

## Summary of the 39<sup>th</sup> Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) Science Team Meeting

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The 39<sup>th</sup> ASTER Science Team Meeting was held at the Akihabara Daibiru Building in Tokyo, Japan, from June 6-9, 2011. The members of the ASTER science team and members of teams related to the ASTER and other scientific projects attended the meeting. The status of ASTER and information on the status of future Earth-observing satellite instruments were reported on at the opening plenary presentation, which was followed by splinter sessions for each working group. The reports from each working group were presented at the closing plenary presentation.

### Opening Plenary Presentation

**H. Tsu** [Earth Remote Sensing Data Analysis Center (ERSDAC)—*Japan ASTER Science Team Leader*] and **M. Abrams** [NASA/Jet Propulsion Lab (JPL)—*U.S. ASTER Science Team Leader*] made opening remarks, offering sympathy for the victims of the Great East Japan Earthquake that occurred on March 11, 2011. **M. Kato** [ERSDAC] presented the meeting schedule.

**W. Turner** [NASA Headquarters] outlined NASA's current status, which covered NASA's organization, future projects, and budget. Turner provided the updates and schedule for the NASA senior review of the ASTER project.

**M. Abrams** provided an update on the status of U.S. ASTER contributions. He presented information on ASTER Global Digital Elevation Map (GDEM) version 2 and observations of several natural disaster events. He also provided an introduction to the Hyperspectral Infrared Imager and the Hyperspectral Thermal Emission Spectrometer missions. Abrams reported that there were many presentations using ASTER data at the 31<sup>st</sup> European Association of Remote Sensing Laboratories Symposium that was held a week before the ASTER science team meeting.

**T. Matsunaga** [National Institute for Environmental Studies (NIES)] provided an update on the Hyperspectral Imager Suite. He described the mission structure, instrument/satellite performance requirements, and project timeline.

**M. Kikuchi** [Japan Resources Observation System and Space Utilization Organization (JAROS)—*Instrument Team*] reported on the status of the ASTER instrument. He addressed instrument lifetime management and radiometric calibration.

**M. Hato** [ERSDAC, Ground Data System (GDS)] reported on the status of the GDS. He gave an update on the production and distribution of GDS. He also reported on the ASTER Operation Segment (AOS) replacement plan.

**D. Meyer** [U.S. Geological Survey Land Processes Distributed Active Archive Center (USGS LPDAAC)] reported on the status of operations, data distribution, science activities, and development at the LPDAAC, and presented the overall validation plan for GDEM version 2.

**M. Fujita** [ERSDAC, Science Scheduling Support Group (SSSG)] presented the Science Scheduling Support Group/Operations and Mission Planning (SSSG/OMP) report. He described the observation status for Global Mapping and underserved observation area.

**T. Tachikawa** [ERSDAC] provided a brief assessment on the quality of GDEM version 2. **M. Kato** [ERSDAC] presented the results from ASTER imagery and data analysis from the March 2011 Japan earthquake.

**T. Matsuzaki** [Japan's Ministry of Economy, Trade, and Industry] made welcoming remarks to the participants, and explained the current status of the ASTER project in Japan.

To close the plenary session, **Y. Yamaguchi** [Nagoya University] raised issues for discussion in the working groups that included data acquisition monitoring, GDEM version 2, and updates of the radiometric calibration coefficients (RCC).

### Working Group Sessions

#### *Level 1/Geometric/Digital Elevation Model Working Group*

In the first half of the session, the results from validation of the ASTER Level 1 (L1) algorithm/software were presented. No appreciable problems were found. There was discussion of geolocation error for the nighttime Thermal Infrared (TIR) data; the error will be corrected by a L1A+ software update. The second half of the session was devoted to the ASTER GDEM project. **H. Fujisada** [Sensor Information Laboratory Corporation] reported on plans for developing GDEM version 2 and beyond. **D. Meyer** presented preliminary validation reports for GDEM version 2 *beta* generated by the

USGS and National Geospatial-Intelligence Agency. **T. Tachikawa**, **A. Iwasaki** [University of Tokyo], **B. Crippen** [JPL], **M. Abrams**, and **R. Bindschadler** [NASA's Goddard Space Flight Center] also presented GDEM version 2 beta validation results. All reports demonstrated significant improvements for GDEM version 2 over version 1.

#### *Radiometric Calibration/Atmospheric Correction Working Group*

**B. Eng** [JPL] reported on the status of the atmospheric correction (L2 software) update. The instrument team reported on the results from the onboard calibration. There is a recommendation to update the radiometric database for visible near infrared (VNIR) retrievals within a year. **M. Kikuchi** and **F. Sakuma** [JAROS] presented the analysis for sensitivity degradation of VNIR and thermal infrared (TIR) retrievals. **N. Leisso** [University of Arizona], **A. Kamei** [National Institute of Advanced Industrial Science and Technology (AIST)], **H. Tonooka** [Ibaraki University] and **S. Kato** [NIES] reported on the results of field campaigns and plans for future surveys. **N. Leisso** showed the comparison of reference panels using calibration. **K. Arai** [Saga University] listed future work, including studying sensitivity degradation trend analysis, ten years of vicarious calibration reports, and recommending RCC (and biases) for users.

#### *Temperature-Emissivity Separation (TES) Working Group*

**H. Tonooka** presented the data from the Great East Japan Earthquake as observed by ASTER/TIR, and also reported on developing a Japanese inland water surface temperature database using ASTER/TIR. Water temperature is an important environmental factor for studying the biology of inland waters, but is either poorly monitored or not monitored at all. **H. Tonooka** and **G. Hulley** presented development status of large-scale emissivity datasets; **M. Ramsey** [University of Pittsburg] reported on initial high temperature emissivity results. **M. Fujita** presented the status of night TIR Global Mapping (TGM), and **H. Tonooka** reported on the cloud assessment update and new areas of interests (AOIs) for TGM.

#### *Operations and Mission Planning (OMP) Working Group/Science Team Acquisition Request (STAR) Committee*

At the beginning, all previous action items (AIs) were reviewed and confirmed as closed. **A. Miura** [GDS, ERSDAC] reported on the plan to replace the facilities for the AOS. **D. Meyer** reported on the status of Expedited Data Set (EDS) processing at LPDAAC and possibility of anomaly reoccurrence. **N. Cole** [JPL] reported a problem that occurs when EDS is set by night

T-only mode, not S+T mode. **L. Maldonado** [JPL] proposed to raise the limitation for EDS to 20 scenes from 15 scenes per day. Investigating the possibility was agreed to, and presented as an AI. **T. Tachikawa** reported on the constraint parameters in the scheduler, which were changed in January. **M. Fujita** noted that the observation resource was increased by a scheduling parameter update, and divided appropriately. He also reviewed the status of Global Mapping 4<sup>th</sup> Round (GM 4<sup>th</sup>), TGM, and Underserved Area STAR (UA STAR). GM 4<sup>th</sup> is progressing well, and GM 5<sup>th</sup> will be discussed at the next ASTER Science Team Meeting. TGM will be nearly complete by the scheduling parameter update in January, and the fifth round will start as soon as possible. **T. Tachikawa** proposed a new UA STAR. Target areas were determined based on the stacking number for GDEM version 2. It was agreed that UA STAR version 2 will begin with approximately 2,000 AOIs, and the GDEM gap filler STAR will be prepared separately. During a STAR Committee meeting, a STAR proposal was reviewed; the working group agreed to ask the submitter whether resubmission was necessary. Global Land Ice Measurements from Space (GLIMS) STAR just arrived at SSSG, and will be put into AOS soon.

#### *Ecosystem/Oceanography Working Group*

**T. Matsunaga** and **G. Geller** [JPL] reviewed action items and the status of STAR. Descriptions of three projects were presented: the Science Degree Confluence Project Community Validation Tool and Global Urban Area Mapping, by **K. Iwao** [AIST]; the J-Earth 100 Cities Project, by **L. Prashad** [Arizona State University]; and Terra Look, by **G. Geller**. Seven research reports were also provided: Challenge for Peatland Management, by **K. Hirose** [Hokkaido University]; Determination of Paddy Field, by **G. Saito** [Tokyo Institute of Technology]; Estimation of Turbidity Distribution, by **Y. Sakuno** [Hiroshima University]; Relationship Between Nighttime Surface Temperature and Sky View Factor, by **S. Kato**; Application to Shallow Water Bathymetry, by **A. Kanno** [Yamaguchi University]; Satellite Remote Sensing in a Global Biodiversity Monitoring System, by **W. Turner**; and Urban Growth and Change Analysis, by **Y. Yamaguchi**.

#### *Geology/Spectral Working Group*

Descriptions of Group research activities were presented: Geologic Mapping of Southern Namibia, by **Y. Yamaguchi**; Tsunami Flood Area Estimation of the 2011 Tohoku Earthquake, by **M. Urai** [AIST]; Satellite and Airborne TIR Imaging for USGS Volcano Observatory, by **R. Wessels** [USGS]; Spectral and Thermal Behavior of Basalt Lava Flows, by **M. Ramsey**; and

not selected. CLARREO is exploring potential teaming opportunities with both groups.

**Kurt Thome** [GSFC]—for **Nigel Fox** [National Physical Laboratory-U.K.]—provided an overview of the Traceable Radiometry Underpinning Terrestrial- and Helio- Studies (TRUTHS) mission concept. TRUTHS is designed to establish benchmark measurements in the RS domain for detecting decadal change using direct sampling and reference calibration of other sensors. Thome stated that TRUTHS is highly complementary to CLARREO and also potentially offers an opportunity for international collaboration.

**Helen Brindley** [Imperial College London]—for **Luca Palchetti** [Italian National Research Council]—presented an overview of the Far-infrared Outgoing Radiation Understand and Monitoring (FORUM) explorer instrument. FORUM focuses on studying the forcing/feedback effect on the climate system from atmospheric water, in the form of water vapor and clouds. FORUM provides—for the first time on a global scale from space—spectrally resolved terrestrial emissions in a broad spectral range that includes the far IR region.

#### Technology Presentations

**Joe Rice** [NIST] presented NIST's capabilities related to calibration and characterization of the CLARREO RS instrument. These capabilities include access to the Spectral Irradiance and Radiance Responsivity with Uniform Sources (SIRCUS), the Hyperspectral Image Projector (HIP), and the Absolute Spectrally Tunable Detector-Based Source.

**Sergey Mekhontsev** [NIST] described NIST's capabilities related to calibration and characterization of the CLARREO IR instrument. The CLARREO team continues to work with NIST to ensure that the IR instrument is designed to provide on-orbit calibration traceability at the required accuracy. CLARREO and NIST are also working to advance traceability standards in the far-IR.

**Keith Murray** [LaRC] provided an overview of the extensive investment in CLARREO-related technology made by NASA's Earth Science Technology Office.

**Dave Young** [LaRC] led a general discussion of the strategy for moving forward, including identifying critical science studies, identifying and pursuing partnership opportunities, developing communications strategy, and planning for documentation of key science results and potential mission implementation options.

#### Conclusion

The central goal of the CLARREO mission is to provide accurate, broadly acknowledged climate records that can be used to validate long-term climate projections that become the foundation for informed decisions on climate change mitigation and adaptation policies. Although the SDT is very disappointed that CLARREO has not been approved to proceed to Phase A, they remain collectively committed to developing cost-effective strategies to achieve this essential science objective. ■

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Thermal-infrared Imaging of Weathering and Alteration Changes on the Surfaces of Basalt Flows in Hawaii, by **E. Abbott** [JPL], Wessels and **D. Pieri** [JPL] gave an update of GLIMS and the ASTER Volcano Archive project, respectively. Pieri reported on progress in TIR detection of persistent low-temperature eruption precursor anomalies, and on using Shannon entropy to successfully identify changes in VNIR scenes. New AIs were discussed and assigned.

#### Closing Plenary Session

After the splinter sessions, the groups reconvened for a closing plenary session to summarize the outcome of each working group's session. **M. Abrams** announced that the next ASTER Science Team Meeting would be held in the U.S. during the week of December 12, 2012. ■