CSIRO
Report on Cal/Val Activities

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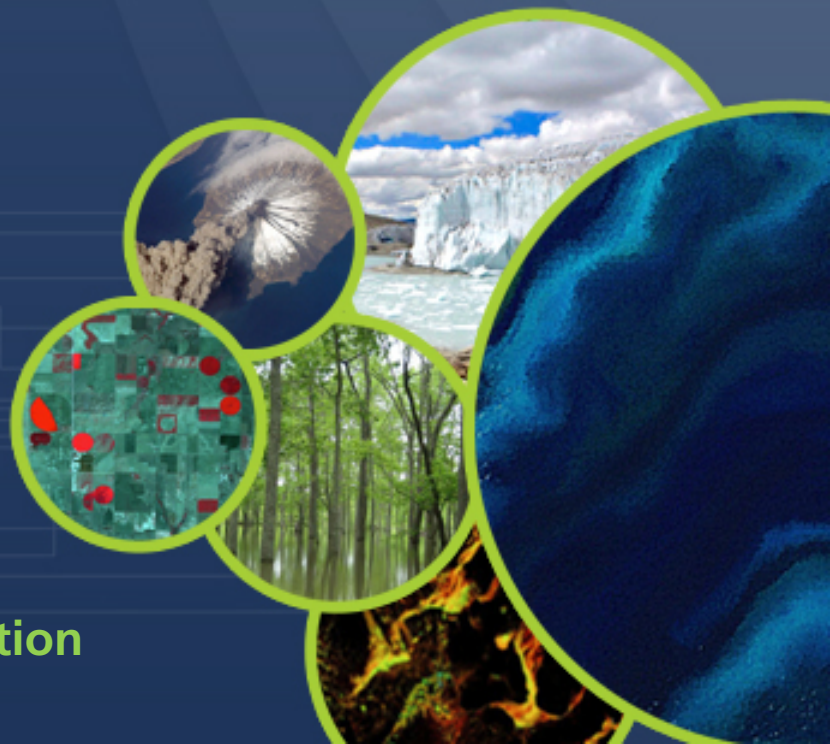
CSIRO, Australia

Agency Report VIII

WGCV Plenary # 39

Berlin

May 6 - 8, 2015



Working Group on Calibration and Validation

Australia to chair CEOS in 2016

- Assumes chair in Nov 2015
- Dr Alex Held (substantive Chair), Dave Williams (ceremonial)
- Plenary meeting planned for November 2016 in Brisbane
- CSIRO is largely funding the role, with CEOS Exec officer Jonathan Ross stepping up to assist (Geoscience Australia support)
- Possible WGCV side meeting at that time?

Australian Satellite Calibration Working Group

- Met in January 2015, reviewed progress in cal-val nationally
- Strong continued international engagement across a range of cal-val areas
- (WGCV, RADCALNET, ESA, DLR, NASA SMAP… JAXA Himawari-8)

- Concerns over national engagement
  - Getting 'buy in' at both Federal and State levels
  - Maintaining some existing cal-val programs
  - Greater automation of existing sites
  - Outreach to general EO community

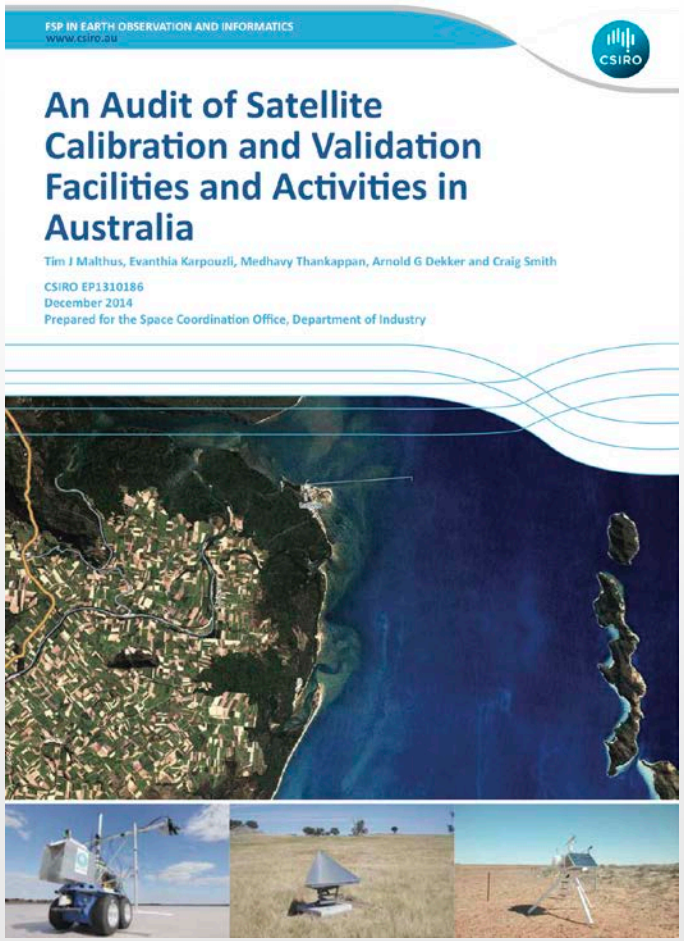
- Concerns expressed over international engagement included:
  - Visibility of expertise in Australian groups to international agencies
  - The need for more systematic international engagement (e.g. for the Sentinels)
  - What further Australia can offer now that there is less dependence on the need for ground receiving stations in Australia

ASCWG Action Plan

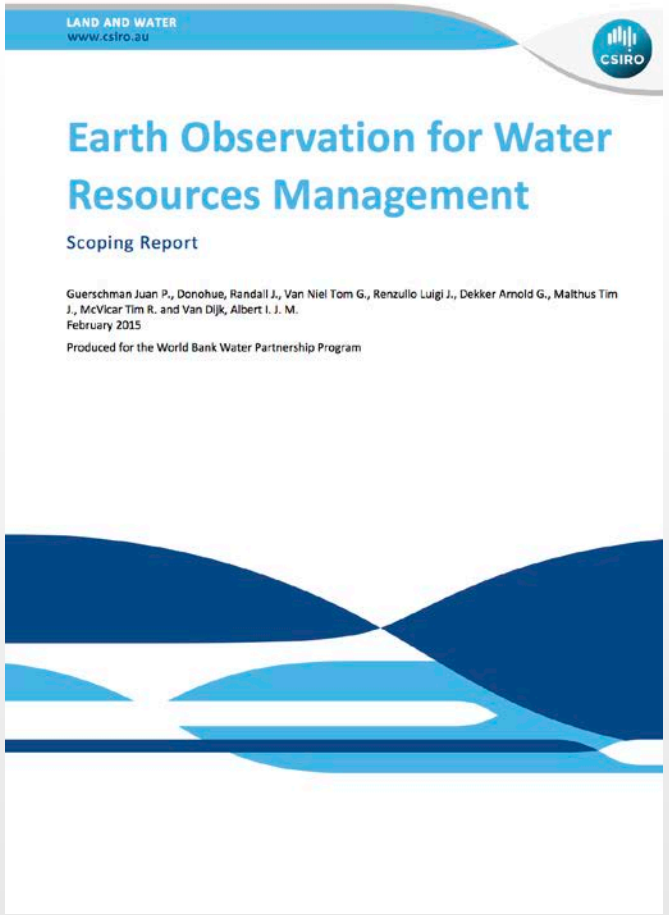
- Maintaining relevance to both Government and the wider EO community affirmed
- Establish a longer-term vision and strategy and greater visibility, position paper, socialise with key agencies and players

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
  - Hard copies available from Medhavy



- **World Bank scoping study** to:
  - Connect World Bank requirements for water resources information to the range of EO-based water resources information products;
  - Describe the current state-of-the-art of water resources related EO
  - Associated overviews of EO sensors (current and future) and measured water resources variables
  - Guidelines on appropriate use of EO to address water resource questions



Cal-val project work; CSIRO appropriation funded

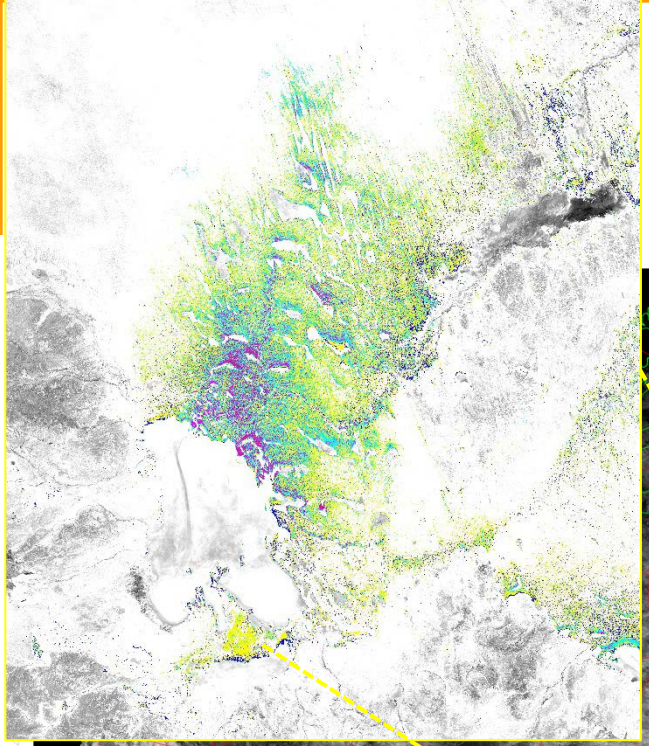
- Calibration facilities (Perth and Canberra)
  - Sustainability - governance and business cases
  - Protocols for spectroradiometers and low cost spectrometers, QA and calibration, traceability
  - Protocols will be public documents
- Continued work at Lake Lefroy vicarious cal-val site

Second vicarious cal-val site, central Australia

- Specific for imaging spectroscopy missions and other optical sensors
- Intended to meet requirements (and aiming for beyond) those of current CEOS endorsed vicarious calibration sites
- Based on systematic evaluation of Landsat and ASTER archives to identify suitable sites

- Raises general question:
- **How do we get Lake Lefroy and new site as CEOS LandNet sites?**

VNIR-SWIR temporal means



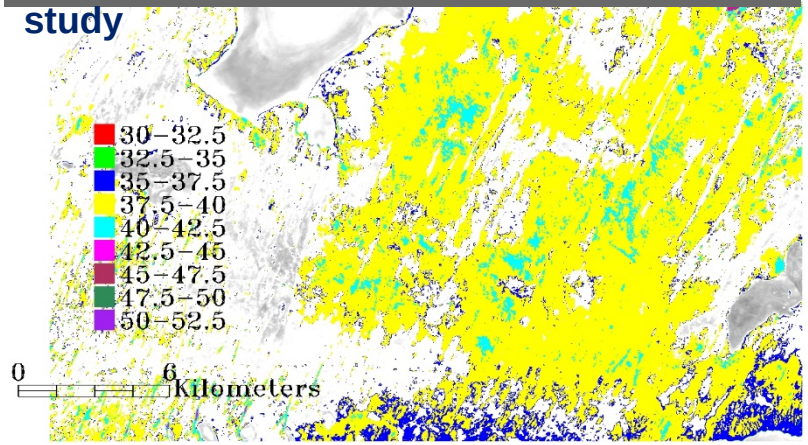
Site Descriptions

- Large uniform areas (within 5% albedo difference and <15% temporal variation);
- Composition: dominant: quartz, ALOH clay, minor: iron oxides;

Location

- 29°7’15.6”S; 137°27’11.7”E

Area identified for further characterisation study



Logistics

- ~ 700 km N of Adelaide
- Nearest airport Olympic Dam, ~ 150 km away
- Nearest town Maree, ~ 100 km away
- Nearest accommodation Muloorina Station, ~50 km

Future plans

- Mid – late June
- Field campaign for site characterisation, sample collection, field spectral measurements (VNIR-SWIR and TIR (TBD)) and possibly some limited BRDF measurements;
- Field trial of dual FOV spectral instrument in collaboration with NERC FSF, University of Edinburgh;
- Laboratory characterisation of samples (XRD, size fractions, etc.);
- Analysis of DEM and climatic data;

Instrumentation planned

- CIMEL
- Weather station linked to CIMEL
- Automated acquisition of complete VNIR-SWIR spectral measurements feeding into systems which are spectral equivalent of AERONET or future RADCALNET and receiving/processing hubs

Site Description – background

	January	February	March	April	May	June	July	August	September	October	November	December	Annual
Mean max temp (°C)	38	36.8	33.9	28.5	23.2	19.6	19.1	21.5	25.8	29.6	33.3	36.1	28.8
Highest max temp (°C)	49.4	47.9	46.1	40.1	34	30.1	29.6	35	39.5	43.7	47.4	49	49.4
Lowest max temp (°C)	18.9	19	18	13.4	12.1	10.6	10.4	11.1	11.6	12.9	17.2	21.4	10.4
Mean rainfall (mm)	17.3	21.5	14.3	11	13.3	13.6	9.9	9.1	10.6	13.1	11.8	16.4	161.8
Highest rainfall (mm)	186	203.3	178.6	215.9	72.8	86.1	53.9	75.9	83.7	69.7	78	107.5	408.7
Lowest rainfall (mm)	0	0	0	0	0	0	0	0	0	0	0	0	39.3
Mean number of cloudy days	4.2	4.2	3.3	4.1	5.8	5.5	5.3	3.8	3.8	4.7	4.9	5.3	54.9
Mean 9am relative humidity (%)	34	41	40	48	62	71	69	58	47	40	36	34	48
Mean 3pm relative humidity (%)	21	26	25	31	39	44	41	34	29	25	23	21	30

Composition

- Large uniform areas (within 5% albedo difference and <15% temporal variation)
- Dominant minerals: quartz, ALOH clay, minor: iron oxides;
- Consistently devoid of green vegetation, potentially small amounts of dry vegetation.

Location

29°7’15.6”S; 137°27’11.7”E

Logistics/Access

- ~ 700 km N of Adelaide, Nearest town Maree, ~ 100 km away

Communications

- TBC but likely to be satellite phone only

Permissions

- Site is on BHPBilliton lease area, permissions required from BHPBilliton, protocol similar to Lake Lefroy

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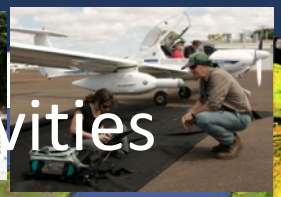
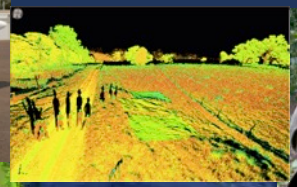
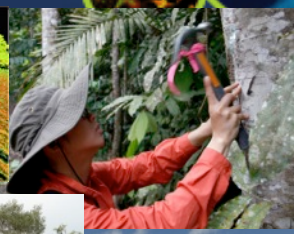
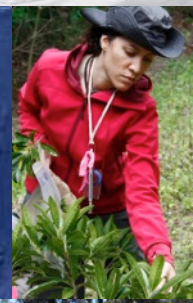
TERN Field Validation Team Activities

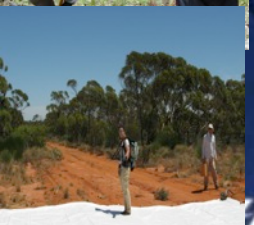









Selected TERN Validation Activities

- Since 2010, coordinated ~10 dedicated field campaigns and took part in several others.
  - Fractional Cover (Modis/Landsat) (CSIRO/ABARES?UQ-DISITIA)
  - Foliage Projected Cover/Persistent Green Fraction (UQ-DISITIA)
  - Burnt Area (CDU)
  - Grass curing (BoM-CSIRO-SensingSystems)
  - Hyperion/MODIS Reflectance (Curtin U.)
  - Canopy Nitrogen (hi-res) (UQ-CSIRO-RMIT)
  - Aboveground Biomass (UQ-DISITIA/CSIRO/UNSW/RMIT)
  - Land-cover type (various & GEOwiki)
  - Phenology (UTS/RMIT)

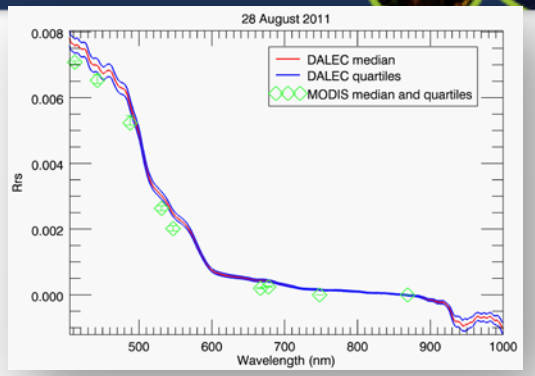
- Development of “AusCover Green Book” on guiding principles for field CAL/VAL practices – June 2015

TERN Supersite Validation (UAV)

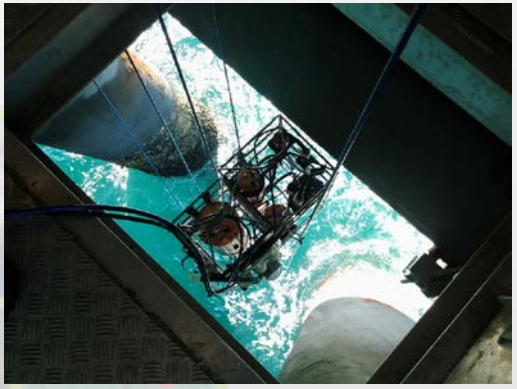
Alfredo Huete and team (UTS)

IMOS activities

- Lucinda Jetty Coastal Observatory – Southern hemisphere vicarious aquatic cal-val site – now fully re-instated
- Ship mounted DALEC radiometers
- http://imos.aodn.org.au/webportal/



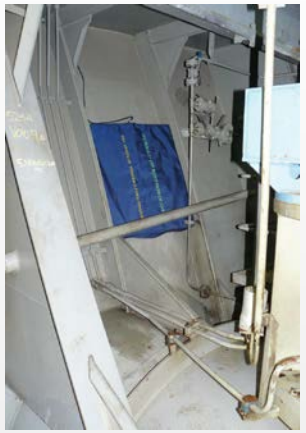
Dalec v MODIS comparison



SST Sensors on Australian Vessels for EOS validation

- 12 vessels provide real-time, QC'd SST data from calibrated sensors
- ISAR autonomous skin SST radiometer on *RV Investigator* (Oct 2014)
- Sole provider of Southern Ocean skin SST observations for satellite SST cal/val ; Sentinel 3 SLSTR

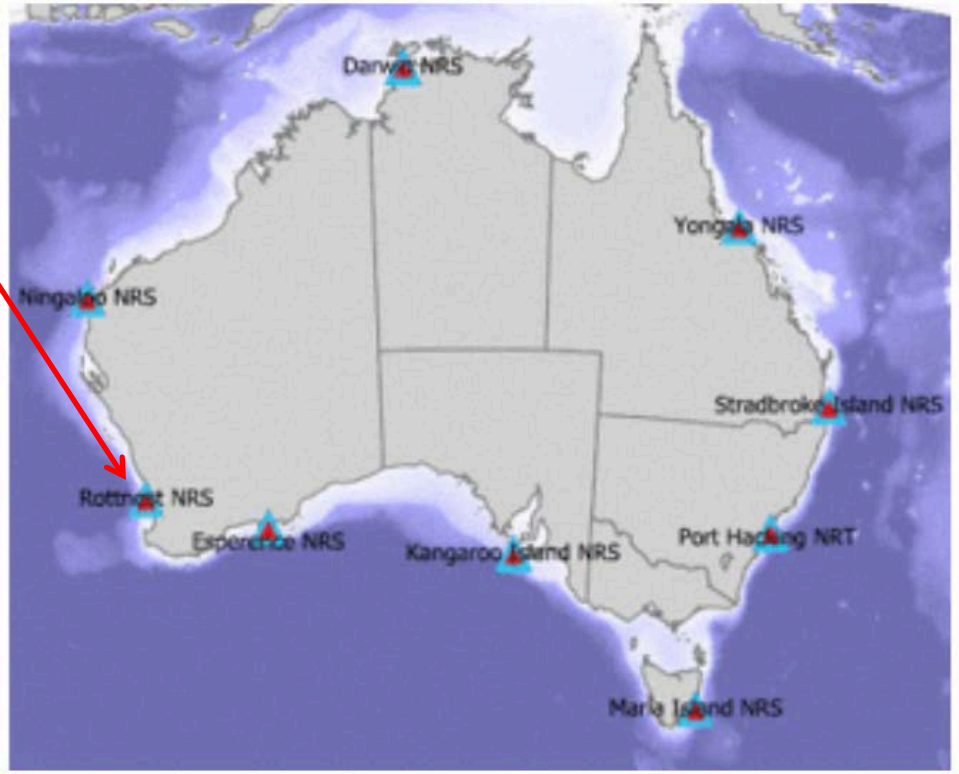
Hull-Temperature Sensor on Ferry (Spirit of Tasmania II)



RV Investigator

Proposed open ocean Southern hemisphere ocean colour vicarious calibration site, near Rottnest Island

- Clear skies, clear to moderately-clear water
- Low aerosol content
- Existing logistics and infrastructure
- Potential partners: UWA, with IMOS, CMST, CSIRO, AIMS, DoF
- Set-up of the IMOS Bio-optical upgrade 2016-17



A map showing the locations of the nine National Reference Stations

CSIRO Oceans and Atmosphere Flagship

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Thank you