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# NEWS & NOTES

The Alaska Satellite Facility

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The SAR image above was acquired September 17, 2003 at approximately 22:50 UTC by the RADARSAT-1 satellite using ScanSAR Wide B beam mode. The image nicely captures the eye of Hurricane Isabel at Latitude 31.23, Longitude -73.180. (R1/4108/SWB). © CSA 2003

## Keeping an Eye on Hurricane Isabel

By Melanie Engram

This September, while Hurricane Isabel advanced toward United States' East Coast, many optical remote-sensing platforms imaged her spiraling swirl of cloud canopy. Scientists interested in ocean processes, however, turned to RADARSAT's C-band SAR instrument to probe beneath Isabel's cloud cover and observe the surface of the Atlantic Ocean directly beneath the hurricane's eye. ASF obtained RADARSAT-1 imagery during Hurricane Isabel in conjunction with the international Hurricane Watch program. SAR imagery of this dramatic meteorological event is valuable to those studying correlations between wind and Bragg wave patterns on the surface of open water.

When Hurricane Isabel's path swung inland, ASF supported the Federal Emergency Management Agency and ASF scientists interested in flood monitoring with RADARSAT imagery of the eastern seaboard. Pre-flood SAR imagery was accessed from archives and used to establish nominal riverbeds and ocean levels. This pre-Isabel data was compared to SAR imagery obtained during and immediately after the hurricane's passage. Using this comparison of RADARSAT SAR data obtained by ASF, disaster-monitoring agencies were able to determine flooded areas in Pennsylvania and the degree of coastal inundation in the Chesapeake Bay area. ♦



An image of Isabel's cloud-cover as captured by GOES-12 on 17-Sep-03 at 18:45 UTC. Image courtesy of NOAA Satellites and Information <http://www.osei.noaa.gov/>.

## The Rising SAR of ALOS

By Larry Ledlow

Japan's Aerospace Exploration Agency (JAXA) plans to loft a new L-band SAR when their Advanced Land Observing Satellite (ALOS) takes flight next September. The Phased Array type L-band Synthetic Aperture Radar (PALSAR) will complement two optical instruments also aboard the four metric ton spacecraft. Advanced Visible and Near Infrared Radiometer type 2 (AVNIR-2) is a four-band imager with a resolution of ten meters across a 70 km swath. While its predecessor flew aboard ADEOS, this instrument incorporates improved electronics and functionality like  $\pm 44$  degrees cross-track steering.

The Panchromatic Remote-sensing Instrument for Stereo Mapping (PRISM) is a panchromatic radiometer with 2.5-meter spatial resolution. Its data will be used for extracting highly accurate digital elevation models (DEM). The PRISM has three independent optical systems for nadir, forward and backward looking to achieve along-track stereoscopy. Each telescope consists of three mirrors and several CCD detectors for pushbroom scanning. The nadir-looking telescope provides 70km width coverage; forward and backward telescopes provide 35km width coverage each.

The real star in the ALOS line up is PALSAR, an active microwave sensor using L-band frequency for cloud-free and day-and-night land observation. On-orbit and operational in the 2004-05 period, PALSAR will

also provide an important complement to existing and planned C- and X-band SAR sensors. This instrument will offer more modes and higher performance than the JERS-1's SAR. PALSAR is capable of beam steering, full polarimetry, and ScanSAR. The fine resolution mode is a conventional one. The PALSAR will have another attractive observation mode, the ScanSAR mode, which will allow us to acquire a 250 to 350 km width (depending on the number of scans) of SAR images at the expense of spatial resolution. This is a three to five times wider swath than conventional SAR images. The development of the PALSAR has been a joint project between JAXA and Japan Resources Observation System Organization (JAROS).

All of this is good news for ASF users. Just over one year ago, ASF and NOAA formalized an agreement to operate Americas

ALOS Data Node (AADN) in Fairbanks as part of JAXA's data distribution scheme. All orders for ALOS optical and SAR data from customers in the Americas will pass to ASF, either directly or through one of our AADN partners. ALOS metadata will be widely distributed, thus making selection and ordering greatly simplified for many users. Moreover, ALOS avoids restricted distribution lists seen in the past, and ASF intends to promote all data sets widely in the research and public service communities. Initially available in ASF's mask only, near-real-time downlink services may be extended throughout North, Central, and South America.

The first two cycles (three months) are dedicated for global coverage by Fine-Beam, Single Polarization (FBS) HH 34.3 degree to obtain baseline data. After that, the PALSAR basic observation plan is as follows:

*ASF will offer these standard SAR products and also produce Level 1A, 1B1, and 1B2 optical products.*

Level	Definition	Option	Note
1.0	Reconstructed, unprocessed signal data appended with radiometric and geometric correction coefficients (appended but not applied). In Polarimetric mode, each polarimetric data is separated. In ScanSAR mode, data is recorded from the top of burst.		
1.1	Range and azimuth compressed Complex data on slant range is available in full resolution.	Full resolution mode, Low data rate mode, Polarimetric mode.	SLC: Single Look Complex used for interferometry.
1.5	Multi-look processed image projected to map coordinates. Option G: Systematically Geo-coded R: Systematically Geo-referenced	Map projection Resampling Pixel spacing.	Only either of options G or R is selectable.

**Ascending observations** are nominal: with one global coverage per year by FBS HH 34.3 deg and two successive cycles' observations per year by Fine-Beam, Dual-Polarization (FBD) HH+HV 34.3 degrees

**Descending observations** are limited for: one global coverage per year by Wide Beam Mode 1 (WB1): ScanSAR 120Mbps 5-scan and limited FBS, FBD and WB1 over selected regions

These observation plans for PALSAR aim to satisfy three main themes: a) Mapping of terrestrial carbon sources and sinks, and changes therein (Kyoto & Carbon Initiative); b) SAR interferometry for Ortho rectification and DEM generation and c) Monitoring of crustal movements by Interferometric SAR (InSAR) .

## RADARSAT-1 Today and Beyond

*By Don Atwood, Ph.D.*

At the recent RADARSAT International Network Station's Meeting (hosted by CSA on 25-26 September), fifty-nine SAR users from 16 countries had an opportunity to hear about the status of RADARSAT-1 and the plans for RADARSAT-2.

The picture painted was an optimistic one with continuous SAR coverage into the year 2012.

Currently, RADARSAT-1 continues to perform nominally. Today, pitch and attitude control is achieved with magnetic torque rods, instead of the original pitch wheels that were disengaged in December 2002.

For data acquired outside of the ASF station mask, many SAR users depend upon the On-Board Recorder, (OBR). To insure its continued use, CSA limits the OBR playback to only one per day for the remainder of R-1's lifetime; and those playbacks occur over Canada exclusively.

RADARSAT-2 will usher in a new era in SAR capability with a series of innovations to the R-1 model. Data continuity will be possible; yet R-2 will also offer an Ultra-fine beam mode with 3m resolution. In addition, there will be full polarimetric modes, left and right-looking capability, faster satellite tasking (12-24 hours routine / 4-12 hours in emergency), as well as faster ground processing.

MacDonald Dettwiler / RSI and its subcontractors are readying R-2 for a late 2005 launch and a 7-year operational design life. Construction is proceeding as planned with development work nearing completion and integration and testing started for most subsystems.

Without NASA playing a role in the launch, the paradigm for R-2 will differ significantly from that of R-1. From the viewpoint of science users, R-2 will be a purely commercial enterprise with a focus on higher capability and faster response. To date, only Norway (NSC, KSAT, and Spacetec) has become a Regional Partner in the RADARSAT program. Other nations, such as the United Arab Emirates, have expressed interest in downlinking R-2 data as well.

With the impending launch date, the pursuit of new Ground Stations for regional partner-

ships is expected to increase. So far, the U.S. government has not expressed an interest in supporting R-2. However, the Alaska Satellite Facility (ASF) with its long history of SAR support and optimal location for downlinks is evaluating possible ways to support RADARSAT-2.



*Photo courtesy of Larry Ledlow*

## ASF Celebrates RADARSAT-1's Eighth Anniversary

*By Melanie Engram*

ASF joined in the celebration of eight years of RADARSAT-1 operation via audio-visual teleconference with the Canadian Space Agency and RADARSAT International. ASF personnel gathered on November 4th to hear speeches (in both French and English) and to cut a birthday cake featuring a picture of the satellite "orbiting" above the frosting. Speech topics ranged from nostalgic stories of pre-launch years to recent engineering modifications, citing the success of the instrument's new attitude control system. A common theme in all thirteen speeches credited the hard work, talent and dedication of the people that work with RADARSAT-1 for the mission's continuing success. ♦



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<b>Conferences</b>	<i>RADARSAT-1 Cycle Reminders</i>	<b>Information</b>
<p>November 16-20, 2003 - 5th Symposium on Fire and Forest Meteorology Joint With 2nd International Wildland Fire Ecology and Fire Management Congress, Orlando, FL <a href="http://www.ametsoc.org">www.ametsoc.org</a></p> <p><i>See us at Fall AGU!</i></p> <p>The 2003 American Geophysical Union Fall Meeting will be held December 8-12, 2003, in San Francisco. ASF will have a booth in the exhibit hall. <a href="http://www.agu.org">www.agu.org</a></p> <p>The American Geophysical Union Ocean Sciences Meeting will be held January 26-30, 2004 in Portland Oregon. <a href="http://www.agu.org">www.agu.org</a></p>	<p>Cycle 122: November 16 - December 10, 2003</p> <p>Cycle 123: December 10, 2003 - January 3, 2004</p> <p>Cycle 124: January 3, 2004 - January 27, 2004</p> <p>Cycle 125: January 27, 2004 - February 20, 2004</p> <p><i>Plan ahead! New data acquisition requests (DARs) for RADARSAT should be submitted 9-10 weeks in advance of the acquisition start date. Meeting this deadline improves the scheduling success rate at CSA. ERS-2 DARs should be submitted a minimum of 6-7 weeks prior to the desired start date.</i></p>	<p>ASF encourages everyone to contact our User Services Office with questions and comments about our products and services.</p> <p>ASF User Services Office The Alaska Satellite Facility Geophysical Institute University of Alaska Fairbanks PO Box 757320 Fairbanks, AK 99775-7320 907- 474-6166 voice 907- 474-2665 fax <a href="mailto:uso@asf.alaska.edu">uso@asf.alaska.edu</a></p> <p>ASF plans to publish its <b>News &amp; Notes</b> quarterly: Winter, Spring, Summer and Fall. Please let us know if you would like to subscribe or contribute articles.</p>