost sisters - there were so few women in the field then! I mentioned a few female meteorologists back in Seattle, and she could think of a few more. But how many were there? Out of this conversation grew a joint project: A survey of women in the atmospheric sciences. It was 1972.

Over the next several months, we scanned journals and *American Men of Science*, wrote university departments to find out about their graduates, and asked friends, colleagues, and the women we discovered for the names of female meteorologists they might remember. We found around 250. Joanne would contact these women, not only by mail, but also by phone: her persistence led to an almost 100% response. The resulting interviews and letters revealed struggles like Joanne herself had experienced. And so many of the struggles still remained - trying to find the job in the face of anti-nepotism rules, trying to find child care, getting access to facilities like ships and aircraft (not to mention bathroom facilities!), and simple out-and-out prejudice. Note that things were not all bad. We could, in Joanne's words, "stick out in a crowd." You weren't anonymous for long, and if you did good work, people would recognize you quickly - one of the benefits of a small field like meteorology.

During that time, she wrote an article in the *Annals of the New York Academy of Sciences* that reflected some of the discouragement she felt. However, by 1989, the situation had improved, with no small credit to Joanne. Her example showed the community and younger women that women could succeed. She wasn't afraid to speak out but kept to the important issues, and she would encourage younger women. Now, although challenges remain, anti-nepotism rules are largely gone or much less restrictive, childcare is more widely available (though this is still a challenge), and young fathers accept more family responsibilities. And, happily, Joanne was able to say in 1989 in her interview for the AMS/UCAR Oral History Project, "It's only in the last decade or so, now that my children are grown, that we are having such wonderful relationships as adults, that they are saying how happy they are that their mother is a professional person in science."

Joanne was mentor not only to younger women, but to women and men of all ages. Those fortunate enough to work in her group would sometimes get short hand-written notes (sometimes with Huckle Kitty or other stickers) expressing delight at a task completed, or a paper she just had just read. Kind of like your favorite elementary-school teacher putting stars on your work when you did well. Even I - halfway across the country - would receive an appreciative note from her when she had read a paper of mine that she particularly liked. With Bob, she solved the work-vs.-family conflict by bringing colleagues into their lives and into their home. It is little wonder that she became known to all of us simply as "Joanne."

I had the privilege of working with her on a recent paper that combines modeling and observations to examine whether the convective updrafts in a TOGA COARE cloud line could be act as "hot towers." (In 1968, Joanne and Herb Riehl argued that hot towers or the updraft cores of deep convective clouds were responsible for transporting energy upward in the upward branch of the Hadley Cell - explaining how such transport could take place despite an energy minimum observed in the clear environment.) Joanne jumped right in, working on versions of the paper, asking questions, and pushing the work forward, in spite of being in and out of the hospital. The answer? Yes, they can. This was one of four papers in *The Journal of the Atmospheric Sciences* that she co-authored in 2009.

I close this essay with the way Joanne closed the oral history interview in 1989:

"I was very fortunate to get into meteorology at the time I did. When Rossby and his students at the University of Chicago were doing the most fantastically exciting work, that I could at least be a spectator if not a real participant in it. A field that has been tremendously fun because it's had so many exciting frontiers since then. Looking it all over, I had problems, but who hasn't? Life is full of problems. It has been a fantastically rewarding field to be involved in. And I hope other people, men and women, will find it equally exciting to be involved in."

I am sure all will agree that Joanne was not only a great scientist, but a warm, generous person who welcomed us as part of a larger family. Though we will miss her, she lives on in our work, our ideas, and our hearts. And don't forget - when you go outside, look up at the clouds, enjoy them, and think of her.

## AS Horizons

# Aerosol-cloud-climate and air quality interactions over Europe

*Anna Harper*

The effects of aerosols on clouds and climate involve a complex array of factors drawing from chemistry, microphysics, large-scale dynamics, and biogeochemical cycles. Aerosol-cloud interactions occur on a tiny scale and yet have implications for regional and global climate and air quality. The uncertainty in our understanding of these relationships is considerable. For example, according to the Fourth Assessment Report from the IPCC, it is unclear whether the radiative effects of aerosols will cause a warming or a cooling in the future.

Satisfactory answers to these complex questions require a concentrated effort of collaborative research. This is the motivation behind the European Integrated project on Aerosol Cloud Climate and Air Quality Interactions (EUCAARI), a five-year project involving 48 universities and institutions from 25 countries. The project is a part of the EU's Sixth Framework Program, which is the EU's main instrument for funding scientific research. The project is receiving 10 million euros per year from the EU from 2007 to 2011, in order to investigate the effects of aerosol particles on climate and air quality.

EUCAARI has two objectives, both of which will serve the scientific community, policy makers, and society in general. First, the project aims to reduce the levels of current uncertainty in aerosol impacts on climate by 50%, and quantify the link between anthropogenic aerosols and regional air quality. The second objective is to quantify the effects of European air quality directives on climate, and to provide the tools to quantify future directives. Given the large amount of uncertainty, the first objective presents a significant challenge. EUCAARI has broken it down to three main tasks:

- Identify and quantify the processes and sources governing regional and global aerosol concentrations.

- Quantify the physical and chemical properties of aerosols.

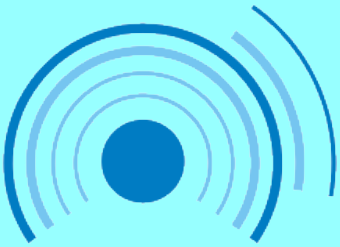
- Quantify the feedback processes between climate change and aerosol concentrations and climate change.

Accomplishing these tasks requires a combination of modeling and observational work and the consideration of multiple scales from molecular to global. In March 2008, long-term ground-based measurements were started at 13 stations throughout Europe. These measurements allow for a higher resolution than the previously available and more detailed data of chemical composition. The network includes many new instruments such as aerosol mass spectrometers and hygroscopicity measurements. In addition, measurements were taken for two years in four developing countries (Brazil, South Africa, India, and China). This expands the network of observations, which has historically been focused in North America and Western Europe.

In addition to collecting data and analyzing model results, the EUCAARI partners are helping the advancement of technology in the field of atmospheric chemistry. For example, the Neutral Air Ion Spectrometer (NAIS) was partly developed within EUCAARI and was used extensively in field experiments. The NAIS measures aerosol particle concentration of particles smaller than 3 nanometers.

"The instruments were installed on a number of field stations around Europe on a long-term basis, and they provided much new information on new particle formation and processes of nanometer-scale particles," said Ari Asmi, a project officer for EUCAARI at the University of Helsinki. The NAIS was used in the EUCAARI Long Range Experiment (LONGREX) field campaign (see sidebar) on board the German DLR Falcon aircraft, enabling the retrieval of profiles of nanoparticles in the European troposphere.

According to Hugh Coe, a PI on the LONGREX campaign, the fact that EUCAARI is a EU-backed project has facilitated the gathering of national resources to address some of the unanswered questions of chemistry-climate-cloud interactions. Many of the results from EUCAARI scientists will be presented at the International Aerosol Conference that will be held in Helsinki later this year. The Norwegian Institute for Air Research is housing data from the project at http://ebas.nilu.no. "As much of the data as possible is made available through this system, but some of it will require contacting the data provider first," said Asmi. More information on the EUCAARI project can be found at its web site: http://www.atm.helsinki.fi/eucaari.



21 European countries are part of EUCAARI, and the project is partially funded by the EU's FP6. This multinational collaboration has allowed for field studies of an unprecedented scale. One example is the LONGREX, which operated from May 6 to May 23, 2008. During this time, scientists collected airborne measurements to study aerosol aging, concentrations and composition over Europe. The logistics of negotiating flight plans over Europe had limited the scale of previous flight experiments. But EUCAARI aircrafts were able to log more than 120 hours of flight time over 12 countries, with a little help from the weather. Much of the time in the air was spent within the boundary layer, from about 1000 feet above ground to just above the boundary layer at 4000-5000 feet. "We were flying at low levels through quite congested air space, with lots of low-level air traffic," says Hugh Coe, the lead PI for the UK's aircraft, the FAAM BAe-146. Germany also supplied an aircraft, the DLR Falcon. The pilots and the scientists were constantly working to negotiate access to a dozen different countries, while also choosing the optimal route to collect the measurements needed.

During nearly the entire field campaign, Europe was dominated by an anticyclone, high pressure and fair weather. This allowed for the build-up of large amounts of pollutants in the lower atmosphere, and for the flights to follow the same air mass fairly consistently. "In terms of studying regional air quality, it was precisely what we needed," says Coe.

The LONGREX campaign found a high prevalence of ammonium nitrate across Europe, especially in regions of maximum NOx and ammonia emissions. The phase of nitrogen in the atmosphere affects its footprint, and the data gathered during the flights can be used to test regional transport and chemistry models. Furthermore, ammonium nitrate concentrations peaked at the top of the boundary layer, so surface measurements might under-predict the total column amounts. This highlights a need to better capture aerosol optical depths over Europe.

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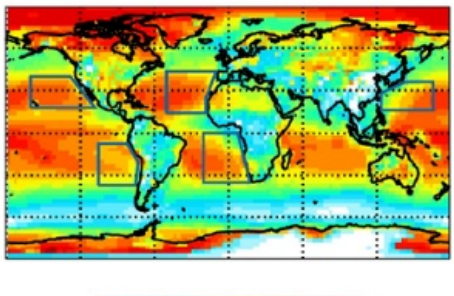
Coe said that the large amount of scientific and financial backing in the EUCAARI project helped make the LONGREX campaign a success. "Nobody has had the permissions to fly at these low levels as we have been able to, so we've been able to get data on vertical extent as well as the special extent of ammonium nitrate," he said. He plans to participate in a follow-up field campaign this summer (funded by the UK's Natural Environment Research Council) to further investigate the role of oxidized nitrogen in the night-time atmosphere.




**Proportion of secondary Cloud Condensation Nuclei (CCN) in the boundary layer. Regions with persistent marine stratoculumuli are highlighted (Merikanto et al., ACP 9, 8601–8616, 2009). EUCAARI produced substantial advances in our theoretical understanding of what controls atmospheric nucleation. The newest theoretical knowledge of secondary particle formation was applied in a global modelling study to show that modern primary and secondary CCN appear to be roughly equally important on a global scale.**


**The AGU booth at the 2010 EGU General Assembly.**

# *A Few Highlights from the EGU2010*

*Michel d.S. Mesquita*

The 2010 European Geosciences Union General Assembly gathered about 10,463 participants from 94 countries, which is 1,375 more participants than in 2009, according to the EGU Press and Media office. The Assembly venue was at the Austria Center Vienna, and the meeting duration was from May 2 to May 7. The number of oral presentations was 4,431 and there were 9,370 poster presentations in 594 sessions. A total of 27% of the participants were students. All participants were given a DVD entitled "The other $CO_2$ Problem: the Threat and Environmental Implications of Ocean Acidification," which was the winner of the Royal Society of Chemistry's Bill Bryson Prize for Science Communication.

There were many highlights in the meeting. The medal lectures featured Dr. Hajo Eicken (University of Alaska Fairbanks), who talked about "Tracking and responding to a changing Arctic sea-ice cover: How ice users can help the scientific community design better observing systems" (Louis Agassis Medal lecture). The Vilhelm Bjerknes Lecture was given by Dr. Akio Arakawa (University of California, Los Angeles) with the title "Toward unification of multiscale modeling of the atmosphere."

Regional Climate Modeling enthusiasts had the chance to have a one-day-long series of talks! Some of them were related to the Coordinated Regional Climate Downscaling Experiment (CORDEX) project. This project is aimed at producing regional climate change scenarios for different regions around the globe. The data will contribute to the IPCC AR5 report and it will be an important dataset for the climate community in general. The project website is: www.meteo.unican.es/en/projects/CORDEX In addition to that, there was an extra session called "Geophysical Downscaling Methods," which discussed different modern techniques used for downscaling. The first talk in this session was given by Dr. Filippo Giorgi (ICTP) on "Dynamical downscaling: Principles, advantages, limitations and perspective."

**On Monday morning, there was a long line for picking up the materials. The light rain did not deter the delegates from coming to the EGU venue. (Photo taken by Michel d.S. Mesquita).**

The session on "Mid-latitude Cyclones and Storms: Diagnostics of Observed and Future Trends, and Related Impacts" discussed the IMILAST project, which aims at comparing different storm tracking algorithms. The talk given by Dr. Urs Neu (ProClim, Switzerland) discussed the project in detail. A number of scientists around the world are involved in comparing results from different tracking algorithms. Even though these algorithms are able to capture the main feature of extra-tropical storm tracks, there are some differences between their overall results.

The poster sessions were very crowded with many exciting posters. One of them was the poster presented by Dr. Masaru Inatsu (Hokkaido University) on "A Scale Interaction Study on East Asian Cyclogenesis Using a General Circulation Model Coupled with an Interactively Nested Regional Model." His model couples a GCM with an RCM where both run together using a two-way nesting approach. Another interesting

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poster was one by Professor Peter L. Read (University of Oxford) on "Nonlinear phase synchronization and teleconnections in the climate system on intra-seasonal and inter-annual timescales," in which he talked about the importance of synchronization in the climate system. Another interesting poster was the one by Andreas Dobler and Dr. Bodo Ahrens (Goethe-University) on the "Analysis of the Indian summer monsoon system in the regional climate model COSMO-CLM," which was based on their In Press paper at the *Journal of Geophysical Research*. The poster by Dr. Gregory P. King (University of Lisbon) discussed "Second-order and Third-order structure functions calculated from 10 years of QuikSCAT winds over the Pacific Ocean." And Dr. Alan Robock was at the EGU as well! His poster, as well as others, touched a very important topic nowadays, that is, the effect of volcanoes on the climate system. Their poster was entitled "Effects of the 2009 Sarychev Volcanic Eruption on Climate."

The AGU booth was there as well and it brought some new features this year. An artist made a large drawing on a large piece of paper, which the AGU organizers displayed at the booth. Everyone was invited to pick up a Sharpie pen and write on this drawing. They could write about what they like best about the AGU as well as provide suggestions on how the AGU could become even better. These opinions were later taken to the AGU headquarters. People who participated also received an AGU bag and could take part in an iPod raffle. This was a clever way to get people's feedback for improvement! I also had the chance to write a few words on how great our AGU Newsletter is (but I didn't win the iPod!). It was also interesting this year that the AGU was trying to promote the use of reusable water bottles to fill with tap water. They had a number of green AGU bottles piled up there. This is an important step that AGU is taking, and the environment says thanks!


**A "feedback wall" where people could write on what they liked most about the AGU.**

# *Data Support for Climate and Weather Research*

*Rachel Hauser and Anna Harper*


**NCAR's RDA Team.**

Many in the global research community studying climate, weather, earth, ocean, and atmosphere interactions turn to NCAR's Research Data Archive (RDA) (http://www.dss.ucar.edu/) when looking for foundational data. Maintained in the Computational and Information Systems Laboratory, the RDA offers a breadth of easy-to-access global and regional data sets, as well as first-class data archive capabilities. Moreover, staffed by those trained in atmospheric and oceanographic sciences, the team's combination of knowledge and skills benefits both the user and the data-provider community. Chances are you already know about some of the data available through the RDA, such as the NCEP and ECMWF Reanalysis, but you might not realize the breadth and user-friendliness of the complete archive.

"The RDA has long been known for high quality data curation for more than 40 years, and now it has significantly improved data acquisition methods," says Doug Schuster, RDA Software Engineer. "Better – and broader – web-interface capabilities make searching for and handling data easier. In the coming year, not only do we expect to apply more computing to improve turn-around time on individual user-specific requests, but we'll have more than 130 Terabytes (TB) of data available online for immediate download."

Because of the in-house expertise of the RDA staff, users have direct access to knowledgeable consultants who are able to answer data questions and recommend data sets that best match research objectives. The team also designs and writes software that is efficient for importing new data, exporting data to users, and that is supplemented with codes and libraries that aid the researcher in their data analysis. This expertise proves invaluable during the quality control/quality assessment process; RDA's data professionals know how data should "look," which makes data content errors stand out more readily and helps eliminate incorrect data before it goes public or becomes widely available.

For first-time users of a particular dataset, web interfaces are available to help choose the temporal range and parameters they require. From these specifications data download scripts are automatically generated, which can then run on the user's host computer and are easy to modify as research goals expand and they also accommodate the arrival of new data to RDA's continually growing archive.

"While ease of access is important to our users, we find that it's critical to balance efforts to facilitate data access with adding data content," says Steve Worley, Manager, Data Support Section. "Because one without the other will certainly disappoint our users."

In addition to serving up, archiving, and providing data quality control, the RDA is tasked with identifying useful data sets generated by those within the science community. The RDA staff is well equipped to identify new datasets that either tie strongly into the existing archive or fill in gaps of knowledge that would benefit the

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| Name | Time Period | Highest Resolution | | |
|---|---|---|---|---|
| | | Temporal | Horizontal | Vertical |
| NCEP/NCAR Global Atmospheric Reanalysis | 1948-2010 (ongoing) | 6 hours | T62 (209km) | 17 Plvl |
| NCEP/DOE Global Atmospheric Reanalysis | 1979-2008 (ongoing) | 6 hours | T62 | 17 Plvl |
| ECMWF Re-Analysis 40-year (ERA-40) | 1957-2002 | 6 hours | T159 (1.125°) | 23 Plvl |
| NCEP North America Regional Reanalysis | 1979-2009 (ongoing) | 3 hours | 32 (km) | 29 Plvl |
| Japanese Reanalysis (JR-25/JCDAS) | 1979-2009 (ongoing) | 6 hours | T106 (1.125°) | 23 Plvl |
| ECMWF Interim Reanalysis (ERA-I/ECDAS) | 1989-2009 (ongoing) | 6 hours | T255 (0.703°) | 37 Plvl |
| NOAA-CIRES 20th Century Reanalysis | 1891-2008 | 6 hours | 2° x 2° | 28 Plvl |
| NCEP Climate Forecast System Reanalysis, Atmos.<br>NCEP Climate Forecast System Reanalysis, Ocean | 1979-2009 (ongoing) | 1 hour | T362 (38km)<br>0.25°– 0.50° | 64 Plvl<br>40 Zlvl |

**Global atmospheric and oceanographic re-analyses are one of many valuable data resources provided by external organizations that employ the expertise of RDA consultants.**

larger research picture as well as individual scientists.

Always striving to get better, RDA data access has made substantial gains in the past five years, says Worley, and this growth and change will continue in the years to come. Plans for the RDA in 2010 include expanding the existing online data archive to 130 TB – four times the archive's current size. As resources continue to be added, the online archive will grow to more than 250 TB during 2011. RDA's online data service is supplemented by an easy-to-use request interface that stages data to disk for Internet download from archive storage. This capability gives users access to the complete RDA, which currently includes more than 400 TB of data.

## *Meteorology in the military. Part I: Training and education of a military weather forecaster*

*Yolande Serra*

**"We can't change the weather, but we can change our operations to conform to the weather."**

**Gen. Henry H. Arnold**

**World War II Diary**

Weather forecasting has had a long and important history in the military. The original organization responsible for forecasting for military operations was the Meteorological Service of the Signal Corps during World War I. On April 14, 1943, the Army Air Forces organized and activated the Weather Wing, which was established in Asheville, N.C. In 1945, the Weather Wing became the Army Air Forces Weather Service, but shortly thereafter, on March 13, 1946, it was redesignated as the Air Weather Service and moved to Gravelly Point, Virginia.

With the formation of the United States Air Force in 1947, the Air Weather Service assumed the responsibility of worldwide weather reporting and forecasting for both the Air Force and the Army. After several relocations, on October 15, 1997, the Air Weather Service was redesignated as the Air Force Weather Agency and relocated to the Offutt Air Force Base, Nebraska, where it remains today. Interestingly, the Congress has never legislated this service.

The Air Force Weather Agency is comprised of two weather groups and it is responsible for worldwide weather forecasts for both the Army and Air Force. The first weather group includes three operational weather squadrons with the mission to provide around-the-clock analyses, forecasts, warnings, and aircrew mission briefings to the Air Force, Army, Guard, and Reserve forces operating throughout the continental United States. These squadrons also provide initial qualification and upgrade training for new apprentice forecasters and weather officers.

The 2nd Weather Group, comprised of the remaining three operational weather squadrons in addition to a Combat Weather Systems Squadron and a Systems Operations Squadron, is responsible for timely, relevant and specialized terrestrial, space and climatological global environmental intelligence to Joint warfighters, DoD decision-makers, national agencies, and allied nations for the planning and execution of military operations.

After completing an eight-month skills course, the operational weather squadron is the first place a newly schooled weather apprentice will report. At the squadron, working along side an experienced weather professional, the forecaster spends an additional 15 months training in all aspects of Air Force meteorology, from aircrew briefing to tactical forecasting.

After this initial training in meteorology, military personnel are strongly encouraged to continue their education. For active duty enlisted men and women, the Community College of the Air Force (CCAF) is one of the very few options available to further their education and work toward a college degree.

The CCAF was established in April 1972 and it received degree-granting authority in July 1976. There are more than 300,000 registered students making the college the largest multi-campus community college in

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**Member of the 25th Weather Squadron, circa 1953. Adopted from Air Force Weather Historian, 2(1), 2004.**

**Milestones in Air Force Weather**

**(Adopted from Air Force Weather Historian, 2(4), 2004.)**

**October 31, 1898** - Randolph P. Williams, the "Father of Air Force Weather," was born in Baltimore, Maryland.

**October 12, 1945** - As directed by the War Department, the last Army Air Forces weather units outside the continental United States were assigned to the Army Air Forces Weather Service.

**October 7, 1946** - An Air Weather Service WB-29 made the first flight over the top of a hurricane.

**December 14, 1959** - Air Weather Service was directed to establish an operational numerical flight plan system.

**October 24, 1960** - Air Weather Service declared the newly installed IBM 7090 operational at the Global Weather Central, Offutt Air Force Base, Nebraska.

**November 4, 1964** - The first AN/FPS-77 weather radar was delivered to Griffiss Air Force Base, New York.

**December 23, 1970** - Air Weather Service completed testing of the AN/TMQ-25 tactical ceilometer and declared it "suitable" for use in Vietnam.

**December 7, 1973** - Air Force directed Air Weather Service's WB-57F high-altitude aerial sampling mission transferred to Strategic Air Command.

**November 11, 1974** - Air Weather Service accepted the first AN/TMQ-22 tactical meteorological measuring sets from the contractor.

**November 26, 1980** - Air Weather Service was assigned responsibility for weather support of the U.S. Rapid Deployment Joint Task Force, which was activated March 1, 1980.


**Air Force Weather Agency Emblem.**

**(Left) LtCol. Lee A. Byerle and (right) Capt. Brian H. Yates, USAF Flight Commander, Training and Standards 25th Operational Weather Squadron.**

the world. Its affiliated schools are located throughout the United States and in nine foreign countries.

The CCAF offers associate in applied science degrees and other credentialing programs. One area of specialization for the AAS degree is meteorology, in which a weather forecaster can begin to work after completing the 15 months of training at one of the operational weather squadrons.

Unfortunately, progress towards a bachelor's degree is much more difficult after the AAS degree is obtained. This is because active duty enlisted men and women move every 2-3 years and not all of their courses transfer to the local university in their new location.

While several universities offer online courses, with some limited options for online bachelor's degrees, online degrees in science do not exist – that is until now. Motivated by the needs of the weather forecasters at the local 25th Operational Weather Squadron in Tucson, Arizona, a new degree program in meteorology through the University of Arizona South offers a hybrid program of in-residence and online classes. "Our objective is that Airmen will be able to complete their degree where ever in the world they are stationed without losing a single credit unit," said Prof. Eric Betterton, head of the Department of Atmospheric Sciences.

Based on the education provided by the CCAF AAS degree in meteorology, the administrators worked for a full year to open the program for UA's spring 2010 semester.

**An AN/FPS-77 weather radar console, circa 1964. Adopted from Air Force Weather Historian, 2(4), 2004.**

With one student currently enrolled and 20 more looking to join the program in June, the degree continually gains steam with high interest from many enlisted personnel at Davis-Monthan. "If folks would like to go to school, but they didn't have the availability due to work schedules or location, this is a great option," said Capt. Brian Yates, training flight commander for the 25th weather squadron at Davis-Monthan. "There's tons of interest already."

Receiving positive feedback from the enrolled member of their squadron, Yates planned a field trip for 20 other interested members of his 140-member squadron to visit the UA campus and learn more about what the degree has to offer.

"The University of Arizona BAS program will provide a rare opportunity for our active duty enlisted weather troops to earn a bachelor´s degree in weather through distance learning, so this is a great opportunity for them," said Lt. Col. Lee Byerle, 25th OWS commander.

"The online portions of the program will allow Airmen to work around their rotating schedules, enabling them to further their education without impacting their ability to contribute to the mission," said Master Sgt. Tim Legg, chief of the 25th OWS Mission Execution Support Flight, who is one of the first to enroll in the program.

Philip King, the education officer for Davis-Monthan Air Force Base, noted that advanced degrees are always helpful in and outside of the military. "The more education they get, the more likely they are to get promoted," said King.

Complete online availability planned over the next year or two will allow someone, wherever they are in the world, to complete their bachelor of applied science in meteorology through this program. Future course offerings will also fulfill the requirements for forecasting jobs with the National Weather Service.

"This is an exciting opportunity to blaze a trail for Air Force weather and perhaps for the Air Force in general," Sergeant Legg said. "If this program succeeds, I can see it expanding to other scientific career-fields, enabling a larger group of Airmen to further their education."

For more information on the new program, visit the department's Web site at www.atmo.arizona.edu.

In addition to educating future meteorologists, the Air Force is also involved in basic research. In the next segment of "Meteorology in the military" we will highlight some of their exciting projects in the area of meteorology.

## *The National Lab Day*

*Morgan Yarker*

**National Lab Day logo. Obtained and modified from http://www.nationallabday.org.**

The National Lab Day initiative is a movement to develop long-term partnerships between educators and science, technology, engineering and mathematics (STEM) experts. This year these partnerships were celebrated throughout the month of May, including a celebration in Washington D.C. on May 12th that with school visits by members of the cabinet and White House staff.

Gina Schatteman, an Associate Professor in Integrative Physiology at the University of Iowa, is actively involved in the National Lab Day cause. She points out that compared to the rest of the world, "the U.S. students rank 35th in math and 29th in science. Nearly one in four have not mastered basic scientific concepts, and American students rank 20th in the proportion of students that receive top scores on international assessments."

The performance of U.S. students in math and science is something that needs immediate and consistent attention. With debates on climate change impacting national and world policy, it is more important than ever that atmospheric scientists represent ourselves in the field of education. As Schatteman explains, "A well-educated populace is essential to our economic vitality." Not only because we will have more innovative thinkers, but because

(continues on the next page)

all citizens have the right to vote on issues in the United States, they need to be critical thinkers and well educated.

So, how can we as science researchers help in this movement? The best thing we can do is share our expertise. As it turns out, teachers across the nation are always looking for experts in the sciences to speak in the classroom and help their students with science-exploration topics - especially they look for atmospheric scientists! Because climate change is talked about frequently in the media, the atmosphere is becoming a popular classroom topic. Atmospheric researchers are more important than ever, so it is a great time to be involved!

If you are ready to lend your expertise to the movement, or if you are looking for an outreach component to satisfy requirements of a research grant, there is a way to connect yourself to local educators. Go to www.nationallabday.org and click on "I'm a scientist." You can register yourself, and the website will provide you a list of educators in your area looking for volunteer experts.

If we want the public to be better informed about issues in atmospheric sciences, it begins in our schools. Researchers have the best information and a responsibility to ensure the public is aware of these issues. The National Lab Day website is one way for you to get involved!

## *Interview with Aristita Busuioc*

*Hans von Storch*

**Dr. Aristita Busuioc**

Dr. Aristita Busuioc was born in 1950 in Romania. She studied mathematics at the University of Craiova (1969-1974) and she has been working at the National Institute of Meteorology and Hydrology (now National Meteorological Administration), Bucharest, since 1974. In 1997 she received her Ph.D. in Mathematics. In 1988 she became the leader of the "Dynamical Climatology Group" and in 2006, the head of the Climatology Division, until December 2009. Her scientific interests are related to climate variability and climate change, especially statistical downscaling models. She has been involved in various EU projects (as participant or team leader). She has published about 70 articles, 17 of them in international peer-reviewed ISI journals. She was awarded with the Stefan Hepites prize of the Romanian Academy. She also participated in the Fourth IPCC Report as Lead Author, she has been editor in chief of the Romanian Journal of Meteorology, a member of the Editorial Consulting Committee of the "The Open Atmospheric Science," and a Senior Associate to the ICTP in Trieste (2004-2009).

How did the change from an authoritarian political regime to a democratic one affect science in Romania?

The most important change was related to the fact that the Romanian scientists were at last free to collaborate with any Western scientific institution. In this way we could become involved in many European projects and enjoy research stays at prestigious European research institutes. On the other hand, we could participate in various scientific meetings to present our results and to exchange experiences with other scientists from all over the world.

There are still not many women among the "higher" ranks, such as professors, department heads and the like. Is meteorology and climate science still "male territory"?

To obtain the highest scientific degrees (such as professor or senior scientist) there is no difference but the management positions such as director are still "male territory."

About 20 years ago, you were suddenly confronted with the possibility of travelling, particularly to the west. This must have been a rather different world. How did you experience this, and which effect did it have on your research activity?

My first long trip was a research stay at the Max Planck Institute for Meteorology in Hamburg. This was a very big challenge. First, from a technical point of view, I had to work with big computers, but I was lucky to have very nice colleagues who helped me very much. From a scientific point of view, this visit practically changed my career. I learned about global climate models and especially about climate change projection on local scale (statistical downscaling) and then I used this expertise during all my research activity. These fields were new in that time in Romania. All the other international collaborations were practically related to this field.

What would you consider to be the two most significant achievements in your career?

I consider that the most significant achievement in my career is related to the development of the climate research field in Romania (development of complex statistical method for analysis of regional climate variability, validation of the global/regional climate models and climate change projection using statistical downscaling models). The second important achievement is my participation in the Fourth IPCC Report as Lead Author of the Working Group 1 contribution.

When you look back in time, what have been the most significant, exciting or surprising developments in atmospheric science?

I consider the assessment of the uncertainty of local/regional climate change estimates using the ensemble of multi-model approach started in the EU ENSEMBLES project one of them. But maybe the most exciting one, from my point of view, is one of the main objectives included in the High Level Declaration of the World Climate Conference-3 (Geneva 2009) which is to develop the inter-annual and multi-decadal climate predictions.

What constitutes "good" science?

It is very difficult to answer this question. In my opinion, "good" science means performing science based only on "science rules" answering (with scientific tools) to the needs of society as well as possible. But of course this depends on the scientific field. Unfortunatly, in the case of atmospheric science it cannot meet all the needs of society with scientific arguments, and these needs are very high. I do not like the speculations.

What is the subjective element in scientific practice? Does culture matter? What is the role of instinct?

In atmospheric science in general, but especially in climate research, the instinct is very important. For example, to perform an efficient statistical analysis of climatological data, the choice of data set and method is firstly based on instinct but then the scientific culture also helps you with this.

## *Announcing the WCRP Open Science Conference*


The World Climate Research Programme (http://wcrp.wmo.int) will host a major international Open Science Conference on 24-28 October 2011 in Denver, Colorado, USA (http://wcrp-climate.org/conference2011).

The conference aims to attract the world's experts to provide a unique synthesis of current research findings on climate variability and change, to identify the most urgent scientific issues and research challenges, and to ascertain how the WCRP can best facilitate research and develop partnerships critical for progress in the future.

## *Opportunities*

Note: You may be asked for your AGU member # to open the following links. Visit the AS Section website for links to other job opportunities not listed here.

**Some of these job postings and others can be found at:**

http://www.agu.org/cgi-bin/membership_services/joblistings.cgi

**Atmospheric Sciences**

* Numerous Research Positions, Atmospheric Sciences & Global Change Division, Pacific Northwest National Laboratory (USA). http://www.pnl.gov/atmospheric/jobs.stm

* Assistant Professor of Atmospheric Science, Northland College, Ashland, (WI)(USA). http://www.northland.edu/jobs.

* Postdoctoral fellowship in multi-model analysis of climate variability and related cloud feedbacks at intraseasonal timescales in CFMIP experiments, CNRM-GAME (France). Contact: Hervé Douville (herve.douville@meteo.fr).

* Postdoctoral fellows/research associates in lake, ice, and atmospheric modeling, NOAA/GLERL & Univ. of Michigan (USA). Contact: Dr. Jia Wang for ice, ocean, ecosystems modeling (jia.wang@noaa.gov) and Dr. Brent Lofgren for atmospheric modeling (brent.lofgren@noaa.gov).

* Head of Model Division, ECMWF, Shinfield Park, Berkshire (UK). Details: http://www.ecmwf.int/newsevents/employment/en/

* Head of Probabilistic Forecasting and Diagnostics Division, ECMWF, Shinfield Park, Berkshire (UK). Details: http://www.ecmwf.int/newsevents/employment/en/

* Postdoctoral research position in data assimilation, UNNE, Corrientes (Argentina). Contact: Dr. Manuel Pulido (pulido@unne.edu.ar).

* Consultant (Scientist) position on ADM-Aeolus Doppler Wind Lidar, ECMWF, Shinfield Park, Berkshire (UK). Details: http://www.ecmwf.int/newsevents/employment/en/

* Scientists and Postdoctoral researcher positions, Application Laboratory, JAMSTEC, Yokohama (Japan). Details: http://www.jamstec.go.jp/e/about/recruit/labo_20100618.html

* Research Scientist in Carbon Cycle Science & Data Assimilation, Jet Propulsion Laboratory, CALTECH, Pasadena, California. Contact: Kevin Bowman (kevin.bowman@jpl.nasa.gov).

* Research Scientist in Monsoon Modelling, NCAS Climate, University of Reading, Reading (UK). Details: http://tinyurl.com/32bhff9*

* Postdoctoral Research Associate in secondary organic aerosol modelling, School of Geosciences, University of Edinburgh, Edinburgh, Scotland (UK). Details: http://tinyurl.com/2ub2lly

* Postdoctoral researcher positions in study of the dynamics and impacts of climate change, Department of Environmental Earth System Science, Stanford University, Stanford (CA) (USA). Contact: Dr. Noah Diffenbaugh (diffenbaugh@stanford.edu).

* Postdoctoral Research Associate positions, Climate Change Research Centre (CCRC), Faculty of Science at UNSW, Sydney (Australia). Contact: Stephen Gray (stephen.gray@unsw.edu.au).

* Postdoctoral position in "Quantitative Microphysical Retrievals with a network of Polarimetric X-band Radars", Météo France, Toulouse (France). Contact: Pierre Tabary (pierre.tabary@meteo.fr).

* Postdoctoral position in halogen chemistry modeling, Laboratory for Atmospheric and Climate Science, Toledo (Spain). Contact: Alfonso Saiz-López (a.saiz-lopez@ciac.jccm-csic.es).

* Lecturer/Senior Lecturer in Meteorology, Monash University (Australia). Details: http://www.maths.monash.edu.au/news/positions-vacant.html (Ref N°: A1010901).

* Climate Scientist, National Institute of Water and Atmospheric Research, Wellington (New Zealand). Details: http://www.careers.niwa.co.nz

* Postdoctoral Research Positions, Center for Clouds, Chemistry and Climate (C4) Scripps Institution of Oceanography (SIO) University of California, San Diego (UCSD), La Jolla (CA) (USA). Contact: Hung Nguyen (hnguyen@ucsd.edu).

* Two postdoctoral fellow positions to test a hybrid variational/ensemble Kalman filter (EnKF) data assimilation method, Center for Analysis and Prediction of Storms and School of Meteorology, University of Oklahoma and CIRES, University of Colorado. Details: https://cires.colorado.edu/jobs/PSD-2.pdf and http://www.caps.ou.edu/employment.htm

* Postdoctoral Fellow for the Atmospheric Climate Modelling in Southeast Asia Project, Earth Observatory of Singapore (Singapore). Details: http://www.earthobservatory.sg/careers

**Interdisciplinary**

* Leader in Climate Model Data Analysis in the NASA Center for Computational Sciences at Goddard Space Flight Center, NASA, Greenbelt (MD) (USA).

* Lecturer position in the general fields of environmental sciences and geology, Earth and Environmental Sciences Department, University of Rochester, Rochester (NY) (USA). Contact: Ms. Kathy Lutz, Department of Earth and Environmental Sciences.

**Student Opportunities**

* Ph.D. position in remote sensing within the project "Fog and Visibility", Department of Geography, University of Bern (Switzerland). Contact: Stefan Wunderle (swun@giub.unibe.ch).

* Ph.D. position, project "Historical Climatology of the Middle East based on Arabic sources back to AD 800", University of Giessen (Germany). Contact: Prof. Luterbacher (juerg.luterbacher@geogr.uni-giessen.de).

* Ph.D. position in "Constraining Global Vegetation Models with Earth Observation Data", School of Geography, University of Exeter (UK). Contact: Dr. Tristan Quaife (t.l.quaife@ex.ac.uk).

* Ph.D. Graduate Research Assistantship to study aerosol indirect effects with a cloud model, Department of Meteorology, University of Hawaii at Manoa (UHM) (USA). Contact: Dr. Vaughan Phillips (vaughanp@-hawaii.edu).

## Schools

**## Weather and Climate Extremes During the Past 100 years ##**

Diessenhofen, Switzerland. 7-9 June 2010.

People that are interested should send a title and an abstract by 20 April 2010 to Stefan Brönnimann (broennimann@env.ethz.ch).

**## 2010 Summer School on Organic Aerosols ##**

Ispra, Italy. 21-25 June 2010.

http://aerosolschool.web.psi.ch/

**## The Urbino Summer School in Paleoclimatology ##**

University of Urbino, Italy. 10-29 July 2010.

http://www.urbinossp.it/

**## 2nd Ewiem Nimdie International Summer School - Weather and Climate Forecasting in Africa and its Application to Agriculture & Water Resource Management ##**

Kwame Nkrumah University of Science & Technology, Kumasi, Ghana. 19-31 July 2010.

http://www.ewiem-nimdie.org

**## NCAS Atmospheric Measurement Summer School 2010 ##**

Isle of Arran, Scotland. 7-19 September 2010.

http://ncasweb.leeds.ac.uk/arransummerschool/

## Conferences

**// 2010 Western Pacific Geophysics Meeting //**

Taipei, Taiwan, 22 - 25 June 2010.

http://www.agu.org/meetings/wp10/

**// Water 2010 //**

Quebec City, Canada, 5 - 7 July 2010.

http://www.water2010.org

**// 2010 NCAS Atmospheric Science Conference //**

Palace Hotel, Manchester, UK, 5 - 7 July 2010.

http://www.ncas.ac.uk/conference2010

**// 11th International Meeting on Statistical Climatology //**

Edinburgh, Scotland, 12 - 16 July 2010.

http://cccma.seos.uvic.ca/imsc/11imsc.shtml

**//** 6th Antarctic Peninsula Climate Change **//**

Leeds, UK, 22 - 23 July 2010.

**// 9th Symposium on the Urban Environment; AMS 19th Symposium on Boundary Layers and Turbulence; 28th Conference on Agricultural and Forest Meteorology //**

Keystone, Colorado, 2 - 6 August 2010.

http://www.ametsoc.org/meet/annual/

**// 2010 The Meeting of the Americas //**

Foz do Iguaçu, Brasil, 8 - 13 August 2010.

http://www.agu.org/meetings/ja10/

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