



Australian Government
Geoscience Australia



Country Report: Australia

Calibration & Validation Activities

Presented by **Medhavy Thankappan**



Contributors

Geoscience Australia

CSIRO

Space Policy Unit (DIICCSRTE)

Terrestrial Ecosystem Research Network (TERN)

Joint Remote Sensing Program (QLD/NSW)

University of Queensland

Monash University

University of Wollongong

University of Technology Sydney

Recognising the Value of Earth Observation



Australian Government



Australian Government

Observations from Space (EOS)
National Infrastructure

for Australia's Space Policy



Australian Government

with Observations from Space
Infrastructure Plan (NEOS-IP)

Discussion Papers

Final Report

National Review
Data Requirements
Gaps and Opportunities



Final Report
ACRES - G

March 2008 www.space.gov.au November 2008

Operational

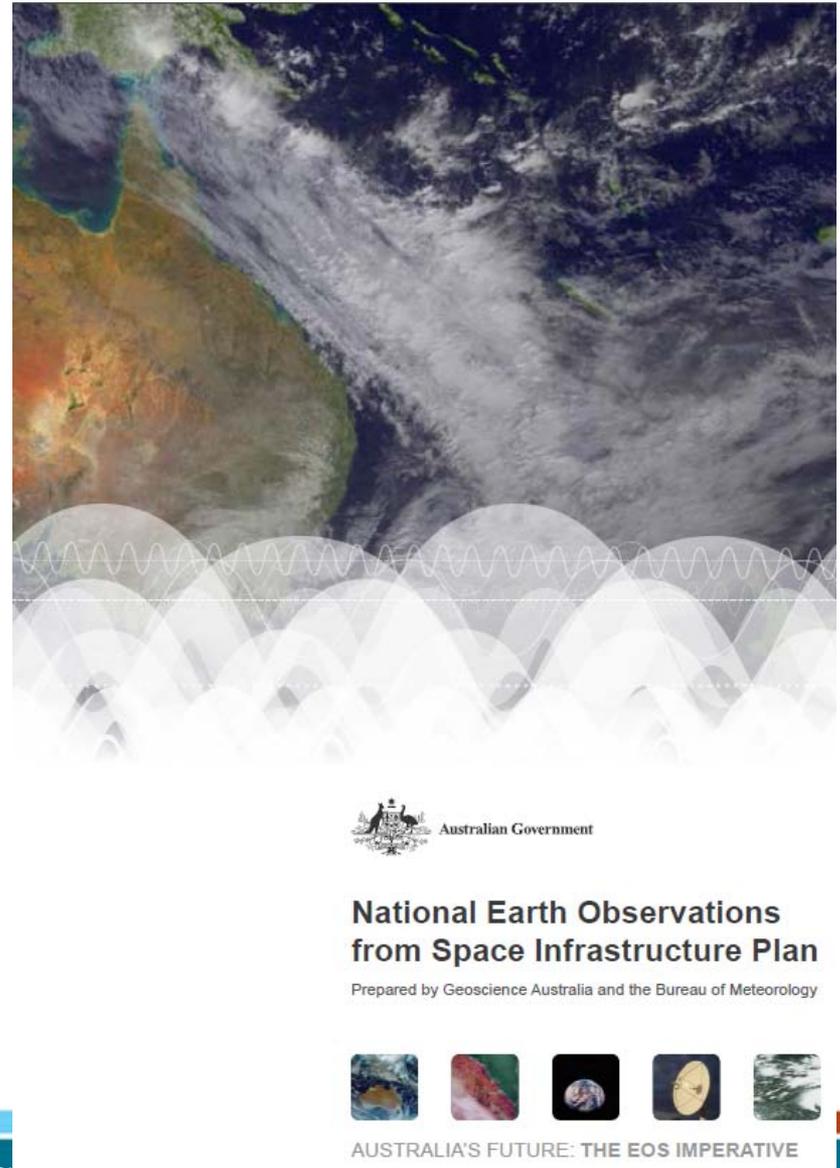
Prepared by Geoscience Australia and the Bureau of Meteorology



National Earth Observation Infrastructure Plan

The NEOS-IP is a plan to focus activity on five priority areas for EOS:

- 1. Coordination*
- 2. Continuing the observations, including commercial sources*
- 3. Ground segment and calibration capabilities*
- 4. Extracting information from the data*
- 5. Sustaining the skills and knowledge base*

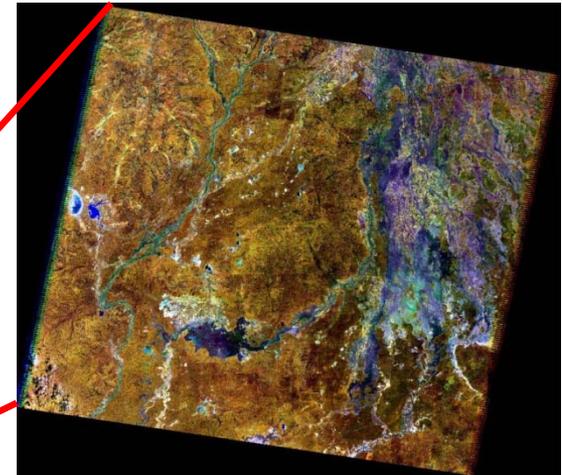
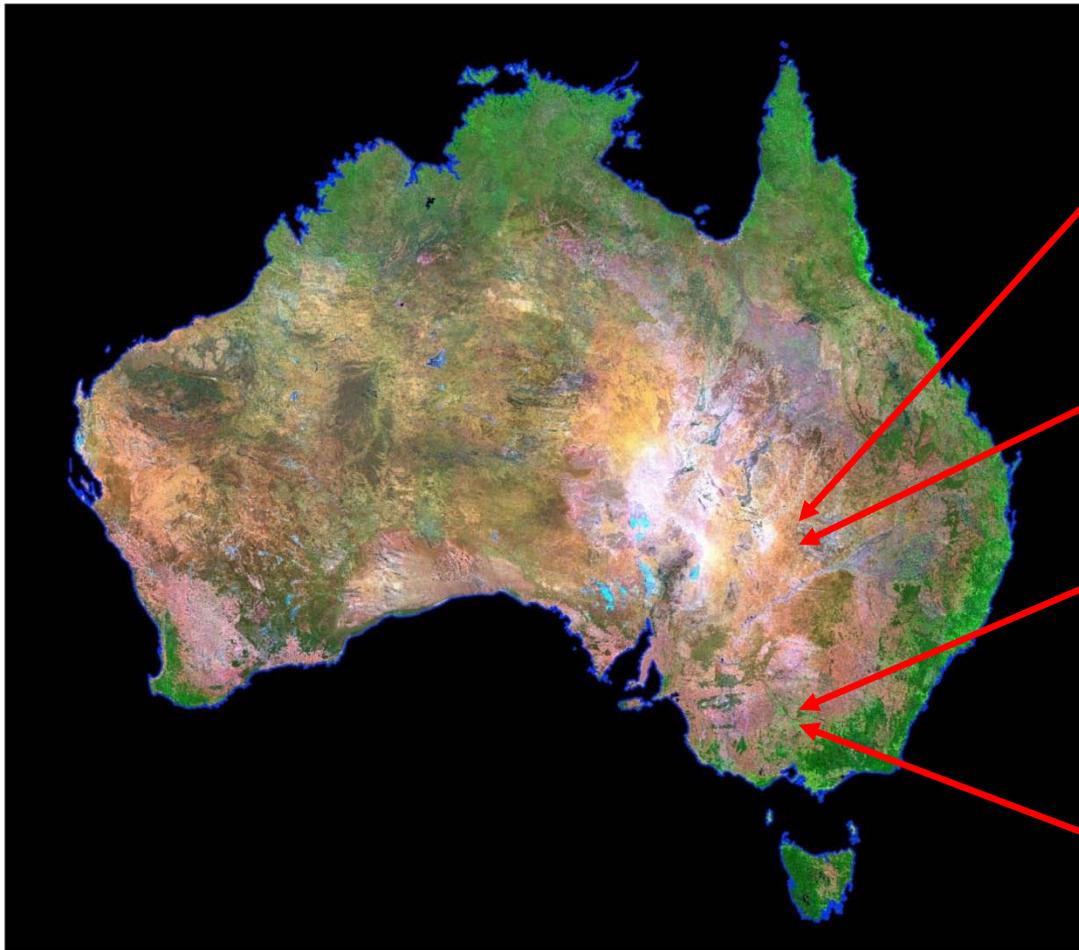


TCP in Earth Observation Informatics

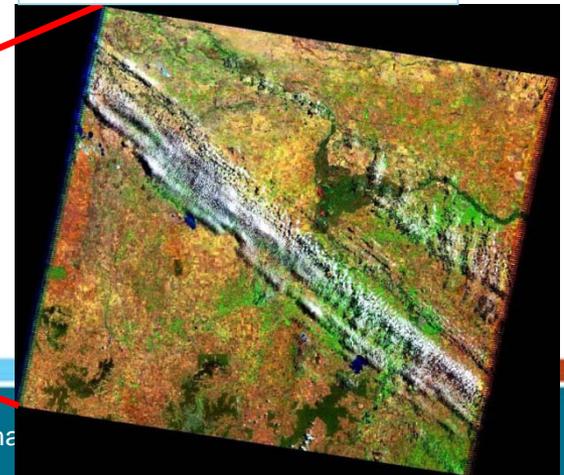
- Transformational Capability Platform (TCP)
- Recognises that EO is fundamental to Australia and that research across CSIRO and outreach needs to be better coordinated
- ~\$10m annual investment in EO research in CSIRO (~\$100m national investment)
- Aims to integrate capabilities and to provide a 'capability portal' for national and international engagement
- Key objectives:
 - Develop capability
 - Leverage infrastructure
 - Develop efficient networks
- Investment \$1M for 2012-13, \$1M+ for 2013-14, growing thereafter

Big Data @ National Computational Infrastructure

- Australian Reflectance Grid (ARG25) Landsat Data produced through the *Unlocking the Landsat Archive Project*.
- Web Catalogue (Metadata), Web Map (Quicklook images), Web Coverage Services (Full Resolution Data)

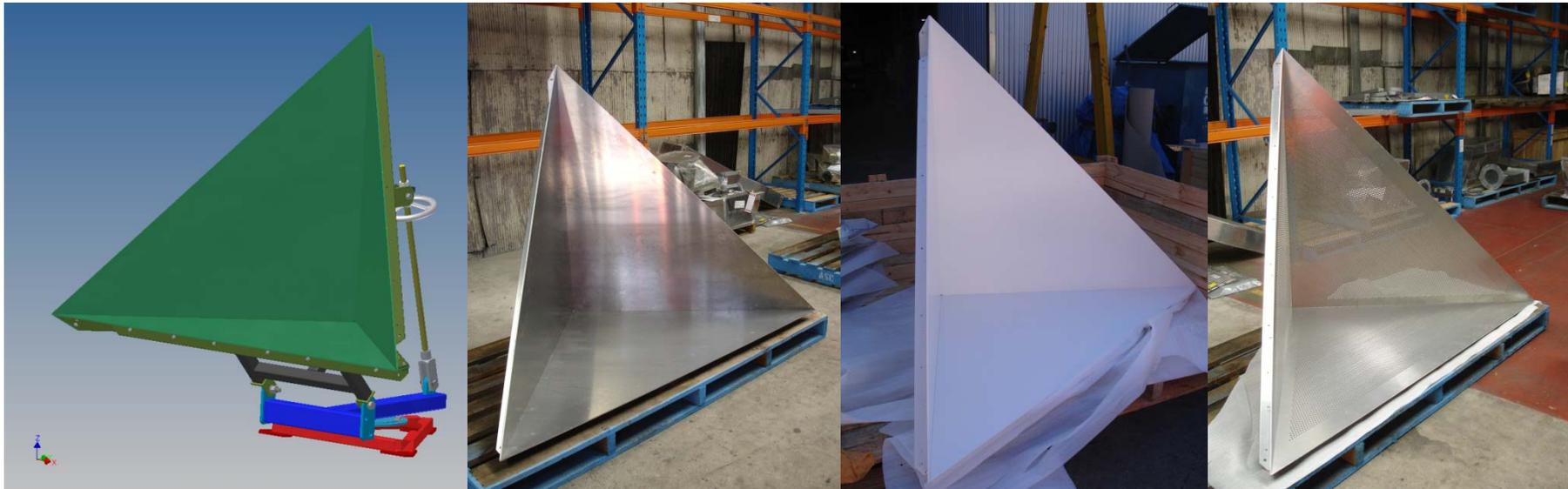
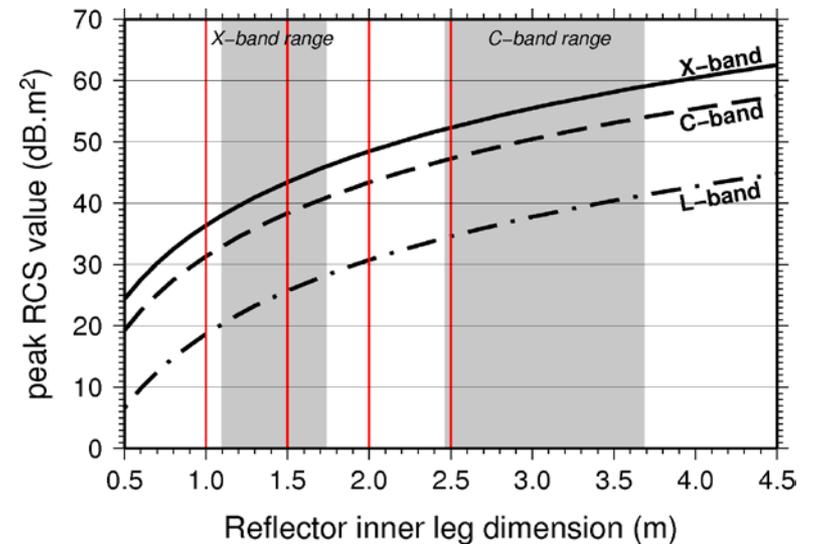


Landsat



AGOS SAR Calibration Infrastructure

- Design, prototype and manufacture a corner reflector network for measuring subtle ground deformation and contribute to SAR satellite calibration and validation



Robotic Antenna Calibration System

The Global Navigation Satellite System (GNSS) calibration facility at GA has two robotic systems to improve accuracy of positioning

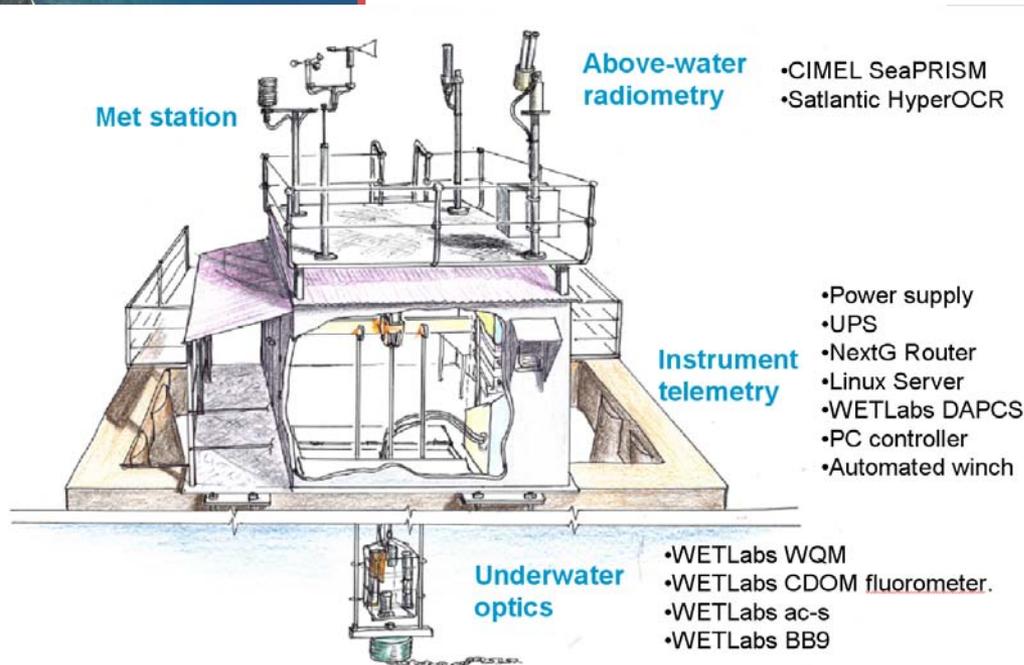
Only one of its kind in the southern hemisphere (one of three in the world)

Will enable the calibration and certification GNSS equipment used for high accuracy GNSS positioning applications

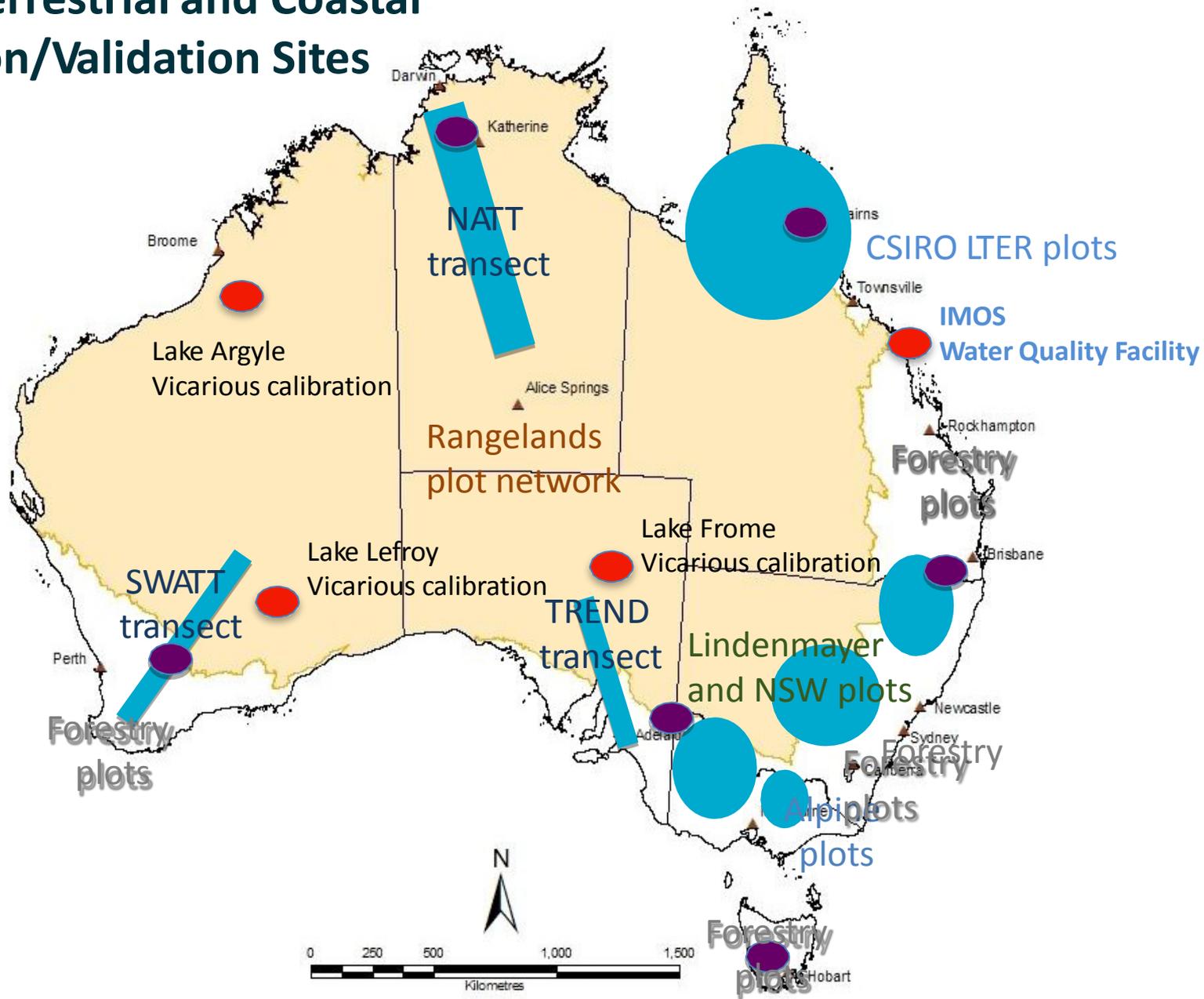


Southern Hemisphere Vicarious Aquatic Calibration and Validation Site LJCO

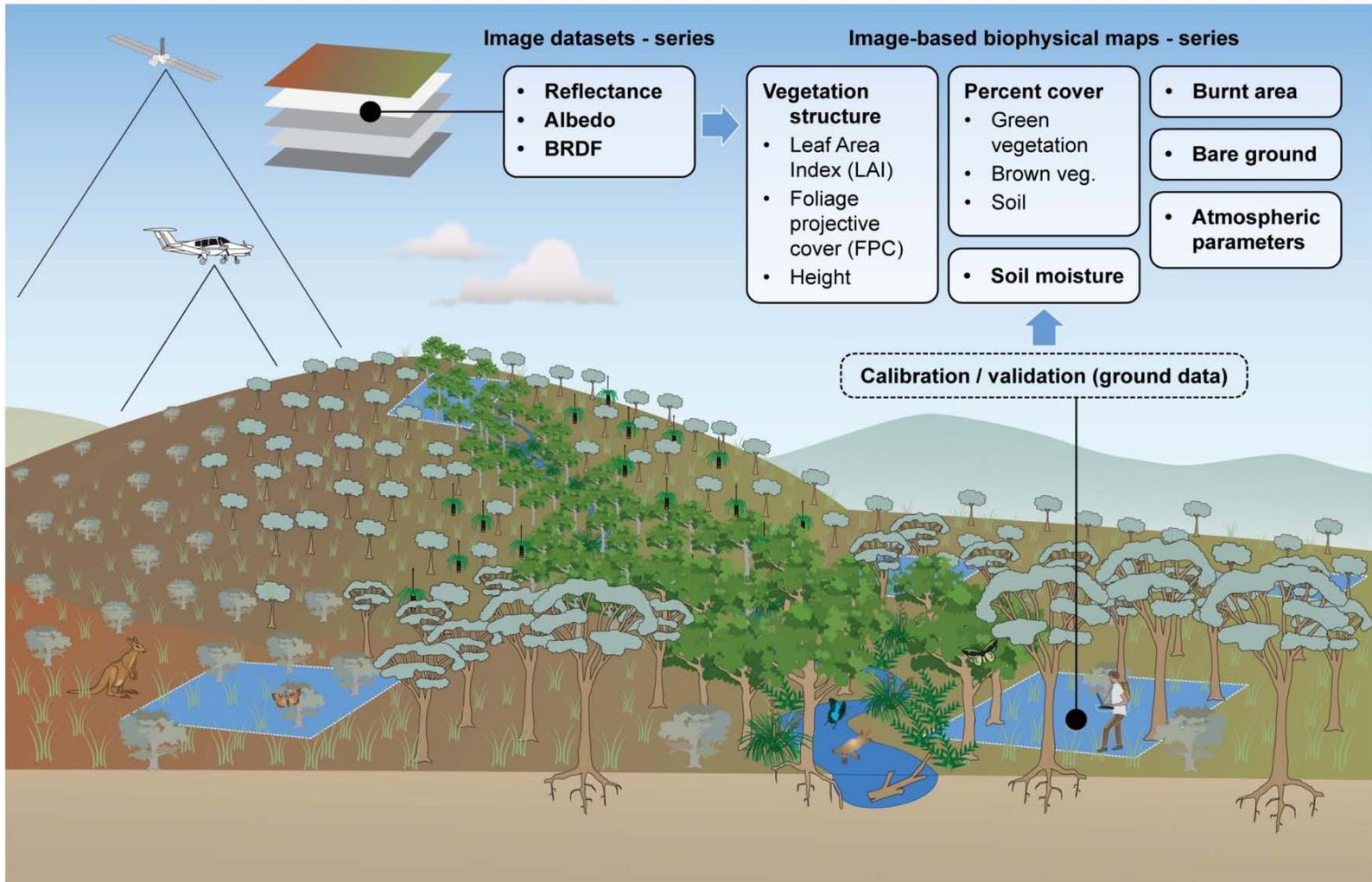
Lucinda Jetty Coastal Observatory (LJCO)
imos.org.au/ljco.html



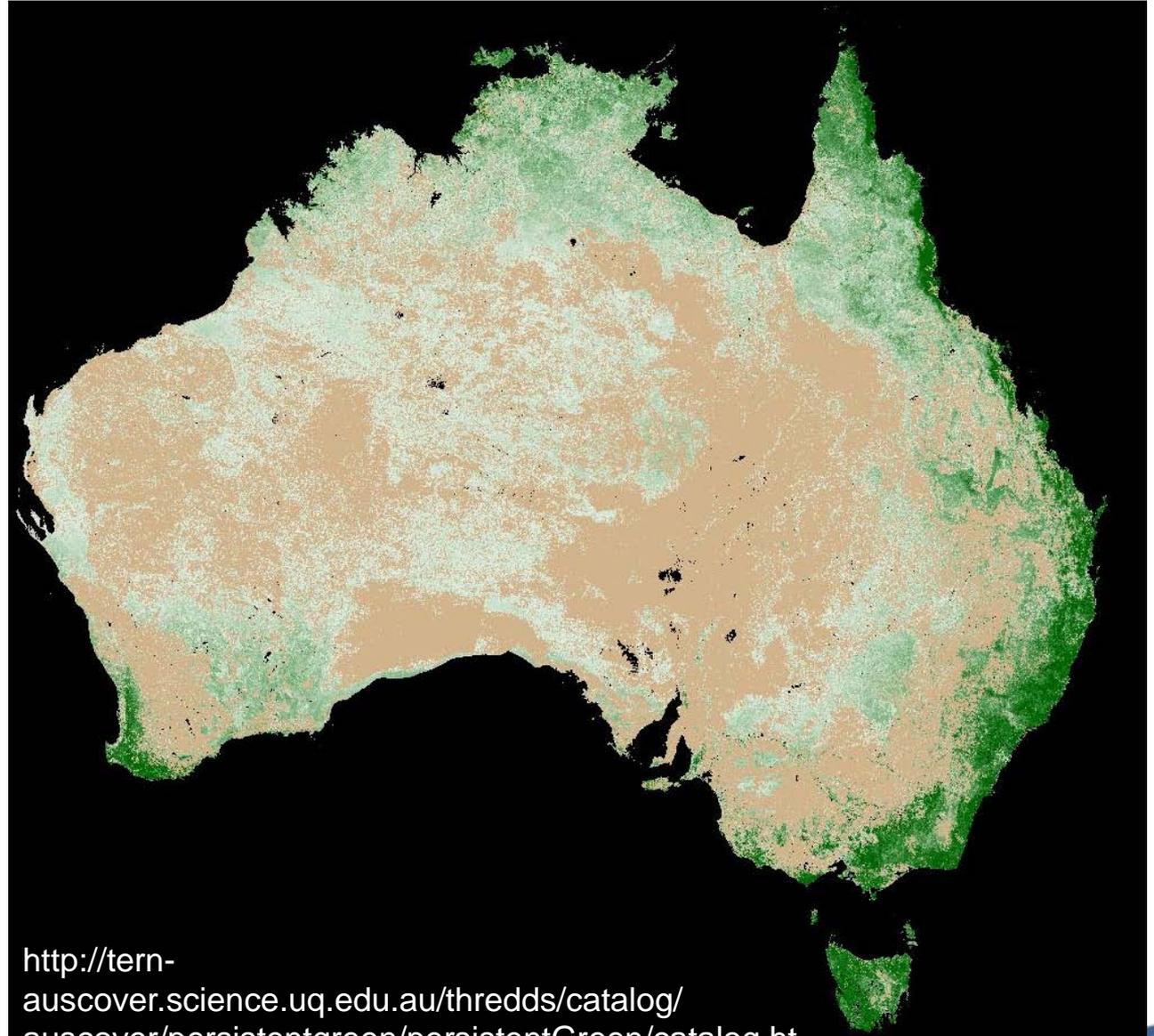
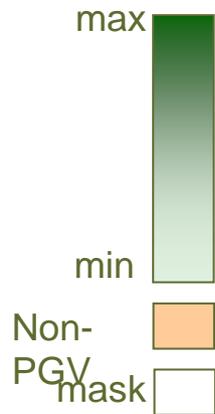
Several Terrestrial and Coastal Calibration/Validation Sites



TERN AusCover Activities and Products



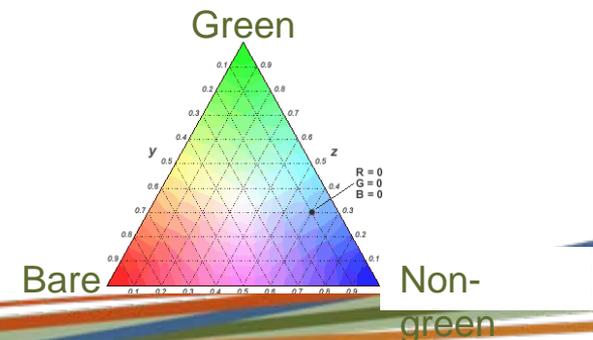
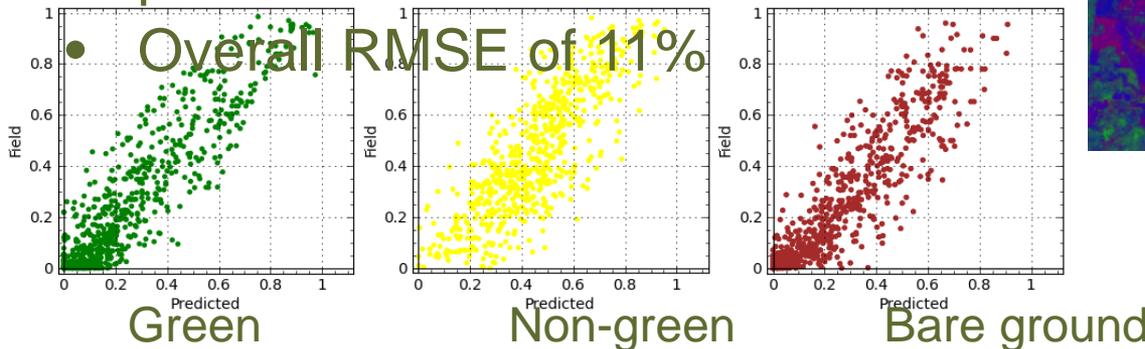
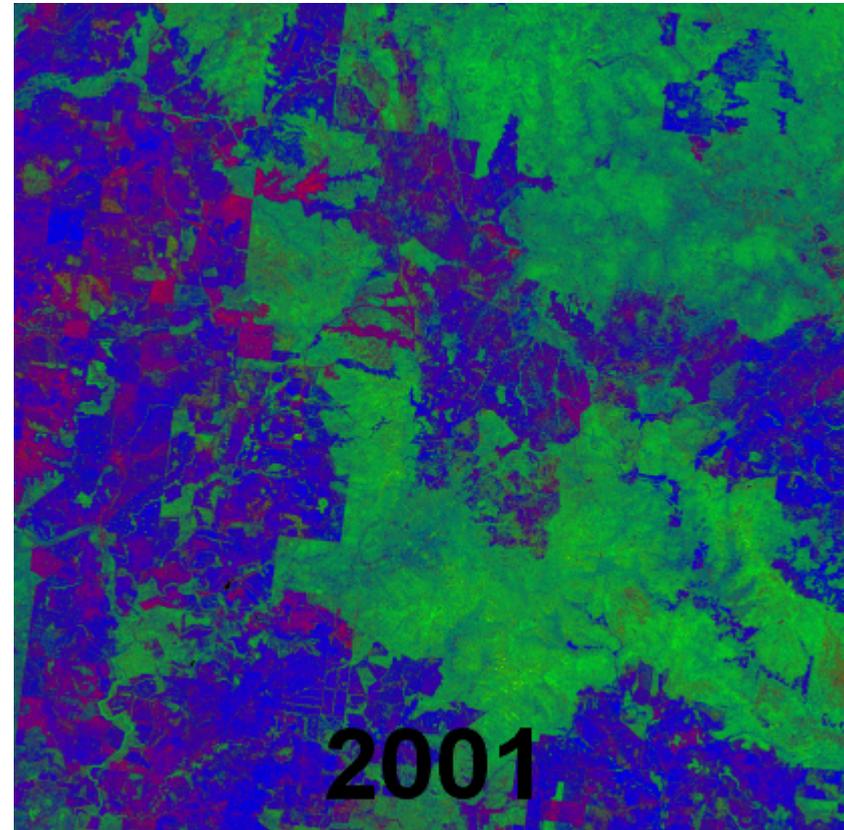
Persistent Green Vegetation Fraction



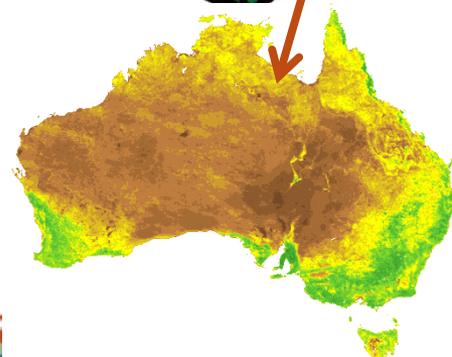
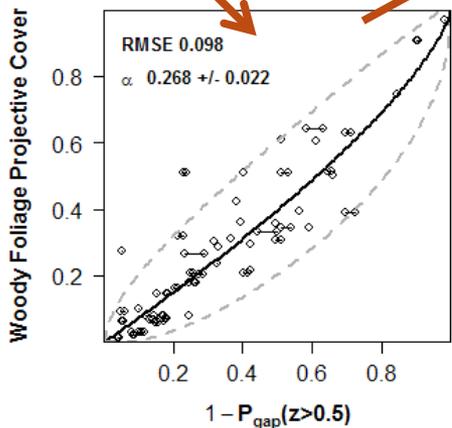
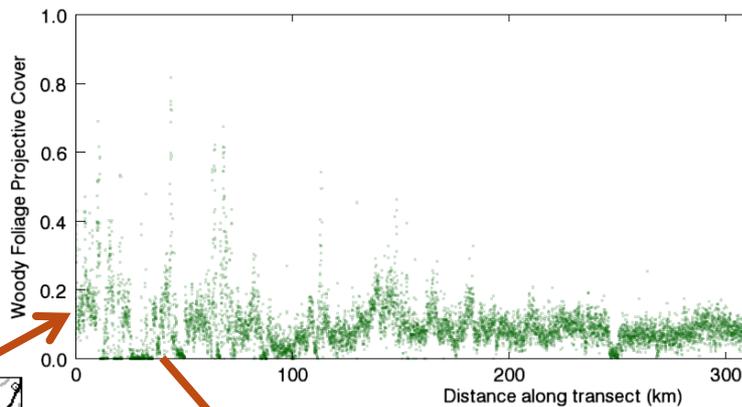
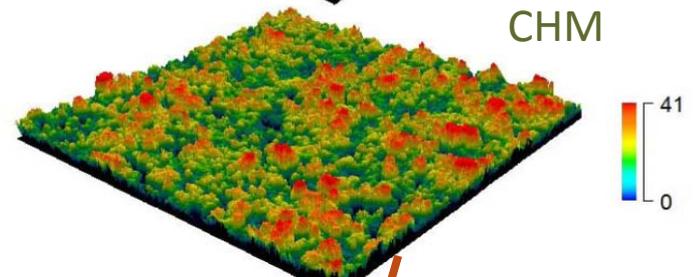
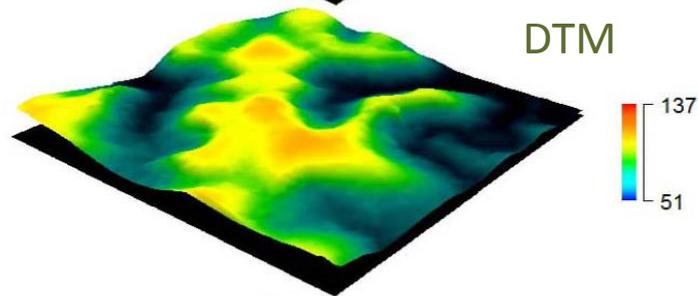
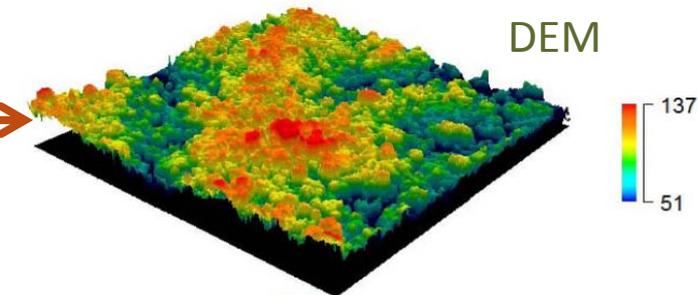
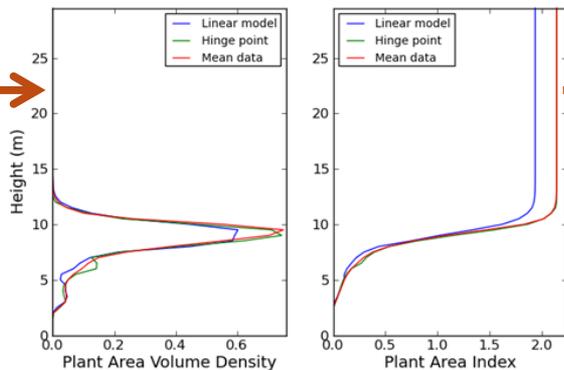
<http://tern-auscover.science.uq.edu.au/thredds/catalog/auscover/persistentgreen/persistentGreen/catalog.htm>

Fractional Cover Time-Series

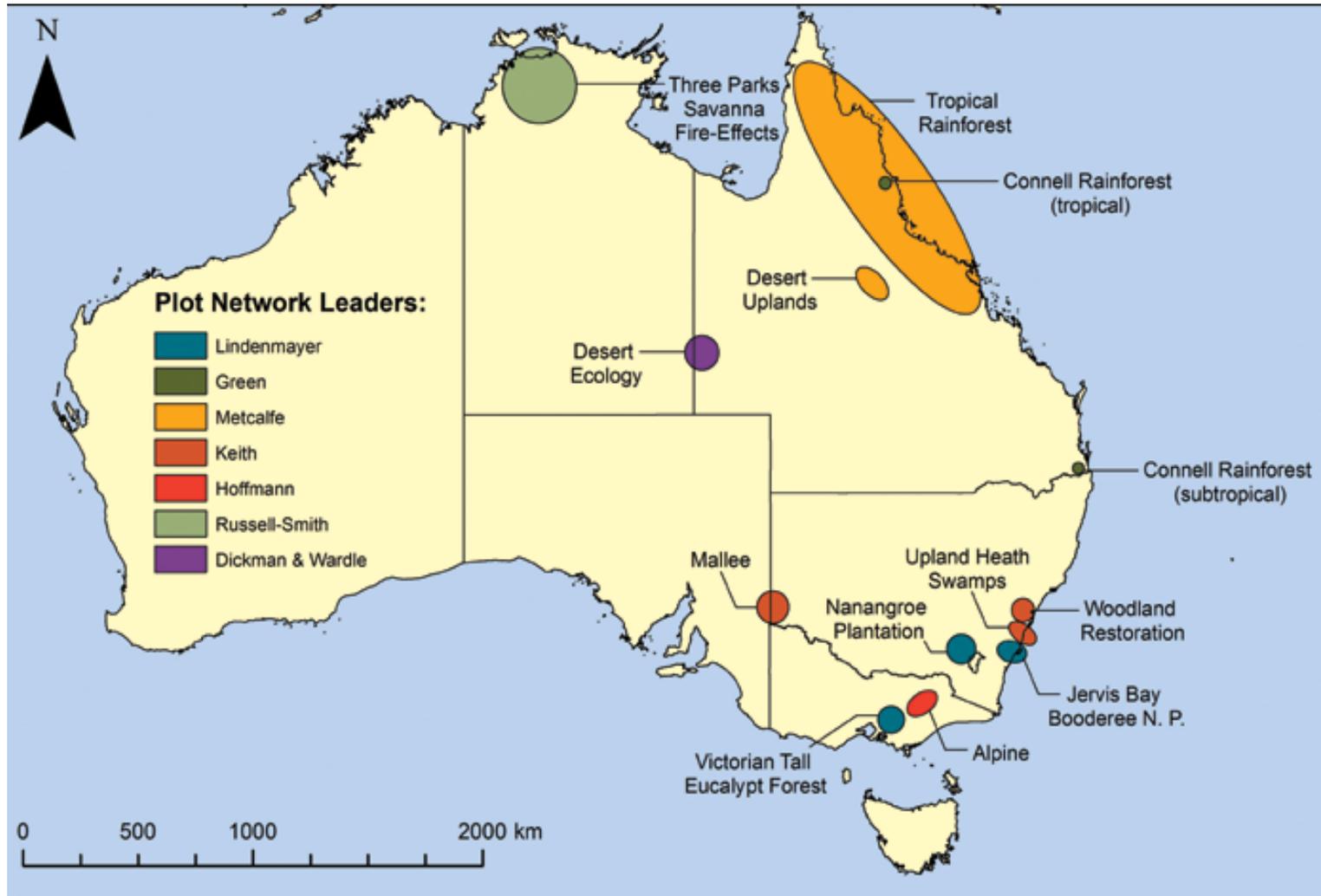
- Fractional cover uses a constrained unmixing model with endmembers derived from field sampling.
- Creates an image with the percentage Bare, Green and non-green fractions
- Field data from 800 sites collected using consistent, nationally agreed protocol



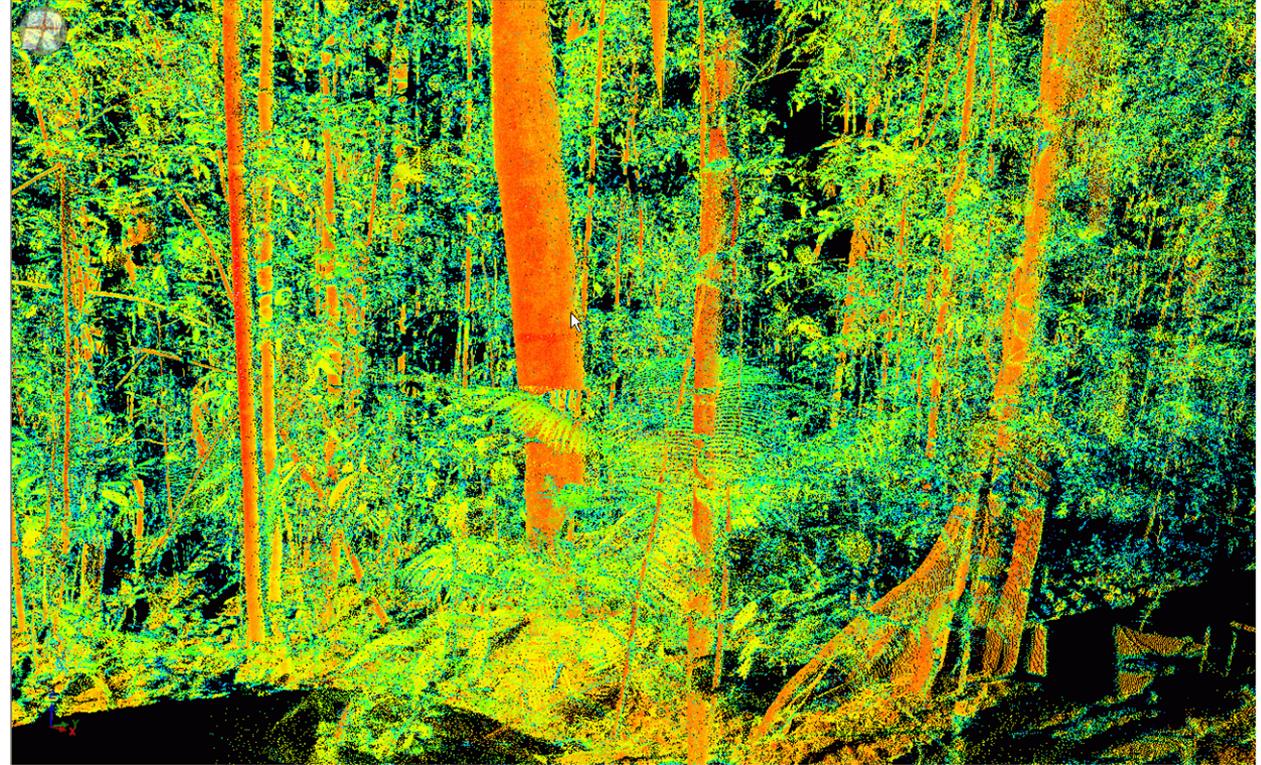
AusCover Field and Airborne Campaigns



Plot Locations : Long Term Ecological Research Network



Field Data Collection: Terrestrial Laser Scanning



Field Data Collection: Phenology



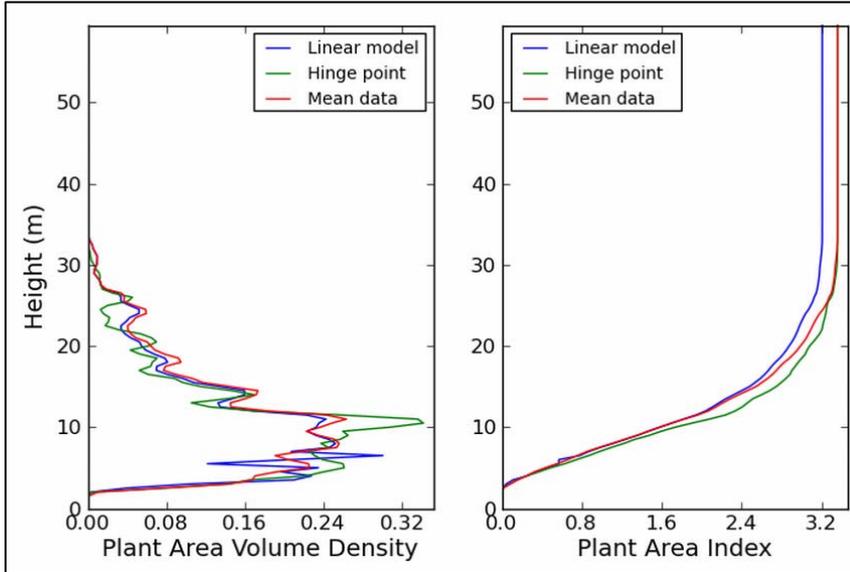
Field Data Collection: Spectral Calibration



Field Data Collection: Atmospheric Measurements



Airborne Data Collection: LiDAR and Hyperspectral Data

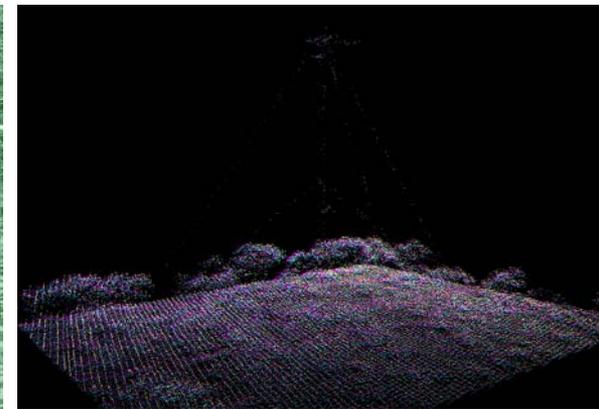
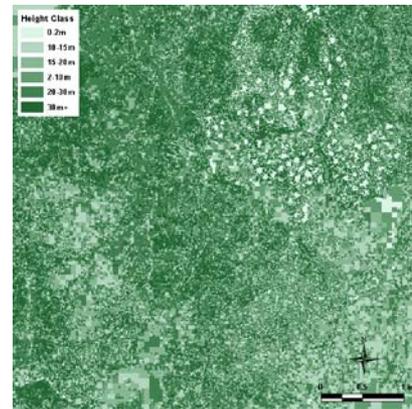
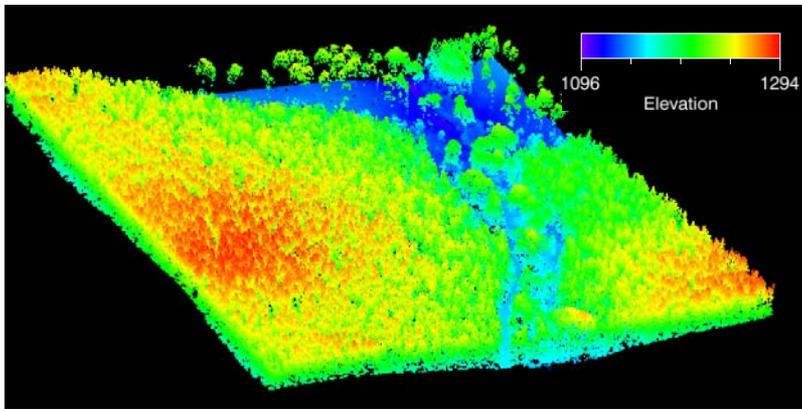
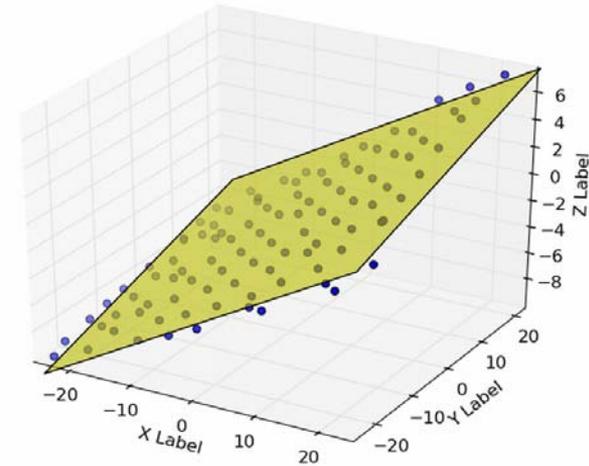


Site

rapid1
rapid2
rapid3
rapid4
rapid5
rapid6
rapid7
rapid8
rapid9
rapid10
rapid11
rapid12

PAI

3.673067
3.363939
2.279929
2.62392
4.901737
3.14998
3.335957
3.652275
3.190056
6.049383
2.897515
3.360222

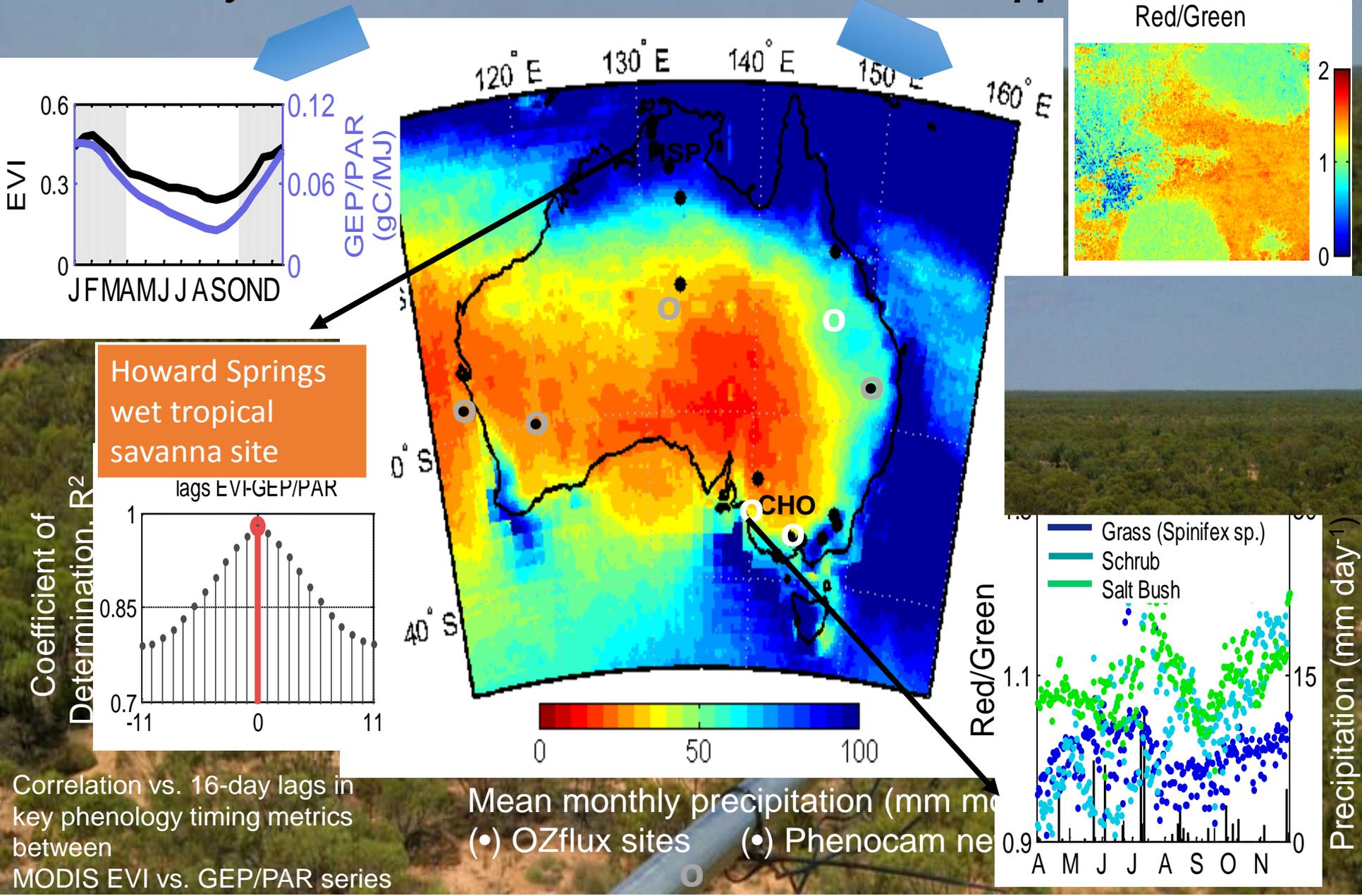


Accessing Field Data

The screenshot shows the TERN AusCover Wiki interface. At the top, there are logos for TERN (Terrestrial Ecosystem Research Network) and AusCover, along with a 'WIKI' logo. Navigation links include 'Log in or Register', 'eMII', 'AusCover', and 'Help'. A search bar is located in the top right. The main content area is titled 'Field Data Collection Resources' and includes a sub-header 'Field Sites > Field Data Collection Resources'. It lists 'Field sites', 'Metadata', 'Product pages', 'Data formats', 'Teams', and 'Outreach'. A section titled 'Field Sheets, Data Entry Forms and Protocols (and links to other resources) for Supersite Field Data Collection.' contains links for 'Data Recording Protocol', 'ASD - Spectroradiometer', 'Ground Features', and 'Calibration Targets'. The 'Data Recording Protocol' section states: 'This protocol outlines the various sampling methodologies and associated data recording requirements for each of the data collection protocols outlined below. Many of the hardcopy and electronic data recording forms associated with the protocols are currently being converted into an ODK format. These include the terrestrial laser scanner, hemispheric photography, SLATS related forms (tree structure, basal area, slats site description and slats transect). Other protocols may have their forms converted in the future. Details on these forms and their use can be found at the ODK forms wiki page.' The 'ASD - Spectroradiometer' section notes: 'Field spectroradiometer measurements are collected to relate field based measurements to satellite data products (e.g. Landsat and MODIS NBAR products).' and lists 'ASD Protocol - Ground Features' and 'ASD Field Sheet'. The 'Calibration Targets' section is partially visible. On the left, there is a 'Map Layer Chooser' with a tree view of themes like 'Active Fire', 'Post Fire', 'Fuel Load', etc., and a list of 'Active Layers' including 'Star Transect computed NADIR FPC'. A map at the bottom shows a scale bar (500 km / 500 mi) and coordinates (109.47266, -0.51758). A tooltip for the 'Star Transect computed NADIR FPC' layer shows a table of 'total_FPC' values ranging from +10.679% to +10.549%.

(<http://data.auscover.org.au/xwiki/bin/view/Field+Sites/WebHome>).

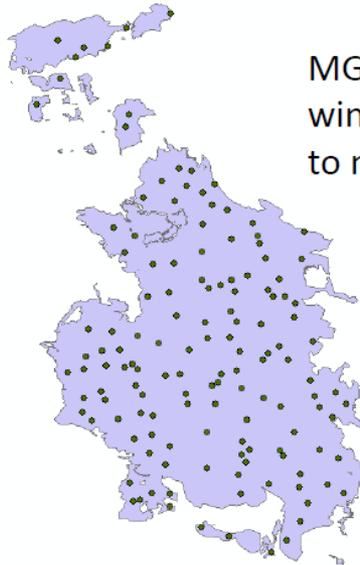
Australian Phenology Product Validation: An Eddy-flux Tower Data and Phenocam Network Approach



MODIS Global Disturbance Index Validation

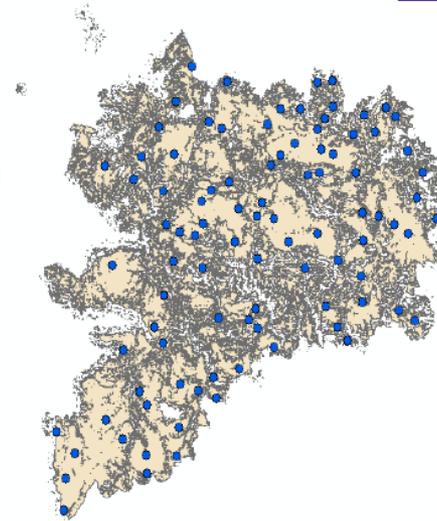
Canberra Fire (ACT)

Duration : 09/01/2003-19/01/2003
Area Burnt : 247 596 ha (One part of the fire)
Sample Points : 135



Wollombi Complex Fire(NSW)

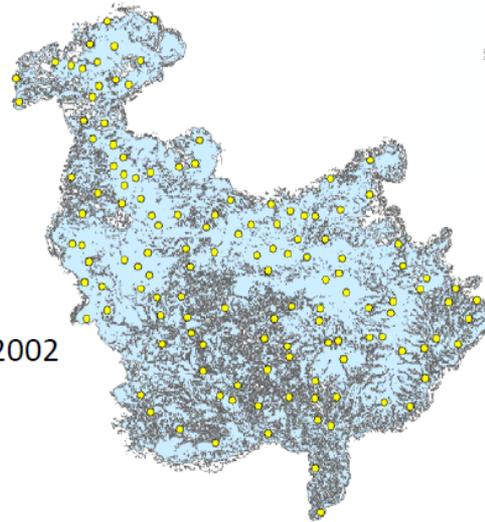
Duration : 06/01/2003-26/02/2003
Area Burnt : 52083ha
Sample Points : 95



MGDI is calculated for a temporal window of 6 months (October –March) to match the fire season

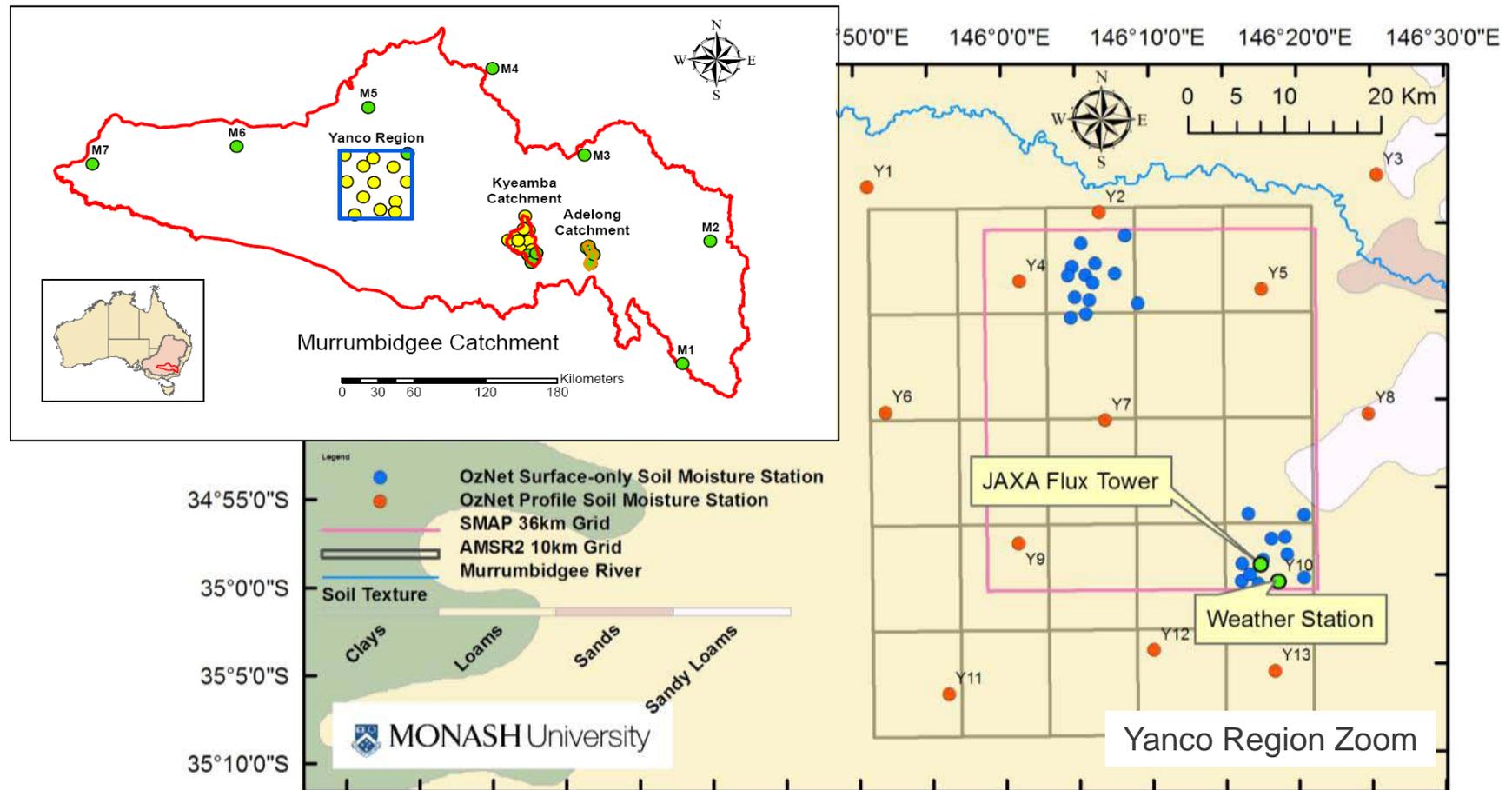
Bala Fire(NSW)

Duration : 05/10/2002-21/12/2002
Area Burnt : 92487 ha
Sample Points : 120



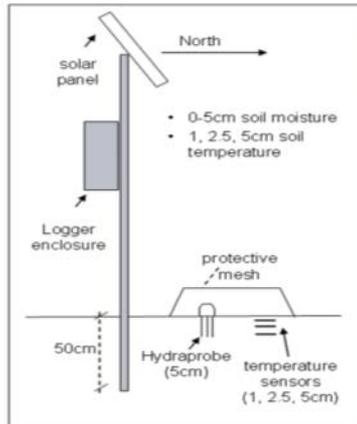
EO within the OzNet Network

- Extensive Cal/Val activities for SMOS, SMAP, GCOM-W1 missions

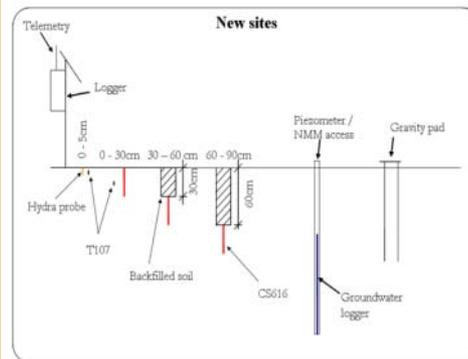


In-situ monitoring – Yanco site

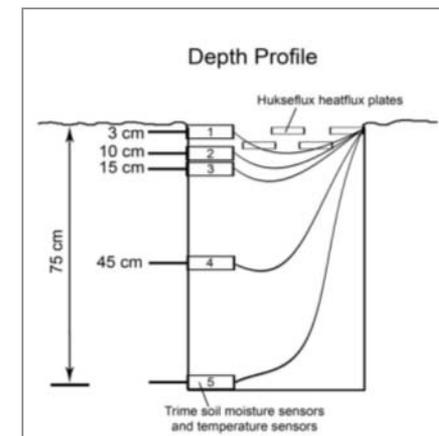
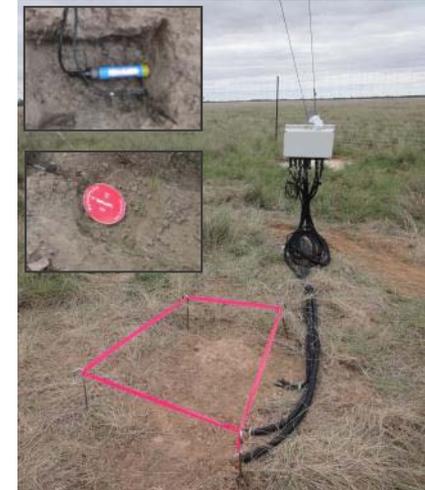
SMAPEX Stations (YA and YB sites)



OzNet Stations (Y sites)



JAXA EC Station



In-situ monitoring – Yanco site



Scintillometers

Optical X 2 (Sensible Heat)

Microwave X 1 (Latent Heat)

Installation in progress

JAXA Flux Tower

Temperature/
Humidity Sensor

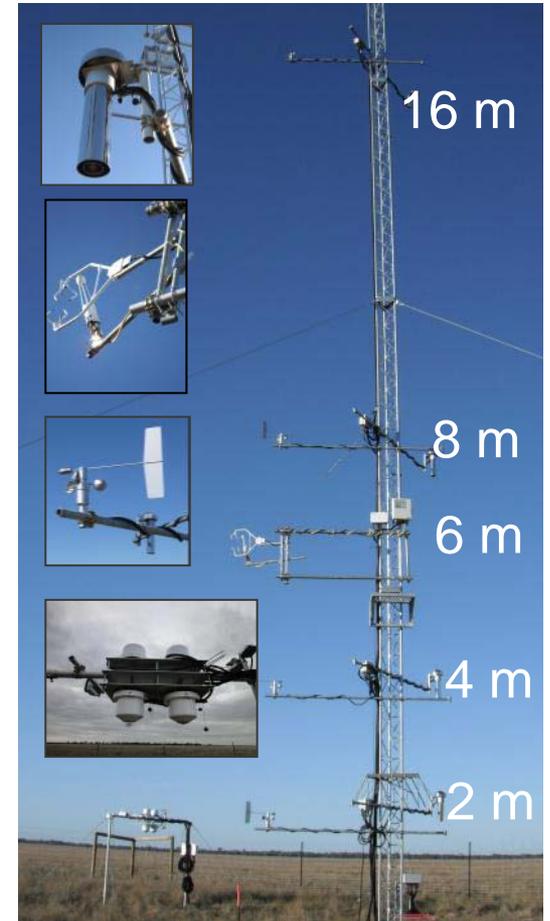
3-D Ultrasonic
Anemometer

Infrared gas
analyzer

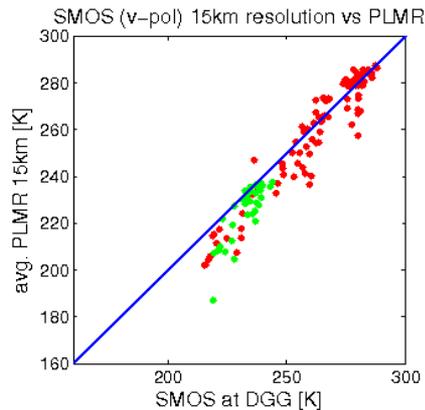
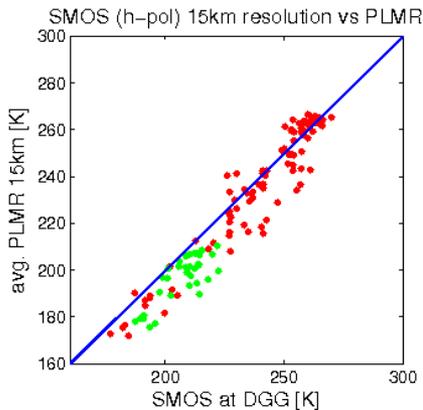
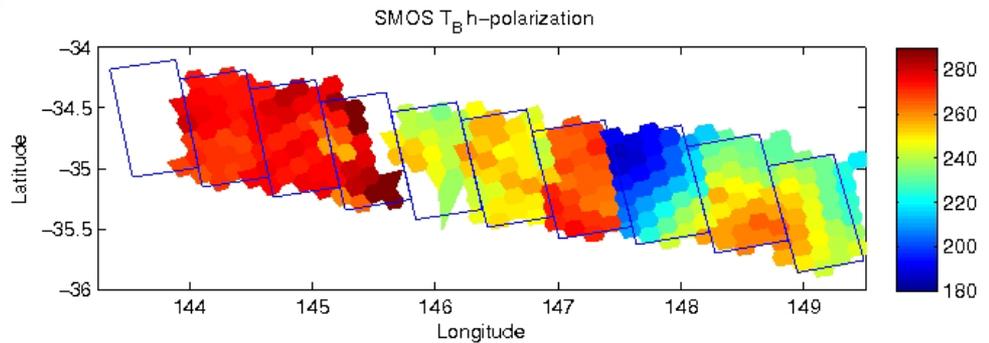
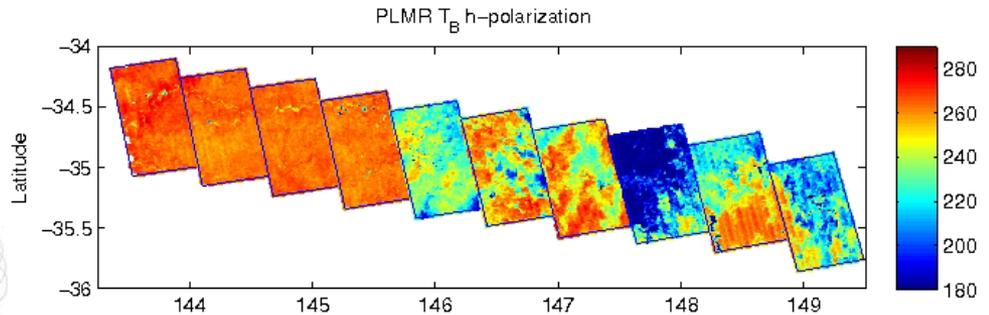
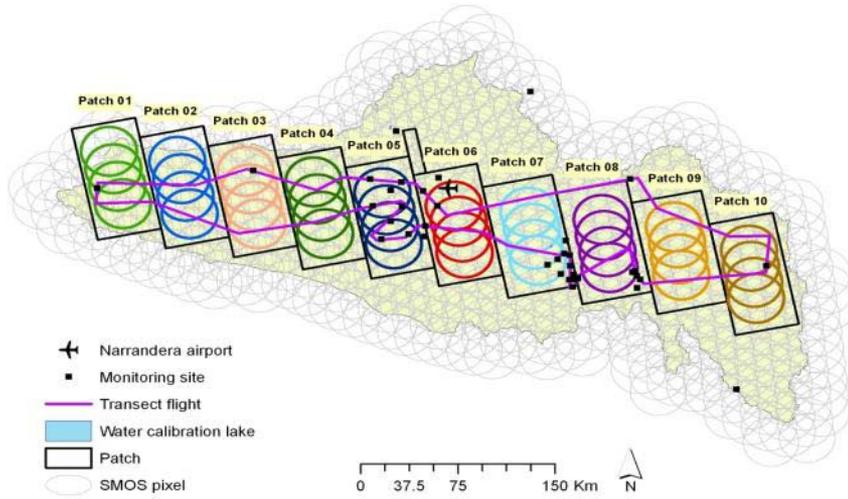
Wind sensor

6 component
radiation sensors

May 2012 - Current



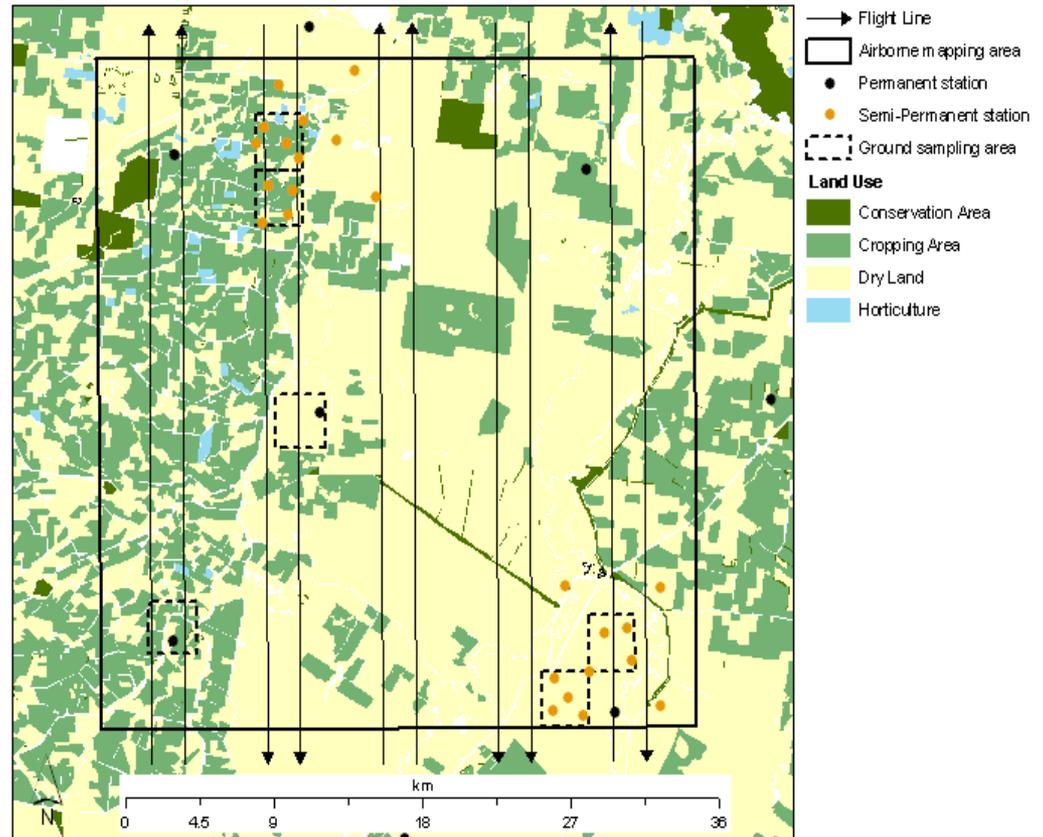
SMOS Cal/Val – AACES campaigns



AACES data available online:
<http://www.moisturemap.monash.edu.au/aaces/index.php>

Plots from Rüdiger et al. (2013), submitted.

SMAP Cal/Val Rehearsal - SMAPEX



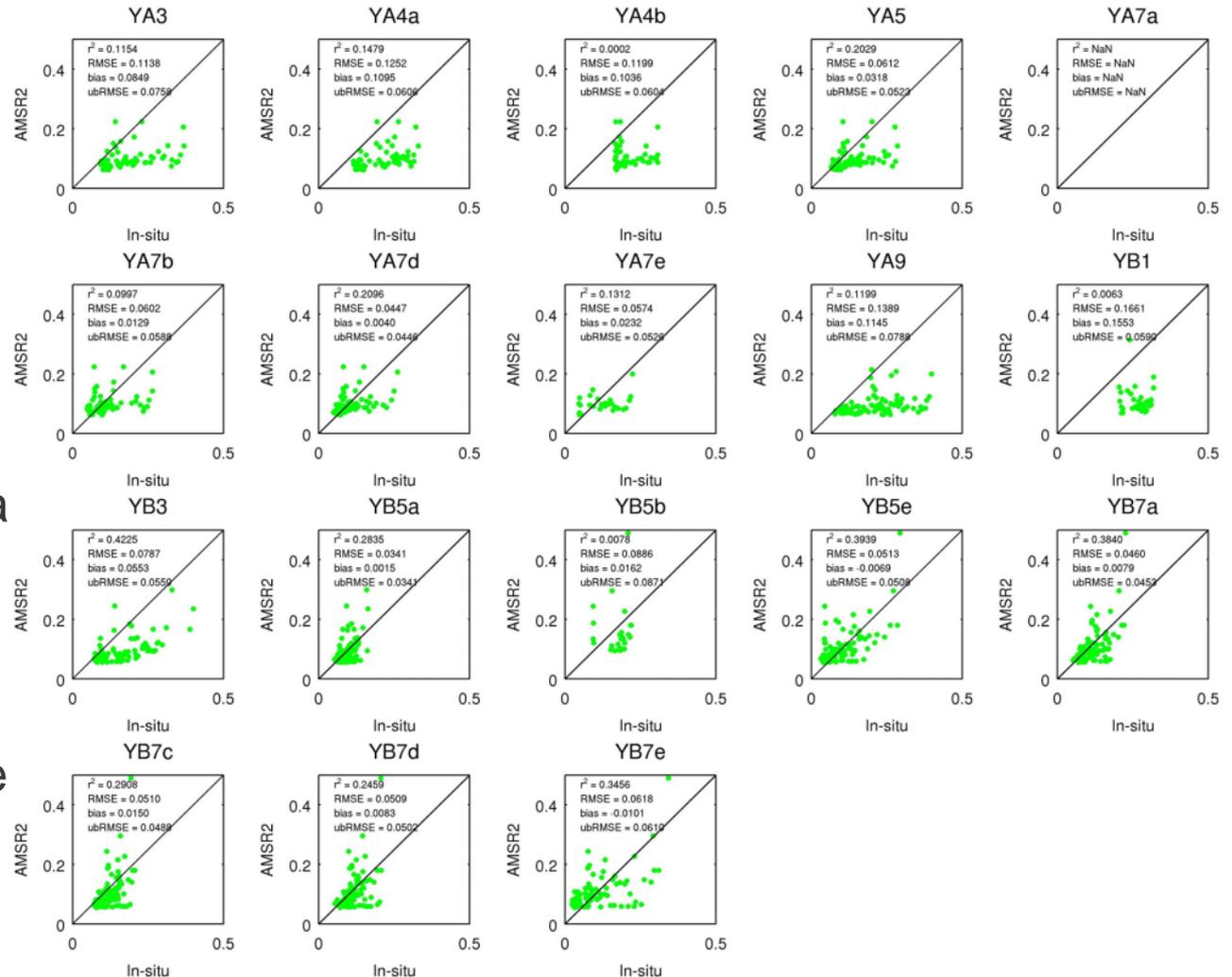
- Coverage: 34km x 38km
- Ground resolution: 1km PLMR, 10-30m PLIS

GCOM-W1 Cal/Val

- Comparison of AMSR2 soil moisture against in-situ from the OzNet monitoring stations in the Yanco Region

- Viewer of the data from the flux tower:

<http://www.arts.monash.edu.au/ges/research/arch/climate/jaxa/>

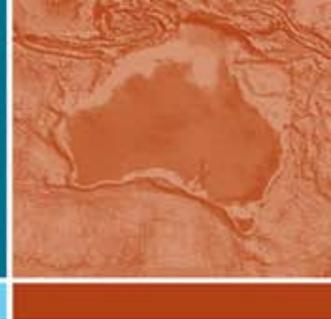


Australia to Chair CEOS in 2016

- 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.



Australian Government
Geoscience Australia



Thank you

**36th Plenary Meeting CEOS Working Group on Calibration and Validation
Shanghai, 13-17 May 2013**