

Atmospheric Sciences Section of AGU Newsletter

Volume 2, Issue 4 September 2008

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Regional Climate Assessment Reports for Northern Europe

Hans von Storch

When communicating results of climate science to the public, scientists are usually confronted with the question of, "What shall we do?" Available options are mitigating climate change by reducing the causes (reduction of emissions) and adapting to those changes that are not or can not be avoided by mitigation measures. For mitigation, the IPCC reports provide ample material (<http://www.ipcc.ch/>). Since not all man-made climate change can be avoided, improved adaptation to the vagaries of climate is and will be needed. But making decisions about regional and local adaptation requires knowledge about the geographic and socio-economic specifics of the region. Such knowledge is usually not readily available, and the knowledge market is flooded by claims made by politically and economically vested interests.

To create a better information base for decision makers, regional assessment reports about climate change and climate change impacts are needed. These reports have to be contextualized into the specifics of each region. For the Baltic Sea Basin, which covers most of Poland, Sweden, Finland, the Baltic states, and parts of Germany, Denmark, Russia, Belarus, Norway, Czech Republic, Slovakia and the Ukraine, such an assessment has recently been compiled under the supervision of the Baltic Sea Experiment (BALTEX). This "BACC-Report" (see <http://www.baltex-research.eu/BACC/>)

was compiled by many scientists, but without engaging politically or economically motivated groups, and deals with the climate of the past 200 years. The report provides perspectives on regional climate change and on changes in terrestrial and marine ecosystems.

The report is strict on describing consensus as it can be read from the literature and not just the expert opinions of a few people considered as particularly knowledgeable. Sometimes this consensus is that an issue is still being contested and needs more research. The consensus was broad with respect to the recent warming and perspectives of accelerated warming for the future. Northward migrations of plants and earlier phenological events are well-documented, but in the case of Baltic Sea marine ecosystems much too little is robustly known about the impact of climate change.

The report was published in January 2008 by Springer Publisher (see http://www.baltex-research.eu/BACC/material/IBS_No35_BACC.pdf for a summary), and *Eos* published a summary of the assessment earlier this year [Reckermann et al., 2008]. The BACC report was welcomed in 2007 by the Board of the Helsinki Commission (HELCOM; which is formed by governments of eight bordering states to the Baltic Sea and the European Commission as contracting partners). HELCOM holds the responsibility

of monitoring the status of the Baltic Sea. The report was used as a basis for a HELCOM policy recommendation (<http://www.helcom.fi/stc/files/Publications/Proceedings/bsep111.pdf>). A compilation of a second BACC assessment report is presently being prepared, which is expected to be published in 2012.

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Reckermann, M., H. von Storch, and H.-J. Isemer (2008), Climate change assessment for the Baltic Sea basin, *Eos*, 89, doi:10.1029/2008EO170001.

HIGHLIGHTS

[2008 Fall Meeting](#) discounted registration deadline is **Nov. 14**. Remember to register for the **AS Section Banquet**, which is Tuesday, Dec. 16. It will feature a performance by Christine Lavin and the presentation of the Holton Award.

Nominate someone you know for the Yoram J. Kaufman Unselfish Cooperation in Research Award by **Dec. 1**.

AS Newsletter

Hello Readers,

Thank you for taking a look at the fourth issue of the Newsletter in 2008. We have a wide breadth of articles in this Issue, ranging from forecasting heatwaves to forecasting monsoons, from climate change to an innovative teaching tool.

Before you dive into this material, though, I wanted to take a moment to discuss some very exciting science being done outside the field of atmospheric science. You probably have heard about the strides recently made at CERN with the Large Hadron Accelerator. On Sept. 10, the first beam of protons made the 17-mile loop through the underground accelerator. The beam traveled close to the speed of light. This project is huge in scope - it took 2,000 scientists, 15 years, and \$8 billion. In return, we could possibly learn more than ever before about the origin and make-up of the universe. More information is not hard to find on the internet - in fact on Sept. 10, Google changed its home page to show an image of the accelerator looping around their logo.

In the meantime, sit back and enjoy learning about the interesting science going on in our field. We hope to hear from you if you have something you'd like to share.

Happy Reading,

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Section News

Fall Meeting Banquet Mixes Old and New Traditions

Alan Robock

The Third Annual Atmospheric Sciences Chinese Banquet will be held on Tuesday, December 16, 2008, during the [2008 AGU Fall Meeting](#). The pre-registration deadline for the Fall Meeting is November 14. [Please sign up for our banquet when you register](#). As always, we will offer a discount for students and will have entertainment, as well as the presentation of the Holton Award. This year, we are delighted to announce that folk singer [Christine Lavin](#) will perform at the banquet.

For those of you who don't know her, Christine is the most charismatic, funny, entertaining singer I have ever heard. She has recorded 17 individual albums, many of them featuring songs related to science. Her latest album includes "Here Comes Hurricane Season," and she has recorded songs about climate ("Winter In Manhattan"), astronomy ("Planet X"), gravity ("Doris and Edwin: The Movie"), and biology ("Amoeba Hop"). In fact she published a children's book based on this last song, *Amoeba Hop*, which received the stamp of approval of The International Society of Protistologists, and won a "Best Book Award" from the American Association for the Advancement of Science.

This year the banquet will be better than ever, with wonderful companionship, great food, and world-class entertainment. [Don't miss it.](#)



Christine Lavin



Yoram Kaufman, 1948-2006, was insightful and unselfish in his collaborations throughout his 30 year career.

Deadline Fast Approaching For New Award

The Atmospheric Sciences Section of the American Geophysical Union is pleased to announce the establishment of a new Section Award for senior atmospheric scientists, the Yoram J. Kaufman Unselfish Cooperation in Research Award. We first told you about this award in an earlier issue and we now have more specifics.

The AS Section will make the first annual Kaufman Award at the Joint Assembly (Spring Meeting) in Toronto in May, 2009. The citation will read: "The Yoram J. Kaufman Award for broad influence in atmospheric science through exceptional creativity, inspiration of younger scientists, mentoring, international collaborations, and unselfish cooperation in research."

The Kaufman Award will consist of a certificate and a \$1,000 credit toward AGU services. The credit may be used for journal subscriptions, book purchases, and AGU meeting registration fees, to be spent over a period of not more than three years from receiving the award. When the award is presented outside the recipient's home country, it will consist in addition of a travel grant of \$1000 specifically to attend the AGU meeting at which it is presented.

Now is the time to submit nominations for the Kaufman Award. **The deadline is December 1, 2008.** To be eligible, the candidate must be a member of the AGU, and be at least ten years past the award of the Ph.D. (or equivalent).

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The nomination package must consist of:

- a nomination letter,
- the candidate's curriculum vitae, and
- three letters of recommendation, at least one from a collaborator of the nominee from a different nation.

The nomination and supporting letters should clearly state how the nominated individual has exhibited the qualities noted in the citation. **Nominations must be submitted by December 1, 2008 (as one combined pdf file) to the Atmospheric Sciences Section President-Elect, Professor Anne M. Thompson, anne@met.psu.edu.** If you are unable to access Adobe to create a single pdf file, inform Dr. Thompson by e-mail and send the nomination package by Express Mail to: Anne M. Thompson, Penn State University, Meteorology Department, 503 Walker Building, University Park, PA, 16802-5013, USA.

This award is named in honor of Yoram J. Kaufman, an outstanding atmospheric scientist, mentor, and creator of international collaborations who worked on atmospheric aerosols and their influence on the Earth's climate for his entire 30-year career. Yoram was tragically killed in a bicycle accident just at the peak of his career at NASA Goddard Space Flight Center. He grew in the 1990s to be a leading light in aerosol research, both as an author of many new theoretical ideas and as a leader of field campaigns such as SCAR-B. He also captained the first NASA Earth Observing System platform, Terra, as its Project Scientist. He advised and mentored a large number of students and junior scientists, and was known for his quick insight, great heart, deep wisdom, and outreach to national and international collaborators.

Building Tomorrow's Talent Today

There is no doubt that the talent to solve many of this generation's scientific questions is present in today's youth. But students need intellectual, collegial and financial support in order to apply that talent in our field. For this reason, AGU has made the 2009 voluntary campaign theme "Building Tomorrow's Talent Today," and has set a goal of \$675,000 raised. According to John Farrington, President of the Ocean Sciences Section, "donations to annual operating funds and endowment funds will support student participation in AGU, and expand efforts to communicate the excitement of our disciplines to school teachers and students through AGU's vital outreach pro-

grams." For more information, visit http://agu.org/givingtoagu/annual_campaign.shtml.

AS Horizons

Don't forget - in the new *AS Horizons* section, we highlight the top projects in the field of atmospheric sciences from around the world. If you feel that you are doing a remarkable effort in our research field, or that you are researching key questions for atmospheric sciences or you simply want the research community know about your ongoing project, then you can submit a description of the project to the Newsletter's *AS Horizons* section. Moreover, you can point out projects that you are not involved in but you think should appear in this section.

You can submit your projects or suggest one that you know of to be highlighted in *AS Horizons*. Submission procedures can be consulted in the AGU/AS section webpage (<http://atmospheres.agu.org>) in the [Volume 2, issue 2 of the AGU AS Newsletter](#).

Forecasting and Training with STORM

Morgan Brown

The Science center for Teaching, Outreach, and Research on Meteorology (the STORM Project) has played an active role in education, research, and professional service since its inception in 2000. The STORM Project, which is funded by the National Oceanic and Atmospheric Administration (NOAA), has developed active programs in curriculum development, teacher training, and meteorological decision support.

STORM has provided summer training opportunities for middle and high school science teachers since 2003. Teachers and undergraduate students from across the United States have attended STORM summer courses on weather forecasting and air quality. According to STORM Director and Professor of Meteorology, Alan Czarnetzki, teacher-participants also develop units or activities in atmospheric science for their home classrooms. Many of these activities have been refined for national dissemination and are supported by real-time weather imagery served online by the STORM Project.

In the area of meteorological decision support, Czarnetzki has developed and delivered a number of online resources and training opportunities for Iowa school superintendents. Czarnetzki explains, "Winter weather in the Midwest can present formidable challenges to school operations, as was seen in the winter of 2007-2008."

STORM seeks to provide non-meteorologist decision makers with tools that can help in making informed decisions about weather-related school delays and closures. Professor Czarnetzki has also organized summer workshops for undergraduate students and science teachers that make use of FX-Net. FX-Net, which was developed by NOAA's Forecast Systems Laboratory (FSL), emulates the software used in National Weather Service Forecast Offices. However, since FX-Net runs on a personal computer by accessing a data server at FSL, the computing requirements are relatively modest. For more information on FX-Net, see the FSL website on that topic (www-tod.fsl.noaa.gov/fxnet.html).

The benefit of using FX-Net is twofold. First, participants have access to real forecast material that can be used in case studies or as lesson development material. Also, students at the University of Northern Iowa have the opportunity to gain experience with software that is similar to what they would find in an operational forecast office. FX-Net has been a unique tool and has helped the STORM Project advance its goal of making data about the atmosphere more accessible to educators and decision makers.

For more information on the STORM Project, or for information on how to get involved in one of their summer workshops, visit their website at www.uni.edu/storm.

CoCoRaHS: Involving Communities to Monitor Weather

Rob Cifelli, with assistance from Nolan Doesken and Henry Reges

The Community Collaborative Rain, Hail, and Snow Network (CoCoRaHS; <http://www.cocorahs.org/>) is an informal science education project where volunteers work together to measure, map and track patterns of rainfall, hail and snow. What started as a local endeavor in 1998 with a few tens of participants in Fort Collins, Colo. has grown to a

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Climate Change's Effects on Alaska's Coastlines

Michel Mesquita

Coastal erosion is a significant problem in the Arctic. The Arctic coastlines are highly variable and their dynamics are a function of environmental forcing (wind, waves, sea-level changes, sea-ice, etc.), geology, permafrost and other elements [Rachold *et al.*, 2005]. Under global warming scenarios, the risk of entire communities disappearing due to coastal erosion is greatly increased. The cost to move an entire village or town could devastate the local economy. Therefore, a better understanding of global warming effects and atmospheric forcing on the coast is essential.

According to Dr. Atkinson, Assistant Professor at the University of Alaska Fairbanks (UAF/IARC), heavy storms regularly hit most coastal regions of Alaska. Most of Alaska (80%) is ocean or river coastal. A lot of people and economic and subsistence activity are at risk due to erosion, inundation (floods and rising sea levels) and shipping accidents (under extreme weather conditions). The Cougar Ace ship accident in 2006, transporting nearly 4,800 Mazda cars and trucks off the coast of Alaska, was an example of how devastating such accidents can be. According to a *USA Today* article on the incident, the loss of one container with small parts could shut down a manufacturing line [Carty, 2006]. The climate change trends that dominate coastal susceptibility are: loss of sea ice, when the coast is ice free, it gets exposed to high winds and storm events and the risk of erosion is higher; melting of permafrost, which weakens coastal zones; and sea level rise, which is not the primary player for Alaska in the short term.

The town of Kivalina (www.kivalinacity.com) has filed a global warming-related lawsuit against nine oil companies, 14 power companies and one coal

company. Kivalina is located in the state of Alaska, northwest of Kotzebue (see map below). According to the 2000 U.S. Census Bureau Summary File 1, the town has 377 inhabitants, 80 housing units and almost 10 km² of total area, more than half of which is water. Kivalina is suing the 24 companies for emissions causing climate change. Due to global warming, the coastal erosion problems there may cause the town to disappear in the near future (see box below – “Interview with the Kivalina City Council Administrator”). The lawsuit was filed in Federal Court in San Francisco on February 26, 2008 and it is still

ongoing. It mentions that the U.S. Army Corps of Engineers and the U.S. Government Accountability Office have estimated the cost of relocating the town at \$95 to \$400 million.

Shishmaref is another example where coastal erosion is threatening a community (see above picture). According to the Shishmaref Relocation website (www.shishmarefrelocation.com), the community has established an erosion and

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Interview with Kivalina City Council Administrator

The following is an interview with Janet Mitchell, the Kivalina City Council Administrator, about the coastal erosion problem in Kivalina:

Michel: How is the erosion problem affecting Kivalina economically?

Janet: After the construction of the rock revetment, landing access will be a bit more difficult for barges and boats because barge access wasn't factored into the plans. Fuel delivery is done by barge and the only access to our town is by the beach, so that will have to be addressed before next year's delivery.

However, people have been known to adapt to changes and can be creative with coming up with ways to have new situations or changes addressed.

Michel: What is the social impact of the erosion in the community in Kivalina?

Janet: People's peace of mind has been disrupted by the erosion events we've been experiencing. Having to evacuate once before has increased the unrest in people. Besides having to deal with rising cost of fuel and how they will manage during the winter months, now they have this worry on their minds. Having to live in cramped quarters doesn't help matters. We have households where up to three families are living in one household. The average household has three bedrooms. Each family has children of their own so we're talking an average of ... 12 in one household. You can rest assured that there will be heated moments within the household with all these worries in mind.

Michel: What are the main causes of erosion in Kivalina?

Janet: Erosion in Kivalina was gradual to begin with. On the ocean side, we experienced erosion at a slow pace every year from surges or stormy weather. When a drain field was built for the water plant in 2004, they disturbed the beach floor by excavating from that area. Serious erosion occurred after that event near the school, which is where the drain field was located. We experienced accelerated erosion after that, which went into 2005. That was when the Northwest Arctic Borough came in with the idea to build a seawall with hesco material to address our serious erosion problem in 2006. During the construction of that seawall, again, they disturbed the floor of the beach, which further accelerated erosion, this time in new locations. They disturbed the beach floor near the AVEC tank farm and near the airport. The AVEC tank farms were compromised and the airport even so. The airport was closed until they had the erosion under control.

On the lagoon side, during the springtime, erosion would occur from the outflow of the Wulik River on the south side of the island. There has been work done twice on the south-east side of the island from river erosion using small sandbags but that didn't stop the gradual erosion.

So the three main causes of erosion is the ocean, the river and man. We have a crew on standby ready to fight more erosion. Our equipment must be in perfect running order and maintained diligently, which is a difficult task. Wear and tear is constant and revenue is scarce.



The town of Kivalina, located at 67°43'8"N, 164°29'32"W. Source: <http://en.wikipedia.org/wiki/Image:AKMap-dot-on-Kivalina.PNG>

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relocation coalition to facilitate the decision to remain at its present location or to relocate. The community is in favor of the latter.

In an effort to understand the Arctic coastal erosion processes, the Arctic Coastal Dynamics project (ACD) was created. The main interests of ACD are: 1) to improve wind and bathymetry databases; 2) to improve the understanding of coastal erosion processes; and 3) to understand the impacts of coastal erosion on humans and biological systems. The ACD is working with many international scientists toward developing a broadly applicable coastal erosion model. The circum-arctic coastal zones are adjacent to shallow continental shelves. To get accurate model results, detailed input bathymetry and wind data are still needed. Improved data collection and the new model will help us understand the changes that global warming could bring to the Arctic.

Atkinson [2005] reported that, "Coastal regions are particularly sensitive to the impact of high magnitude weather events. These areas receive storm energy in a concentrated form, due to a transfer of momentum from wind to water, which focuses the wind energy into waves, delivering it more effectively into the coastal zone." Therefore, it is necessary to better understand the effects of storm tracks, wind activity and global warming for accurate projections of change along the Arctic coastlines. It is hoped that the ACD efforts and the Arctic research work being conducted in many universities may shed some light on understanding the future Arctic condition.

Acknowledgements: We would like to thank Janet Mitchell, the Kivalina City Council Administrator, for the interview and also Dr. Atkinson for the invaluable comments on the coastal erosion problems in the Arctic.

The lawsuit can be downloaded from:

<http://climatelaw.org/cases/country/us/kivalina/Kivalina%20Complaint.pdf>

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- Zhang, K., et al. (2004), Global Warming and Coastal Erosion, *Climate Change*, 64, 41-48.

Monitoring European Heatwaves

Juan A. Añel



Dr. José Sobrino, project coordinator of Desirex-2008, on the roof of Torre Picasso (Picasso Tower) during the measurements.

During June and July of 2008, the European Space Agency (ESA) carried out a two-week campaign to see if spaceborne thermal infrared sensors can help to reduce the number of casualties due to high temperatures and heatwaves. The urban heat island (UHI) effect is a closely related phenomenon and is very important when dealing with this topic. The sensor was taken airborne and ground measurements were taken with infrared sensors. The objectives were to produce thermal datasets to support upcoming projects on urban heat islands and urban thermography, and to perform a preliminary mission analysis for a dedicated satellite sensor for the provision of temperature observations over European cities.

The campaign was named DESIREX-2008 (Dual-use European Security IR Experiment 2008), and Madrid was chosen as the test site for the campaign because of its special condition as one of the cities in Europe that suffers many heatwaves.

DESIREX-2008 was funded by ESA. Participants included Spanish teams from Universities (Universidad de Valencia, Universidad Autónoma de Madrid, Universidad Complutense de Madrid and Universidad de Vigo), and national institutes (INTA, AEMET, CIEMAT, CECAF, AENA and LABEIN), and the collaboration of the University of Strasbourg and the City Council of Madrid. It involved 60 researchers from 14 institutions and multiple satellites, airborne and field instruments.

The main instrument used during the campaign was the Airborne Hyperspectral

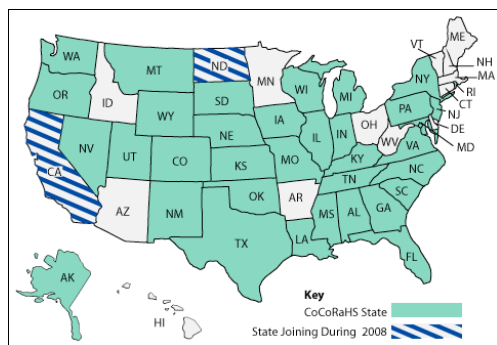
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A house destroyed due to coastal erosion in Shishmaref, Alaska. Photo courtesy by Ned Rozell (Science Writer, GI/IARC).

CoCoRaHS

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States currently participating in CoCoRaHS (green) and states joining the network by the end of 2008 (striped).

multi-state network in 2008 with over 10,000 active volunteers trained in the collection of precipitation measurements. As of September 2008, 35 states and the District of Columbia have joined the CoCoRaHS network with several more expected by the end of 2008 (see map below). Participants range in age from teenagers to seniors in their 80s and include students, teachers, senior citizens and anyone with an interest in the weather of their region. Volunteers across the country record 24-hour accumulations of precipitation at 07:00 local time and submit their measurements to the CoCoRaHS website (www.cocorahs.org).

An important feature of CoCoRaHS is its simplicity. Participants use the simplest of devices: a standard 4-in diameter rain gauge to measure rainfall (and snow water equivalent), snow measurement rulers to measure snow depth, and a 1-in thick styrofoam pad covered with heavy duty foil to measure the number and size of hailstones. These low-cost measurements help to fill the huge gaps between weather observing sites. On the CoCoRaHS website, maps show the frequency, quantity and spatial patterns of precipitation. This process yields continuous learning opportunities for participants and a rich new data set for a variety of meteorological and hydrological monitoring and research applications. Teachers have helped develop a number of lesson plans based on CoCoRaHS that are also available on the CoCoRaHS web site.

In addition to the daily precipitation observation, volunteers can also submit reports of intense rain, hail, or snow on the CoCoRaHS website that are sent immediately to the appropriate local National Weather Service forecast office. To ensure high quality data, all volunteers are strongly encouraged to take a two-hour training course. Moreover, a series of automated checks and QC consistency checks performed by dedicated volunteers are

used to catch erroneous data.

CoCoRaHS precipitation data are used by a variety of local, state, and federal agencies for applications ranging from flood forecasting (National Weather Service) to drought monitoring (USDA). In addition to providing critical information on regional water resources, one of the strengths of the project has been the ability to provide important information to research scientists who then use the data in applications ranging from validating radar-based rain and hail estimates to regional climate studies. Another strength has been the engagement of citizens resulting in the increased scientific awareness of the volunteer participants.

From Alan Robock: I just joined CoCoRaHS and find it great fun and a nice hobby. I had to cut down some trees to install solar panels on my roof and now I can also measure rain at my house. I encourage you all to join. Just go to <http://www.cocorahs.org/> to order your rain gauge and sign up.

Heat Waves

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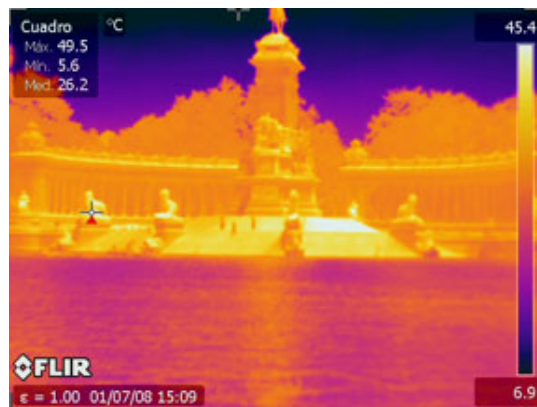
Scanner (AHS) [Fernández-Renau *et al.*, 2005], which is an imaging line-scanner radiometer, installed on a CASA-212 aircraft (<http://www.eufar.net/experiment/aircraft/spec/aircraft.php?num=42>) owned by Spain's National Institute for Aerospace Technology (INTA). Four cars carrying instrumentation followed the flight paths and analyzed the effect and the evolution of the UHI during the experiment.

Many satellite measurements were also acquired during the campaign from a range of satellite sensor. A brief list including links is shown:

- Medium Resolution Imaging Spectrometer (MERIS)
<http://envisat.esa.int/instruments/meris/>
- Advanced Along Track Scanning Radiometer (AATSR)
<http://envisat.esa.int/instruments/aatsr/>
- Spinning Enhanced Visible and InfraRed Imager (SEVIRI)
<http://www.esa.int/msg/pag4.html>
- Moderate Resolution Imaging Spectroradiometer (MODIS)
<http://modis.gsfc.nasa.gov/>
- Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER)
<http://asterweb.jpl.nasa.gov/>

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- Revista del Aficionado a la Meteorología. Septiembre 2008 (<http://www.meteored.com/ram/2868/las-observaciones-basadas-en-los-satlites-ayudan-a-disminuir-los-efectos-de-olas-de-calor-en-zonas-urbanas/>)



Above Left: Spectral measurements in front of the Royal Palace of Madrid.

Above Right: Thermal image of the lake in Parque del Buen Retiro (Park of the Pleasant Retreat).

bluefire: A Powerful New Tool for Atmospheric Science

William Anderson

Introduction

The National Center for Atmospheric Research (NCAR) in Boulder, Colo., has an established reputation for providing high-performance computing (HPC) resources to the atmospheric science research community, in support of the center's goals for scientific progress. This began with Control Data scientific computers in the 1960's and 1970's, and with the Cray 1-A, acknowledged within the computing industry as the first "supercomputer", which was operational between 1977 and 1989. Fast-forward 30 years and NCAR has built upon this legacy with its latest supercomputer, bluefire, a machine nearly one million times more powerful than the Cray 1-A.

In using this HPC tool, scientists can run higher-resolution simulations than previously possible, revealing new details of atmospheric phenomena including climate change, pollutant transport (atmospheric chemistry), atmospheric turbulence, hurricane and severe weather event forecasting, and earth-sun interaction. Furthermore, higher resolution

simulations reduce the need for numerical assumptions and parameterizations. On the contrary, results from such simulations may challenge the correctness of currently used assumptions. At the time of installation, bluefire ranked in the top 30 of the world's most powerful supercomputers. In this article, details of bluefire are presented, in the context of how researchers in our community can use this HPC resource. This article assumes the reader has limited experience with NCAR's existing HPC resources. Information on this report was sourced online from the Computational and Information Systems Laboratory (CISL), at the University Corporation for Atmospheric Research (UCAR) and NCAR website :

(<http://www.cisl.ucar.edu/computers/bluefire>).

Hardware & Software

bluefire is a distributed shared-memory supercomputer comprised of IBM Power 575 server systems. The computer consists of 127 nodes, where 117 are allocated to batch workload and the remaining 10 support user-interaction, debugging, and other non-batch functions. Each node houses 32 CPU's, for a total of 4,046 CPU's. The CPU's are IBM POWER6 processors running at a 4.7 GHz clock-speed. The system has a peak computation rate of 76.4 trillion floating-point operations (TFLOPS). An earlier story in this newsletter featured Japan's Earth Simulator,

which had a peak computation rate of 40 TFLOPS at the time of installation, earning it the number one position on the TOP500 list of the world's most powerful supercomputers between 2002 and 2004. In total, bluefire contains 12 terabytes (TB) of memory and 150 TB of high-performance disk space. The system is exceptionally efficient to run, owing to its unique CPU cooling technology. Figure 1 (a) and (b) illustrates copper piping which circulates coolant throughout the system – analogous to the function of an automobile's radiator and cooling system – and via two chilled-water storage tanks (shown at the rear of Figure 1, a). This hydro-cooling approach is supplemented by air-conditioning. This technology makes bluefire 33% more energy efficient than its predecessors, bluevista and blueice, which relied exclusively on air-cooling.

What can I use it for?

The system is available for HPC analyses of complex atmospheric science problems. More specifically, and as an example, this may include iterative spatiotemporal solutions of the governing differential equations of motion and transport in atmospheric processes. Code optimization and operating efficiency is very important to using NCAR HPC resources.

How do I use it?

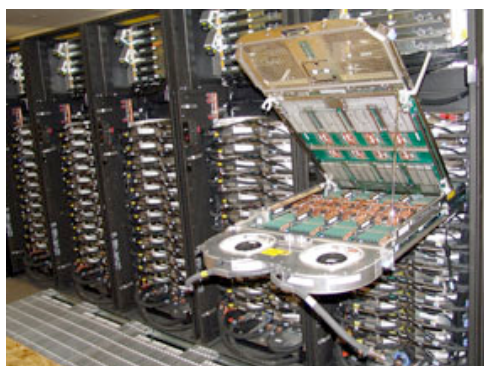
NCAR offers computational and data storage resources to NSF-supported university research grants. The NCAR website contains all relevant information for access protocol and compute time. Users interact with bluefire in a UNIX environment. Researchers familiar with running batch jobs on smaller local clusters, in a UNIX platform, will not be challenged by bluefire. All details for proper script file development are offered at the NCAR website. NCAR has accepted the first round of applications for allocation of compute time (known as General Accounting Units, GAU's) on bluefire, and has a particular interest to fund proposals requesting large GAU allocation for problems of strong scientific and computational merit.

Summary

A new supercomputer, named bluefire, has been commissioned by NCAR for analyses of the most complex contemporary problems in atmospheric (and related) sciences. This machine became fully operational in July 2008. This article constitutes a brief summary of bluefire's details and capabilities, and is intended only to share information about the potential uses of this machine to our community. Complete details of bluefire are found online at NCAR's [website](http://www.cisl.ucar.edu/computers/bluefire).



Left: bluefire hydro-cooling system (cooling towers shown in background).



Top Right: compute node (32 CPU's/node), copper pipes circulate coolant for CPU's



Bottom Right: bluefire cabinets.

Monsoon Madness

Yolande Serra

The Department of Atmospheric Sciences at the University of Arizona began conducting North American monsoon (NAM) weather discussions this past monsoon season and they have been quite a success. These discussions are part of a broader effort within the department to improve monsoon forecasts, which help local governments in the southwest more effectively respond to flooding and other weather-related hazards, as well as manage water resources for their growing populations. Anyone who has an internet connection can participate by going to the following link:

<http://breeze.ltc.arizona.edu/monsoon/>, and entering the site as a guest. Weather summaries are also available on the department's web page at:

http://www.atmo.arizona.edu/products/models/forecasts/wrf_disc.html.

Most of the discussions have been lead by Mike Leuthold, a senior staff programmer for the department and principal developer of a regional climate model for the southwest U.S. Mike optimized a version of the Weather Research and Forecast (WRF) model, which was originally developed at the National Center for Atmospheric Research (NCAR). This version of WRF runs at 1.8 km horizontal resolution over Arizona and parts of California, New Mexico, and northern Mexico in order to improve forecasts over the region's mountainous terrain.

Discussions generally begin with an analysis of the current observations and 0-hour forecasts from the global models, all accessible on the internet in graphical form. The discussion then turns to various global and regional model forecasts for the 12-36 hour time period. These discussions are an opportune time to evaluate the performance of Mike's regional model against existing operational model forecasts for the Southwest region.

Several scientists from around the country regularly chime in to the discussions, as well as local citizens interested in the weather. Within the department, graduate students and others new to the NAM get introduced to the trials and tribulations of forecasting and learn a great deal about the dynamics that organize monsoon outbreaks. A few graduate students have even been brave enough to lead a discussion or two.

The department plans on continuing these discussions until the monsoon season is over (typically beginning to middle of September).

The discussions will then resume again next summer.

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: <http://www.agu.org/sections/atmos/> click on Job Listings/Resources.

These job postings and others can be found at:

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

Atmospheric Sciences

- NOAA Climate and Global Change Postdoctoral Fellowship Program through UCAR, Deadline Jan. 15, 2009.
- Tenure-track faculty position, Dept. of Marine, Earth, and Atmospheric Sciences at North Carolina State Univ. in aerosol-cloud-radiation observations, apply by Oct. 15
- Postdoctoral position in climate research, Max Planck Institute for Meteorology, Hamburg, Germany. Deadline Oct. 10
- Postdoctoral researcher of wind energy, Division of Atmospheric Science, Desert Research Institute
- Postdoctoral fellow in atmospheric chemistry, Dept. of Atmospheric Science, Colorado State Univ.
- Research associate in paleoclimate research, Dept. of Earth Science and Engineering, Imperial College London, apply by Oct. 15
- Visiting scientist position in improving pollutant plume predictions, NOAA Air Resources Lab, Silver Spring, Maryland.
- Research meteorologist, Tropical Prediction Center/National Hurricane Center, Miami, Florida
- U.S. CLIVAR Climate Predictions Applications Postdoctoral Program, deadline Dec. 15
- Research Scientist positions, Goddard Earth Sciences and Technology Center, apply by Sept. 30

- Wyoming Excellence Chair in Atmosphere-Biosphere Interaction, Depts. of Atmospheric Science and Renewable Resources, Univ. of Wyoming, Laramie, apply by Nov. 10

- Tenure-track faculty positions in Tropical Meteorology and Atmospheric Chemistry, Department of Environmental Sciences, Rutgers University. Deadline November 15, 2008. For further information, visit <http://envsci.rutgers.edu/>

Interdisciplinary

- Postdoctoral fellow at the Community Surface Dynamics Modeling System Integration Facility at the Univ. of Colorado, Boulder
- Earth Sciences Librarian and Bibliographer, Stanford Univ.
- Professor of Remote Sensing, Centre for Geo-Information, Wageningen Univ., the Netherlands, deadline Oct. 8
- Leader in regional climate impacts, Pacific Climate Impacts Consortium, Univ. of Victoria
- Tenure-track position in remote sensing, Dept. of Geography and the Center for Global Change and Earth Observations, Michigan State Univ., apply by Nov. 1
- Three tenure-track positions in the Dept. of Land Resources and Environmental Sciences, Montana State Univ., Bozeman, apply by Nov. 1
- Postdoctoral position in weather and climate forecasts in water resource management, Water Institute, Univ. of Florida, apply by Oct. 15
- Postdoctoral and Ph.D. vacancies, Max Planck Institute for Meteorology

Ocean Sciences

- Researcher in remote sensing of the maritime environment, Arete Associates, Arlington, Virginia

Student Opportunities

- Graduate student opportunities in the Dept. of Earth, Atmospheric and Planetary Science in Spring, 2009 at MIT, deadline Nov. 1

Conferences

- **Chapman Conference on Atmospheric Water Vapor and Its Role in Climate**, October 20-24, 2008, Kailua-Kona, Hawaii, USA
<http://www.agu.org/meetings/chapman/2008/ecall/>
- **2008 Fall Meeting**, December 15-19, 2008, San Francisco, California, USA
<http://www.agu.org/meetings/fm08/>
- **Fifth International Conference on Technology, Knowledge and Society**, Jan. 30-Feb. 1, 2009, Huntsville, Ala.
<http://www.Technology-Conference.com>
- **2009 World Congress on Computer Science and Information Engineering**, Mar. 31-Apr. 2, 2009, Los Angeles, Calif.
<http://world-research-institutes.org/conferences/CSIE/2009>
- **Chapman Conference on Effects of Thunderstorms and Lightning in the Upper Atmosphere**, May 10-15, 2009, University Park, Pennsylvania
<http://www.agu.org/meetings/chapman/2009/bcall/>
- **Second International Symposium on Academic Globalization**, July 10-13, 2009, Orlando, Florida. Abstracts deadline Oct. 28,
<http://www.2009iiisconferences.org/AG>