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The Information Science and Technology Center ...at Colorado State University

Colorado State University's Information Science and Technology Center (ISTeC)

presents <u>two</u> lectures by

Dr. James Hack

Senior Scientist and Head, Climate Modeling Section
Deputy Director, Climate and Global Dynamics Division
National Center for Atmospheric Research (NCAR)

ISTeC Distinguished Lecture

in conjunction with the Computer Science Department Seminar Series

"The Earth Simulator: A Retrospective on the Background, Science Opportunities, and Risks"

Monday, May 1, 2006
Lecture: 4:10 to 5:00 pm
Reception: 5:00 to 5:30 pm
Guggenheim 107

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Joint Electrical and Computer Engineering Department and Atmospheric Science Department Seminar

sponsored by ISTeC

"Modeling the Climate System Across Scales"

Monday, May 1, 2006
Lecture: 10:30 to 11:30 am
Atmospheric Science Building (ERC), room 101

ABSTRACTS

"The Earth Simulator: A Retrospective on the Background, Science Opportunities, and Risks"

In the spring of 2002 the Earth Simulator Center of the Japan Marine Science and Technology Center (JAMSTEC) opened for business, announcing that its large scale ultra-high-speed parallel computational system known as the GS40 or "Earth Simulator" had achieved the world's highest sustained performance of 35.61 trillion floating-point operations per second. This performance was almost five times as fast as the former record holder, the United States ASCI White System. More importantly, the GS40's sustained performance was 87.2% of its theoretical peak performance of 40 TeraFlops, considerably higher than the commodity off the shelf (COTS) systems fielded in the United States.

The Earth Simulator Initiative was jointly developed by the Earth Simulator Research and Development Center, which was founded by the National Space Development Agency of Japan, the Japan Atomic Energy Research Institute, and JAMSTEC. The objectives of this government funded project were to facilitate the investigation of problems in Earth Sciences, such as global warming, with the GS40's unique computational capabilities. This talk will review the Earth Simulator Project, the opportunities it presented for scientific simulation, and the response of the U.S. High Performance Computing community to its introduction.

"Modeling the Climate System Across Scales"

Scale interactions, both spatial and temporal, are an important feature of atmospheric and oceanic flows. The numerical weather prediction community has long recognized, and quantified, that the explicit representation of additional scales of motion led to more accurate deterministic predictions. On climate time scales, however, global numerical models fail to capture important modes of atmospheric and oceanic variability. These simulation deficiencies are relatively insensitive to increases in global model resolution. This talk will discuss a new multi-scale modeling framework which nests cloud system resolving configurations of the Weather Research and Forecasting (WRF) model in the CCSM Community Atmosphere Model (CAM). The focus of this modeling framework is to understand the manner in which moist convection and its associated mesoscale organization drives larger circulations. Early simulation results from channel configurations of WRF will be presented.

Dr. James J. Hack is a Senior Scientist at the National Center for Atmospheric Research (NCAR) in Boulder, Colorado, Deputy Director of the Climate and Global Dynamics Division, and Head of the NCAR Climate Modeling Section. He also holds an Adjunct Professor position at the University of Colorado, Boulder. He received his Ph.D. in Atmospheric Dynamics from Colorado State University in 1980, after which he became a Research Staff Member at the IBM Thomas J. Watson Research Center where he focused on the mapping of scientific algorithms to high-performance computer architectures. He moved to NCAR in 1984, where he has been a lead developer of the NCAR global atmospheric model, currently called the Community Atmosphere Model (CAM). His primary scientific activities have been in the areas of tropical dynamics, the parameterization of moist convection, cloud processes and their modulation of radiative transfer, and on diagnostic methodologies for evaluating simulation quality. He has worked on all aspects of large-scale global modeling, including the development and evaluation of numerical methods, the development of analysis frameworks, and the implementation of global models on high-performance computer systems. He is a member of a variety of scientific and advisory committees including the JSC/CAS Working Group on Numerical Experimentation (WGNE), and the DOE Office of Science Advanced Scientific Computing Advisory Committee.

To arrange a meeting with the speaker, please contact Patty Schwindt at (970) 491-1577 or Patty.Schwindt@colostate.edu.

ISTeC (Information Science and Technology Center) is a university-wide organization for promoting, facilitating, and enhancing CSU's research, education, and outreach activities pertaining to the design and innovative application of computer, communication, and information systems. For more information please see ISTeC.ColoState.edu.