Australian Government
Geoscience Australia

CEOS WGCV-37 Plenary
Agency Report: Geoscience Australia

Medhavy Thankappan

Recent Developments

- GA was admitted as CEOS Associate Member at the 2013 Plenary in Montreal
- Working with other Australian Government agencies to support CEOS objectives and activities; support for Australian Chairmanship in 2016
- Australia's National Earth Observation from Space Infrastructure Plan (NEOS-IP) - Calibration/ Validation is a key element
- CSIRO-led national audit of calibration/validation activities conducted

Calibration / Validation Activities

National Field Spectroradiometer Loan Facility

National and international joint campaigns on vicarious calibration

Corrections for BRDF, Atmosphere and Terrain Illumination to Landsat data holdings; field data collection to validate surface reflectance from Landsat 5,7, and 8

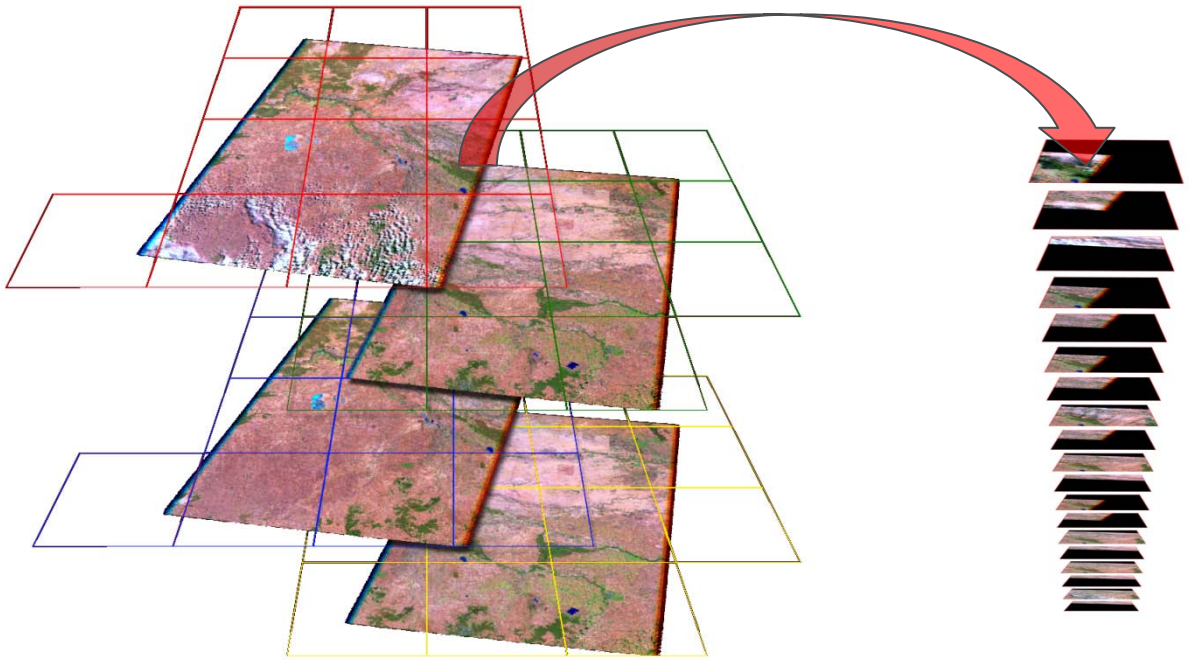
Recent publication:
Fuqin Li, David L.B. Jupp & Medhavy Thankappan , International Journal of Digital Earth (2013): Issues in the application of Digital Surface Model data to correct the terrain illumination effects in Landsat images, International Journal of Digital Earth, DOI: 10.1080/17538947.2013.866701

Calibrating the 30+ years of Landsat data to consistent surface reflectance, enables multiple applications that rely on long time-series EO data

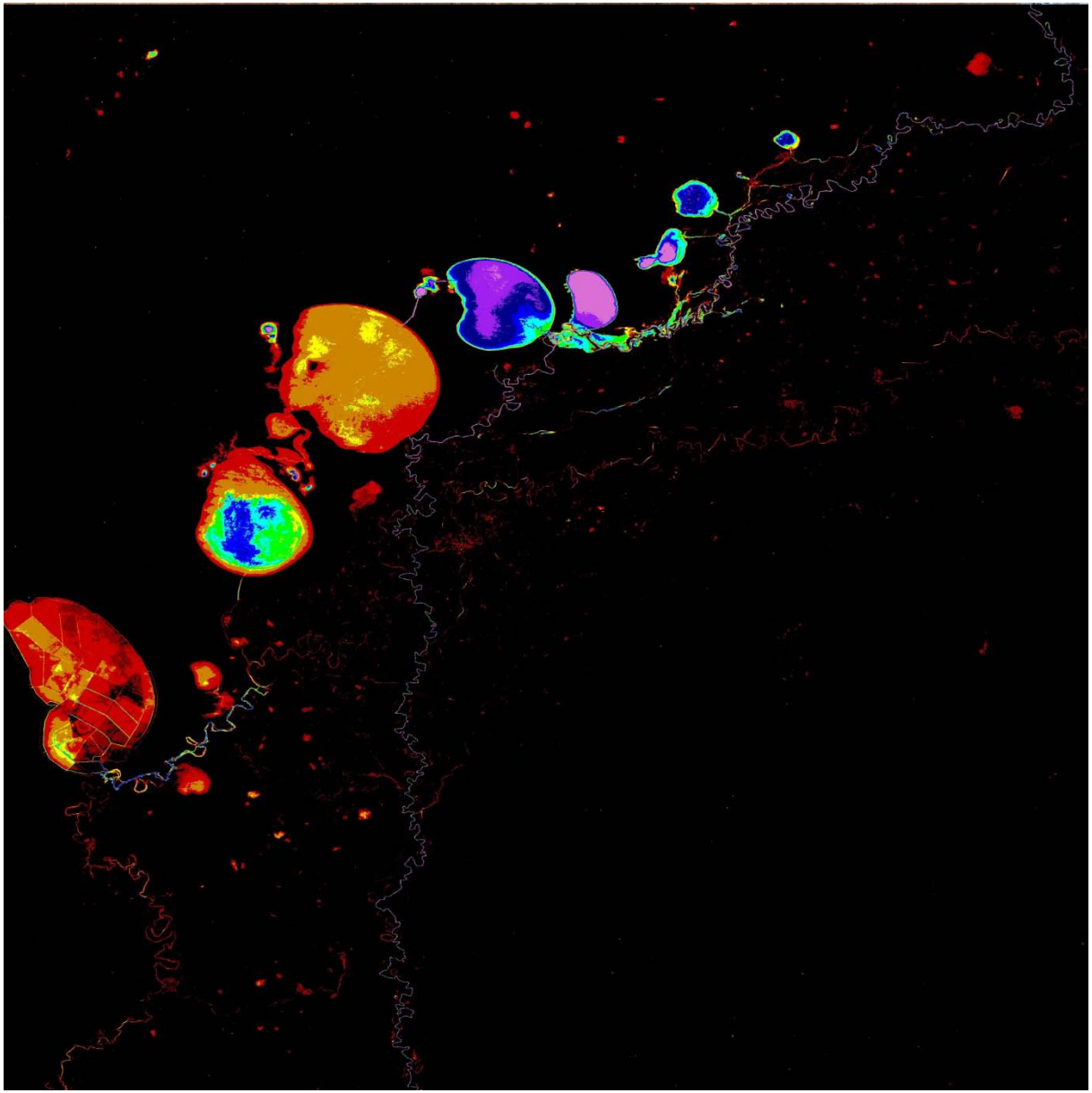
The 25m Australian Reflectance Grid

Australian Geoscience Data Cube

- The Data Cube arranges the data spatially and temporally to allow flexible and efficient large-scale analysis.
- Data subdivided into spatially-regular, time-stamped, band-aggregated tiles which can be managed as a dense temporal stack

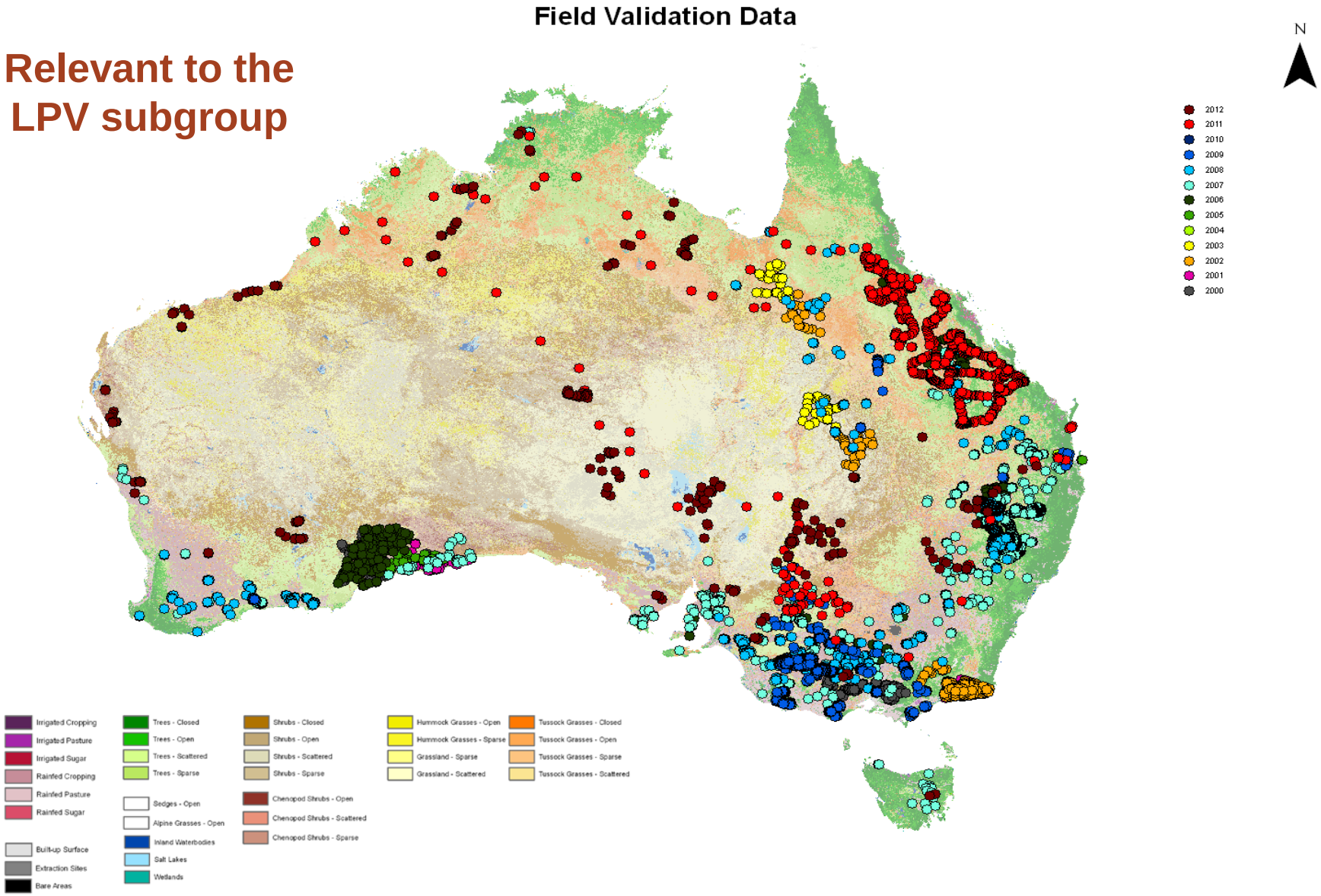


National Flood Risk Information Project



Validation of Continental-scale Land Cover

Relevant to the LPV subgroup



Corner Reflector Characterisation

The Australian Geophysical Observing System (AGOS) includes Corner Reflector (CR) infrastructure that could be used for calibrating SAR sensors

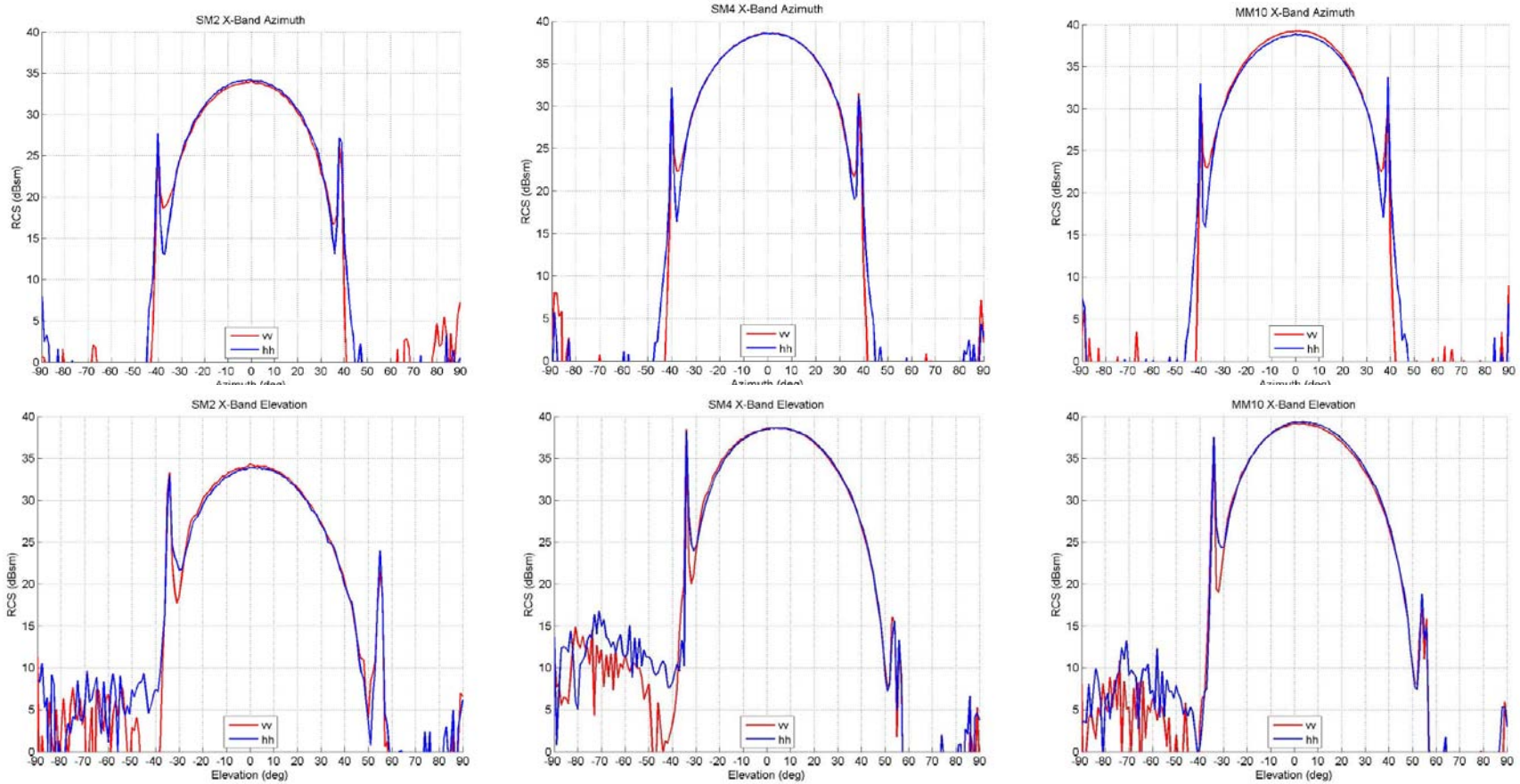
GA designed and manufactured 18 triangular trihedral CR prototypes of three different material finishes and 4 sizes: 1, 1.5, 2, and 2.5m leg dimension.

The Defence Science and Technology Organisation's Radar Ground Reflection Range near Adelaide was used for characterising 12 prototype CRs (1 and 1.5m)

Two-path propagation measurement technique utilised to ensure coherent sum of direct and ground-reflected waves is maximised; RCS calibration was performed by referencing prototype CRs to a 303mm triangular trihedral calibration target of known RCS

CR Characterisation: Results

- Measured RCS at C-band for the prototype trihedrals was found to be 1-3 dB lower than the theoretical maximum.
- At X-band the 1m prototype trihedral RCS was less than 2.5 dB below the theoretical maximum, while the 1.5m prototype trihedral RCS was found to be 4-7dB lower than the theoretical value

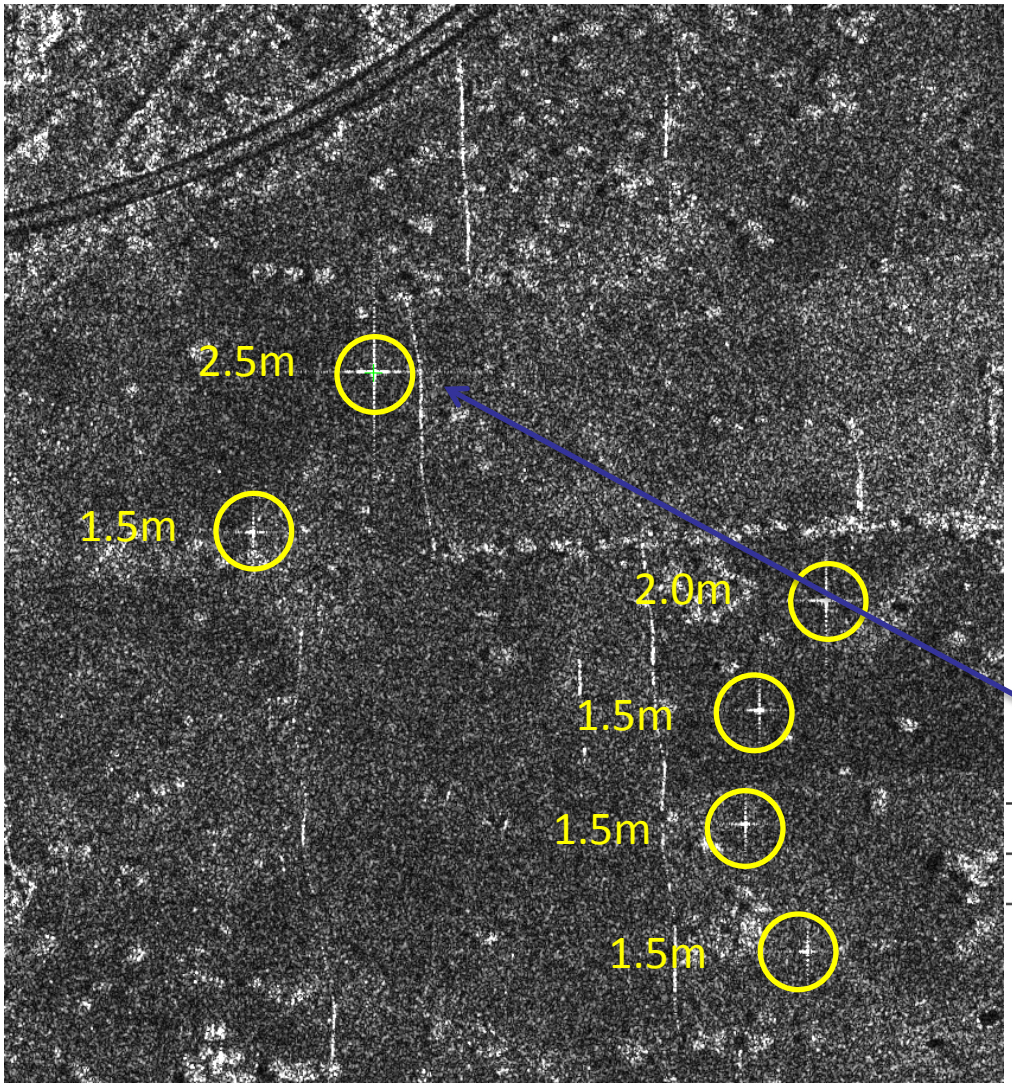


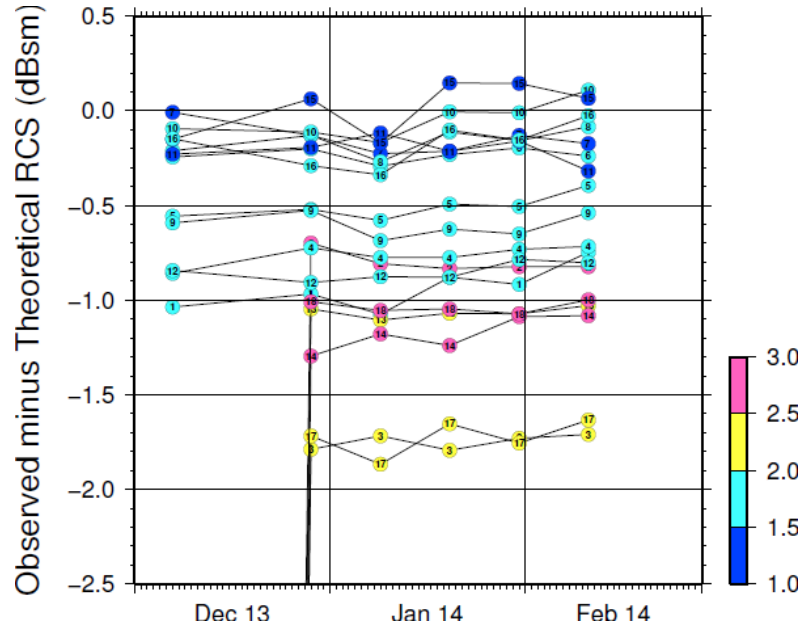
Field Performance Testing of CRs

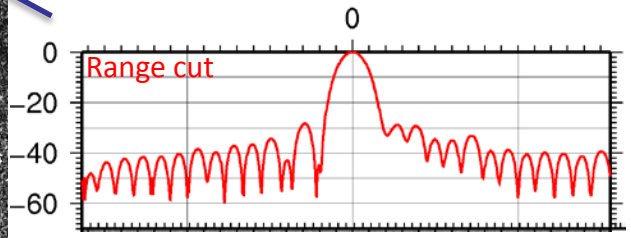
- 18 CR prototypes deployed at a site in Gunning near Canberra; SAR data acquisition over the site by TerraSAR-X, RADARSAT-2, COSMO-SkyMED and RISAT from Dec 2013 to Mar 2014
- CRs when deployed permanently will offer an independent means of evaluating SAR sensor performance
- Australian contribution to the international EO cal/val effort

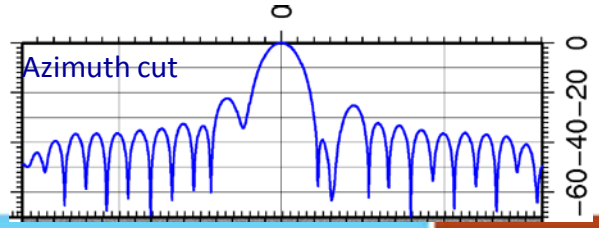
TerraSAR-X

Thanks to DLR for supporting data acquisitions through the AO science proposal LAN1499



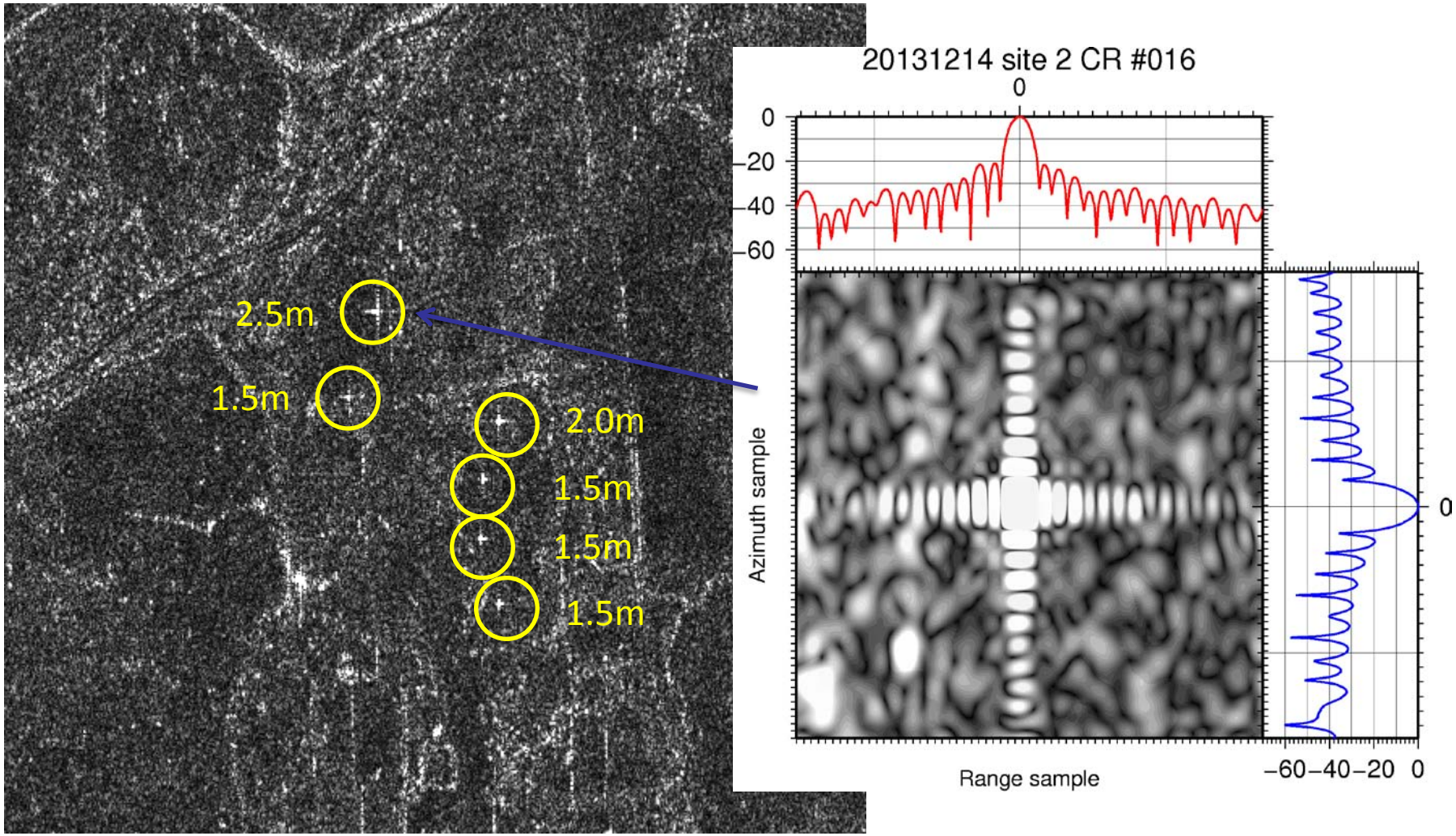






29 Dec 2013

RADARSAT-2



14 Dec 2013

Robotic GNSS Antenna Calibration Facility

- National GNSS antenna calibration facility located at Geoscience Australia
- Enables antenna phase centre calibrations, that underpin:
  - Crustal deformation surveys in Australia (seismic hazard, ground water and gas extraction)
  - Equipment certification and legal traceability of position (for government and industry)

Australian Government
Geoscience Australia

Questions

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37th Plenary Meeting CEOS Working Group on Calibration & Validation, Frascati, 17-20 February 2014