OPEN DATA CUBE

The Australian and International Datacube

- CSIRO- Geoscience Australia- National Computational Infrastructure initiative for enabling the use of big data Earth Observation

Slides courtesy Stuart Minchin, Geoscience Australia

NCI

Australian Government
Geoscience Australia

CSIRO

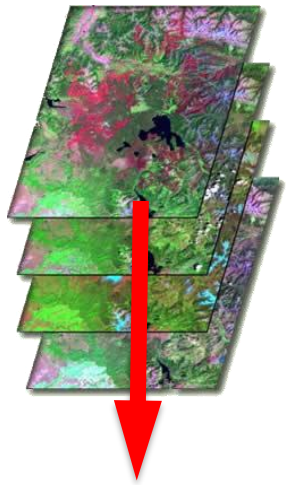
Satellite Data Trends

- More and more free and open data
- Growing data volumes
- Improved computing technologies
- Open source software
- Pre-processed products

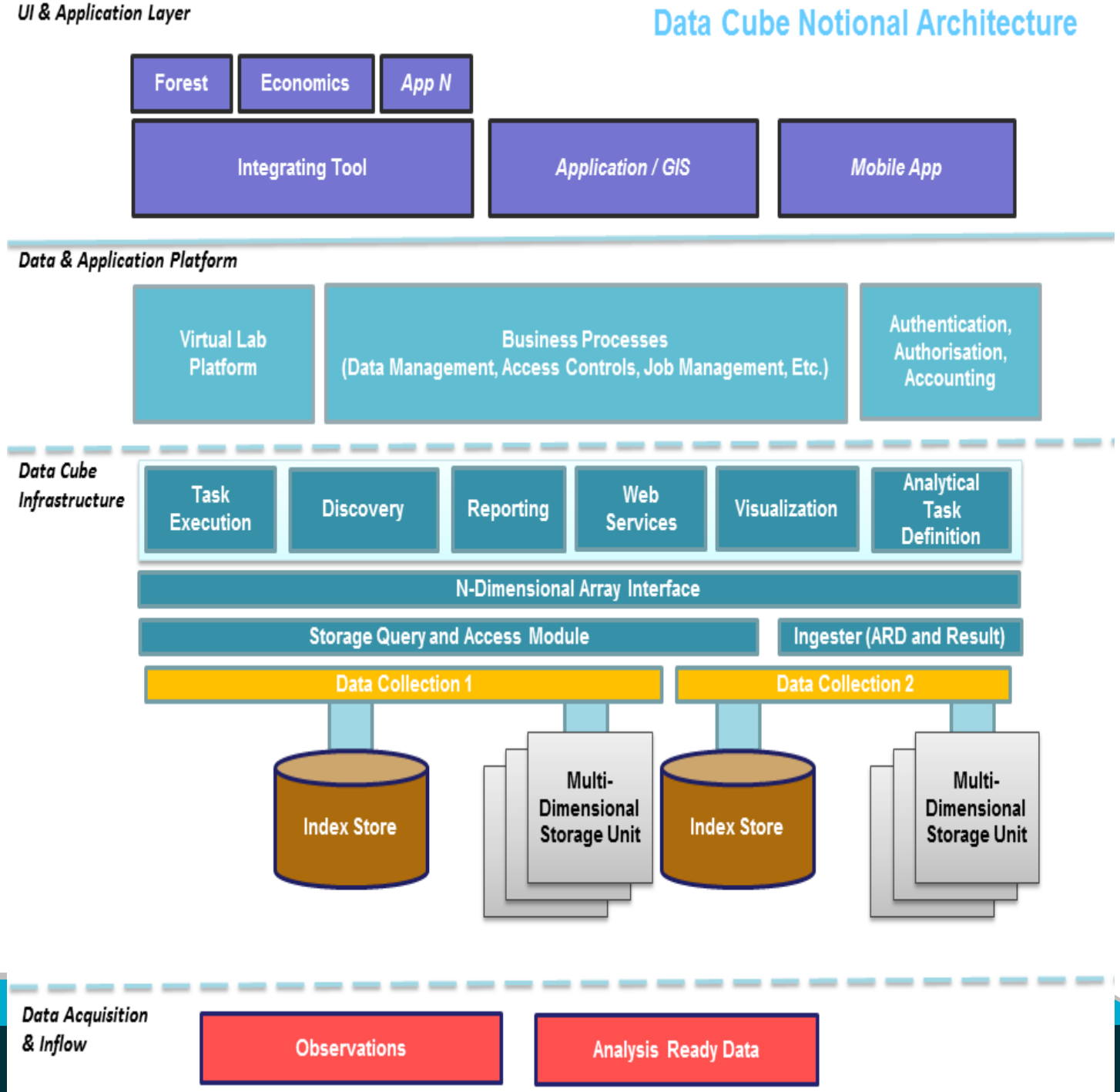
OPEN DATA CUBE

What are Data Cubes?

- **Data Cube** = Time-series multi-dimensional (space, time, data type) stack of spatially aligned pixels ready for analysis
- **Proven concept** by Geoscience Australia (GA) and the CSIRO and planned for the future USGS Landsat archive.
- **Analysis Ready Data (ARD) ...** Dependent on processed products to reduce processing burden on users
- **Open source** software approach allows free access, promotes expanded capabilities, and increases data usage.
- **Unique features:** exploits time series, increases data interoperability, and supports many new applications.



Data Cube Notional Architecture



Storage formats and indexes

Many GDAL formats can be supported

- Constraint: Within a data collection, pixels need to spatially align
- Projection: Any PROJ4 projection

NCI, AWS (CEOS)

- netCDF, Albers projections (equal area)
- *In file metadata*

USGS, AWS Earth

- GeoTiff

USGS, MODIS land products

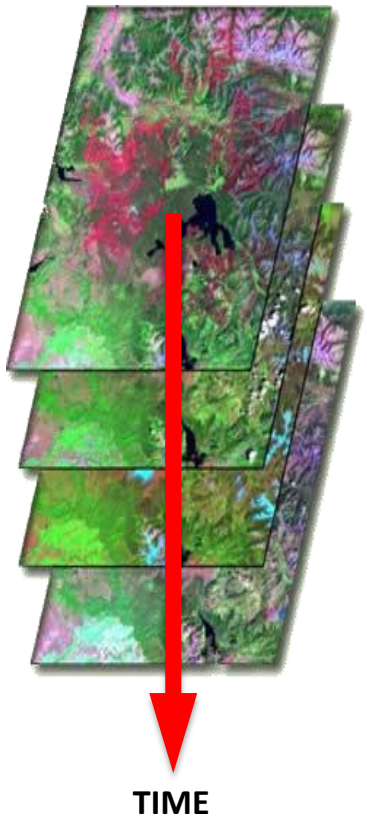
- HDF-EOS, Sinusoidal projection (equal area)

CSIRO (AWS)

- S3 array structures
- ***No*** *in file metadata*

Databases

- PostgreSQL (documents, spatial)
- AWS RDS

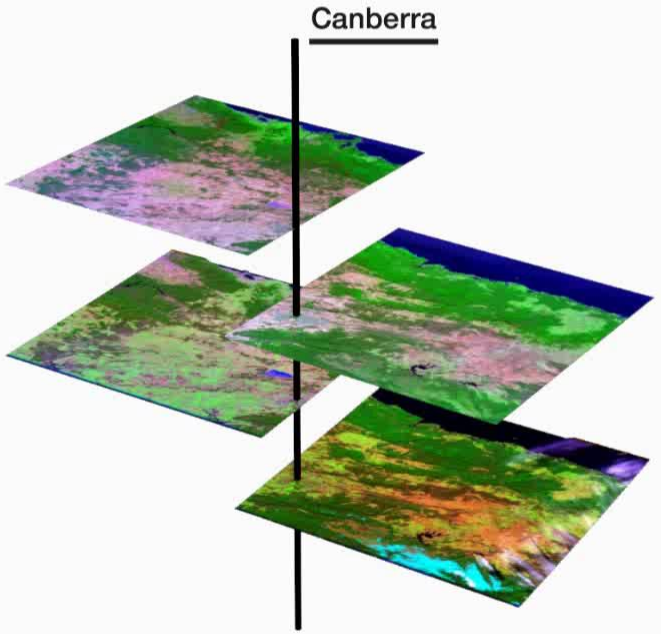


Developing the Australian Geoscience Data Cube

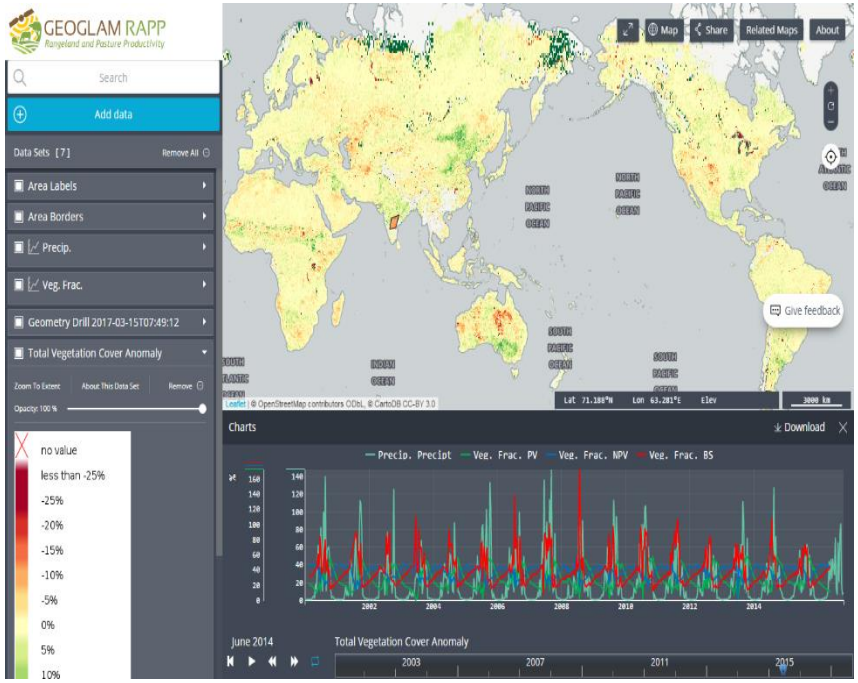
Orthorectification

Calibration

Time series



Science applications - examples & domains



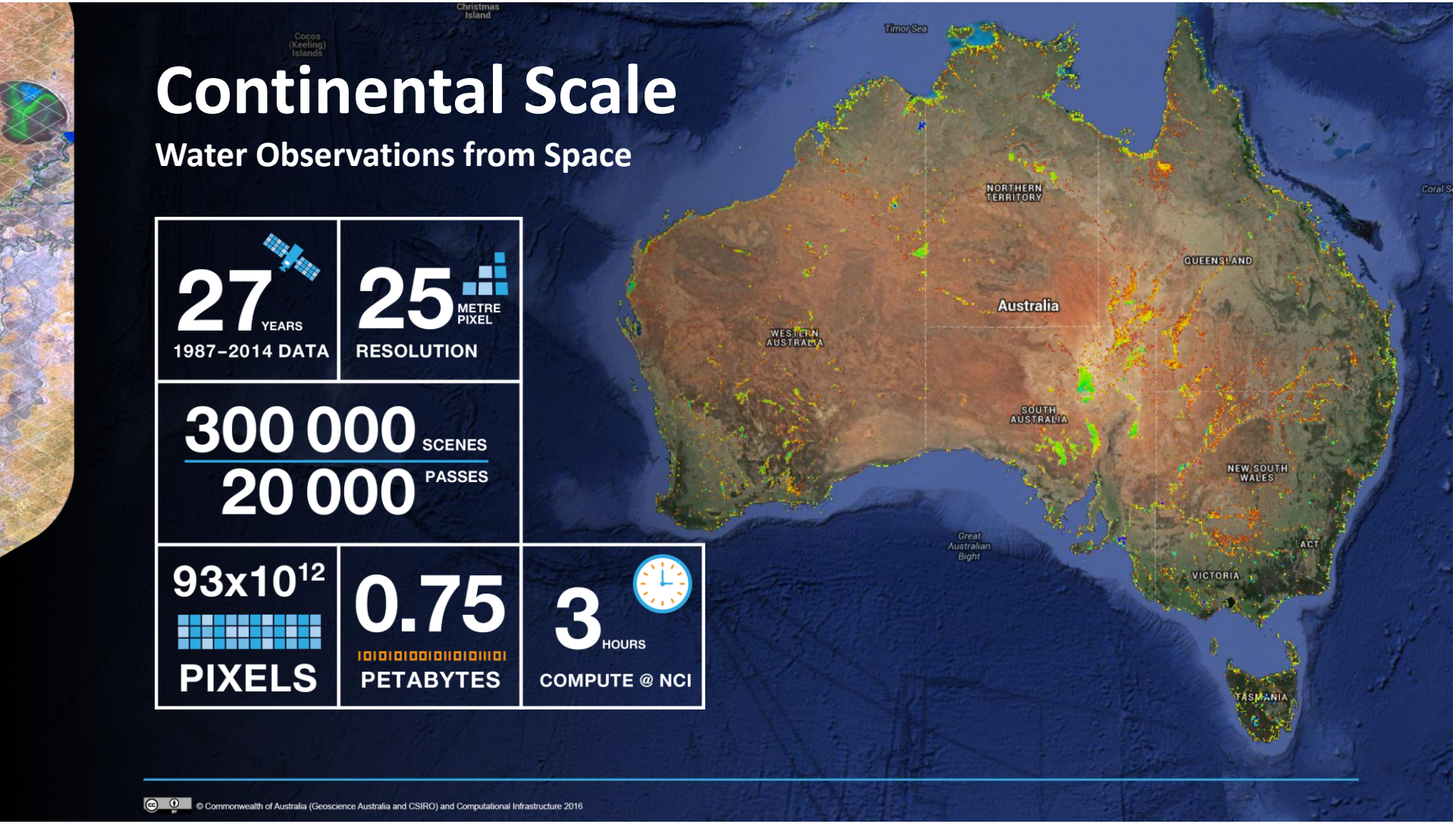
GEOGLAM RAPP
Rangeland and Pasture Productivity

Terrestrial

- BRDF (MODIS, Landsat)
- Fractional cover (MODIS)
- MODIS-Landsat Blending
- Surface water (WOfS)
- Agriculture
- Biodiversity

Aquatic

- Atmos. Corr
- Algal blooms
- SwamPy and Sambuca
- Coastal change
- Mangroves


Continental Scale
Water Observations from Space
27 YEARS
1987–2014 DATA
25 METRE PIXEL
RESOLUTION
300 000 SCENES
20 000 PASSES
93x10^12
PIXELS
0.75
PETABYTES
3 HOURS
COMPUTE @ NCI
Christmas Island
Cocos (Keeling) Islands
Timor Sea
NORTHERN TERRITORY
QUEENSLAND
Australia
WESTERN AUSTRALIA
SOUTH AUSTRALIA
NEW SOUTH WALES
ACT
VICTORIA
TASMANIA
Great Australian Bight
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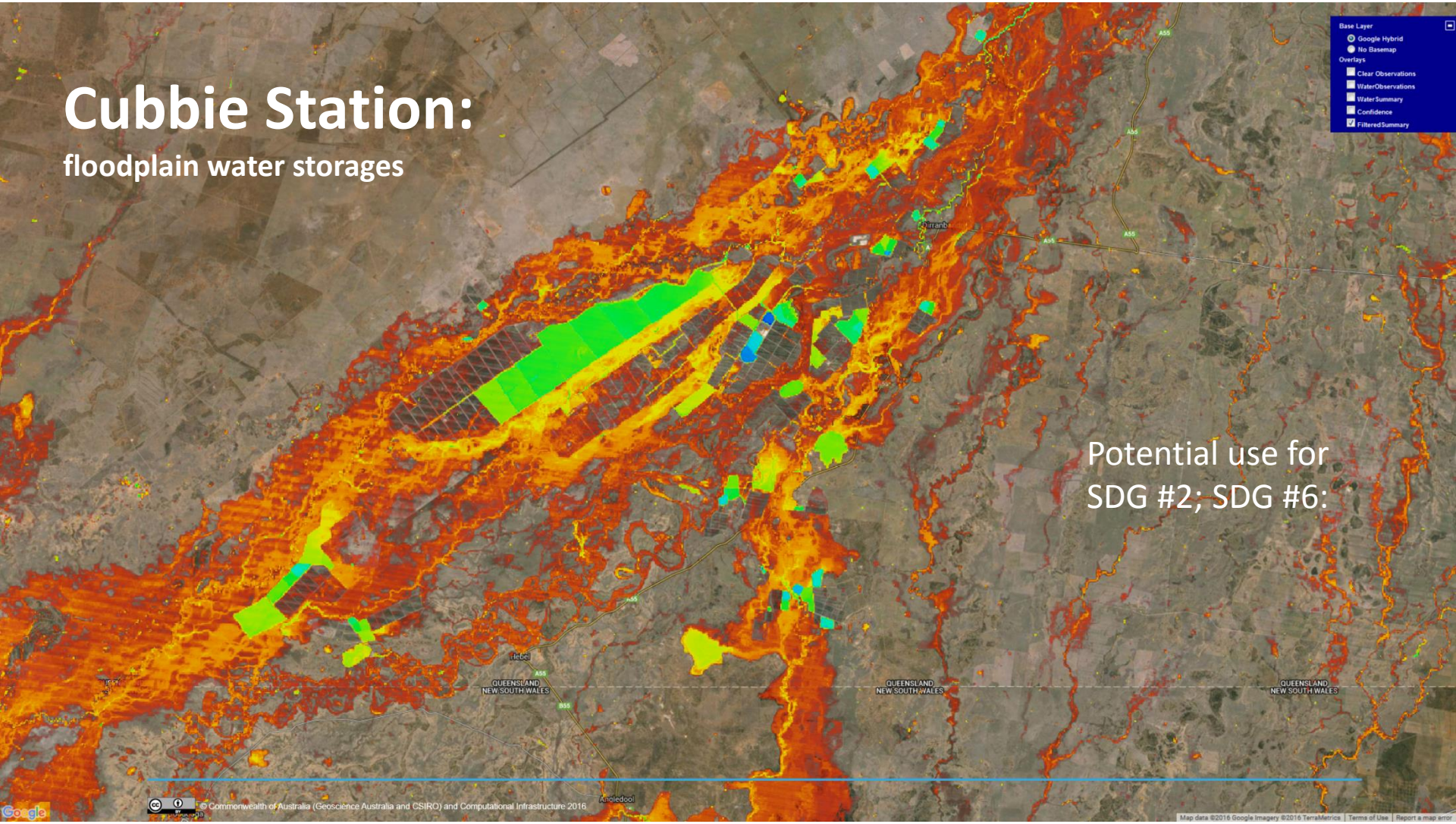
Cubbie Station:

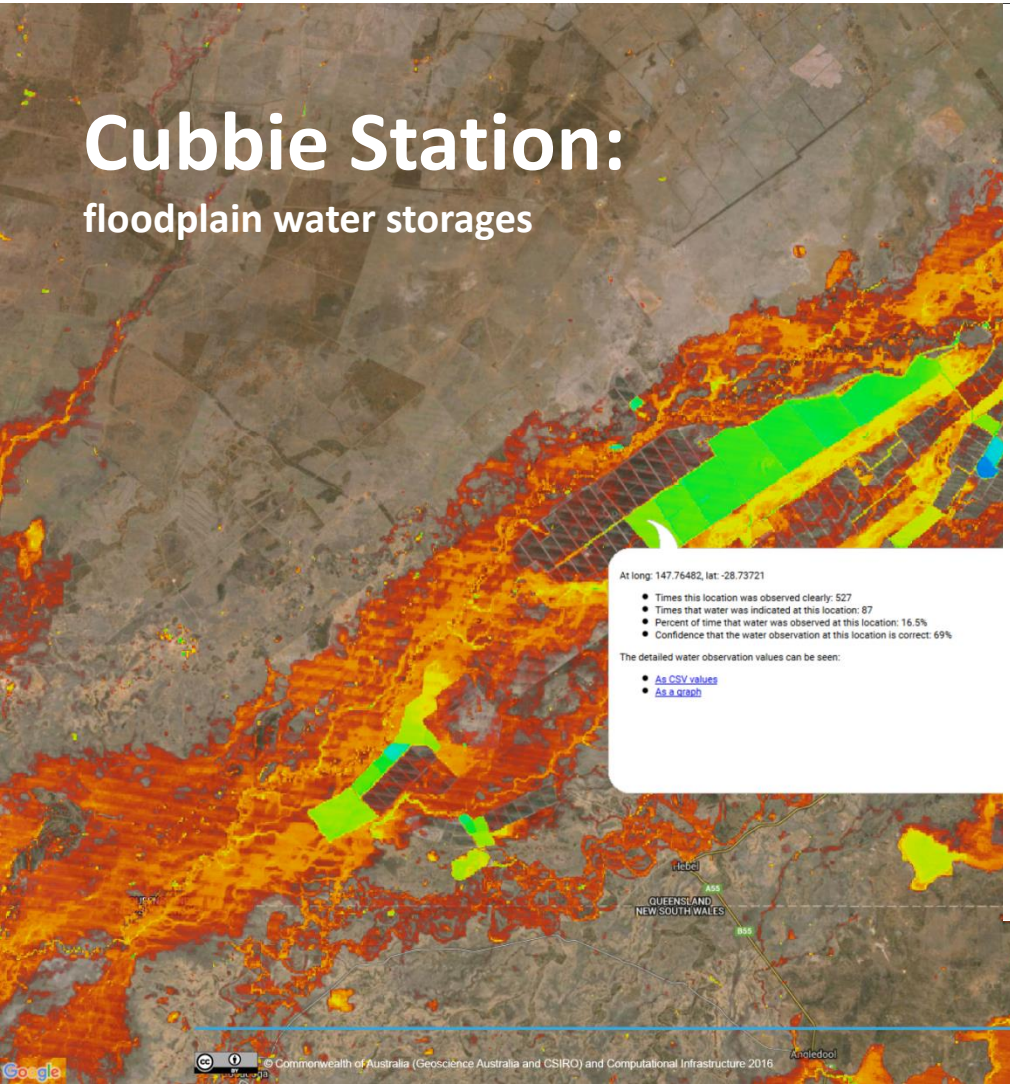
floodplain water storages

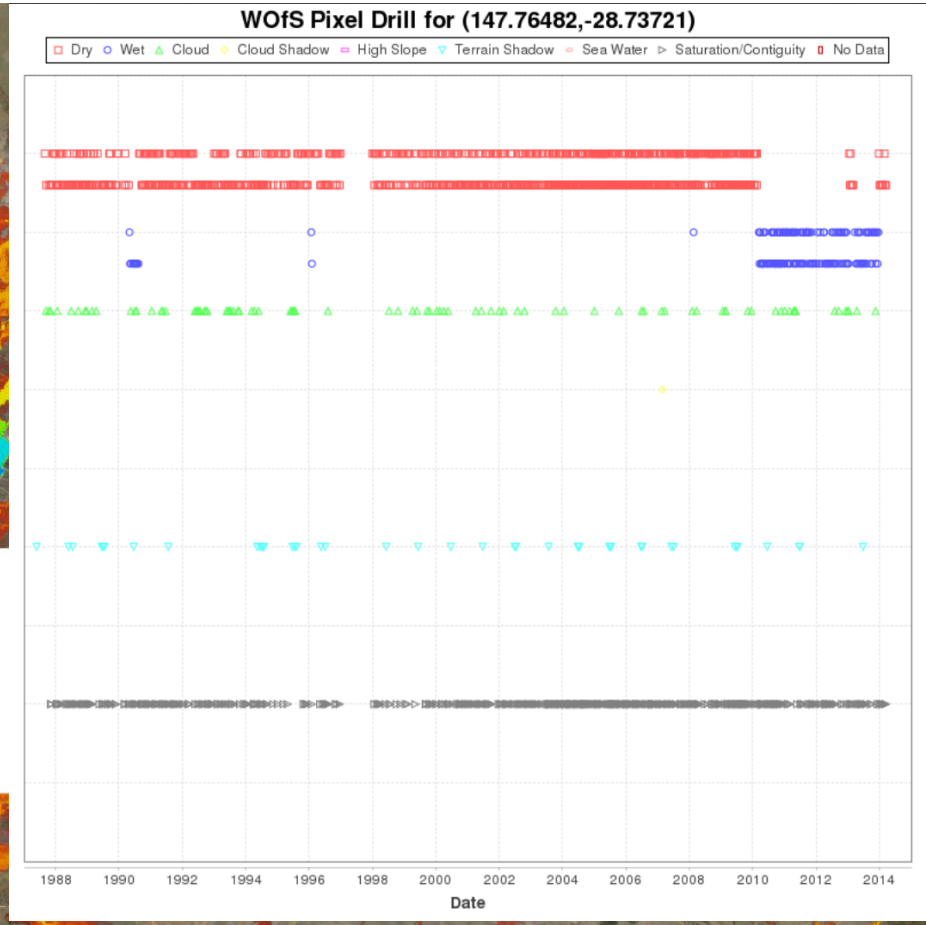


Potential use for
SDG #2; SDG #6:

Cubbie Station:

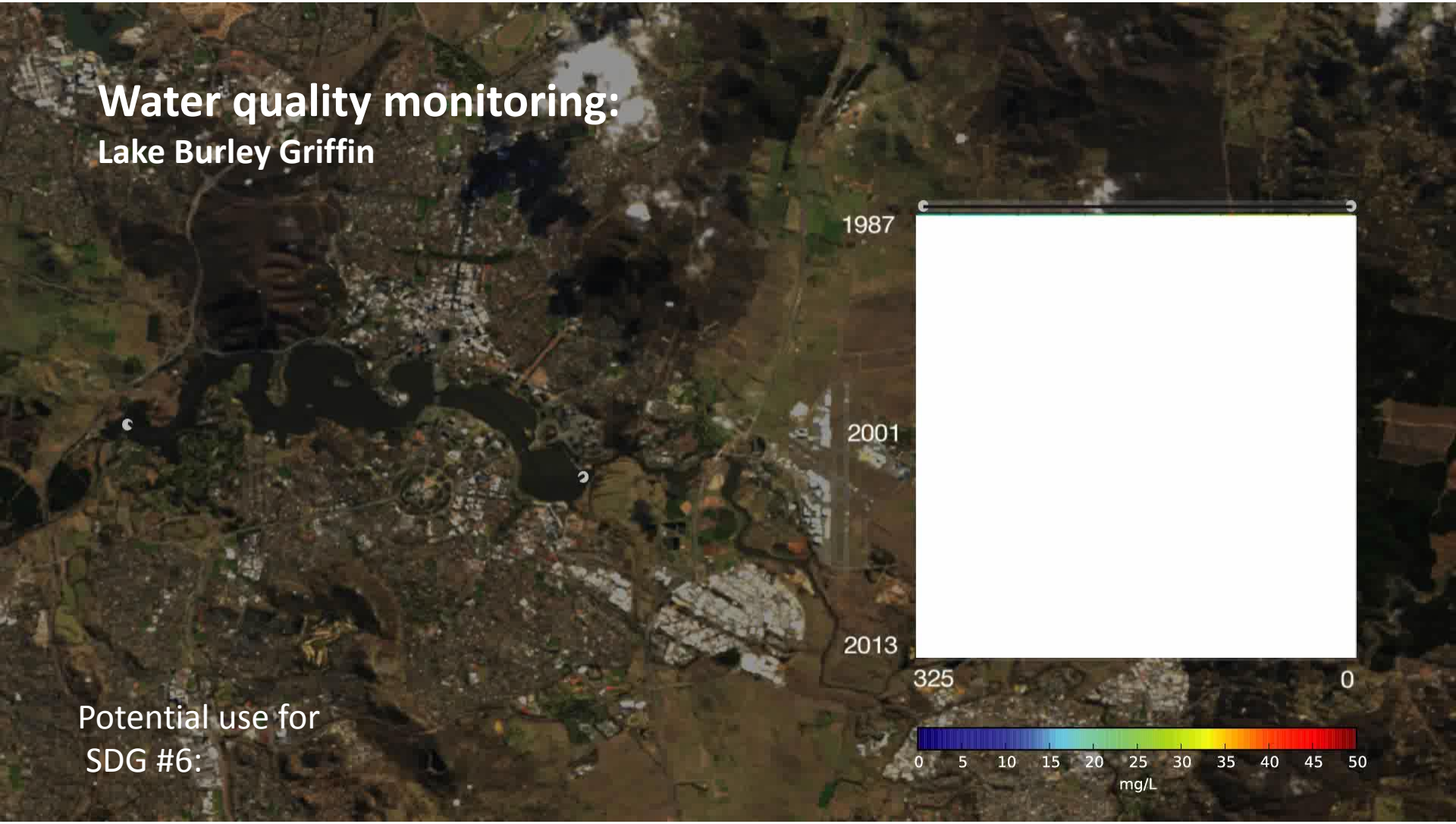
floodplain water storages






1987

Water quality monitoring:
Lake Burley Griffin



Potential use for
SDG #6:

Potential use for
SDG #2; SDG #6:

Tracking agricultural change

Asia Pacific - Open Data Cube Initiatives

Vietnam

- Began engagement in Dec 2016, following CSIRO's role as Chair of CEOS in 2015/16
- MOU signed with Vietnam National Space Center and Vietnam Academy of Science and Technology. VNSC in turn have an MOU signed with FIPI (for REDD+)
- Five visits for technical, strategic and application exchanges in 2017 (4 to Vietnam, 1 to Aust)
- Hardware, resources and initial training complete. Implementation in 2018

China

- Initial technical and strategic discussions over two visits (1 to China, 1 to Aust)
- Linked to broader satellite ground station and regional EO training centres, likely under 'Belt & Road'

New Zealand

- Proposal accepted by Centre for Space Science Technology (start-up associated with NZ Space)
- First technical workshop in Nov 2017, sponsored by NZ

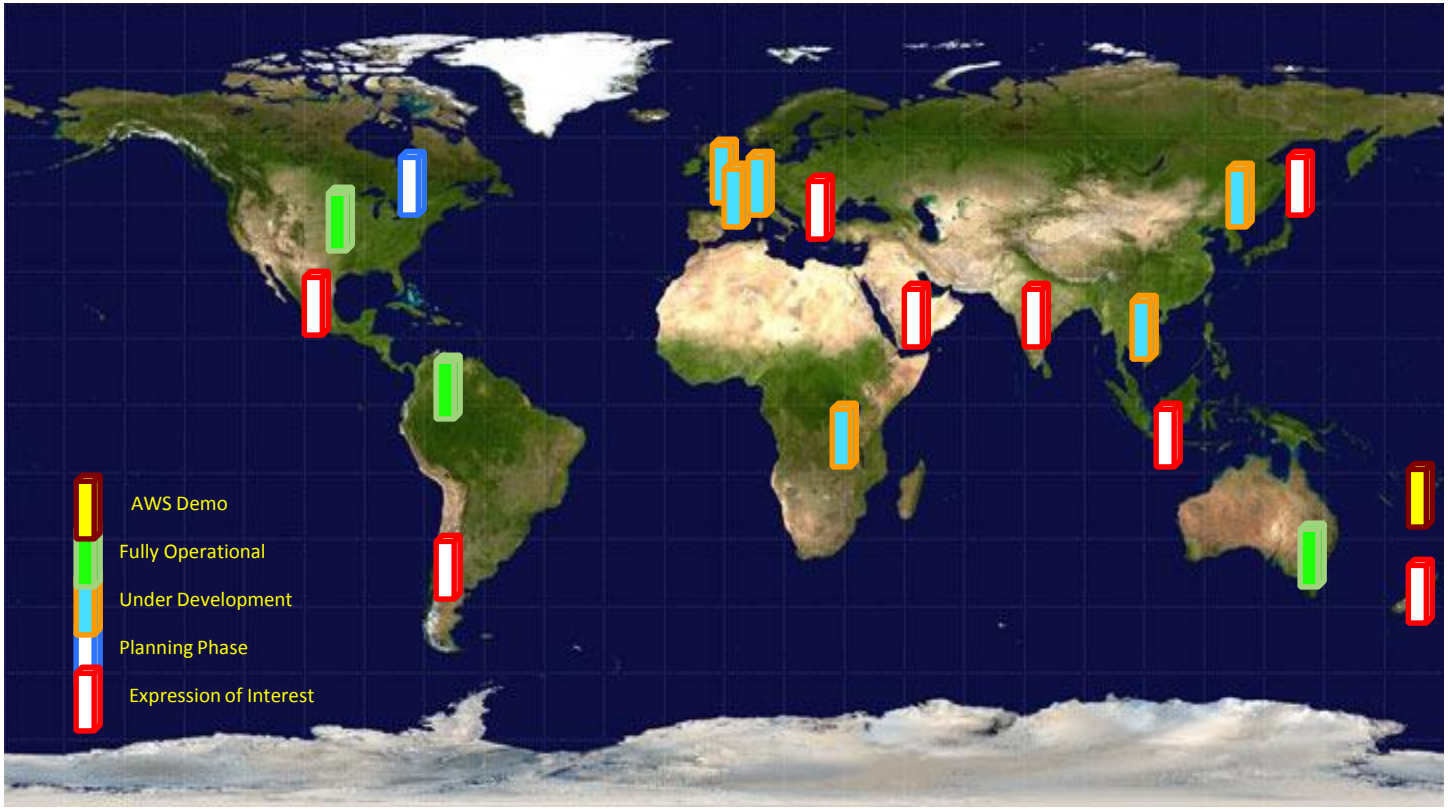
Taiwan

- Collaboration between National Taiwan University and National Space Organization
- Technical exchange visit in July 2017, sponsored by NTU

Singapore, India, Seychelles

- Early stage collaboration discussions and technical exchanges

OpenDataCube.org: Growing a Network of Compatible Open DataCubes



Regional training

ODC is building a set of standard training materials for the community (ODC events)

- IGARSS 2017, Fort Worth
- IGARSS 2018, Valencia

CSIRO runs training workshops in the Asia-Pacific region

- ..more soon (Singapore, China, Vietnam)

Contact us to discuss training at your site

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