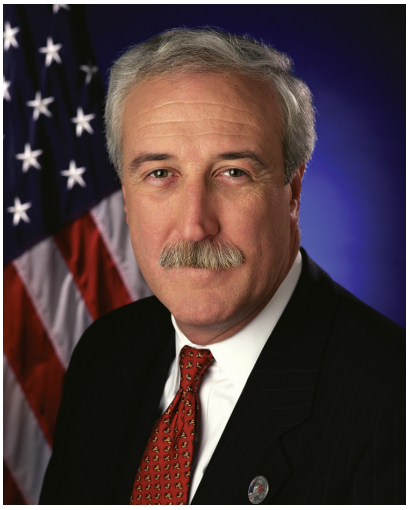
SUPERCOMPUTING CONFERENCE WELCOME

Welcome, SC2004 participants,

I am pleased to welcome you to the 16th annual Supercomputing Conference in Pittsburgh. The SC2004 conference theme, "Bridging Communities," will bring together representatives from many technical communities to exchange ideas, share recent successes, and plan for the future of supercomputing.



Sean O'Keefe, NASA Administrator

This year, NASA's demonstrations and presentations represent work being done within each of the agency's four new Mission Directorates: Science, Aeronautics Research, Exploration Systems, and Space Operations. These NASA Mission Directorates were formed earlier this year in response to President Bush's charter to NASA to transform its organization in order to advance our nation's new Vision for Space Exploration.

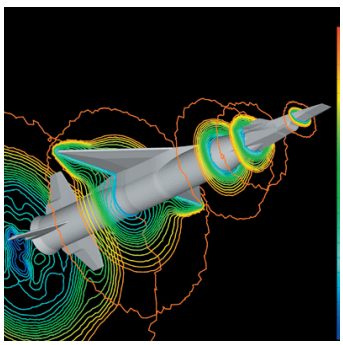
An important part of NASA's transformation includes high-end computing. We are delighted to introduce a major new supercomputer called "Columbia," a 10,240-processor system that increases NASA's computing capability ten-fold and revitalizes the agency's high-end computing efforts. Constructed in just four months, the newly completed Columbia is already being used to make major contributions to several key projects of the four Mission Directorates.

At SC2004, you will learn about work being conducted at seven of the NASA field centers. These projects include the design of NASA's X-43A scramjet-powered vehicle, which holds the Guinness World Record for the fastest air-breathing aircraft at Mach seven. High-performance computing contributed to this record-breaking flight. You will also hear how a climate model, the Finite Volume General Circulation Model (fvGCM), is currently being run on Columbia to improve hurricane track predictions. With this model, scientists are obtaining accurate hurricane forecasts five days ahead of time—three days sooner than other prediction tools.

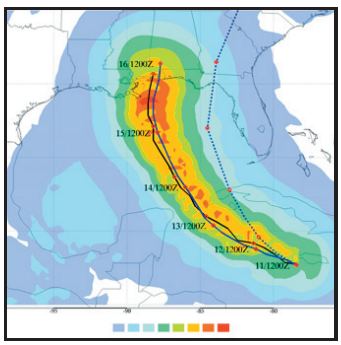
Another NASA highlight at the conference is a computational framework for design and analysis of the entire fuel supply system of a liquid rocket engine, including high-fidelity unsteady turbopump flow analysis. We will present analysis results along with performance data of the simulation runs on Columbia. In addition, advances in the emerging field of nanophase thermal and structural composite materials will be presented. These materials are expected to revolutionize the capabilities of virtually every system for future robotic and human exploration missions of the moon and Mars.

We hope you have an opportunity to learn about these and other impressive supercomputing applications that are a part of the effort to support NASA's four missions through high-end computing.

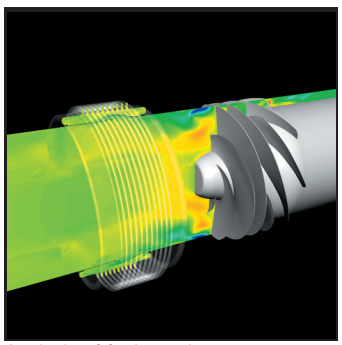
– Sean O'Keefe



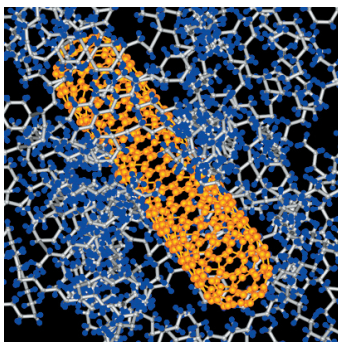
Visualization of the X-43A in flight.



Hurricane Ivan's track and intensity as forecasted by the NASA Finite Volume General Circulation Model.



Analysis of fuel supply system of liquid rocket engine.



Carbon nanotube-polymer composite, light-weight, very strong thermal protection material.