

Press Release

# SC2002 to Feature Innovative NASA Research and Technology

by SpaceRef

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NASA's cutting-edge research in high-performance computing will be showcased at an upcoming seven-day conference in Baltimore.

SC2002, the Conference of High Performance Computing and Networking, will be held Nov. 16-22 at the Baltimore Convention Center. This year's theme, "From Terabytes to Insights," emphasizes the opportunity to use technology to transform an ever-increasing flow of data into the knowledge that will impact education, science, business, government and every aspect of society.

"For more than 20 years, NASA has been a leader in the development and application of high-performance computing systems that further the Agency's science and engineering work," said John Ziebarth, acting chief of the NASA Advanced Supercomputing Division at NASA's Ames Research Center, located in California's Silicon Valley. "SC2002 will again showcase our recent accomplishments, including research results that are only possible on NASA's unique supercomputers, data analysis methods that are not yet available to the rest of the scientific community, and science products resulting from NASA-university collaborations."

The 40-by-40-foot NASA exhibit will showcase more than 25 demonstrations and numerous panel discussions on topics ranging from homeland security to innovations in high-end computing. Scientists from five NASA centers will feature a variety of real-time and interactive demonstrations of the latest research in computational applications serving NASA's aerospace, Earth science and space science missions.

Featured at NASA's SC2002 exhibit will be a demonstration of simulation-based medical planning for heart bypass surgery. The current paradigm for cardiovascular surgery planning relies exclusively on diagnostic imaging data to define the present state of the patient, empirical data to evaluate the effectiveness of prior treatments for similar patients, and the judgment of the surgeon to decide on a preferred treatment.

Researchers at Stanford University and the Center for Turbulence Research, a Stanford/NASA Ames consortium, are working to create a simulation-based medical planning system for treating cardiovascular disease that uses computational methods to evaluate alternative surgical options prior to treatment, using patient-specific models of the vascular system. The blood flow simulations enable a surgeon to see the flow features resulting from a proposed operation and to determine if they pose potential adverse effects, such as increased risk of atherosclerosis and blood clot formation.

Another exhibit will feature research in modeling the Earth's atmosphere that is being conducted at the Data Assimilation Office (DAO) at NASA Goddard Space Flight Center, Greenbelt, Md. The NASA finite-volume General Circulation Model (fvGCM) is the DAO's global atmospheric modeling system (a numerical approximation of the fundamental physical, dynamical and chemical processes of the atmosphere.)

The DAO strives for a unified climate, weather and chemistry transport model, used in combination with real-world observations to produce the best estimate of the true state of the Earth's atmosphere. The NASA fvGCM combines community-based physical approximations with numerical approximations to the fluid dynamics of the atmosphere in order to predict the evolution of the Earth's weather and climate. Researchers at the DAO apply the NASA fvGCM to high-resolution, real-time weather forecasting problems in an effort to improve the predictability of hurricanes and other atmospheric phenomena, in addition to global climate prediction.

An exhibit entitled 'Estimating the Circulation and Climate of the Ocean: the Circulation Pathway of Subtropical-Tropical Exchange' features research being conducted at NASA's Jet Propulsion Laboratory, Pasadena, Calif. By combining satellite observations and a state-of-the-art numerical model, a complete description of the ocean is obtained for studying mechanisms of ocean circulation.

The exhibit focuses on the circulation of the tropical Pacific Ocean and illustrates the circuitous water mass pathways that connect the subtropics and the tropics, and the vigorous mixing that occurs along the way. The analysis allows researchers to 'see through' the ocean to monitor climate change and to help understand how water circulates and interacts with its surroundings.

Another NASA Ames exhibit will feature Cart3D, NASA's Software of the Year 2002. Cart3D is a software package for fully automating aerodynamic simulations around complex flight vehicles, for example the complete space shuttle with boosters and attachment hardware. The software permits users with access to networked computing clusters or supercomputers to synthetically generate the types of aerodynamic databases typically obtained only through extensive wind-tunnel testing.

SC2002 attendees can select and manipulate pre-built vehicle geometries, and set up aerodynamic simulations over a range of flight conditions. These simulations then can be submitted for processing on NASA's Information Power Grid. Aerodynamic databases from these and previously computed analyses also will be available for playback and demonstration.

SC2002 is sponsored by the Institute of Electrical and Electronics Engineers Computer Society and by the Association for Computing Machinery's Special Interest Group on Computer Architecture. For more information about the conference, see:

<http://www.sc2002.org/index.html>

<http://www.nas.nasa.gov/SC2002/>

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