



AOS & CICS Newsletter

September 2007

Volume 1, Number 3

Program in Atmospheric and Oceanic Sciences (AOS) & The Cooperative Institute for Climate Science (CICS)

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GFDL picnic A family friendly event

GFDL Employees Association (EA) board (Jasmine John, Robbie Toggweiler, Sonya Legg, Anand Gnanadesikan, Jeff Flick, Lori Sentman), fire chiefs (Gabe Vecchi, Dick Wetherald, Fanrong Zeng), Cathy Raphael and Chip Levy for washing dishes, and all those who helped schlep things back and forth to the picnic site (Whit Anderson, Riccardo Farneti, and many, many others), the picnic was a tremendous success. Whether, simply enjoying a leisurely conversation, a cooked-to-perfection burger or hotdog, a friendly game of volleyball, a fun-filled family two legged race, or (for the kiddies) a spirited jump in the inflatable bouncer, a good time was had by all.

Summertime ... and the living was easy

This summer, GFDL subscribed to the old adage, "All work and no play . . .". Under the leadership of Alistair Adcroft, the 2007 GFDL picnic went off without a hitch. Thanks to members of the



Volleyball anyone???



A cool treat on a hot summer's day

Having had time to digest the fine picnic fare, on June 26th, GFDL fielded a team, "Model Runners", in the ETS Firecracker 5K, a fundraiser for the Princeton YWCA and an opportunity for GFDL to match its Jersey Shore Relay performance. The team placed second behind Tyco and ahead of ETS, the US Olympic Development Team, Bracco and the Ewing Lions. That finish garnered them a set of four trophies - one of which was placed in GFDL's common room.



Bill Stern, Marian Westley, Bill Hurlin, and Tony Broccoli before the Jersey Shore Relay

The team featured some alumni from the Jersey Shore Relay Bonanza: Keith Dixon, Bill Hurlin, Tony Broccoli, Remik Ziemlinski and Marian Westley, and welcomed newcomers Vinod Kumar, Charlie Stock, Aaron Watters and Brian Dixon. In addition to the team trophy, several team members picked up some individual hardware. Brian Dixon placed 2nd in his age group, Charlie Stock and Marian Westley came in 3rd in theirs. Remik missed 3rd in his group by a mere 8 seconds. Mike Winton's 10-year old

daughter won her age group and, rumor has it, is being heavily recruited for the next corporate challenge! On Sunday, October 14th the "Model Runners" will Race for the Cure at Six Flags great Adventure in Jackson, NJ. Events include a 5K race, kiddie races, a 4K, and a one mile health walk. Race participants receive up to six half-price admissions to Six Flags. Race info is available at: <http://events.komencsnj.org/> Those interested in signing up should register as part of the Team called "Model Runners." See Marian Westley for details.

ETS FIRECRACKER 5K
26 June 2007

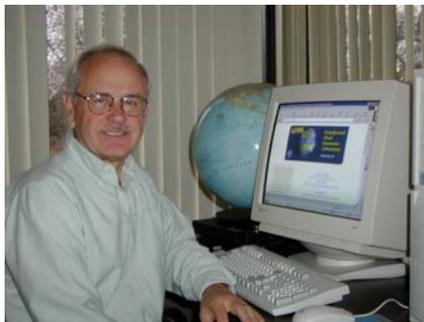


2nd PLACE TEAM:
GFDL
"MODEL RUNNERS"



* TOP 4 OFFICIAL FINISHERS*
CUMULATIVE TIME = 89:38

Colloquium to be held in Honor of Ants Leetmaa



Ants Leetmaa, Distinguished Former Director of GFDL

In recognition of Ants Leetmaa's distinguished career, a scientific colloquium will be held on October 4, 2007 at GFDL. A series of talks exploring, "The role of oceans in climate: A look forward" will be given by former colleagues, in an endeavor to highlight the central theme of Ants' illustrious career. Among the topics to be discussed are: observations, SI forecasting, and long-term climate. David Anderson, Mark Cane, Lisa Goddard, Marty Hoerling, John Marshall, Bob Molinari, Steve Pacala, Dick Reynolds and Carl Wunsch are all confirmed speakers. The program is scheduled to begin at 9:00 am, with a welcome by Tony Rosati, and will conclude at about 5:00 pm, with a cookout scheduled at GFDL from 12:20 to 2:00. The cookout fee is \$5 for GFDL Employee Association members and \$6 for non-members. See Jeff

Wunsch are all confirmed speakers. The program is scheduled to begin at 9:00 am, with a welcome by Tony Rosati, and will conclude at about 5:00 pm, with a cookout scheduled at GFDL from 12:20 to 2:00. The cookout fee is \$5 for GFDL Employee Association members and \$6 for non-members. See Jeff

Story Ideas?

We'd love to hear from you! Please send your suggestions to:

jcurcio@princeton.edu

Flick, Steve Garner, or Sonya Legg to sign up. An informal celebration will follow the colloquium at a local Chinese restaurant, *Sunny Garden*.

Ants is respected among his peers for his role in establishing the scientific foundation for moving climate prediction from statistically-based to physically based techniques, thus providing major improvements in the skill and applicability of operational climate forecasts. While Director of NOAA's Climate Prediction Center, his leadership played a major role in providing the first-ever successful, real-time El Niño and La Niña forecasts. At GFDL, his support for the development of a comprehensive Earth System Model continues to make a lasting impact and keeps GFDL at the forefront of global climate modeling.



Director's Corner

Having had the opportunity in the last issue of the newsletter to tell you about some of talented folks I have the pleasure of working with as the Director of CICS and AOS, namely our CICS oceanographers, I thought I'd share with you some of the remarkable strides that our graduate students are making in their own areas of expertise.

Gang Chen, a recent graduate in the Program of Atmospheric and Oceanic Sciences, who has been supported by CICS, has been awarded a NOAA Climate and Global Change Postdoctoral Fellowship. This NOAA-sponsored program, which pairs recently graduated postdoctorates with host scientists at U.S. institutions to work in an area of mutual interest, will pair Gang with Alan Plumb, Massachusetts Institute of Technology. Since its inception in 1989, the program endeavors to attract recent PhD's in sciences that address studies of relevance to the NOAA Climate and Global Change Program, in particular those who will be able to provide predictions and assessments of global climate change on seasonal to centennial time scales. Gang's research will focus on understanding the fundamental dynamical mechanism responsible for the poleward shift of the mid-latitude jets in response to stratospheric ozone depletion and global warming. He is one of only ten finalists to be selected worldwide. He joins the ranks of past recipients including recent awardees, Irina Marinov, Dargan Frierson, and Ken Takahashi.

Another recent graduate of the AOS program and a GREF Fellow since 2001, Cynthia Randles, was awarded the 2006 Marvin L. Wesely Distinguished Graduate Research Fellowship award for the 2006-2007 academic year. Cynthia recently defended her thesis, "Impact of Carbonaceous Aerosols on Climate: Examination of the Sensitivity of Simulated Regional Climates to Absorbing and Scattering Aerosols." While at Princeton, she worked with V. Ramaswamy. Cynthia has accepted a Research Scientist position at NASA Goddard.

Yi Huang, a graduate student with Ramaswamy, is in his second year of funding of a NASA Earth System Science Fellowship for his proposal entitled, "Diagnostic Investigation of Satellite-Observed and Model-Simulated Spectral Longwave Radiances: Spectral Signatures of External (Natural, Anthropogenic) Climate Forcings and Internal Variability". Fuyu Li, another

graduate student mentored by Ramaswamy, was awarded a NASA Earth System Science Fellowship in September 2007 for his proposal entitled, "Emission, Transport and Deposition of Mineral Dust in the Southern Ocean and Antarctica: An Integrated Approach Using GCM and Satellite Observations."

Patrick Schultz, a Geoscience graduate student in my group, is in his third year of funding of a NASA Earth System Science Fellowship for his proposal entitled, "Application of Novel Satellite Observations of Phytoplankton Carbon Biomass and Growth Rates to Develop and Empirical Ocean Ecosystem Model". He has also been awarded an Honorific Harold W. Dodds Fellowship for this academic year. Kelly Kearney, another Geoscience graduate student, has been funded by CICS/NOAA for her proposal, "Integrating top-down and bottom-up modeling approaches for ocean ecosystems" this year. Also noteworthy, Geosciences graduate student Yves Plancheral has been funded by NSF by a proposal for his research on "Stoichiometry of Oceanic Remineralization by Non-Linear Global Optimization on an Improved Data Set". Finally, Danielle Bianchi, an AOS graduate student, has been funded by DOE by a proposal for his research on "Do Coupled Climate Models Correctly Simulate the Upward Branch of the Deep Ocean Global Conveyor."

As Director, it is particularly gratifying to see that the strength of our faculty and research staff is matched by a strong graduate student population that reflects a wide array of interests and talents. I recognize the commitment of these students and their dedication to their fields.

AOS & CICS Research in Action

[This column is intended to focus on AOS & CICS research accomplishments and milestones, past, present, and future. In this issue, we highlight the accomplishments of Cyril Crevoisier who recently returned to France after 3 years in the AOS Program.]

A native of the sunny South of France, Cyril studied physics at the Ecole Normale Supérieure of Cachan in the grey South of Paris, where he was awarded the *Agrégation* in Physics. He then turned his attention to the monitoring of CO₂ atmospheric concentration from space (1) by pursuing a PhD at the Ecole Polytechnique. Cyril joined the AOS program shortly after defending his PhD to work with Manuel Gloor, Jorge Sarmiento and Steve Pacala on improving the estimation of sources and sinks of carbon over land. This involved the development of a carbon observing system, which aims at using data on varied spatiotemporal scales (flux and tall towers, flask and aircraft atmospheric data, forest inventories, oceanic data, remote sensing data), in conjunction with climate models, to better understand the key processes controlling carbon fluxes over the continents.

*In future issues,
we'd like to
include a column
dedicated to
Alumni News.
Please send your
news, or news of
friends and
colleagues, to:
jcurcio@princeton
.edu*

In collaboration with NOAA/GMD/ESRL, Cyril has started to exploit the new network (20 sites) of aircraft profiles obtained as part of the North American Carbon Program. Using this new sampling strategy of 3D CO₂ atmospheric distribution together with a novel budgeting approach to circumvent the traditional weaknesses of atmospheric inversions, Cyril has designed a Direct Carbon Budgeting Approach (DCBA) to infer carbon sources and sinks over the continent (2). DCBA puts a control volume on top of North America, balances air mass flows and into and out of the volume and solves for the surface fluxes. This method was first used to analyze the strengths and weaknesses of the network, leading to the implementation on a new station at Berms (Saskatchewan) to complement the network in a region that was poorly sampled by the existing network. Recently, the use of the first year of measurements has suggested a moderate carbon sink in North America of -0.51 ± 0.39 GtC.yr⁻¹ (3). The sinks are mainly distributed in three regions: mid-west states, which are characterized by extensive agriculture; South-East regions where forests are regrowing; and the South of the boreal region. The implication of this result for the global carbon budget is now under study.



Cyril Crevoisier, Associate Research Scholar

In parallel, together with Elena Shevliakova, Sergey Malyshev and Drew Purves, of Princeton University, Cyril has started to develop a data assimilation scheme to constrain the new GFDL vegetation model, LM3V (4), in order to better understand the key processes controlling carbon fluxes over the continent. So far, this effort has been limited to the use of eddy flux tower and forest inventory data.

As part of the carbon observing system, Cyril has designed a data-based prognostic fire model (5), for use in Dynamic Global Vegetation Models, relying on in-situ and remote sensing observations of fire. This model, which is being included in LM3V, estimates monthly burned area from four climate (precipitation, temperature, soil water content and relative humidity) and one human-related (road density) predictors. So far, due to the lack of reliable data over long time periods in other regions, this model has been designed for the boreal forest regions only. However, by exploiting observation of CO₂ from space, it is now possible, for the first time, to have a direct proxy for fire emissions in the tropics (6). Cyril is studying the potential use of this new data to model fire in the tropics.

Finally, together with Sara Mikaloff-Fletcher (AOS), Cyril has started to develop a multi-species approach to infer carbon surface fluxes through a combined atmospheric and oceanic inversion constrained by observations of various gases (CO₂, CO, CH₄, O₃, O₂). In particular, the simultaneous use of observations of CO₂ and CO made at the surface and from space (by the AIRS and MOPITT instruments) is studied. This approach, relying on available atmospheric and oceanic data, takes advantage of the correlation existing between different species to add more constraint on the fluxes and the atmospheric transport. The results will inform the development of the full carbon observing system.

Cyril has recently obtained a highly cherished CNRS research position in France at the Laboratoire de Météorologie Dynamique/IPSL where he will be in charge of exploiting various space infrared missions to study Earth climate, in particular trace gases, aerosols and surface characteristics. He will also teach radiative transfer at the University of Paris VI. Through his activities, he will keep working with colleagues at Princeton, GFDL and ESRL. Cyril would like to take this opportunity to thank all of them for the fantastic time he had in Princeton.

Cyril's new contact information is:

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91128 Palaiseau Cedex, France
cyril.crevoisier@lmd.polytechnique.fr

Selected publications

- (1) Crevoisier C., Heilliette S., Chédin A., Serrar S., First midtropospheric CO₂ concentration retrieval from AIRS observations in the tropics, *Geophys. Res. Lett.*, *31*, L17106, 2004.
- (2) Crevoisier C., Gloor M., Gloaguen E., Sarmiento J. L., Horowitz L. W., Sweeney C. and Tans P. P., A direct carbon budgeting approach to infer carbon sources and sinks. Design and synthetic application to complement the NACP observation network, *Tellus*, *58B*, 366-372, 2006.
- (3) Crevoisier C., Sweeney C., Gloor M., Sarmiento J. L. and Tans P. P., A moderate carbon sink in North America is suggested by extensive CO₂ vertical profile observations used in a direct budgeting approach, *in prep.*
- (4) Shevliakova et al., Carbon Cycling under 300 years of Land-use Changes in the Dynamic Land Model LM3V, *in revision.*
- (5) Crevoisier C., Shevliakova E., Gloor M., Wirth C. and Pacala S., Climate and human drivers of fires in the boreal forests: data constrained design of a prognostic model for burned area, *J. Geophys. Res.*, *accepted*, 2007.
- (6) Chédin A., Scott N. A., Armante R., Pierangelo C., Crevoisier C., Fossé O. and Ciais P., A quantitative link between CO₂ emissions from tropical vegetation fires and the daily tropospheric excess (DTE) of CO₂ seen by NOAA-10 (1987-1991), *J. Geophys. Res.*, *in revision*, 2007.

AOS & CICS News

Arrivals:

Charlie Stock joined us on May 14, 2007, after completing a joint postdoctoral position in Berkeley and Princeton (Simon Levin). He is working with John Dunne and the Ocean Biogeochemical Model Development Team on improving representation of zooplankton and coastal phytoplankton dynamics in the global ocean biogeochemistry model.

Isodoro Orlanski, who retired from GFDL, joined the AOS Program as a Senior Scientist on September 1, 2007. Dr. Orlanski will continue his research of storms and their consequence to climate variability and change, while also continuing to co-teach AOS572 this spring.

Dilip Ganguly began working on July 9, 2007 with V. Ramaswamy running the coupled model (CM) simulations with real world aerosols. He was previously a Postdoctoral Fellow in the Space and Atmospheric Sciences Division of the Physical Research Laboratory in Ahmedabad, India where he received his Ph.D. in 2006.

Laurent White arrived on September 1, 2007 and is working with Alistair Adcroft on ocean general circulation modeling and numerical methods. He completed his Ph.D. in Applied Mechanics and Geophysics at the Université Catholique de Louvain in Belgium.

Arnico Panday will join AOS on November 1, 2007. He is currently a Postdoctoral Associate at MIT's Center for Global Change Science, where he received his Ph.D. in Atmospheric Sciences in 2006. Arnico will be working with Larry Horowitz and Hiram Levy on the effects of regional and global atmospheric chemistry.

The Program in Atmospheric and Oceanic Sciences extends a warm welcome to three new first year graduate students, **Andrew Ballinger**, **Erica Staehling**, and **Peng Xie**.

Departures:

After 5 years in the AOS Doctoral Program, under the advisement of Leo Donner, **Seung-Soo Lee** defended his thesis (June 4, 2007), entitled, "Aerosol Effects on Clouds and their Sensitivity to Numerical Representations of Microphysics". He is currently a Postdoctoral Associate at the University of Michigan.

Former graduate student, **Gang Chen** defended his thesis, "Mechanisms that Control the Latitude of Jet Streams Surface Westerlies" on August 1, 2007. He has been awarded a NOAA Climate and Global Change Postdoctoral Fellowship and will work with Alan Plumb, Massachusetts Institute of Technology. While at Princeton, Gang was mentored by Isaac Held.

On Friday, September 7th, **Cynthia Randles** defended her thesis, "Impacts of Carbonaceous Aerosols on Climate: Examination of the Sensitivity of Simulated Regional Climates to Absorbing and Scattering Aerosols." During her time at Princeton, she was mentored by V. Ramaswamy. Cynthia has accepted position at NASA Goddard as a Research Scientist.

Former Postdoctoral Students, **Rongrong Zhang** and **Qian (Scott) Song** have accepted positions at Goldman Sachs, New York and Deutsche Bank, New York, respectively.

SAYRE HALL'S 5th IRON CHEF COMPETITION

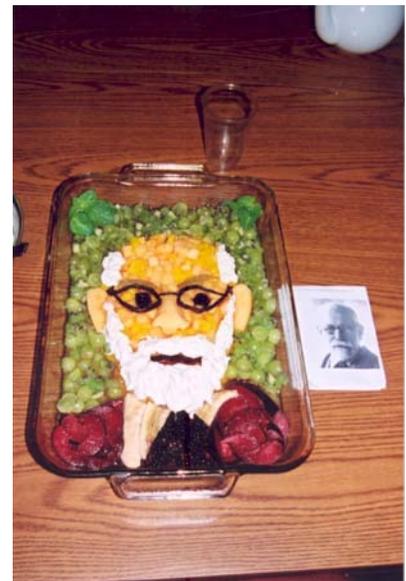


Cyril Crevoisier's "Ode to Summer"

Unseating reigning champion, **Sara Mikaloff Fletcher**, **Cyril Crevoisier** won the coveted title of Sayre Hall's Iron Chef with his "Ode to Summer" dessert, a tasty blend of raspberry coulis, almond biscuit, peach crème brulee, Chantilly, and fresh blueberries in individual parfaits. The "Dreaming of Summer" theme called for fresh summer fruit as its secret ingredient.

Cyril wasn't alone in his creativity and culinary flair; **Eric Galbraith** was runner up with his entirely edible fruit sculpture. The sculpture, designed in the likeness of Sigmund Freud, the father of dream analysis, racked up 11 points in the style category alone.

Coming in third place was **Laura Jackson** with a unique entry of ginger melon soup, with ginger wine served in a melon bowl topped off with a fresh cucumber salad garnish. **Anna Valerio's** lemon freeze and **Bob Key's** lemon bisque did not make the top three, however, were among the favorites when it came to going back for seconds.



"Sigmund Fruit" by Eric Galbraith



Bob Key's Lemon Bisque

SAYRE HALL'S 6th IRON CHEF COMPETITION

"From Bologna to New Jersey: When tradition becomes inventive," the Sayre Hall's 6th Iron Chef Competition, took place on September 10th. The secret ingredient for this Italian flavored theme was cheese. As anticipated, **Anna Valerio** won by a landslide with her fantastic gnocchi/home-made red wine/fresh figs. Delizioso! First-time entrants, **Laura Rossi** and **Riccardo Farneti**, fared quite well, coming in respectively 2nd and 3rd. To shake things up a bit, Iron Chef VI pitted two teams against one another, the Italian vs. Italian-the American team. Although the Italian side dominated the

competition, outstanding dishes on the American side gave the Italian team a run for their "sold" (\$\$\$ - *Italian style*). Details on the highly anticipated Iron Chef VII will be forthcoming.



Gnocchi/home-made red wine/ fresh figs compliments of Anna Valerio



Tagliatelle al ragu' by Riccardo Farneti



Laura Rossi's Pizzelle with mascarpone and cream filling

ANNOUNCING THE SAYRE HALL IRON CHEF WEBSITE



Thanks to the Iron Chef (IC) organization team, a dedicated website to Sayre Hall's Iron Chef Competition is now up and running. The site can be accessed at: <http://aos.princeton.edu/WWWPUBLIC/cyril/IC/> (Please note: Due to a bug in the latest version of Internet Explorer, please be sure to access the site through Mozilla Firefox.)

Please visit the site for:

Information regarding upcoming competitions

Official rules

Photos of past Iron Chef Competitions

Recipes

A special section entitled, "Food Court," which aims at collecting names and addresses of recommended restaurants around the globe

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