

CSIRO Agency Report

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CSIRO OCEANS AND ATMOSPHERE FLAGSHIP www.csiro.au



CEOS WGCV Plenary - 30 September 2014

Australia to chair CEOS in 2016

- Via CSIRO, Australia has recently been invited to become Chair of the Committee on Earth Observation System (CEOS (http://www.ceos.org)) for 2016
- Dr Alex Held (tentative Chair)
- Developing budget and forward plan, in close consultation with central government and associated agencies.
- Suggestions welcome from WGCV for areas or activities which could be emphasized during the 2015-2017 term.



CSIRO restructure

- De-matrixed, Flagship only, no Divisions
- Future Science Platform in Earth Observation Informatics
 - Supports and underpins EO-based research across CSIRO and outreach
 - Leveraging research in cal-val, data processing
 - Supporting both:
 - Terrestrial Ecosysystem Rsearch Network (TERN)
 - Integrated Marine Observing System (IMOS)



FSP Cal-Val developments

- Optical calibration facilities in Perth and Canberra (national capabilities)
- Procedures for QA and Calibration of spectroradiometers, panels
- Augmentation of facilities at Lake Lefroy vicarious cal site, WA
- EO-based identification of other potential vicarious cal sites



Survey of national Cal/Val capabilities

- Funded by Space Coordination Office
 - Audited existing Australian cal-val facilities and activities (survey and SWOT analysis)
 - Provided recommendations on the path forward for the future of cal-val activities in Australia
 - Draft report currently with SCO

Findings

- Significant infrastructure and activities exist. Some operating longterm.
- Recent NCRIS funding (TERN, IMOS and AusScope) has been a significant stimulant (infrastructure and diversity)
- Good examples of best practice cal-val (e.g. ocean altimetry, ABARES Groundcover validation)
- Duplication of effort low, Many strong international connections

	Number of 'Facilities' identified	Value	Running costs per annum
Calibration	12	\$ 21.4 M	\$ 2.8 M
Validation	21	\$ 36.5 M	\$ 6.5 M

SWOT - Geography

Threats

* Initiatives in other Southern hemisphere countries compromise our locational advantage

Strengths

- * Location x 3
- * Austral summer is northern winter
- * Unique environments with low aerosols

Opportunity

- * Diversity of locations (tropics - Antarctic)
- *'Supersites' for international EO calval across continent and oceans
- *Southern hemisphere collaboration

Weakness

- * Environments "too" unique
- * Smoke, dust and haze
- * Remoteness of remote areas

SWOT - Infrastructure

Strengths

Six key recommendations

- 1. Establish a multi-agency coordinated approach to calibration and validation.
- 2. Harmonize and build toward a single, national cal-val capability.
- 3. Exploit current good practice for the systematic archiving and distribution of related cal-val data and associated metadata.
- 4. Adopt international standards, protocols and best practice and publish these.
- 5. Exploit opportunities for training and education in cal-val
- 6. Leverage the benefits of improved coordination and planning to provide a systematic, coordinated and sustainable engagement with international community

Australia-wide satellite-based survey of suitable vicarious calibration sites

- Potential for a Southern Hemisphere, Australian cal-val site
- Landsat 5 analysis, 2003-2010, based on the Geoscience Australia DataCube

VNIR-SWIR temporal means

Simpson Desert

Green vectors
show high rainfall
zone >600 mm pa
Red circles show
radius of 400 km
(half day's drive)
from major airport
Image is VNIRSWIR temporal
means

Strzelecki Desert

IMOS activities

- Lucinda Jetty Coastal Observatory Southern hemisphere vicarious aquatic calval site – now fully re-instated
- Ship mounted DALEC spectroradiometers installed continuing to aqquire water leaving radiance in Australian sector of the Indian, Pacific and Southern Oceans

http://imos.aodn.org.au/webportal/

Integrated Marine Observing System

Lucinda Jetty Coastal Observatory (LJCO) imos.org.au/ljco.html

Dalec v MODIS comparison

IMOS Ship of Opportunity SST

http://imos.org.au/sst.html

- Since early 2008 IMOS has significantly enhanced quantity, quality and timeliness of ship SST data in the Australian region
- QA'd SST from additional 18 vessels made available via GTS and IMOS Ocean Portal
 - Errors similar to drifting buoys when compared with satellite SST
- Applications: SST analyses, Satellite SST validation, Ocean Model validation, Climate Data Sets

Number of Ship SST obs in 2007

Total number of Ship SST Observations in 5x5 degree boxes

Number of Ship SST obs in 2013

Date: 01–Jan–2013 to 31–Dec–2013

Total number of Ship SST Observations in 5x5 degree boxes

IMOS Ship SST data

http://imos.org.au/sst.html

- Near real-time QA'd sea surface temperature data from 11 vessels currently available from GTS and IMOS Ocean Portal (netCDF format): <u>http://imos.aodn.org.au/imos123/</u>
- All data (except SeaFlyte) have comparable errors to drifting buoys (see Beggs et al., 2012, J. Operational Oceanography)

Stand. Dev. (AVHRR SST - In Situ SST)

Infrared SST Autonomous Radiometer (ISAR) for Australia's RV Investigator

- ISAR will be installed on RV Investigator in late 2014 to routinely measure skin (~10 micron) SST along all cruise tracks around Australia and in Southern Ocean
- With support from IMOS, Bureau of Meteorology will QC ISAR data and produce GHRSST format "L2i" files for public dissemination
- ISAR L2i products will be used to validate regional SST data from:
 - Sentinel-3, Himawari-8, METOP-B, NOAA-18/19, S-NPP, etc

TERN AusCover Program

-Product Validation Activities -

Products:

- MODIS LAI
- Burnt-area
- Fractional cover
- Woody vegetation
- Reflectance
- Aboveground biomass

2013

Atmospheric correction of 19 band MOD09

Validation of the Simple Method for Atmospheric Correction (SMAC) under Australian conditions

Thank you

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CSIRO EARTH SCIENCE AND RESOURCE ENGINEERING
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Summary

- We are ramping up in cal-val
- Significant infrastructure already exist
- Significant capabilities and experience
- Backed up by NEOS-IP (approved by Australian government)
- Southern hemisphere advantages
- Good climatic conditions for a large part of the country
- Large expanse of land away from "interferences"; temporal analysis shows quite a number of potential sites that will be further investigated