NEWS

Open Radar Interferometry Software for Mapping Surface Deformation

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Over the past 15 years, software for processing interferometric synthetic aperture radar (InSAR) data into maps of surface deformation has been developed and refined. The InSAR technique is commonly used to investigate deformation associated with earthquakes, volcanoes, withdrawal of crustal fluids, and coherent ice motions [*Massonnet and Feigl,* 1998].

The software, called Generic Mapping Tools Synthetic Aperture Radar (GMTSAR), is an open-source (GNU General Public License) InSAR processing system designed for users familiar with Generic Mapping Tools (GMT) [*Wessel and Smith,* 1998]. The GMTSAR code is written in the C programing language and will run on any UNIX® computer. It requires installation of GMT and Network Common Data Format (NetCDF) and supports several fast Fourier transform libraries.

The software has three main components: (1) a preprocessor for each satellite data type (currently European Remote Sensing (ERS), Envisat, and Advanced Land Observation Satellite (ALOS)) to convert the native satellite format and orbital information into a generic format; (2) an InSAR processor to focus and align stacks of images, map topography into phase, and form the complex interferogram; and (3) a postprocessor, mostly based on GMT, to filter interferograms and construct interferometric products of phase, coherence, phase gradient, and line-of-sight displacement in radar and geographic coordinates.

GMT is used to display the products as PostScript files and Keyhole Markup Language overlays for Google Earth™. A set of C shell scripts has been developed for standard two-pass processing as well as image alignment for stacking and time series. ScanSAR (wide-swath) processing is also possible but requires a knowledgeable user.

The software, satellite orbits, and custom digital elevation model generation are available at http://topex.ucsd.edu/gmtsar. A tutorial and algorithm document is available at the same site and also is published as a Scripps Institution of Oceanography technical report [*Sandwell et al.,* 2011]. The documentation includes appendices on the basics of SAR and InSAR and is suitable for an upper division undergraduate- or graduate-level class. Users are welcome to contribute to this effort with new or refined algorithms, scripts, tutorials, and methods. Within the next year, the GMTSAR code will be delivered as part of the standard GMT distribution, which will simplify the installation process.

References

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In Brief

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NASA focusing beyond space shuttle era Although the NASA space shuttle *Atlantis* is set to close out the space shuttle era in July with the STS-135 mission, this final shuttle mission will not mark the end of America's leadership in human spaceflight, NASA administrator Charles Bolden said in a 1 July speech at the National Press Club in Washington, D. C.

"When I hear people say, or listen to media reports [that indicate], that the final shuttle flight marks the end of U.S. human spaceflight, I have to say, 'these folks must be living on another planet.' We are not ending human spaceflight; we are recommitting ourselves to it and taking the necessary and difficult steps today to ensure America's preeminence in human space exploration for years to come."

Bolden said the agency needs to get out of the business of owning and operating low-Earth-orbit transportation systems and hand them off to the private sector in the United States.

"We need to focus on deep-space exploration, while empowering today's innovators and entrepreneurs to carry out the rest," Bolden said, noting that human spaceflight destinations include the Moon, asteroids, and Mars.

"NASA's 21st-century mission will focus on the transportation systems that will carry us beyond where we have been, to new destinations and new milestones in the annals of human history," he said. "We have choices today. Do we want to keep repeating ourselves, or do we want to look at the big horizon and do the inspirational things we have always challenged ourselves to do? My generation touched the Moon. Together with those that followed, we built the [International Space Station]. Today, NASA, and the nation, wants to touch an asteroid and eventually send humans to Mars."

Bolden said NASA is pursuing several critical building blocks for future deep-space exploration with an announcement soon regarding the agency's decision on a heavy-lift rocket. Earlier this year, Bolden made a decision to base a deep-space crew module on work done on the Orion multipurpose crew vehicle. (For more about the space shuttle, see the About AGU section on page 236.)

Revitalizing urban waterways Eleven U.S. federal agencies have joined together in a new initiative to protect and revitalize urban waterways and communities. The Urban Waters Federal Partnership, announced on 24 June, is focusing on seven pilot locations to help urban communities reconnect with and revitalize their waterways, according to Lisa Jackson, administrator of the U.S. Environmental Protection Agency (EPA), which launched the initiative.

"Urban waters have the potential to support healthy environments, growing businesses, and educational and recreational activities. By bringing together the experience and expertise of multiple federal partners, we have a chance to reconnect local residents, young people, and community groups with the environmental resources all around them," she said.

While there is no new U.S. federal funding for the partnership, agencies will participate in the initiative in a number of ways, including EPA using its statutory authority to protect and preserve water quality and the Department of Agriculture helping communities with sustainable farming and forestry. Other partner agencies include the Department of the Interior, the National Oceanic and Atmospheric Administration, and the Army Corps of Engineers.

Pilot projects include the Anacostia Watershed in the Washington, D. C., area; the Los Angeles River Watershed in California; and the Lake Pontchartrain area in New Orleans, La. For more information, see http://www.urbanwaters.gov.

Higher "normal" U.S. temperatures Temperatures across the United States were approximately 0.5°F warmer on average from 1981 to 2010 than they