



NSF Press Release

NSF PR 04-123 - September 16, 2004

Media contacts:	Cheryl Dybas, NSF	(703) 292-7734	cdybas@nsf.gov
	Robert Tindol, Caltech	(626) 395-3631	tindol@caltech.edu
Program contact:	Robin Reichlin, NSF	(703) 292-8550	rreichli@nsf.gov

NSF Awards \$6.75 Million for Geodynamics Computational Facility

ARLINGTON, Va.—The National Science Foundation (NSF) has awarded \$6.75 million to the California Institute of Technology to house the central activities of a major new effort to revolutionize scientific computing in geophysics. The NSF initiative, which will involve at least 24 other American universities and research institutions and four foreign affiliates, is intended to allow scientists studying such fields as seismology, plate tectonics, volcanism and geomagnetism to take full advantage of recent advances and extraordinary opportunities available in scientific computation.

According to director Michael Gurnis, a geophysicist at Caltech, the center, called the Computational Infrastructure for Geodynamics (CIG) center, will focus on developing advanced software that will enable individual Earth scientists to produce more realistic simulations for studying natural phenomena, and also for the analysis and integration of data. CIG will initially be located on the main campus in central Pasadena and later at the recently acquired St. Luke property in northeast Pasadena.

"The center will revolutionize computational geodynamics by developing state-of-the-art, modular codes that will benefit a cross-section of Earth scientists, ultimately allowing us to address problems at the interfaces of disciplines," said Robin Reichlin, program director in NSF's division of earth sciences, which funded the center. "CIG products will be flexible enough to be run on supercomputing platforms or desktop computers used in classrooms, helping to educate the next generation of computational Earth scientists."

"CIG will enable scientific progress in several areas of geophysics," Gurnis says. "The frontier has moved into problems in which investigators now want to use simulation software for data interpretation, data assimilation and hypothesis testing."

According to Gurnis, "Our science is now moving into a new era as the United States deploys an unprecedented array of instrumentation to image the planet's interior and sense the slight tectonic motions of the surface with EarthScope. CIG will allow researchers to model and interpret the tidal wave of data from EarthScope and other initiatives. Scientific computing has become an essential component in Earth science research and CIG will allow the national community to advance software in lock step with the huge growth in geophysical data."

According to Louise Kellogg, geophysicist at the University of California, Davis, "CIG will be a catalyst for collaboration among earth scientists and computer scientists. By developing new methods and taking advantage of advances in software engineering and computer hardware, these communities will be able to work towards solving some of the major scientific questions in Earth sciences."

CIG will consist of a core team of software architects and engineers dedicated to creating new products. In addition, the center will support a visitor program open to the international Earth science community.

Gurnis believes "the special attribute of CIG will be infrastructure allowing an immensely talented and creative community of scientists--the U.S. community of computational geophysicists--to collaborate in the development of a new generation of computational software that will allow us to solve

previously intractable problems."

The focus of software development will concentrate on several areas of Earth science:

- Better understanding of mantle dynamics. Earth's mantle and its convection are responsible for plate tectonics and continental drift, but the processes are poorly understood.
- Better understanding of magma dynamics and geochemical transport. The dynamics and evolution of Earth's interior can be inferred from the chemistry of the materials erupted from the mantle, but there are still many open questions, including how melted and solid materials are distributed and interact to affect the geochemical evolution of the planet.
- Crustal and lithospheric dynamics on million-year timescales. The crust we live on undergoes deformations over long time-scales, and better modeling could lead to increased understanding of how erosion from climate change and crustal changes are related.
- Crustal dynamics on earthquake timescales. Advances in understanding how stress relates to the triggering of earthquakes and aftershocks could lead to better knowledge of earthquake hazards.
- Seismic wave propagation. Data from existing instruments will soon be augmented by data from the EarthScope project, necessitating better computational tools for analysis and modeling.
- The geodynamo. Progress in understanding Earth's magnetic field requires extensive numerical investigations.

-NSF-

The National Science Foundation (NSF) is an independent federal agency that supports fundamental research and education across all fields of science and engineering, with an annual budget of nearly \$5.58 billion. NSF funds reach all 50 states through grants to nearly 2,000 universities and institutions. Each year, NSF receives about 40,000 competitive requests for funding, and makes about 11,000 new funding awards. The NSF also awards over \$200 million in professional and service contracts yearly.

*Receive official NSF news electronically through the e-mail delivery and notification system, **Custom News Service**. To subscribe, enter the NSF Home Page at: <http://www.nsf.gov/home/cns/#new> and fill in the information under "new users."*

Useful NSF Web Sites:

NSF Home Page: <http://www.nsf.gov>

News Highlights: <http://www.nsf.gov/od/lpa>

Newsroom: <http://www.nsf.gov/od/lpa/news/media/start.htm>

Science Statistics: <http://www.nsf.gov/sbe/srs/stats.htm>

Awards Searches: <http://www.fastlane.nsf.gov/a6/A6Start.htm>



National Science Foundation
Office of Legislative and Public Affairs
4201 Wilson Boulevard
Arlington, Virginia 22230, USA
Tel: 703-292-8070
FIRS: 800-877-8339 | TDD: 703-292-5090

