

SDSC-ASU's OpenTopography Facility Part of \$4.4 Million NSF Award To Develop a Geographical Information Science (GIS) Framework

UIUC to Lead 'CyberGIS' Project

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The OpenTopography Facility, a collaboration between the San Diego Supercomputer Center at UC San Diego and Arizona State University, will participate in a five-year, \$4.4 million award from the National Science Foundation (NSF) to form a collaborative software framework for analysis of geographic data that will benefit many fields of research, from archaeology to urban planning.

"The overarching goal of this project is to establish CyberGIS as a fundamentally new software framework encompassing a seamless integration of cyberinfrastructure, geographical information science (GIS), and spatial analysis and modeling capabilities," said Shaowen Wang, a professor of geography and a senior research scientist at the National Center for Supercomputing Applications (NCSA) at the University of Illinois at Urbana-Champaign (UIUC), in a release issued by UIUC. "It could lead to widespread scientific breakthroughs that have broad societal impacts."

Wang will lead an interdisciplinary team of researchers that will work to develop a software framework intended to harness the power of cyberinfrastructure for GIS and associated applications. Cyberinfrastructure refers to an accessible and integrated network of computer-based resources and expertise, focused on accelerating scientific inquiry and discovery. GIS software has been widely used for spatial problem solving and decision-making applications since the 1960s. However, conventional GIS software isn't capable of handling the huge volumes of data and complex analysis required for many modern applications.

Incorporating ideas from NSF's TeraGrid Science Gateway program, the CyberGIS project will build a GIS framework that can handle large data volumes and complex computations through the application of high-end cyberinfrastructure. CyberGIS brings together groups that are building software for high-performance geospatial data analysis, and the Science Gateways program provides scientists access to these via community-designed web portals known as gateways.

Through the CyberGIS project, OpenTopography data access mechanisms and Web service-based processing tools will be integrated with other CyberGIS tools. Also funded by the NSF, OpenTopography facilitates community access to high-resolution, Earth science-oriented, topography data and related tools and resources. Through a web-based portal, OpenTopography allows users to access meter to sub-meter scale data acquired with LiDAR (Light Detection and Ranging) remote sensing technology. OpenTopography has also developed a suite of processing and analysis tools that can be accessed through the project's web portal to derive data products and visualizations from the raw LiDAR data.

The CyberGIS project is part of NSF's Software Infrastructure for Sustained Innovation program, which aims to promote scalable, sustainable, open-source software elements. In addition to the advanced problem-solving capabilities, participants hope the project will enhance sharing among researchers and facilitate cross-disciplinary interaction through multiple-user, online collaboration.

In addition to the OpenTopography Facility at the San Diego Supercomputer Center, the project involves partnerships among academia, government, and industry, including the Computer Network Information Center of the Chinese Academy of Sciences, Environmental Systems Research Institute (ESRI), Georgia Institute of Technology, Oak Ridge National Laboratory, University College London Centre for Advanced Spatial Analysis (England), University Consortium for Geographic Information Science, the University of California-Santa Barbara, University of Washington, the U.S. Geological Survey, and Victorian Partnership for Advanced Computing (Australia).

SDSC's work on the CyberGIS project will be guided by Nancy Wilkins-Diehr, CyberGIS co-PI and the TeraGrid area director for the Science Gateways program; Christopher Crosby, project manager for the OpenTopography Facility; and Sriram Krishnan, SOA (service-oriented architecture) lead architect for the OpenTopography Facility.

About OpenTopography OpenTopography currently hosts and distributes a growing collection of Earth science-oriented data acquired with funding from the NSF, NASA, U.S. Geological Survey (USGS), and the World Bank. As one of the most powerful tools available to study the earth's surface, overlying vegetation and man-made structures, high-resolution LiDAR data sets are widely regarded as revolutionary for Earth science, environmental and engineering applications, as well as natural hazard studies. Late last year, OpenTopography was awarded a three-year, \$1.7 million NSF grant to operate an internet-based national data facility for high-resolution topographic data acquired with LiDAR remote sensing technology. The facility also provides online processing tools and acts as a community repository for information, software and training materials.

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