Coordination Overview
October 2009

Remote Sensing Technologies (RST) Project
http://calval.cr.usgs.gov/

Greg Stensaas, stensaas@usgs.gov

U.S. Department of the Interior
U.S. Geological Survey
Remote Sensing Technologies Project Characterization Tasks

- Satellite Characterization and Calibration
  - US system calibration and characterization group
  - Joint Agency Commercial Imagery Evaluation (JACIE) Team
  - Remote Sensing System data assessment

- Aerial Mapping Sensor Characterization and Calibration
  - Film Camera Calibration
  - Small/Medium Format Digital Camera Calibration
  - Digital Aerial System Product Characterization
  - In situ calibration for analog and digital sensors
  - USGS Quality Assurance Plan for Digital Aerial Imagery

- Range Characterization and Calibration Sites
- Ground Instrumentation Sites
- Assessment of Remote Sensing Technologies
- Commercial Data Acquisition and Management
USGS Calibration, Characterization, and Image Quality Assurance

- USGS has a strong history of sensor calibration (Landsat and Photography)
- USGS Optical Sciences Lab (OSL)
  - Responsible for calibration services for film camera in U.S. since '73
- ASPRS panel of experts >> USGS should address digital aerial sensor and satellite calibration processes (2000)
  - Interagency Digital Imagery Working Group (IADIWG)
  - Validating Laboratory and In-Situ calibration methods
  - Establishing Calibration Processes and Guidelines
  - USGS Plan for Quality Assurance of Digital Aerial Imagery
- Successful Joint Agency Commercial Imagery Evaluation (JACIE) 8th Annual Workshop
  - Aerial and Satellite
  - Characterization & Application
  - International Scope
- Catalog of Worldwide test sites
USGS Calibration, Characterization, and Image Quality Assurance

USGS Plan for Quality Assurance of Digital Aerial Imagery

- **Manufacturer Sensor Type Certification**
  - Working with International Partners to establish a common practice
  - Canada, Asia, Europe (EuroSDR), Australia, ...

- **Data Provider Product Certification**
  - Developing Cal/Val Range Stds. & 6 National Ranges
  - Dual use for hi-res ortho & satellite, & LiDAR cal/val

- **Image Quality Guidelines and Processes**
  - Spec and Check Tool development
  - Contracting and QA guidelines
Landsat Data Gap Study Team (LDGST)

- The Earth observation community is facing a probable gap in Landsat data continuity before LDCM data arrives.
- A data gap will interrupt a 34+ yr time series of land observations.
- LANDSAT DATA GAP STUDY- Technical & Implementation Report

Landsat Cross-calibration Activities

Recently completed or continuing Cross-calibration Activities
- L7 ETM+ and L5 TM sensor
- L5 TM and L4 TM sensor
- L7 ETM+/L5 TM and EO-1 ALI sensor
- L7 ETM+/L5 TM and Terra MODIS sensor
- L7 ETM+/L5 TM and IRS-P6 AWiFS/LISS-III sensor
- L7 ETM+/L5 TM and CBERS-2A CCD sensor
- L7 ETM+/L5 TM and ALOS AVNIR-2 sensor

On-going or planned Cross-calibration Activities with L7 and L5
- Beijing1, CBERS-2B, DMC, THEOS, ResourceSat, RapidEye, SPOT
- QuickBird, Worldview, GEOEYE, TopSat
- AVHRR MetOP, ENVISAT MERIS, MODIS
- ASTER DEM, Cartosat-1 and -2
Multiple Satellites Used in Science

• Example of data to support Sagebrush study in Wyoming, USA

Data included:
- Landsat-5
- Landsat-7
- EO-1 ALI
- EO-1 Hyperion
- ASTER
- IRS AWiFS
- IRS LISS-III
- Surrey DMC
- DG QuickBird
Joint Agency Commercial Imagery Evaluation (JACIE) 8th Annual Workshop held March 31-April 2, 2009 @ Fairfax Marriott, Fairfax, VA

- NASA, NGA, NOAA, USGS, USDA Collaboration
- Next workshop – March 16, 2010 in Fairfax, VA request for abstract is out


- Enhanced scope to medium resolution Satellite & Aerial sensors useful to the remote sensing community – U.S. and International systems
- Request for a short Lidar and SAR session

Independent assessment of product quality and usability

New applications and understanding of remotely sensed data
System Characterization and Calibration

- Lead/Host 2009 JACIE Conference with NGA and USDA
  - NOAA and NASA participants
  - JACIE process evolving to support a National role
- Assess data from JACIE selected systems
  - Characterize systems key to USGS LRS and National Science
  - Stay abreast of technologies and rapidly changing field
  - Arrange test downlinks, analysis of potential Multi-Mission Data and Landsat Data Gap planning (future work to be funded separately)
- Continue key work already begun to harmonize data quality internationally
  - CEOS/GEOSS support
  - CEOS WGCV Leadership and involvement
  - NASA LCLUC is a great tie to system characterization work
Land Cover Land Use Change Proposal

- The Remote Sensing Technologies (RST) project successful in getting the grants from NASA ROSES Grant from May 2008-April 2010
- Research titled “Cross-calibration of the current Landsat sensors with foreign Landsat-class sensors for long-term monitoring of land surface processes”
- Interdisciplinary group of researchers from the USGS EROS, NASA GSFC, and South Dakota State University (SDSU)
- Extend theoretical and applied understanding of radiometric cross-calibration of multiple sensors in support of continued long-term studies of the Earth
http://calval.cr.usgs.gov/sites_catalog_map.php
Instrument Farm Sensors

- CORS: Constantly Operating Reference Station: National Geodetic Survey/NOAA
- GSOS: GPS Surface Observing System: Forecast Systems Lab/NOAA
- SURFRAD: Surface Radiation Budget Network: Surface Radiation Research Branch/NOAA
- CRN: Climate Reference Network: National Climatic Data Center/NOAA
- SCAN: Soil Climate Analysis Network: Natural Resources Conservation Service/USDA
- CIMEL Sun Photometer - AERONET (AErosol RObotic NETwork)
- Carbon Flux Towers owned by EROS
- USGS Seismologic station
- New Canadian Reference Climate Station (RCS) Network
- NEON support (very limited due to funding)
- Only site in the US with more than 4 networks (8 networks)
Implementing the Commercial Remote Sensing Space Policy (CRSSP)
Helping Federal Users Get the Imagery They Need

Federal users are informed of how to obtain existing data and/or potential partnerships.

If imagery does not exist, users can procure the data from commercial vendors through contracts such as the USGS Commercial Remote Sensing Data Contracts.

Federal users needing aerial or satellite imagery enter their requirements into the web-accessed CRSSP Imagery Derived Requirements (CDDR) tool. (http://cddr.cr.usgs.gov)

The requirements are then analyzed by USGS staff. The CDDR database is used to find potential agency/interagency partnerships. USGS and NGA commercial imagery holdings (as well as commercial vendors) are searched for existing imagery that may meet the users' requirements.

If new imagery is acquired, users are encouraged to share the imagery with other federal agencies by providing a copy to the USGS. (The USGS acts as a clearinghouse for commercial imagery.)

For more information:
Email: RemoteSensing@usgs.gov
Phone: 888-20-USGS
New Technologies Assessment

- Aerial system sensor and data assessment
  - NDOP technology briefings
  - Joint camera and LiDAR cal/val process (IFTN/LFTN)
  - Need more aerial remote sensing for system and science application assessments
  - Potential for UAV sensor assessments
- Potential remote sensing data alternatives
  - Trying to maintain understanding of all satellite datasets
  - Strong push for hyperspectral and SAR data characterization and integration
- Satellite cross calibration and data integration
  - Need university technology grants
- GEO DA-09-01 - CEOS WGCV QA4EO Quality Assurance Guidelines
- Working with ASPRS Primary Data Acquisition Division and Standards committee
  - PDAD has digital aerial quality assurance committee
Common requirements, joint efforts

a. Joint System and Production Quality Assessment
b. Hardware, Software, and Data Component requirements
c. Range Support
d. Image Assessment tools
e. Calibration of long focal length digital camera lenses
f. Additional research requirements