Title:

Learning and Spreading the Application of NOAA GFDL Atmospheric Model Version 3

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Abstract

Dr. Liu conducts research based on the climate models and attended the workshop in Geophysical Fluid Dynamics Laboratory (GFDL) in 2012 for the introduction of NOAA GFDL atmospheric model version 3 (AM3). However, the AM3 is configured for the environment of supercomputer in NOAA and the manual to the public is rather rough. This limits the application of AM3 outside the GFDL. Dr. Liu proposes to cooperate with the scientists in GFDL to setup a series of experiments and introduces these applications to the RSMAS community. Funds are requested for travel to GFDL and one-day course in RSMAS. This is an important activity for career advancement including the improvements of technical skills in numerical models and teaching experiences, which is not covered by sponsored research.

Activity goals

The GFDL AM3, as the atmospheric component of the GFDL coupled model CM3, was designed with an awareness of key emerging issues in climate science, including aerosol-cloud interactions in climate and climate change, chemistry-climate feedbacks, land and ocean carbon cycles and their interactions with climate change, and decadal prediction. This model has been proved to have some advantages over the other popular atmospheric models in the climate simulations. But because of the scientific research nature of the GFDL, they are not responsible for the application of this model outside the institute. Moreover, the model is developed under the frame of Flexible Modeling System (FMS) of GFDL. It increases the difficulty to transplant this model onto different supercomputers.

So the first goal of this activity is to cooperate with the scientists in GFDL to setup a series of numerical experiments for some fundamental climate simulations which can be transplanted onto general Linux-system based supercomputers. These experiments represented by the scripts can be modified for the specific scientific studies. The beginners could benefit from these experiments to learn and apply the model into practical research in a convenient way. The second goal is to educate the RSMAS community who are interested in this model in the form of a short course. The model would be introduced and tested under step-by-step guidance. It would help the researchers overcome the difficulties of time-consuming self-learning and focus on the real scientific topics.

Personal goals

Dr. Liu is an early-career research scientist. Both technical skills for scientific research and teaching experiences are essential for his advancement in academia. This activity that funds are requested for, will greatly enhance his ability of numerical model simulations, which will contribute to his ongoing study on the role of mid-latitude air-sea interaction and future projects. Also teaching experience is an important factor to be competitive in the field of academia. For a pre-tenure researcher, the teaching opportunity is quite limited. So this activity will also help Dr. Liu strengthen the ability of how to organize and teach courses.

In addition, for the activity to be accomplished Dr. Liu need communicate with the scientists in GFDL and researchers in RSMAS, also need plan and organize the activity effectively. The whole process will help him improve the ability of communication and cooperation, which is critical for the future career.
Budget requested

Travel to New Jersey in spring of 2014: airfare ($500), hotel (5 days, $150 pd), ground transportation $200, per diem (5 days, $50 pd). Total travel cost: $1,700. Course expenses: $800. SEEDS request: $2,500.
Hailong Liu

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I. Education
• 05/2009, Ph.D., University of Maryland-College Park, Physical Oceanography
  Dissertation title: Global oceanic mixed layer properties
• 07/2002, M.S., Institute of Oceanography, Chinese Academy of Sciences, Physical Oceanography
  Thesis title: The seasonal and climatological characteristics of sea surface fluxes in China Seas
• 07/1999, B.S., Ocean University of Qingdao, Oceanography
  Thesis title: Elementary research on relative mean sea level along Qingdao coast

II. Computer Knowledge
• Programming languages and scientific software (Fortran90/95, C, GrADS, CShell script, MatLab, netCDF and IDL)
• Operation systems (PC, Macintosh, UNIX and Linux)

III. Research Expertise
• Oceanic mixed layer properties and upper ocean dynamics
• Tropical climate variability and air-sea interaction
• Numerical modeling of ocean (coupled) general circulations and data assimilation

IV. Professional Experience
• 09/2009-present, Postdoctoral Associate / Research Associate, RSMAS/CIMAS, University of Miami
  Focus areas: 1) Atlantic Warm Pool and Tropical Atlantic Variability and their climate impacts. 2) The roles of oceanic mixed layers and barrier layers/compensated layers in the climate system.
• 05/2009-08/2009, Visiting Research Scientist, Center for Ocean-Land-Atmosphere Studies, Institute of Global Environment and Society
  Focus area: Setting up GFDL AM2.1 numerical model for Aqua-Planet Experiments to study on the interaction of Hadley cell and mid-latitude eddy-driven jets.
• 09/2002-04/2009, Graduate Research Assistant, University of Maryland MEES program
  Focus areas: 1) Applying Princeton Ocean Model to simulate an ideal river plume on continental shelves. 2) Global oceanic mixed layer properties based on observations and numerical simulations with data assimilation.
• 09/2000-07/2002, Graduate Research Assistant, Institute of Oceanography, Chinese Academy of Sciences

  Focus area: The mean and seasonal characteristics of sea surface fluxes in the adjacent seas of China based on statistical methods.

V. Conferences and Workshops Attended

  Conferences
  • 2012 Ocean Sciences Meeting, Salt Lake City, Utah, USA, Feb 20-24
  • 2011 WCRP Open Science Conference, Denver, CO, USA, Oct 24-28
  • 2008 Ocean Sciences Meeting, Orlando, Florida, USA, Mar 2-6 (Oral presentation)
  • 2006 Ocean Sciences Meeting, Honolulu, Hawaii, USA, Feb 20-24
  • 2005 MEES Graduate Colloquium, Baltimore, Maryland, USA, Oct 7-8

  Workshops
  • 2012 Summer School on Atmospheric Modeling, GFDL/NOAA, Jul 16-20
  • 2009 Fundamental Problems in Climate Dynamics, Princeton University, May 04-13
  • 2007 Applications of Remotely Sensed Observations in Data Assimilation, University of Maryland, Jul 23-Aug 10

VI. Professional Association

  2012-present: Member, American Meteorological Society
  2004-present: Member, American Geophysical Union
  2003-present: Member, Chinese-American Oceanic and Atmospheric Association

VII. Service and Activities


VIII. Fellowships and Honors

  • 08/2012, Peer Educators in the Ethics of Research (PEER) Fellowship of University of Miami
  • 05/2009, Member of the Scientific Research Society Sigma Xi
  • 03/2008, Jacob K. Goldhaber Travel Grant of Graduate School of University of Maryland
  • 03/2008, Student Travel Award of Ocean Science Meeting 2008
  • 07/2004, NOAA/National Estuarine Research Reserve (NERR) Graduate Research Fellowship (Declined)
  • 09/2002-07/2004, Horn Point Graduate Research Fellowship
  • 12/2001, “PENG MENGGAN” Fellowship of Chinese Academy of Sciences
  • 01/2000, First Class Advanced Science and Technology Prize of Chinese Ministry of Education (9th Author)
  • 06/1999, First Class Industrial and Commercial Bank Scholarship
  • 01/1999, Second Class Prize of the National Undergraduate Mathematical Contest in Modeling
IX. Publications

Work in progress


Peer reviewed


