



Report on CEOS WGCV SAR Subgroup Activities

Presented at

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Agence spatiale
Canadienne

Canadian Space
Agency

CEOS SAR Subgroup

- Mission: to foster high-quality synthetic aperture radar imagery from airborne and space borne SAR systems through precision calibration in radiometry, phase, and geometry, and validation of high level products.
- Objectives:
 - Act as a forum for international technical interchange on the evolving methodologies, techniques, and equipment of SAR data processing, calibration and validation,
 - To determine standard definitions and calibration-validation requirements for SAR systems.
 - To support changes in CEOS formats and user products as appropriate,
 - To facilitate international cooperative programs in the calibration and validation of SAR systems,
 - To educate the SAR community.

CEOS SAR Subgroup

- Action Plan:
 - Annual Workshop/Meeting
 - Set up standard CAL/VAL sites – inter-sensor comparison
 - Calibration requirements and techniques for Polarimetry, Interferrometry, POLInSAR

- Recent Annual Workshop/Meeting
 - 2005 – Jointly Coordinated by DSTO and University of Adelaide in Adelaide, Australia
 - 2004 - Coordinated by ESA in Ulm, Germany
 - 2003 – Coordinated by CSA in Saint-Hubert, Canada
 - 2002 – Coordinated by BNSC in London, UK
 - 2001 – Coordinated by JAXA in Tokyo, Japan

13th CEOS SAR Workshop/Meeting (2005)

- Jointly Coordinated by DSTO, Defence Science and Technology Organisation (DSTO), Australian Department of Defence and The University of Adelaide
- Held on September 28-30, 2005 in Adelaide, Australia
- Thirty Five Participants
- Seven Presentation Sessions (Calibration I, Calibration II, SAR & Signal Processing, Validation & Applications, Systems, Interferometric SAR Cal/Val, and POLInSAR)
 - 29 Presentations Made
 - Each Presentation Session Concluded with a Discussion, Session Summary and Recommendations to WGCV
- Workshop Proceedings being produced and then distributed on CD by DSTO

Recommendations from SAR Subgroup

- **13th CEOS SAR Workshop/Meeting Concluded with a Set of Recommendations:**
 - Agencies should provide both slightly under sampled and adequately sampled detected products.
 - Characterize boreal forest in Canada, and elsewhere, for use in antenna pattern measurements, at least as a secondary site.

Recommendations from SAR Subgroup

- Discuss calibration of polarimetric *bistatic* SAR systems at future CEOS SAR Workshops.
- Discuss in a session at future SAR Workshops the issues associated with SAR processing for wide bandwidth.
- Agencies should support development and use of physics-based modeling as a tool to aid in the design of future SAR systems

Recommendations from SAR Subgroup

- All papers supported the use of quad-polarisation for current and future applications and the recommendation is that agencies consider strongly the incorporation of quad-polarisation capability in future SAR programmes, even when the specific mission does not require fully polarimetric data. It is often possible to enhance the system to fully polarimetric capability at very little extra cost,
- POLInSAR applications in forestry at low frequencies (P and L band) are now mature airborne applications. It is recommended that space agencies consider the exploitation of this new technology in future SAR missions aimed at vegetation mapping.

Recommendations from SAR Subgroup

- The problems of Faraday rotation and adaptation to terrain variations call for the use of QUADPOL systems and while there are some specific applications that can operate with dual polarisation from airborne sensors, space operation will be compromised by such restrictions. It is recommended that space agencies consider QUADPOL operation for all future L and P band systems.
- Issues needing to be considered in optimum frequency of operation include limited spectrum allocation and severe Faraday rotation at P band balanced by wider bandwidth availability (higher resolution products), less Faraday rotation but increased temporal decorrelation at L band. It is recommended that agencies undertake studies of the comparative POLInSAR benefits at L and P band especially for space operation.

Recommendations from SAR Subgroup

- It is noted that POLInSAR also has important benefits at higher frequencies, C, X and Ku bands for short vegetation, urban structure, forest canopy studies and cryospheric applications. However the state of maturity of polinsar algorithms and techniques at these higher frequencies is lower than at the L and P frequency bands and so it is considered premature for CEOS to make any specific recommendations as yet. However, agencies are urged to consider POLInSAR modes in their future considerations for high frequency sensors, as it is expected that these applications will mature and develop into important new commercial and scientific applications over the next few years



Next CEOS SAR Workshop/Meeting (2006)

- Will be held towards End of September or Early October in 2006 at the University of Edinburgh, Scotland
- Hosted by the University of Edinburgh
- Contact: Prof. Shane Cloude

