Session Summaries & Recommendations

20th CEOS SAR Workshop

Joint ASAR/CEOS Workshop 2013

CSA, St. Hubert / Canada

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Cal Status of Running Missions

- Documentation of performance monitoring (see CEOS & other conferences)

- Issue: unified and/or certified processors for one mission to ensure comparable product quality

- "global" corner reflector data base (position & acc, size, pointing information,…)

Discussion:

Product size is an issue. Expert users have to be provided with detailed information on instrument (e.g. internal cal).

Instead of distributing Level 0 data range compressed and instrument corrected product could be an alternative ➔ Level 0b

Other option: provide full spectrum Single-Look-Complex data

Destiny (NASA) will provide free processor with Level 0 data.

Recommendation:

Mission Operators should ensure product quality by providing necessary instrument information also for licensed third-party processing chains. As an alternative of providing Level 0 range-compressed (corrected for instrument specific characteristics) Level 0b should be provided.

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SAR WGCV Workshop 2013
CSA, St. Hubert, Canada

Session Summary
Calibration Status of Running & Future Missions

D. Geudtner
ESA

S. Cote
CSA

Calibration Status of Running & Future Missions

TanDEM-X Acquisition Planning and DEM Performance in the Third Year of Operation (Daniel Schulze, DLR)

Since early 2011, the TDX mission has covered the Earth twice completely, and the global DEM acquisition plan is to continue as intended, concentrating on Antarctica, deserts, and areas susceptible to shadow and layover. The relative height error requirement (<2m) is fulfilled for 90% of all scenes processed so far (first & second acquisitions).

Radiometric Calibration of RISAT-1 SAR (A. M. Jha, ISRO)

No presentation.

Sentinel-1 C-SAR Internal Calibration Approach and its Evolution up to Flight Configuration (Ignacio Navas-Traver, ESA-ESTEC)

Tight radiometric stability and accuracy requirements have prescribed a sophisticated internal calibration for S-1, which includes real-time temperature compensation, and hardware changes aimed at reducing coupling and leakage signals.

Calibration Status of Running & Future Missions

Independent Verification of the Sentinel-1 System Calibration (Bjorn Döring, DLR)

The Microwave and Radar Institute has a mandate to perform an independent verification of the calibration of the S-1 SAR. A calibration field is being deployed (3 transponders, 3 CRs). Efficient cal strategy is required by the absolute radiometric accuracy requirement, and the 3-month commissioning phase. Measures are taken to minimize number of measurements; i.e., an antenna model will provide antenna patterns and gain offsets beam-to-beam.

PAZ Mission Characterization, Calibration and Validation: an INTA Approach (Beatriz Gomez, INTA)

The space segment of the mission is based on the TerraSAR-X bus, SAR payload + modes/products with a new front-end developed by EADS-CASA.

INTA is responsible for the GS and implements the characterization & cal-val plan, which aims at pre-launch readiness for internal calibration and antenna model, monitoring requirements, product definition, and configuration of the end-to-end imaging system. In-flight activities are being developed, among others: test site and target selection, SAR parameter update monitoring and management.

Calibration Status of Running & Future Missions

Statements / Recommendations

TerraSAR-X and TanDEM-X still demonstrate outstanding performance levels, setting new global DEM standards.

SAR missions now have large quantity of beams/modes, and strategies and compromises are often required for efficient calibration (during commissioning) and validation/recalibration (during operations). Aside from the use of an antenna model, are there general principles a cal-val strategy should adopt for optimization?

There is a need to define Compact Pol calibration strategies

TerraSAR-X/TanDEM-X and PAZ will operate in a virtual constellation and it is planned to provide harmonized products.

Recommendation: Future cooperative missions should harmonize product specifications and definitions. For international cooperative missions the data policies should match this recommendation.

Cal Tools & Targets

- Inverse SAR processing to generate test products from backscatter maps

- Absolute calibration of transponder RCS is being independently tackled by ESA & DLR (results expected in next WS)

- Calibration of compact polarimetry is affected by non-circularity at off-boresight angles, which is quite different from dual and quad-pol calibration. If the system can operate in quad-pol one possible approach could be to use quad-pol to characterize compact pol. Further investigations are necessary. Experience from RISAT would be interesting.

Action Item:
requirements for quad-pol should be extended to compact-pol

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Cal Procedures & Algorithms

- Depending on the required radiometric accuracy non-flat frequency & angular target response is causing considerable measurement uncertainties (even for low relative bandwidth)

  →Proposed measures:

  - Equivalent RCS (ERCS)
  - Standardized apodization functions

- Novel antenna model (error matrix) refinement combining TRM and rain forest measurements

- Analysis of PS-cal in comparison to transponder measurements was presented (ASAR & ERS) → criteria for outlier detection have been derived

Cal Procedures & Algorithms cont.

- Analysis of Faraday rotation in the ALOS/PALSAR archive: 12% of the data over western hemisphere showing FR higher than 3deg and the maximum was 11.5deg. Day-time acquisition trace the solar cycle, night-time show seasonal oscillation and the solar cycle is only secondary effect

- New approach for pol-cal was presented. For future L- & P-band missions FR has to be taken into account for reliable estimates of the cross-talk.

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SAR Processing

- Implementation of TOPS on RADARSAT-2 in support of Sentinel-1: interesting data set providing S1-like TOPS data over various sites is available via ESA campaign site

- High-precision processing for TerraSAR-X, TanDEM-X and beyond: for demanding squint angles propagation effects have be taken into account and geometric approximations have to be carefully considered keeping high throughput

- First TanDEM-X user products are available from global DEM acquisitions

- ScanSAR vs TOPSAR has been discussed. Mission has to be designed for TOPS operation and TOPS is demanding wrt to INSAR processing (specifically co-registration).

- Discussion on NRT accuracy (e.g. geolocation), generally geolocation acc. should be half of the resolution cell

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