



CSIRO Agency Report

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Structure

- Background to CSIRO – EO activity
- TCP in Earth Observation Informatics
- Calibration facility
- Workshop on spectral libraries
- TERN Validation efforts
- National Satellite Calibration Working Group (co-lead)
- TERN and IMOS – threats to the continuation of funding

Earth Observation in CSIRO

- Split across a number of Divisions:
 - Land and Water
 - Earth Science and Resource Engineering
 - Marine and Atmospheric Research
 - Mathematical and Information Sciences
 - Plus three others
- Applications focussed
- Recognition that key areas are being overlooked, including coordinated efforts in cal-val

TCP in Earth Observation Informatics

- Transformational Capability Platform
- Recognition of fundamental nature of EO to Australia and that research across CSIRO needs to be better coordinated
- ~\$10m annual investment in EO research in CSIRO (~\$100m national investment)
- Aims to:
 - Integrate capabilities, maximise return on investment and minimise duplication across the organisation, and to ensure focus on key technology development opportunities
 - To provide a 'capability portal' for national and international engagement
- Key objectives:
 - Develop capability
 - Leverage infrastructure
 - Develop efficient networks
- \$1M for 2012-13, growing to \$5-6M thereafter

Development of instrumentation calibration facility

- Part CSIRO, part TERN funded
 - Integrating sphere
 - Radiance sources
 - Wavelength calibration lamps
 - NIST calibrated and traceable
-
- Currently installing the facility, developing procedures
 - Intention is to build this into a national calibration facility for spectroradiometers and small hyperspectral imagers

ACEAS workshop on spectral libraries

- Brisbane, 18-22nd June 2012
- Brief Report: <http://www.aceas.org.au>



The challenge of field measurement



Context

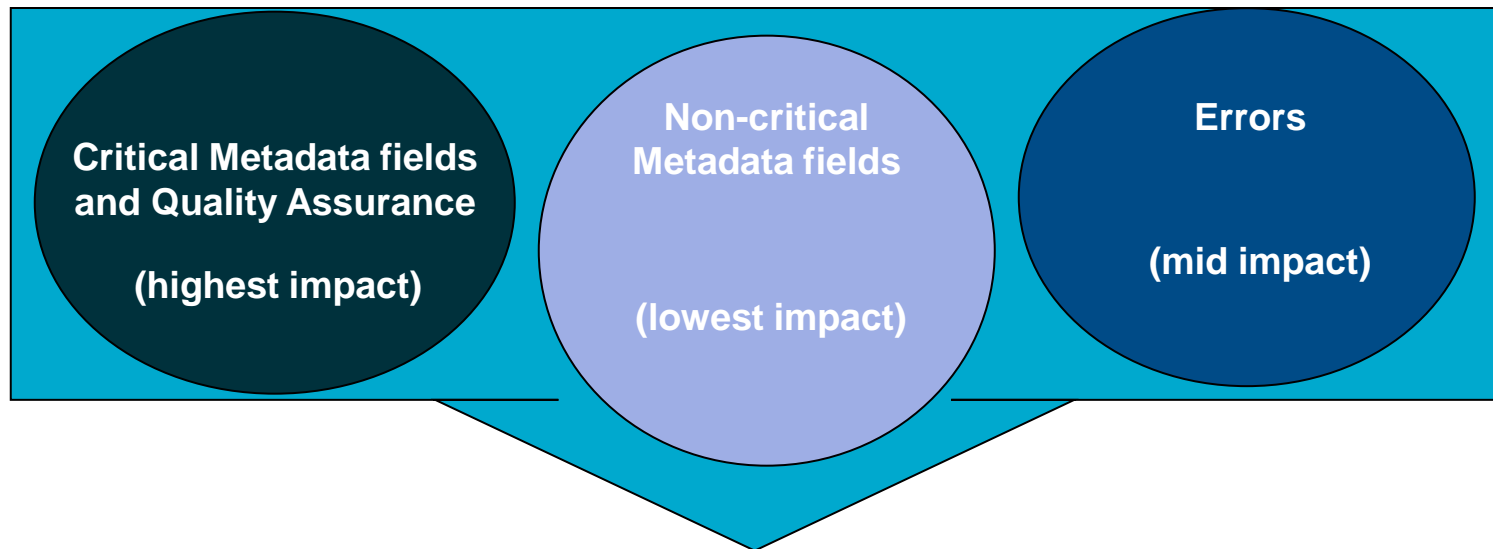
- Data produced is often of high value but not easily discoverable
- Needs for data preservation, legacy value, lineage
- Increased interest in the storage, reuse exchange of spectral data, but users need reassurance in *data quality* and *representativeness*
- National or international standards are lacking
- Informing best practice
- Quality determined by many different things (project design, user, instrument, conditions, documentation...)
- Metadata the critical component
- Workshop attempted to lay the foundations for an international standard

Key recommendations

- Needs for (flexible) standards to ensure quality in data collection to facilitate accurate cross comparison of data
- Tools needed to ease the burden of input of metadata
- The need for care in the preparation of field protocols and of recording data in the field
- Draft minimum metadata requirements, novel quality tools
- With modifications, SPECCHIO should be the international tool for storage and exchange of spectral datasets
- Outcomes being implemented through separate ANDS project to enhance SPECCHIO to harmonise TERN and other Australian spectra data

Measuring quality

- One approach is quality analysis algorithms to quantify the completeness and quality of a metadata set for the purpose of informing a data user's decision to use it
- Amalgamation of data completeness + quality assurance



Optimal / Suboptimal Quality Measure

Metadata completeness

Critical metadata: 100%

General Campaign metadata

Instrument
Viewing geometry
Illumination information...

Campaign-specific metadata

Vegetation
Mineral exploration
Substratum target...

Noncritical metadata: (variable)

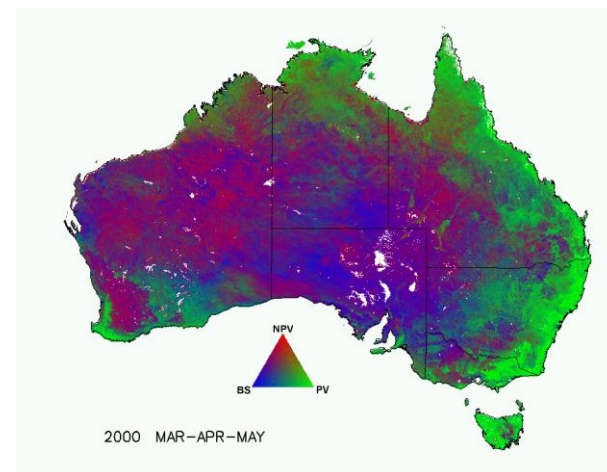
General project information

+

Additional metadata
that would enhance re-
usability & fusibility
with other datasets

TERN Validation efforts

- Ongoing efforts in validation of a number of biophysical products
- Airborne hyperspectral and Lidar characterisation of TERN Supersites
- AusPlots as part of a National Monitoring Network. Establishment of long-term plots
- Fractional cover validation, funded Federally



Australian Satellite Calibration Working Group

- Thankappan and Malthus as co-convenors
- Aimed at better coordinating the significant Australian activity on cal/val, maintain a census of cal/val related activities
- Provides a national voice to highlight importance of cal/val to EO data improvement
- Promote mutual awareness
- Central point of contact, coordinating body, source of information dissemination
- To support Australian representation on international forums involved cal/val
- To form specific working groups to address specific sensor types

Future of TERN and IMOS

- Integrated Marine Observing System (2013)
- Terrestrial Ecosystem Research Network (2014)
- Have an uncertain future
- \$60 million set aside by Govt. to support extended operations of NCRIS facilities (Quantum Transitional Funding) – over 18 months
- Consultative group to advise on how to prioritise this up
- There are currently 12 facilities
- It won't go far...

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Thank you

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But... a number of questions, challenges, issues

- The challenge to make good measurements in the field
- Has best practice been followed?
- Spectral data collections are most often project (campaign) based, obtained for different purposes
 - single spectra, nested data from projects, replicates, related targets, campaigns
- Need to assess quality of spectra obtained
- Incompatible, often internal, data formats, from different instruments, separated from metadata
- How to store to facilitate exchange
- Efficiency in metadata entry