



Australian Government
Geoscience Australia



Digital Earth
AUSTRALIA

Program Roadmap

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1 Introduction

1.1 Background

Digital Earth Australia (DEA) is an Australian government program that turns routine, reliable and robust satellite data into decision-ready information about Australia's natural and built environments. This information helps governments and industry better understand soil and coastal erosion, the impact of land management practices, deforestation, urban development, and water quality and availability.

DEA enables the processing, interrogation and presentation of Earth observation data in response to the government's priority information needs; for example, carbon farming opportunities, agricultural productivity, land use and/or forest cover in Australia.

DEA supports Australia's developing digital economy by providing businesses with access to reliable, standardised satellite data that can be used to build new algorithms and applications for commercial purposes. This helps generate new jobs and commercial opportunities, particularly in small to medium sized enterprises where such data was previously out of reach.

DEA provides a series of structures and tools that calibrate and standardise datasets, enabling the application of time series and the rapid development of quantitative information products. It uses open source standards and is designed to help both government and private industry make informed decisions.

DEA supports Australia's Earth observation community to achieve some of the broader goals outlined within the *Australian Earth Observation Community Plan*¹ and *2026 Spatial Industry Transformation and Growth Agenda*,² both of which explicitly reference the need for digital infrastructure to support industry growth, and note the importance of DEA as a key platform.

The programs also collaborates with National Research Infrastructure facilities (including the proposed Earth Observation Facility) to ensure they deliver capabilities that can transition into operation through Digital Earth Australia.

DEA benefits government departments and agencies that need accurate and timely spatial information on the health and productivity of Australia's landscape and provides Australian industry with access to stable, standardised data from which it can innovate to produce new products and services.

DEA creates opportunities for small to medium enterprise, particularly in the development of applications that can improve agricultural productivity, and provide more efficient tools for environmental accounting and monitoring.

The DEA program delivers robust data infrastructure and information products that:

1. increase the efficiency and effectiveness of Australian government programs and policies; and
2. enable Australian business to quickly capitalise on open data, and create new capabilities to increase efficiency, productivity and employment opportunities.

¹ <https://www.eoa.org.au/aeocp-the-plan/>

² <https://2026agenda.com.files.wordpress.com/2016/10/2026-agenda-ideas-v1-9-for-release.pdf>

1.2 Looking Ahead

While the DEA program (and this roadmap) is intentionally focused on the building blocks of future capability, i.e. those projects which are currently underway, and those which are on the horizon, it is important that the program maintain a view beyond the horizon that is both ambitious and formative.

To ensure it remains relevant and continues to deliver value, DEA must keep pace with the rapidly growing demand for information, the expanding capabilities of observation platforms, and evolution of integrative data-rich science. These developments will push the boundaries of current technologies and thinking about how DEA and Earth observations can be used to address national and global environmental challenges.

The long-term goal of most Earth monitoring is environmental forecasting. To achieve its full potential, DEA must aim to provide a forecast; the ability to advise on “*What will happen if...?*”, as we do for the weather, the climate, national revenues and expenses, and global populations. The establishment of a meaningful forecast for land and water provides a focus for the longer-term direction of DEA. Over time, DEA will move from characterising and detecting changes to the Earth’s surface, through to modelling and prediction. With this aim in mind, several development fronts are implied:

- DEA must be ‘future ready’. A conceptual framework that accommodates observations and modelling will allow the development of DEA to be guided by longer-term considerations as well as deliver specific products to meet immediate needs. Importantly, this framework will need to be developed in partnership with the wider science and research community.
- Characterisation, i.e. quantifying the state at a particular point in space and time, must become spatially and temporally seamless. DEA must be able to be queried at any arbitrarily nominated place and time, with quantitative estimates of uncertainty. Interpolation and estimation methods will be essential building blocks.
- Models of the behaviour of places (or objects) will be needed so that their future state can be predicted. Initially, these models will be statistical; for example the central tendency and the seasonal variation. But in Australia, where episodic events such as rainfall, wind and heat, drive our landscapes so strongly, additional co-variates (elevation, evaporation, rainfall, elevation, soil characteristics, terrain position for example) will be needed for even these empirical models to perform well.
- Process knowledge, that is models that incorporate a knowledge of process, will be increasingly called for. Examples of process models may include factors that lead a waterbody to be turbid, or a pasture to grow. A pathway will be needed to evolve statistical models into increasingly process-aware representations. This is a key challenge for the conceptual framework

The program will explore technologies such as machine learning and AI methods to generate new foundational products that will empower scientists, government agencies, and industry to generate their own applications and bespoke analytics.

Internationally, the program will look to ensure that DEA helps Australia influence key global agendas such as the Sustainable Development Goals, the Sendai Framework for Disaster Risk Reduction and the Paris Climate Accord.

1.3 Purpose

This document describes the high level workplan for DEA. It is a living document that will be regularly updated.

DEA is a highly collaborative program that is seeking opportunities to work with others to generate value to its stakeholders. The program's approach is to test ideas through innovation and rapid production of new beta products and capabilities. Not all endeavours produce viable outcomes and the program follows an iterative approach: small, smart steps; pause and learn; then build those lessons into the next stages, or halt development if required.

Working across such a broad domain with so many opportunities to choose from, DEA necessarily structures itself in a way that encourages staff to test ideas, explore and innovate to identify opportunities to meet particular stakeholders' needs. This document has been designed to promote and support this approach and send a clear message DEA staff and stakeholders alike that we want to hear about good ideas, and will act on them quickly when the opportunity arises.

This roadmap communicates the broad areas in which DEA sees opportunity to derive valuable insight for its stakeholders. Within each of these broad areas it will outline the current projects as well as priorities we see on the horizon. This approach allows the program to adapt to changing circumstances rather than being bound to a preconceived plan. Given the deliberately incomplete nature of the document, it will be updated on an ad-hoc basis as required.³

³ Initiatives in the Current Projects sections of the Roadmap are those being actively worked on in the current Program Increment (12-week period). Those in the On the Horizon sections are intended to provide a sense of potential future activity, but are indicative only and are not a definitive schedule for upcoming program increments. Projects may occasionally move between current and horizon states as priorities and activity shifts between program increments.

2 Projects

The projects listed in the following section represent a high level summary of those areas of activity in which DEA is currently investing resources and development effort. In keeping with the program planning approach, these projects are a snapshot of current priorities as defined by the program with input from its users, partners and Interdepartmental Committee.

This view of the program is subject to change as priorities shift in response to Australian government and industry requirements, advances in technology and relationships with the international satellite operators and data providers that support the Australian Earth observation community.

The section is divided into broad areas of focus (e.g. Land Cover and Land Use, Marine and Coastal, and Data Management) and further subdivided into Current and On the Horizon projects. The Current projects are those development efforts to which the program has presently allocated resources. The On the Horizon projects are potential areas for research and development that have not yet been allocated resources and have yet to be prioritised by the program.

2.1 Product Development Approach

The DEA Program takes an Agile, user-centric approach to development that aims to ensure each product or service developed by the program has a practical, real-world application that will enable positive business change for its users.

Idea

A product idea exists when DEA staff and/or stakeholders have an idea of how they might be able to gain further insights from Earth observation data. DEA staff and stakeholders are constantly engaging with new problem spaces. A product idea usually results from direct engagement with a potential user from outside the program, or from exploratory research.

Concept

A product concept is effectively a refined and tested product idea. This is the point at which at least one potential user has been consulted to work out what the product would look like in order to be useful. The product concept expands on the product idea by clearly identifying an initial product outline and user profile.

Prototype

The product prototype represents the first, minimum viable product version of the newly developed concept. A beta product will be produced and iteratively improved in consultation with potential users to ensure any major issues are resolved before the product is officially published and routinely produced.

Operational

The operational product is the published version of the product prototype. This is the point at which all systems required to routinely produce the product are up and running. Products that are available to users through NationalMap (www.nationalmap.gov.au) are listed at Appendix 1 along with other products that are accessible from the National Computational Infrastructure's (NCI), and DEA's cloud-based distribution service.

Insight

DEA measures its value in terms of the improvements we have enabled in the decisions, policies and programs of others.

Insight is the point at which DEA's products are embedded into business systems and processes to enable users to gain insights relevant to their activity, and resultantly make more informed business decisions. Often this stage will involve DEA staff collaborating directly with organisations and users to help them to embed DEA products into their business systems and processes. This is the point at which DEA's products generate real value for users, and is the how the program will measure its success.

Refinement

This ongoing phase of the product development cycle involves continuing to work with users to understand how products could be better and to ensure that the positive business changes enabled by the product are maximised, captured and promoted.

2.2 Users

Users (or end-users) are the individuals or organisations that ultimately use, or are intended to use, the products and services produced by the DEA program. In the initial stages of product development users may be represented by an archetype or hypothetical 'typical user' until a definitive user is identified. All DEA products are designed with a user in mind.

2.3 Partnerships

In cases where a user has identified the need for significant customisation or assistance to successfully embed a DEA product in its business processes, DEA may establish a project partnership. Project partners work with DEA to co-design the final product, generate support for it within their organisation, and to identify and communicate the positive business change enabled by the newly developed capabilities. Project partners invest their own time and expertise in the project in order to ensure that the DEA products will provide tangible benefits.

2.4 Interdepartmental Committee

The DEA Interdepartmental Committee (IDC) is composed of senior representatives from eight Commonwealth Government entities. The IDC assists the program in setting a strategic direction that aligns with the Australian Government's agenda and achieves the desired benefits for the Australian Government. The IDC members provide strategic insight into both the broader political landscape and specific programs within their departmental portfolios that could benefit from the application of spatial information and the DEA.

IDC members have been quick to see the value in the program for their respective portfolios and will likely have one or more Project Partners within their organisation working collaboratively on DEA

projects. The IDC plays a dual role of advocating for new projects from within their portfolio areas and advocating the potential of DEA across government.⁴

⁴ Projects in the Current Project sections are given a scale of Small, Medium, or Large. This scaling is an estimate based on the project's complexity, time frame, and resource requirements. The scale is indicative only and based on an understanding of the project requirement at the time the project is initiated. This scale may change over time as the project scope expands or is reduced (e.g. following completion of a particular phase of the project).



3 Land Cover and Land Use

Land cover is the observed biophysical cover on the Earth's surface including trees, shrubs, grasses, soils, exposed rocks and water bodies, as well as human elements such as plantations, crops and built environments. Earth observation data recorded over a period of time allows the observation of land cover dynamics. Classifying these responses provides a robust and repeatable way of characterising land cover types.

Land use information shows how our land resources are used. This includes the production of goods (such as crops and timber) and services (such as defence, recreation, biodiversity and natural resources protection).⁵ Land uses have a major effect on Australia's natural resources through their impacts on water, soil, nutrients, plants and animals. There is also a strong link between changing patterns of land use and economic and social conditions, particularly in regional Australia.

The ability to detect change in the landscape is essential for land accounting, environmental reporting and modelling applications, including modelling of climate change, erosion risk, natural hazards and carbon dynamics.

Satellites orbiting the Earth are uniquely positioned to make routine observations of a variety of physical characteristics over very large geographic areas and over extended periods of time. The scale of these observations is such that they cannot be provided as effectively and efficiently by aircraft or unmanned aerial vehicles or in-situ systems such as ground-based observatories.

State and territory governments have similar but differentiated needs for monitoring of the land cover. Each state and territory has legislation and regulation that is predicated or specifically requires forms of land cover mapping. While the classes of land cover and the uses for land cover will differ between jurisdictions and according to uses, the underlying approaches and measurements that enable this work share a high degree of commonality.

The provision of a national, medium resolution (10 m – 30 m) land cover product that is both consistent and updated on a regular basis fills several needs at the state, federal and international levels. Monitoring land cover nationally is a key requirement for several agencies in environmental reporting. It is one of several inputs to the National Land Accounts (with land value, land tenure, and land use); it is required for carbon accounting, the monitoring of tree clearing and environmental protection; it is required for agricultural monitoring and forecasting, water monitoring, and government Economic and Environmental Accounts. More broadly, land cover is a key input to State of the Environment reporting and can provide critical information for monitoring Sustainable Development Goals indicators such as desertification, land degradation and drought.

To develop a comprehensive land cover suite, DEA works with Australian Government partners, such as the Department of the Environment and Energy, and Earth observation community groups, such as the Earth Observation Australia and the Earth Observation for Government Network to engage state and federal stakeholders to find agreed inputs to a national product. The national product will include existing products where appropriate, and build new contributing products in collaboration with the

⁵ <http://www.agriculture.gov.au/abares/aclump/land-use>

stakeholders. DEA provides the mechanism to be the custodian of the processing and operational delivery of national land cover as well as develop products that help to achieve the required consistency and standards for national level monitoring and reporting.

3.1 Current Projects

3.1.1 Surface Reflectance Stats for Land cover mapping

Project	Working with	Scale
Surface Reflectance Stats for Land cover mapping	Department of Environment Land, Water & Planning, (DELWP) VIC	Small

DEA is delivering Landsat Surface Reflectance statistics for land cover mapping to the Victorian and South Australian governments. This work is being carried out in collaboration with the Victorian State Government which is providing land cover field data that is being used to validate DEA's new land cover product. Similar statistics for the Department of Environment, Water & Natural Resources (DEWNR) in South Australia are in the production pipeline.

3.1.2 Near Real Time Water Observations from Space, Sentinel-2

Project	Working with	Scale
Water Observations from Space Sentinel-2		Medium

DEA is developing a near-real-time (NRT) Water Observations from Space (WOfS) product based on Sentinel-2 data. WOfS allows users to understand the location and movement of water present in a landscape. A component of this project includes testing the quality and reliability of the classification and output of the NRT data.

A Sentinel-2 based WOfS product will feature a much improved temporal and spatial resolution over previous Landsat-based products. Water information will be made available in near real time and can be used for environmental monitoring, flood mapping, monitoring planned water releases, and management of water resources in highly regulated systems.

3.1.3 Sentinel-2 Fractional Cover

Project	Working with	Scale
Sentinel-2 Fractional Cover	University of Queensland, Cibo Labs	Medium

DEA is working on the production of a near-real-time (NRT) fractional cover (FC) product based on Sentinel-2 data. For each date that a clear NRT Sentinel-2 scene is available, a corresponding FC classification will be created that represents the proportion of the land surface that is bare (BS), covered by photosynthetic vegetation (PV), or non-photosynthetic vegetation (NPV). The FC product allows users to understand the large scale patterns and trends and inform evidence based decision making and policy on topics including wind and water erosion risk, soil carbon dynamics, land management practices and rangeland condition.

3.1.4 Fractional Cover for Department of Agriculture

Project	Working with	Scale
Fractional cover for DAWR	DA	Small

DEA is developing a composited monthly fractional cover product using Sentinel-2 and Landsat data and the Joint Remote Sensing Research Program (JRSRP) fractional cover algorithm. The composite product will support the ground cover monitoring capability of the GEOGLAM RAPP tool developed by CSIRO, NSW OEH and the Department of Agriculture.

It is expected that the product will provide fractional cover at up to 10m resolution and deliver monthly and seasonal composites to the environmental monitoring community.

3.1.5 WA Ground Cover

Project	Working with	Scale
WA Ground Cover	WA DPIRD	Small

DEA is supporting WA DPIRD to monitor WA ground cover, wind erosion and land degradation. This collaboration involves DPIRD validating the fractional cover product for WA and becoming direct users of the DEA API with training and support from DEA.

3.1.6 Waterbody Area Mapping and Monitoring (WAMM)

Project	Working with	Scale
WAMM	MDBA, NSW DOI	Medium

This project uses the Water Observations from Space product to identify persistent water in the landscape. Polygons identifying the locations of dams and on-farm storages will be produced, and an accompanying time series of fill and draw down events for every identified water body will be pre-computed. These results will be provided to project partners via a web service.

3.1.7 Crop and Dam Mapping

Project	Working with	Scale
Crop and Dam Mapping	MDBA, NSW DOI	Medium

Water availability is a critical factor that drives agricultural decision-making and financial outcomes for primary producers. Using satellite data the DEA can develop information on spatial and temporal trends in water use which is critical for adaptive decision-making about how to manage scarce water supplies. Understanding irrigator responses to changes in water availability and irrigator responses to seasonal changes is also critical for building strategies to support effective management of water resources.

Following the successful completion of an irrigated crop mapping trial, DEA will develop a national scale NDVI percentiles product and evaluate its suitability for irrigated crop extent mapping.

3.1.8 National Land Cover Project

Project	Working with	Scale
National LCCS	University of Aberystwyth	Large

This product extends a successful trial implementing the United Nations Food and Agriculture Organisation Land Cover Classification System, to provide annual, continental land cover and land cover change for Australia.

3.1.9 Tasselled Cap Statistics

Project	Working with	Scale
Tasselled Cap Statistics	DoEE, CEWO, Groundwater Branch (GA)	Small

The tasselled cap statistics project will deliver percentiles of the brightness, greenness and wetness indices. These percentiles provide insight into the temporal dynamics of wetlands, salt lakes and groundwater dependent ecosystems.

3.1.10 Urban Feature Classification

Project	Working with	Scale
Urban Features	ABS	Medium

This project will investigate the use of DEA and EOS to identify urban areas and detect changes due to construction or other phenomena. The first phase of the project will involve developing an operational workflow based on machine learning approaches to urban feature classification.

3.1.11 Burn Extents

Project	Working with	Scale
Burn Extents	Australian National University, Tasmanian Government	Medium

The DEA Burn Extents project is developing automated algorithms to map burnt area extent, and incorporating existing burn scar algorithms from other agencies. This will provide a set of burn scar mapping tools at the Sentinel-2 and Landsat scale, plus investigate incorporating MODIS-based burn scar mapping into DEA. In addition a new set of fire severity tools are being investigated to help understand the impact of fires in the Australian environment.

3.1.12 Wetland Insight Toolkit (WIT)

Project	Working with	Scale
WIT	DoEE, CEWO, MDBA, QLD DES, QLD Herbarium, VIC DELWP	Medium

This project will develop a wetland asset monitoring web service. This service will pre-compute WOfS, fractional cover and tasselled cap wetness, updated with every new Landsat observation. This data will be made available as an image via a clickable web service. This product will allow DOEE, CEWO

and the MDBA to monitor changes in the wetness and vegetation health of identified wetlands across Australia. Initially this project will target wetlands listed under the Ramsar Convention on Wetlands.

3.1.13 Environmental watering in the Murray-Darling Basin since 2014

Project	Working with	Scale
Environmental watering in MDB	CEWO	Medium

The CEWO and Geoscience Australia are working together to describe the temporal and spatial characteristics of wetland inundation associated with environmental water delivery in the Murray-Darling Basin (MDB). This will include:

- Determining the spatial extent of inundation for each site for each event from 2014-2018 at each Ramsar site across the Murray Darling Basin
 - Determining the additional impact of environmental watering events;
- Identifying the area of each specified vegetation type for each Ramsar site inundated for each event for a range of specified time intervals.
- Verifying the remotely sensed extent with available ground-truthed data (e.g. OEH dataset in NSW)
- Identifying potential changes in vegetation condition across each Ramsar site using an appropriate metric. Where possible, verifying this remotely sensed data with on-ground observations.

The scope is limited to Ramsar wetlands in the MDB that can be influenced by environmental water.

3.1.14 Inland Water Quality Monitoring

Project	Working with	Scale
Inland Water Quality	CSIRO, State governments, MDBA MARIS (Industry)	Medium

This project aims to establish an operational inland water quality monitoring capability on DEA, underpinned by an extensive field work campaign to acquire parameterisation and validation data. The project will enable near-real time and historical analysis of water quality components such as chlorophyll-A and suspended sediments, to assist state and commonwealth monitoring and reporting programs. Incorporation of citizen science and other in-situ measurements will enable development of further applications such as improved identification of harmful algal blooms, and reporting against SDG indicators.

3.1.15 Change Detection and Monitoring

Project	Working with	Scale
Change detection and monitoring	DoEE and CER	Medium

This project is a scoping study to progress change detection and monitoring for DoEE and CER, following a positive evaluation of change detection methods by DoEE.

3.2 On the Horizon

Project	Objectives
National Wetlands Extents Map	Nationally mapping change in wetlands extents for State and Federal reporting on Sustainable Development Goals
National Land Use Map Integration with DEA	Greatly improved efficiency, frequency and precision in NLUM reporting.
Floodplain Monitoring	Working with the Murray Darling Basin Authority to develop automated methods to detect floodplain harvesting structures.
Mangrove Uptake by NCAS	Embed the National Mangrove Canopy Extent Map and related workflows in NCAS processes.
National Soil Condition	DEA will work with CER, DA, DoEE and other stakeholders to develop a national soil condition map.
National Vegetation Condition	DEA will work with CER, DA, DoEE and other stakeholders to develop a national soil vegetation map.
MDBA Water Information in the Northern Basin program	DEA will work with the MDBA to deliver products and services in support of its Improving Water Information in the Northern Basin program.
Reducing Life Lost from Heatwave Project	Provide green space information to assist investigation of which Australians are most at risk in heatwave conditions



4 Marine and Coastal

Through the establishment of an ocean and coastal monitoring capability, Digital Earth Australia (DEA) aims to provide a suite of products and tools that can be used to tackle a broad range of marine applications spanning mapping and monitoring environmental conditions, offshore resources and fisheries sectors. However, as DEA's experience lies predominantly in the terrestrial domain, it will be essential that the program work with experts from across the marine and coastal domains to identify where it can provide value.

There are a wide range of government stakeholders working on specific applications in the water quality area; including the Integrated Marine Observing System (IMOS), Australian Institute of Marine Science (AIMS), CSIRO and the Bureau of Meteorology (BoM). DEA will seek to leverage the expertise of these and other groups to support development of new capabilities in marine and coastal monitoring, and build consensus around best practise methods to implement, identifying key users and stakeholders, and determining a longer term strategy for meeting their requirements.

By leveraging the time series data and analytical capability DEA provides, we will provide government with a combination of historical baselines, operational and monitoring products, and high quality scientific analysis tools. The ability to target these capabilities at a continental scale and high spatial resolution of 10-25 m uniquely positions DEA to tackle a range of problems not currently addressed in government programs, and provide solutions which complement existing scientific and monitoring efforts.

Specific issues that can be addressed by a DEA marine capability include mapping sea-surface properties across the marine estate to monitor ocean temperature and identify marine heat-waves, trace patterns in sediment discharge from land to sea in sensitive coastal areas, and map changes in the extent and health of coastal mangrove forests and seagrass meadows as a measure of blue carbon storage. As the DEA data holdings continually improve, so will the complexity of the algorithms it can support, enabling more complex ocean variables such as chlorophyll to be derived, to further understand the health and productivity of our oceans.

One of the challenges in working in this environment is the requirement of calibration, validation and in-situ data; held and acquired by a wide range of commonwealth, state and academic institutions. In collaboration with CSIRO, the DEA program is collating comprehensive databases of these available field data in the marine environment. This will enable the development and application of algorithms to produce high resolution monitoring and mapping capabilities for a range of ocean and coastal variables.

The ability of the DEA to produce both historical and near real-time products means that current events or seasonal effects can be interpreted in relation to robust historical baselines, enabling informed management decisions to be made.

A key area of application will be reliable mapping of changes in the position and stability of coastal landforms, such as river mouths (harbours), intertidal areas and urban beaches. Documenting change in the geomorphology of these areas provides necessary context for understanding responses to climate change impacts, notably coastal erosion as forced by sea-level rise and intense storms. To

ensure consistency of this analysis, DEA coastline change products will be linked to the national coastal sediment compartments framework, providing functional boundaries to the coast within which practical management strategies can be applied.

4.1 Current Projects

4.1.1 Shallow Water Habitat Mapping

Project	Working with	Scale
Shallow Water Habitat mapping	CSIRO, State Governments, SatDek	Small

This project is exploring the use of satellite imagery to detect seafloor habitats, bathymetry and water column properties in marine waters that are shallower than about 20 m depth. The project will initially focus on identifying seafloor habitats using a three part classification: green, white and brown - a broad proxy for vegetated, sand and mud environments.

Near-real time and historical analysis will support managers of marine estate with their monitoring and reporting programs. Preliminary capability testing and development will focus on detecting seagrass meadows across various locations in Australia. Seagrasses are essential contributors to coastal ecosystem health and stability as well as the blue economy.

4.1.2 Bureau of Meteorology Sea Surface Temperature Products

Project	Working with	Scale
BoM SST	BoM	Small

This project will work closely with the BoM to establish a functional pipeline to integrate the community standard sea surface temperature products (GHRST) produced by the Bureau. Establishing this capability will enable ease of access to end users such as DoE and Marine Parks, and value-add analysis to be more easily conducted.

4.1.3 National Mangrove Mapping V.2

Project	Working with	Scale
National Mangrove Map	DSITI QLD, University of Aberystwyth	Medium

This project will improve upon the methodology used to produce the National Mangrove Map version one product and address issues with the underestimation of national mangrove extents.

4.1.4 Coastal Change Characterisation

Project	Working with	Scale
Coastal Change	NEMO (GA)	Small

The development of tidally tagged composites that are used to generate NIDEM identified areas where the coastline has changed at some point over the last 30 years. This project will place those

areas of change into the context of the coastal compartments and 'smartline' coastal geomorphological classifications. This project will identify coastline types where EO techniques can be used to understand coastal stability and coastal erosion risk, and demonstrate how EO techniques can provide insight into rates of coastal erosion for some coastline types.

4.2 On the Horizon

Project	Objectives
Ocean Colour & SST Statistical Summary	Develop a range of flexible tools to enable time series and statistical analysis of the full range of ocean EO products. These tools will underpin products that provide insights into marine heatwaves, cold water upwelling events, chlorophyll dynamics, and ocean current dynamics



5 Analysis Ready Data

Analysis Ready Data (ARD) is Earth observation data that has been processed to a minimum set of requirements and organised into a form that allows immediate analysis with a minimum of additional user effort and interoperability both through time and space, and with other datasets. ARD is a fundamental starting point for further analysis, and ARD collections such as Surface Reflectance Landsat data form the basis for the majority of the information products currently produced by DEA.

The DEA program will steadily increase the breadth and depth of its analysis-ready collections with the addition of data from a range of satellites sensors and, in time, other sources of Earth observations such as rainfall and stream gauge data, radiometric and climate surface information.

Over the next two - four years, the DEA program anticipates creating and extending ARD collections from the following satellites: Landsat-5, Landsat-7; Landsat-8; Sentinel-1A / 1B; Sentinel-2A / 2B; ASTER, Sentinel-3A / 3B; Himawari-8; Terra and Aqua.

5.1 Current Projects

5.1.1 Analysis Ready Data - Production Code Upgrade

Project	Working with	Scale
ARD Code Upgrade	MDBA and DoEE	Medium

The Surface Reflectance Definitive project represents the formative piece of work being undertaken by DEA to deliver surface reflectance products based on Landsat and Sentinel-2 data.

The project will focus on the development of code to enable routine delivery of definitive, Sentinel-2 and Landsat surface reflectance products. The definitive products make use of the latest, up-to-date ancillary information regarding atmospheric constituents such as aerosols and water vapour.

Planned algorithm/software (wagl) upgrade:

1. MODTRAN 6 integration: improved efficiency (3 to 1); updated solar irradiance file for SR improvement in blue and ultra-blue bands, replace flux table method to avoid errors for water absorption bands, e.g., Sentinel-2 band 9.
2. New angle implementation: this improvement will avoid mosaic boundary issue due to different aerosol data used in adjacent Sentinel-2 tiles and for the streamlined implementation of the algorithm for new sensors.
3. Terrain mask: to avoid noise in flat area in terrain illumination corrected Surface Reflectance products (NBART).
4. BRDF: Collection 6 BRDF implementation and surface structure based BRDF (instead of scene based). It will improve the SR for data captured both in summer and winter.
5. Improved ancillary inputs, such as ECMWF and similar data available from BoM.
6. Land Surface Temperature (LST).

5.1.2 Surface Reflectance Validation

Project	Working with	Scale
Reflectance Validation	CSIRO, TERN, AusCover	Medium

The DEA Reflectance Validation project aims to establish a nationally agreed field validation strategy for the DEA surface reflectance product. It is intended that the strategy will also serve as the basis for community-led collaborative validation of other optical EO products.

In collaboration with CSIRO and state and territory actors, the DEA Reflectance Validation project will develop good practice field measurement protocols, identify appropriate validation sites across Australia and collect field data for use in validation of the DEA surface reflectance products. Phase 1 of the project concluded recently with data collection completed for over a dozen sites across Australia. Planning for Phase 2 of the project has commenced for data collection over complex sites with vegetation and terrain. Validation of surface reflectance and other products is critical for ensuring their quality, and for users to determine the products' fitness for purpose.

5.1.3 Aquatic Surface Reflectance

Project	Working with	Scale
Aquatic Surface Reflectance	CSIRO	Medium

This project will develop a surface reflectance product for marine and coastal environments. Similar to the original terrestrial surface reflectance processing, adjustments will be made to the standard processing workflow to account for specific variables such as aerosols encountered in the marine environment.

Alternative ancillary data sources have been assessed, and CSIRO has validated the end product and processing workflow. The next steps involve implementing the processing workflow to deliver Aquatic Surface Reflectance.

5.1.4 National Surface Deformation

Project	Working with	Scale
Surface Deformation	Geodesy (GA)	Small

Interferometric Synthetic Aperture Radar (InSAR) is a technique that is used to produce maps of surface motion from temporal stacks of Synthetic Aperture Radar (SAR) data. Through a series of case studies, the Geodesy Section has demonstrated a range of InSAR based applications including monitoring subsurface resource extraction, subsurface tunnelling, mapping of earthquake deformation, volcano monitoring (in Papua New Guinea) and detection of nuclear tests (in North Korea).

This project will scale-up this capability in order to generate InSAR products over large areas of Australia will contribute to better constrained national geodetic products (e.g. 4D national surface deformation models).

The DEA and the InSAR Team in Geodesy will work together to achieve large-scale processing of Sentinel-1 SAR data, with the aim of generating a product(s) over a portion of Australia that can demonstrate the benefits of the InSAR capability to a range of stakeholders prior to scaling up the product to achieve national coverage.

The InSAR project is also evaluating a suite of Analysis Ready Data (ARD) products for InSAR applications. It is envisaged that output products and candidate ARD definitions from the project will contribute towards global community efforts in defining ARD products from SAR.

5.1.5 Sentinel-2 Cloud Masking

Project	Working with	Scale
S2 Cloud Mask		Small

The project is to develop and/or define and implement cloud masking algorithms based on time-series surface reflectance data. The current focus of the project is to develop a multi-temporal cloud mask for Sentinel-2 data.

This project will also inform the development of an improved cloud mask for Landsat data.

5.1.6 SAR Analysis Ready Data Development

Project	Working with	Scale
SAR ARD	CSIRO	Small

This project will:

- develop a SAR-enabled Data Cube, implementing CARD4L specifications
- help refine and promote the ARD specifications advocated by CEOS, through domestic and International Consultation
- demonstrate a small initial set of applications, namely national-scale surface water mapping and regional-scale rangeland dynamics and mapping.

5.1.7 Assessment of the ESA Sentinel-2 Surface Reflectance Product

Project	Working with	Scale
Assessment of the ESA Sentinel-2 Surface Reflectance Product	ESA, Copernicus Data Hub	Medium

This joint project with members drawn from the Copernicus Australasia Data Hub and ESA will evaluate the fitness for purpose of the ESA Sentinel-2 surface reflectance product for use in Australia / New Zealand.

5.2 On the Horizon

Project	Objectives
Himawari-8 ARD	High revisit (10 minute) observation cycle for use in dryness and hotspot monitoring.
Sentinel-3 ARD	Provision of data continuity for MODIS program and ocean monitoring applications.

Project	Objectives
Climate Data	Establishment of a climate data collection from sources such as DoEE and BoM data archives.
Assess Quality of USGS LST product	Review USGS land surface temperature products for accuracy and quality.
Surface Reflectance Near-Real-Time Service	Deliver Landsat-7 ETM+ and Landsat-8 OLI Surface Reflectance products in near-real-time for up-to-date compliance monitoring and change detection by users.
Multi-sensor ARD Inter-comparison and Sensitivity Analysis	Provide answers for two fundamental questions: 1. How well do Surface Reflectance products from multiple sources or sensors compare through time (consistency) and with respect to in-situ measurements (absolute accuracy)?; and 2. Which parameters must ARD algorithms/approaches have in common to minimise artefacts for inter-sensor operability?.



6 Platform Improvement

Addressing the storage, processing and analytical challenges posed by the increasingly significant volumes of Earth observation data from satellites and other sources is a key driving factor behind the technical development of the DEA technical platform.

Improvements to the performance and capability of the platform through regular code releases and the development of new analytical techniques will be driven in part by the requirements of the projects and project partners outlined in this roadmap, but also by the need to ensure the platform remains up-to-date with technical advances in Earth observations, data management and analysis, and high performance and cloud computing.

6.1 Current Projects

6.1.1 Open Data Cube 2.0

Project	Working with	Scale
Open Data Cube 2.0	ODC Community	Large

Now that a number of organisation are making operational use of the ODC, the patterns of its use are better understood. By having access to use cases, DEA has been able to identify opportunities to simplify the project.

In order to implement these simplifications, it's necessary to make breaking changes in the code. This project seeks to create a new major version of the ODC - Version 2.0. Consequently downstream software will need to adapt. More importantly, Version 2.0 provides an opportunity to modernise and simplify the project in a range of areas. The work will be undertaken as a collaborative effort between ODC stakeholders including GA and it will be widely socialised throughout the broader ODC community.

6.1.2 Automation and Orchestration

Project	Working with	Scale
Automation	ODC community	Medium

Arguably the most import aspect of DEA is the delivery of data products to end users. This requires a huge amount of software and data to be deployed, tested and run on an ongoing basis.

This project involves the ongoing improvements to the automatic systems that test and deploy software, and then run said software on freshly available data to produce the end data products.

There will always be some level of manual intervention required, for some of the quality checks, but this should decrease over time as more automation is put into place, and our monitoring improves.

This project will complete the automation of DEA's current Landsat data processing pipeline. This will increase the efficiency of processing downloaded and downlinked Landsat data through to surface reflectance and ensuring lower latency of Australia's national Landsat archive.

Additionally, the project will explore ways that data pipelines can share code between cloud and on premise pipelines.

6.1.3 SpatioTemporal Asset Catalogue

Project	Working with	Scale
STAC	International EO community	Medium

SpatioTemporal Asset Catalogue (STAC) is an emerging metadata standard that is being developed in conjunction with international collaborators including:

- providers of free EO data;
- commercial satellite operators and EO data on-sellers;
- Academia.

DEA is engaged with the STAC project to ensure that DEA products are made available with the most accessible metadata. This will mean tools developed for interacting with DEA data are interoperable with that of other EO data providers and vice versa.

6.1.4 Scalability and Performance

Project	Working with	Scale
Scalability	ODC community	Medium

The core Open Data Cube code upon which most of the DEA infrastructure relies upon for data access and management has served us well for most of our operations so far. However, as the quantity and variety of data being managed grows, we need to stay ahead of the curve in ensuring any performance bottlenecks are addressed before they can cause any serious problems.

Issues likely to be addressed include:

- The PostgreSQL database currently handles 10's of concurrent users and stores 10's of millions of dataset records. Assess what work is required to grow to meet the demands of hundreds of users and hundreds of millions of datasets.
- Improve software performance of AWS hosted Open Data Cube: OGC Web Services.
- Legacy approaches to data processing which limit the performance and usefulness of newly developed multithreaded algorithms such as the geometric median. This has a particular impact on continental scale analysis, leading to wasted time and increased failure rates.

6.1.5 Architecture Documentation

Project	Working with	Scale
Architecture Documentation	ODC community	Medium

DEA has a wide range of software used in the production and delivery of its data products and services. There is ongoing work required to ensure that all of the technical processes and tools are adequately documented. Having suitable documentation is also necessary for effective collaboration with ODC partners, by making it clear what problems our software is solving, and how it is architected to solve those problems.

6.1.6 DEA Sandbox and Science Algorithm Portability

Project	Working with	Scale
Algorithm Sharing	ODC community	Medium

The same satellite data which DEA relies upon for its products is also used around the world by many organisations to create their own products and monitoring systems.

Several organisations are starting to use the underlying Open Data Cube code for their data management. But at the moment there is significant work required to transform the algorithms which operate on the data.

By ensuring that as many example algorithms as practicable are able to be run on the DEA Sandbox, we gain confidence that these algorithms are portable. There are potential time savings and collaboration opportunities that arise from being able to readily share our science algorithms with other parties. Inversely, DEA also benefits from being able to run algorithms developed elsewhere on our own data.

6.2 On the Horizon

Project	Objectives



7 Data Visualisation and Delivery

Data visualisation (the presentation of data in a pictorial or graphical format) is particularly important when dealing with the complexity and scale of Earth observation data. Data visualisation enables decision makers to see analytics presented visually, simplifying difficult concepts and identifying patterns in the data that might otherwise be overlooked. Interactive visualisation takes the concept further by using technology to drill down into and manipulate the data to enable customisation of scenarios and the analytical outputs for particular purposes.

The DEA program will develop (and support development of) a range of data visualisation tools and services that will enable users to manipulate, analyse, interpret and present Earth observation data and information products in ways that are meaningful and relevant to the users' needs. DEA aims to use industry-standard protocols and formats wherever possible.

A suite of standards-based technologies are used to share this spatial data, typically set out by an organisation such as Open Geospatial Consortium (OGC). A Web Map Service (WMS) can be used to display spatial data with a style or colour ramp, to be viewed on websites or in Geographic Information System (GIS) software. A Web Coverage Service (WCS) is used to transfer the underlying data between applications, such as a server to a client GIS package or analysis tool. A Web Processing Service (WPS) is used to run an analysis tool remotely, and return the results to the user. The combination of these can bring the required information to a user, without having to download entire datasets.

7.1 Current Projects

7.1.1 Digital Earth Australia Hotspots Upgrade

Project	Working with	Scale
Digital Earth Australia Hotspots	DiSI, Landgate WA	

DEA Hotspots (previously known as Sentinel Hotspots) is a cloud-based Mission Critical Application in Geoscience Australia which is currently undergoing an upgrade to the User Interface and production system to improve efficiency. The application uses satellite data to detect potential bushfires, map their impact and model their spread, and makes this information available to relevant Commonwealth, State and Territory Governments, as well as the general public.

DEA is collaborating with Landgate to develop a national hotspot system to remove duplicate systems, ingest new hotspots sources, increase cost efficiencies and implement research outputs developed by the Bushfire and Natural Hazards Corporative Research Centre.

7.1.2 Jupyter Hub

Project	Working with	Scale
Jupyter Hub	FrontierSI	

DEA is collaborating with FrontierSI on the development and hosting of an integrated analytical platform to demonstrate the use of Open Data Cube with Digital Earth Australia's cloud hosted decision ready data. The goal of this platform is to attract and inspire small and big businesses to tap into known and emerging applications of remote sensing data to stimulate economic growth within Australia. In an effort to ensure our systems are safe and resilient to attack we always perform security enhancements alongside all our other feature enhancements. To measure progress and manage risk, an external audit will be conducted to validate the program's security configuration.

7.1.3 NEII Viewer Extension

Project	Working with	Scale
NEII Viewer Extension	BoM	Small

The National Environmental Information Infrastructure (NEII) Viewer Extension project will link the Bureau of Meteorology's stream gauge network data set with the DEA's historical Landsat archive to enable the visualisation of the extents of environmental flooding. The project will also establish the protocols, workflows and services necessary to link additional data sets in the NEII and DEA data collections.

7.1.4 Open Data Cube Web Processing Service Development

Project	Working with	Scale
ODC WPS		

DEA intends to enable on the fly time series analysis of its EO archive and derived products through the WPS standard to platforms such as National Map. Exposing this functionality through intuitive workflows and reusable, standard interfaces will mean that these services can be consumed and enjoyed by a greater audience.

7.1.5 NCI Web Services Development

Project	Working with	Scale
NCI Web Services Development	NCI	Small

This project supports the development of NCI's Geospatial Data Server, GSKY, which provides a key component of DEA's data delivery infrastructure. The objective of the project is to provide enhanced data services which support improved data delivery services.

This project has produced a new "combined surface reflectance" web service, combining Landsat missions 5, 7, 8 with Sentinel 2a and 2b to produce a single, intuitive service for the purposes of visualising satellite information.

Work is currently focused on delivering band ratio's indices including, but not limited to, Normalized Difference Vegetation Index, Normalized Difference Water Index, Modified Normalized Difference Water Index and NDCI on DEA's Landsat and Sentinel 2 archive.

7.2 On the Horizon

Project	Objectives
S3 Save	This project will enable users of DEA's Jupyter Hub to save, export and share insights and data they have created.



8 Data Management

At its core, DEA is a series of structures and tools that calibrate and standardise datasets, enabling within-sensor time series analysis and the rapid development of quantitative information products. DEA addresses the formerly costly and time-consuming process of downloading, analysing and providing satellite imagery and other geospatial datasets to users.

By calibrating the entire data stream to the same standard in advance and by making the data accessible in a High Performance Data (HPD) structure co-located with a High Performance Computing (HPC) facility, the data can be viewed as enabling infrastructure for data-intensive science.

Over the next ten years, the volume of EOS data available to Australian programmes is set to grow substantially, having already taken our storage requirements from the terabyte to the petabyte scale. The acquisition, storage and management, search and discovery of these rapidly increasing data collections is a critical facet of the DEA program. DEA will continue to develop and improve tools for the management of its data and metadata, the automation of processing for ancillary data, and improved search and discovery of its collections.

Alongside improvements to data management tools, DEA will work to increase the efficiency of its ARD processing pipelines to ensure the enduring availability of high quality Australian data archives. Of primary importance to the current suite of DEA products are the currency, integrity and quality of its Landsat archive.

Historically, Landsat data has been downlinked or downloaded from the USGS Landsat satellites and online archives, processed to surface reflectance for Australian conditions, then used to develop a range of derived information products such as Water Observations from Space, Fractional Cover, and High and Low Tide Composites.

During 2018, DEA will undertake a systematic review of the potential impact of transitioning from an Australian managed data architecture to one in which Landsat Level 1 processing is handled by the USGS. This is a fundamental change that may have lasting impacts on the downstream products produced by DEA and other Australian users of the Australian Landsat Archive managed by Geoscience Australia.

The reasons for undertaking this review, and potentially switching to a USGS managed pipeline, are variously:

- USGS-managed Landsat archives are several generations ahead of the Australian archives in terms of processing software and correction algorithms applied to the base satellite data.
- Maintaining (potentially unnecessary) separate processing pipelines is inefficient when USGS-processed data may be suitable for the vast majority of Australian applications.
- Many Australian (and the majority of international) users are already basing their downstream products and decision-making on the USGS-processed Landsat data, making it a default standard.

DEA will work with Australian end users of Landsat to understand and assess the potential impact of this change through the Collection Upgrade and Transition Analysis and other related projects.

8.1 Current Projects

8.1.1 Landsat Collection Upgrade

Project	Working with	Scale
Landsat Collection Upgrade	NASA, USGS	Medium

The Collection Upgrade project will establish a new baseline for Landsat products within DEA.

Following an initial assessment of the impact of transitioning from Australian-managed data architecture, to one in which Landsat Level 1 processing is handled by the USGS. The overall objective of the project is to ensure that DEA maintains the most efficient processing chain possible for Landsat data.

DEA will establish a new Landsat data collection by downloading Level 1 data directly from the USGS, and providing additional data in areas of particular significance to DEA via supplemental processing with DEA in-house systems. Production parameters for these supplemental datasets will be modified slightly from the USGS specification to enable more “stackable” data.

Following an initial assessment of the impacts of the new level 1 baseline, the forward program of work will adapt derivative product generation procedures to make use of the new baseline input. The collection upgrade will provide significant advantages to DEA uses in terms of maintaining consistency with USGS products and provision of the latest improvements in Level 1 processing by the satellite data providers. The upgrade represents a major advance in GA and USGS cooperation on the Landsat mission. Through influencing the production processes on the US side, GA is reducing the need for unnecessary duplication of effort.

The project will also work to introduce a new naming convention for DEA products with a view to rolling this out across other mission data as new products are developed.

8.1.2 Technical content update

Project	Working with	Scale
DEA webpage content update	NEMO (GA)	Small

This project will review and update the technical content relating to DEA products to improve discovery and consistency of product documentation across our range of products and services.

8.2 On the Horizon

Project	Objectives
Asia-Oceania Data Hub	This project will establish and maintain an operational Asia-Oceania regional storage and synchronisation service for satellite data in the Asia-Oceania Region.

9 Industry and Community Engagement

Almost every sector in the Australian economy benefits from the use of spatial information and location technologies. Spatial information from Earth observations from space (EOS) contributes around \$5.3 billion annually through various industry programs, and is projected to generate over 15,000 jobs by 2025.

Globally, the forecasted growth of 30% per annum in geoservices provides a great opportunity for Australian companies to increase their businesses on an international scale. This market has already created around 4 million jobs worldwide, and has the potential to increase productivity in sectors representing around 75 per cent of the global economy.

Enabling the Australian spatial industry to exploit the full value of EOS information to enhance their business and be competitive in global markets is a key goal of DEA. The products created by Australian businesses and researchers using DEA will be transferrable to international markets as they evolve. The underpinning satellite data is global, and the United Kingdom, United States, Canada, and South Africa, Colombia and Vietnam are exploring their own deployments, based on DEA.

Understanding the requirements of Australian businesses for Earth observations, data infrastructure, and information products is integral to the success of DEA and to fully realising the benefits of spatial information.

In addition to direct industry partnership projects, DEA continues to work with community coordination groups such as Earth Observation Australia and the Earth Observation for Government Network to better understand broader Australian requirements for Earth observation products and services. DEA continues to work with these groups to coordinate the implementation of the *National Earth Observation for Space Infrastructure Plan*, the *Australian Earth Observation Community Plan 2026* and *2026 Spatial Industry Transformation and Growth Agenda*.

9.1 Current Projects

In 2018/19 DEA undertook a nationwide consultation process which led to the development of the DEA Industry Strategy. A key pillar of the strategy was the implementation of a pilot incubator program - DEA Labs. Announced in April 2019, DEA Labs provides successful business applicants with up to \$50,000 and technical support to prototype, test, refine and operationalise systems or products that incorporate DEA data and/or technology. DEA Labs is also helping DEA better understand the needs of Australian businesses and tailor its approach to industry engagement.

The 2019 pilot round of DEA Labs received over 30 applications from multiple sectors – triple the number anticipated. Eight projects were shortlisted, three of which were successfully funded.

9.1.1 DEA Labs - Cibolabs

Project	Working with	Scale
Data insights for Australian red meat producers	Cibolabs – Chapel Hill QLD, Frontier SI	Small

This project will support Cibolabs to use DEA to improve on-farm decision-making for Australian redmeat producers. Cibolabs specialises in providing data insights for pasture biomass, ground cover and land conditions in Northern Australia. Cibolabs is based in Chapel Hill, Queensland.

9.1.2 DEA Labs – DataFarming

Project	Working with	Scale
Mapping paddock boundaries Australia-wide	DataFarming – Toowoomba QLD, Frontier SI	Small

This project will use DEA data to automatically map paddock boundaries, a task that is traditionally prohibitive for many farmers. DataFarming specialises in simple, automated and low-cost products and services for agronomists. It is based in Toowoomba, Queensland.

9.1.3 DEA Labs - NGIS Australia

Project	Working with	Scale
Decipher Product development	NGIS – Burswood – WA, Frontier SI	Small

This project will integrate DEA data and analytics into its Decipher product, which provides farmers with detailed crop data. NGIS is based in Burswood, Western Australia.

9.2 On the Horizon

Project	Objectives
Market Research Study	This research project will help identify those Australian market sectors most ready to adopt DEA data and tools, identify challenges to the adoption of satellite data, and identify key organisations for DEA to work with in each sector.

DEA Labs (Round Two, 2019)

Building on the success of the 2019 pilot round of DEA Labs, a second competitive round in 2020 will offer proponents an opportunity to receive financial and technical support to prototype, test, refine and operationalise systems or products that incorporate DEA data and/or technology

10 International Engagement

As Australia has no sovereign satellite capability, good relationships with international satellite operators and coordinating groups are critical to ensure the ongoing supply of Earth observation data to Australia. DEA will manage Australia's engagement with these groups, and work with the Australian spatial sector to increase the uptake and relevance of Earth observations.

Geoscience Australia's geospatial expertise combined with its understanding of how to exploit satellite data means it is a valued partner of the Department of Industry, Innovation and Science (DIIS) in supporting Australia's involvement in national and international civil space activities.

GA's role in supporting Australia's space sector, with a particular emphasis on activities related to Earth observation from space (EOS) data, is explicitly recognised in both the:

- *Australian Government's Satellite Utilisation Policy* which identifies Geoscience Australia, the Bureau of Meteorology and CSIRO as "... the Australian Government Agencies jointly responsible for Australia's Earth Observations from Space activities"; and
- *Australia's State of Space Report for 2016* which explicitly identifies GA as one of the key agencies responsible for "... secur[ing] the future pipeline of key EOS data for Australia."

GA is an active member of the DIIS-chaired *Australian Government Space Coordination Committee* and are co-chairs of associated *Australian Government Earth Observation from Space Working Group*.

GA has played a highly successful role in ensuring that Australia has a secure and stable supply of satellite data and has successfully negotiated agreements with the United States Geological Survey, the European Space Agency and the European Organisation for the Exploitation of Meteorological Satellites to ensure Australia has timely access to key public good satellite data.

More generally, Geoscience Australia is Australia's principal representative to the intergovernmental Group on Earth Observation and an associate member of the international Committee on Earth Observation Satellites (CEOS).

In the near term, DEA will focus on supporting the joint USGS / GA workplan, growing the relationships with the EC and ESA through the Copernicus Data Hub, and supporting Australia's involvement in the Committee on Earth Observing Satellites (CEOS) and the Group on Earth Observations (GEO).

In addition, DEA continues to contribute code, documentation, How-to guides, tutorials, and support to international users of the Open Data Cube. The Open Data Cube (ODC) initiative seeks to increase the value and impact of global Earth observation (EO) satellite data by providing an open and freely accessible architecture, and fostering a community to develop, sustain, and grow the technology and the breadth and depth of its applications for the benefit of all.

10.1 Current Projects

10.1.1 Support for the Group on Earth Observations

Project	Working with	Scale
GEO Support	GEO, AO-GEOSS	Small

This project will influence the work of GEO through the GEO Program Board and aims to ensure that the GEO Work Program includes activities and deliverables of interest to Australia and the Australasian region.

The project will also support the development and evolution of the Asia-Oceania Global Earth Observation System of Systems (AO-GEOSS).

10.1.2 Support for the Committee on Earth Observation Satellites

Project	Working with	Scale
CEOS Support	CEOS	Small

This project will contribute to CEOS leadership through the delivery of SIT Vice-Chair responsibilities and will encourage the evolution of the CEOS Data Cube Initiative as a platform for GEO projects.

10.1.3 Support for Regional Development Projects

Project	Working with	Scale
Regional Support		Small

This project will identify and secure support from key agencies for projects that can exploit Earth observations for in-country and regional use. The project will work to secure DFAT funding for relevant projects and establish links between Australian industry (in partnership with European, UK and US industry) to export EO applications to the region.

10.1.4 Open Data Cube Community Development

Project	Working with	Scale
ODC	ODC Community	Medium

This project will establish a community around the ODC technology stack that enables people to better exploit Earth observation data globally.

10.1.5 Digital Earth Africa

Project	Working with	Scale
DE Africa	GEO, GA, AfriGEOSS, WEF, UNECA, ARDC	Large

Digital Earth Africa will improve understanding of Africa's changing landscape, providing much-needed insights, knowledge and analysis for more informed, strategic and inclusive decision-making across the continent.

10.2 On the Horizon

Project	Objectives
Mekong Open Data Cube	Develop an ODC for the Mekong River Basin
Digital Earth Pacific	Develop an ODC for the Pacific region

Appendix A Products

A.1 Product Summary

Product	Description	National Map	Product Link
Water Observations from Space	A summary of surface water observations derived from Landsat imagery for all of Australia from 1987 to the present.	✓	http://pid.geoscience.gov.au/dataset/ga/121054
Daily, Seasonal, and Annual Water Summaries	A summary of water classified scene information (clear count, wet count, frequency) from the Water Observation Feature Layers over a particular period of time (all-time, annual, seasonal...).	✓	http://pid.geoscience.gov.au/dataset/ga/121074
National Yearly Average Image	High-dimensional, continental-scale pixel composite mosaics for landscape characterisation (Geomedian).	✓	http://pid.geoscience.gov.au/dataset/ga/120374
National Barest Earth Image	A national composite image representing the barest (i.e., least vegetation) state for each Landsat pixel across Australia.	✓	http://pid.geoscience.gov.au/dataset/ga/122573
National Fractional Cover	A 25m x 25m footprint of the proportions of living vegetation, dry/dying vegetation and bare soils across Australia.	✓	http://pid.geoscience.gov.au/dataset/ga/102285
National Fractional Cover Percentiles	Statistical (10th, 50th and 90th percentile) summaries of fractional cover per epoch (whole-of-archive-summary, annual, seasonal) from 1987 to the most recent full calendar year.	✓	http://pid.geoscience.gov.au/dataset/ga/120843
National Mangrove Canopy Cover	A series of national maps of mangrove canopy cover and extent from 1987 to the most recent full calendar year.	✓	https://nationalmap.gov.au/#share=s-6F7eMKFcPEGAYOGTCaFT1XF7UM8
Intertidal Extents Model	A national dataset of the exposed intertidal zone; including the relative height and depth of the intertidal zone of Australia's coastline.	✓	http://pid.geoscience.gov.au/dataset/ga/113842
National Intertidal Digital Elevation Model	A continental-scale elevation dataset for Australia's exposed intertidal zone.	✓	http://pid.geoscience.gov.au/dataset/ga/123678
High and Low Tide Images	The High and Low Tide Composites (HLTC) are mosaics produced to allow visualisation of the Australian coastline and reefs at high and low tide.	✓	http://pid.geoscience.gov.au/dataset/ga/113843
Landsat Surface Reflectance	Landsat-based collections of Earth observation data that has been corrected for variations caused by atmospheric properties, sun position and sensor view angle and terrain.	✓	http://pid.geoscience.gov.au/dataset/ga/102288

Sentinel-2 Surface Reflectance	Sentinel-2-based collection of Earth observation data that has been corrected for variations caused by atmospheric properties, sun position and sensor view angle.	✓	http://pid.geoscience.gov.au/dataset/ga/101785
Dynamic Land Cover Dataset	Nationally consistent and thematically comprehensive land cover reference for Australia.	✓	http://pid.geoscience.gov.au/dataset/ga/71071

Product	Description	Prototype	Product Link (Terria link)
Wetland Insight Tool	Provides users with a quick and easy view of the change in water, vegetation and soil within a wetland over the last 30 years.	✓	http://terria-cube.terria.io/#share=s-qVxFiKXzvKEUc7w01Pf70gr1qFp
Landscape Insight Tool	Provides users with a quick and easy view of the change in water, vegetation and soil within a single paddock over the last 30 years for the areas affected by major flooding in the Flinders River floodplain in early 2019.	✓	https://terria-cube.terria.io/#share=s-qSXU2f8RkExrduNOiiV527bMAGW

Appendix B Document Control

B.1 Changelog

Revision Date	Change Location	Change Description
August 2019	Section 3, Land Cover and Land Use	Removed 3.1.1 Fractional Cover Percentiles. Project completed. Water Observations from Space, Sentinel-2 – moved to Current. Sentinel-2 Fractional Cover – Moved to Current. Water Observations from Space, Sentinel-2 retitled Near Real Time Water Observations from Space, Sentinel-2. DEA Products in DoEE Wylie – retitled Change Detection and Monitoring and moved to Current.
	Section 4, Marine and Coastal	Ocean Colour Statistical Summary moved to On the Horizon and retitled Ocean Colour & SST Statistical Summary. Sea-Surface Temperature Statistical Summary amalgamated with Ocean Colour Statistical Summary and moved to On the Horizon. Shallow Water Habitat Mapping moved to Current. Bureau of Meteorology GHRSSST products moved to Current and retitled Sea Surface Temperature Products.
	Section 5, Analysis Ready Data	Surface Reflectance Near-Real-Time Service moved to On the Horizon. Multi-sensor ARD Inter-comparison and Sensitivity Analysis moved to On the Horizon. S2 ARD project retitled Assessment of the ESA Sentinel-2 Surface Reflectance Product.
	Section 6, Platform Improvement	Enhanced API Access retitled Open Data Cube 2.0. Science Algorithm Portability retitled DEA Sandbox and Science Algorithm Portability.
	Section 7, Data Visualisation and Delivery	Removed Data Publication Governance. Completed. Removed ODC WCS Development. Completed. Removed Data Dashboard. Completed.
	Section 8, Data Management	Removed Copernicus Australia Regional Data Hub. Completed. Technical Content upgrade moved to Current.
	Section 9, Government Engagement	Removed this entire section and redistributed projects to Land Cover and Land Use and Marine and Coastal. Removed Murray Darling Basin Authority. Project completed. Fractional Cover for DAWR moved to Land Cover and Land Use. Removed ABS Statistical Workflows. Project completed. WA Salinity moved to Land Cover and Land Use and retitled WA G Removed Tasmanian Transition. Project completed.

Revision Date	Change Location	Change Description
		<p>Surface Reflectance Stats for Land cover mapping for Victorian DEWNR moved to Land Cover and Land Use on the Horizon.</p> <p>Mangrove Uptake by NCAS moved to Land Cover and Land Use On the Horizon.</p> <p>DEA Products in DoEE Wylie moved to Land Cover and Land Use On the Horizon.</p> <p>Marine Product Extension moved to Marine and Coastal On the Horizon and retitled Ocean Colour & SST Statistical Summary.</p>
	Section 10, Industry and Community Engagement Strategy	<p>Renumbered to Section 9.</p> <p>Removed Industry and Economic Value Strategy. Project completed.</p> <p>Removed Natural Resource Management Analysis. Project discontinued.</p> <p>Removed Astron Wetlands. Project completed.</p> <p>Removed Measuring and Monitoring Vegetation Health Impact. Project completed.</p> <p>DEA Labs projects created.</p>
June 2019	All sections	Removed Status column from On the Horizon tables. Planning and/or pre-planning status did not provide significantly useful information.
	Section 3, Land Cover and Land Use	<p>Removed 'New Approaches to Statistical Analyses of Time Series Data' from Current Projects. Project phase 1 completed; follow-on project to be determined.</p> <p>Removed 'Barest Earth' from Current Projects. Project completed.</p> <p>Moved 'Inland Water Quality Monitoring' to Current Projects. Retitled from 'Water SDG Monitoring'.</p> <p>Retitled and updated 'Dam Mapping and Monitoring' to 'Waterbody Area Mapping and Monitoring (WAMM)'.</p> <p>Retitled and updated 'National Scale Dam Mapping' project to 'National Scale Waterbody Area Mapping and Monitoring (WAMM)'.</p> <p>Added 'Environmental watering in the Murray-Darling Basin since 2014' to Current Projects.</p> <p>Removed 'National Wetlands Extents Map' from On the Horizon. Project rolled into 'Environmental watering in MDB' project.</p> <p>Collapsed 'Waterbody Area Mapping and Monitoring' and 'National Waterbody Area Mapping and Monitoring' into a single project.</p> <p>Removed 'Barest Earth 30 Year' from Current Projects. Project completed.</p>
	Section 4, Marine and Coastal	<p>Moved 'Shallow Water Habitat Mapping' to On the Horizon.</p> <p>Removed 'National Intertidal Digital Elevation Model' from Current Projects. Project completed.</p>
	Section 5, Analysis Ready Data	<p>Updated and retitled 'Landsat ARD Inter-comparison and Sensitivity Analysis' to 'Multi-sensor ARD Inter-comparison and Sensitivity Analysis.'</p> <p>Updated and retitled 'Landsat Surface Reflectance Near-Real-Time Service' to 'Surface Reflectance Near-Real-Time Service'.</p> <p>Moved 'Surface Brightness Temperature Validation' to On the Horizon and retitled to 'Assess Quality of USGS LST product'.</p> <p>Updated 'Surface Reflectance Validation' to reflect current status.</p>

Revision Date	Change Location	Change Description
		Updated 'Sentinel-2 Cloud Masking' to reflect new multi-temporal masking approach. Removed 'MODIS Indexing'. Moved 'Evapotranspiration' to On the Horizon.
	Section 6, Platform Improvement	Updated 'Automation and Orchestration' and 'Science Algorithm Portability' projects.
	Section 7, Data Visualisation and Delivery	Removed 'Web Map Tile Service Support' from Current Projects. Project completed. Sentinel Hotspots Upgrade moved to Current Projects.
	Section 9, Government Engagement	Moved 'Tasmanian Transition' to On the Horizon. Removed 'Seasonal Conditions Update for NSW DPI Agriculture' from Current Projects. Project completed.
	Section 10, Industry and Community Engagement	Updated 'Natural Resource Management Australia Requirements Analysis' project to reflect completion of workshops.
March 2019	Section 3, Land Cover and Land Use	Removed paragraph on large-scale image composites in section intro. Added 'Wetland Monitoring' to Current Projects. Retitled 'Crop and Dam Mapping' and 'NDVI Percentiles' projects to more accurately reflect purpose. Added 'National Scale Dam Monitoring' and 'Floodplain Monitoring' to On the Horizon.
	Section 5, Analysis Ready Data	Minor edits to correct syntax and spelling throughout.
	Section 7, Data Visualisation and Delivery	Added 'Web Map Tile Service Support' to Current Projects. Added 'Sentinel Hotspots Upgrade' to On the Horizon.
	Section 8, Data Management	Added 'Sentinel Hotspots Upgrade' and 'Technical Content Upgrade' to On the Horizon.
	Section 9, Government Engagement	Moved 'Tasmanian Transition', 'Fractional Cover for DAWR', 'Enabling ABS use of DEA' and 'WA Salinity Mapping' projects from On the Horizon to Current Projects.
	Section 10, Industry Engagement	Added 'Astron Wetlands Characterisation' and 'Measuring and Monitoring Vegetation Health Impact' to Current Projects.
	Section 11, International Engagement	Removed 'Cambodia Open Data Cube' from Current Projects. Project completed in Q2 2018.
	Appendix A, Products	Added 'National Intertidal Digital Elevation Model' to Product Summary.
Revision Date	Change Location	Change Description.
November 2018	Section 2, Projects	Added 'Product Development Approach'. Added 'Users'. Updated 'Project Partners'. Removed 'Project Documentation'.

Revision Date	Change Location	Change Description
	Section 3, Land Cover and Land Use	<p>Changed 'Partners' to 'Working with' in all project tables.</p> <p>Updated 'Partners' across all Current and Horizon project entries.</p> <p>Added change detection content to section overview.</p> <p>Added 'Fractional Cover Percentiles' to Current Projects.</p> <p>Added 'Crop and Dam Mapping' to Current Projects.</p> <p>Added 'NDVI Percentiles' to Current Projects.</p> <p>Added 'LCCS National Product' to Current Projects.</p> <p>Added 'Tasselled Cap Statistics' to Current Projects.</p> <p>Added 'Barest Earth' to Current Projects.</p> <p>Added 'Urban Feature Classification' to Current Projects.</p> <p>Added 'New Approaches to Statistical Analyses of Time Series Data' to Current Projects.</p> <p>Added 'Burn Extents' to Current Projects.</p> <p>Added 'Wetlands Characterisation' to On the Horizon.</p> <p>Completed 'Un Land Cover Classification System Feasibility Study'. Removed from Current Projects.</p> <p>Completed 'Dynamic Land Cover Dataset'. Removed from Current Projects.</p> <p>Completed 'Irrigated vs Non-irrigated Crop Extents'. Removed from Current Projects.</p> <p>Removed 'National Intertidal Digital Elevation Model' from On the Horizon. Added to Current Projects in Section 4, Marine and Coastal.</p> <p>Removed 'Broad Commodity Type Crop Mapping' from On the Horizon.</p> <p>Removed 'NEXIS Enhancement' from On the Horizon.</p> <p>Removed 'National Wetlands Extents Map' from On the Horizon.</p> <p>Removed 'Urban Features' from On the Horizon.</p> <p>Moved 'Forest Cover' from Current Projects to On the Horizon.</p> <p>Moved 'Water Quality Monitoring for Sustainable Development Goals' to On the Horizon.</p> <p>Moved 'NRM Requirements Analysis' from On the Horizon to Section 10, Industry and Community Engagement, Current Projects.</p>
	Section 4, Marine and Coastal	<p>Changed 'Partners' to 'Working with' across all project tables.</p> <p>Updated 'Partners' across all Current and Horizon project entries.</p> <p>Updated 'National Mangrove Mapping'.</p> <p>Added 'National Intertidal Extents Digital Elevation Model' to Current Projects.</p> <p>Added 'Coastal Change Characterisation' to Current Projects.</p> <p>Added 'Ocean Colour Statistical Summary' to Current Projects.</p> <p>Added Sea-Surface Temperature Statistical Summary' to Current Projects.</p> <p>Removed 'IMOS Products' from On the Horizon.</p> <p>Removed 'Marine Turbidity' from On the Horizon.</p> <p>Removed 'Ocean Colour Statistical Summary' from On the Horizon.</p> <p>Removed 'Sea-Surface Temperature Statistical Summary' from On the Horizon.</p>

Revision Date	Change Location	Change Description
		<p>Removed 'Coral Bleaching' from On the Horizon.</p> <p>Removed 'Coastal Change Characterisation' from On the Horizon.</p>
	Section 5, Analysis Ready Data	<p>Changed 'Partners' to 'Working with' across all project tables.</p> <p>Updated 'Partners' across all Current and Horizon project entries.</p> <p>Removed 'Change Detection' section. Merged all current content into Section 3, Land Cover and Land Use.</p> <p>Renumbered Section 5, Analysis Ready Data.</p> <p>Added 'Analysis Ready Data – Production Code Upgrade' to Current Projects.</p> <p>Added 'Landsat Surface Reflectance Near Real Time Service' to Current Projects.</p> <p>Updated 'Surface Brightness Temperature Validation'.</p> <p>Updated 'Surface Reflectance Validation'.</p> <p>Added 'National Surface Deformation' to Current Projects.</p> <p>Added 'Sentinel-2 Cloud Masking' to Current Projects.</p> <p>Added 'MODIS Indexing' to Current Projects.</p> <p>Added 'Evapotranspiration' to Current Projects.</p> <p>Added 'SAR Analysis Ready Data Development' to Current Projects.</p> <p>Completed 'Observation Density Quality Assessment'. Removed from Current Projects.</p> <p>Completed 'Improving the Location Accuracy of Synthetic Aperture Radar'. Removed from Current Projects.</p> <p>Removed 'Sentinel-1 ARD' from On the Horizon.</p> <p>Removed 'MODIS ARD' from On the Horizon.</p> <p>Removed 'VIIRS ARD' from On the Horizon.</p> <p>Removed 'Evapotranspiration' from On the Horizon.</p> <p>Added 'Improved Landsat Cloud Mask' to On the Horizon.</p> <p>Added 'Assess Quality of USGS LST Products' to On the Horizon.</p>
	Section 6, Platform Improvement	<p>Changed 'Partners' to 'Working with' across all project tables.</p> <p>Updated 'Partners' across all Current and Horizon project entries.</p> <p>Renumbered Section 6, Platform Improvement.</p> <p>Added 'Enhanced API Access' to Current Projects.</p> <p>Added 'Spatio-Temporal Asset Catalogue' to Current Projects.</p> <p>Updated 'Architecture Documentation' in Current Projects.</p>
	Section 7, Data Visualisation and Delivery	<p>Changed 'Partners' to 'Working with' across all project tables.</p> <p>Updated 'Partners' across all Current and Horizon project entries.</p> <p>Renumbered Section 7, Data Visualisation and Delivery.</p> <p>Added 'Jupyter Hub' to Current Projects.</p> <p>Added 'ODC Web Processing Service Development' to Current Projects.</p> <p>Added 'ODC WCS Development' to Current Projects.</p> <p>Added 'Data Dashboard' to Current Projects.</p>

Revision Date	Change Location	Change Description
		<p>Completed 'User Experience Design'. Removed from Current Projects.</p> <p>Completed 'GSKY Services for National Map'. Removed from Current Projects.</p> <p>Removed 'Virtual Products' from On the Horizon.</p> <p>Removed 'Web Processing' from On the Horizon.</p> <p>Removed 'Data Dashboard' from On the Horizon.</p> <p>Added 'S3 Save' to On the Horizon.</p>
	Section 8, Data Management	<p>Changed 'Partners' to 'Working with' across all project tables.</p> <p>Updated 'Partners' across all Current and Horizon project entries.</p> <p>Renumbered Section 8, Data Management.</p> <p>Added 'Landsat Collection Upgrade' to Current Projects.</p> <p>Added 'Copernicus Australia Regional Data Hub' to Current Projects.</p> <p>Completed 'Automation of Landsat Processing Pipeline'. Removed from Current Projects.</p> <p>Completed 'Cloud Computing Architecture Pilot'. Removed from Current Projects.</p> <p>Completed 'Regional Copernicus Data Hub Development'. Removed from Current Projects.</p> <p>Removed 'Collection One Upgrade' from On the Horizon.</p> <p>Removed 'DGGS Support' from On the Horizon.</p> <p>Removed 'DGGS Implementation Support' from On the Horizon.</p> <p>Removed 'Near Real Time Landsat Processing' from On the Horizon.</p> <p>Added 'Asia-Oceania Data Hub' to On the Horizon.</p>
	Section 9, Government Engagement	<p>Changed 'Partners' to 'Working with' across all project tables.</p> <p>Updated 'Partners' across all Current and Horizon project entries.</p> <p>Renumbered Section 9, Government Engagement.</p> <p>Added 'Murray Darling Basin Authority' to Current Projects.</p> <p>Added 'Seasonal Conditions Update for NSW DPI Agriculture' to Current Projects.</p> <p>Completed 'Department of the Environment and Energy Needs Analysis'. Removed from Current Projects.</p> <p>Removed 'Tasmanian Government Transition to DEA' from Current Projects.</p> <p>Added 'Tasmanian Transition' to On the Horizon.</p> <p>Added 'Marine Product Extension' to On the Horizon.</p> <p>Added 'FC and S2 FC for DAWR for GEOGLAM-RAPP' to On the Horizon.</p> <p>Added 'ABS Using DEA' to On the Horizon.</p> <p>Added 'WA Salinity Mapping / WA Enablement' to On the Horizon.</p> <p>Added 'DEA Products in DoEE Wylie' to On the Horizon.</p> <p>Added 'Mangrove Update by NCAS' to On the Horizon.</p> <p>Added 'Prototype Products for Drought Response' to On the Horizon.</p> <p>Removed 'Inter-departmental Grad Program' from On the Horizon.</p>

Revision Date	Change Location	Change Description
	Section 10, Industry and Community Engagement	<p>Changed 'Partners' to 'Working with' across all project tables.</p> <p>Updated 'Partners' across all Current and Horizon project entries.</p> <p>Renumbered Section 10, Industry and Community Engagement.</p> <p>Updated 'Industry Strategy' in Current Projects.</p> <p>Added 'Natural Resource Management Regions Requirements Analysis' to Current Projects.</p> <p>Removed 'FarmMap4D Need Analysis' from On the Horizon.</p>
	Section 11, International Engagement	<p>Changed 'Partners' to 'Working with' across all project tables.</p> <p>Updated 'Partners' across all Current and Horizon project entries.</p> <p>Renumbered Section 11, International Engagement.</p> <p>Added 'Digital Earth Africa' to Current Projects.</p> <p>Added 'Mekong ODC' to On the Horizon.</p>
	Appendix A, Products	Added 'Geomedian' to A.1 Product Summary.
	Appendix B, Document Control	<p>Removed Appendix B Projects content.</p> <p>Renamed Appendix B to Document Control.</p> <p>Added B.1 Changelog.</p> <p>Renumbered B.2 Glossary.</p>

B.2 Glossary

Term	Definition
ABARES	Australian Bureau of Agricultural and Resource Economics
ABS	Australian Bureau of Statistics
ACLUMP	Australian Collaborative Land Use and Management Program
ACT	Australian Capital Territory, territory (AUS)
AIMS	Australian Institute of Marine Science
AMA	Analytical Mechanics Associates (US)
ANU	Australian National University
ARDC	Africa Regional Data Cube
AFRI-GEOSS	Africa Global Earth Observation System of Systems
AO-GEOSS	Asia Oceania Global Earth Observation System of Systems
API	Application programming interface. Protocols and tools for building application software.
ARD	Analysis-Ready Data. Data that has been processed with a set of standard corrections.
AURIN	Australian Urban Research Infrastructure Network
AusCover	TERN multi-agency partnership on national terrestrial remote sensing data (AUS)
AWS	Amazon Web Services. Cloud computing infrastructure provided by Amazon.
BoM, Bureau	Bureau of Meteorology (AUS)
BRDF	Bi-directional Reflectance Distribution Function
CEOS	Committee on Earth Observation Satellites
CER	Clean Energy Regulator
CRCSI	Cooperative Research Centre for Spatial Information (AUS)
CSIRO	Commonwealth Scientific and Industrial Research Organisation (AUS)
CSST, NZCSST	Centre for Space Science Technology (NZ)
Data61	CSIRO's data innovation group
DAWR	Department of Agriculture and Water Resources (AUS)
DEA	Digital Earth Australia
DFAT	Department of Foreign Affairs and Trade (AUS)
DGGS	Discrete Global Grid System
DIIS	Department of Industry, Innovation and Science (AUS)
DLCD	Dynamic Land Cover Dataset
DoEE	Department of the Environment and Energy (AUS)
DPIPWE	Department of Primary Industries, Parks, Water and Environment (TAS)
DPIRD	Department of Primary Industries and Regional Development (WA)
DWER	Department of Water and Environmental Regulation (WA)
EC	European Commission
EO	Earth observation/s
EOA	Earth Observation Australia. Community coordination group.

EOS	Earth observations from space
ERIN	Environmental Research and Information Network (AUS)
ESA	European Space Agency
ET	Evapotranspiration
EUMETSAT	European Organisation for the Exploitation of Meteorological Satellites
eWater	Australian Government owned not-for-profit organisation.
FAO	Food and Agriculture Organisation
FarmMap4D	Australian provider of geospatial information to the agricultural sector.
FC	Fractional Cover
GA	Geoscience Australia
GEO	Group on Earth Observations
GHD	GHD Pty Ltd.
GIS	Geographic information system
GSKY	Suite of web services developed by the NCI
HLTC	High and Low Tide Composites (DEA product)
HPC	High performance computing
HPD	High performance data
IDC	Interdepartmental Committee
IMOS	Integrated Marine Observing System
ITEM	Intertidal Extents Model (DEA product)
JRSRP	Joint Remote Sensing Research Program (AUS)
LCCS	Land Cover Classification System
MDBA	Murray-Darling Basin Authority
MODIS	Moderate resolution imaging spectrometer. Sensor on the Aqua and Terra satellites.
MOU	Memorandum of understanding
NASA	National Aeronautics and Space Administration (US)
NBAR	Nadir BRDF Adjusted Reflectance
NBAR/T	Nadir BRDF Adjusted Reflectance (Terrain)
NCI	National Computational Infrastructure. Supercomputer at Australian National University.
NDC	Nationally Determined Contributions. Carbon sequestration and adaption measurement.
NDVI	Normalised Difference Vegetation Index
NEII	National Environmental Information Infrastructure (AUS). Environmental data platform.
NEMO	National Earth and Marine Observation Group (GA)
NLI	National Location Information Branch (GA)
NLUM	National Land Use Management
NRM	Natural Resource Management/Managers
NRT	Near-real time. Generally, rapid processing of satellite data for time critical applications.
NSW	New South Wales, state (AUS)
NSW DOI	Department of Industry (NSW)

NT	Northern Territory, territory (AUS)
ODC	Open Data Cube
OGC	Open Geospatial Consortium
PM&C	Department of the Prime Minister and Cabinet (AUS)
Prapability	Product/capability (cognate)
QLD	Queensland, state (AUS)
SA	South Australia, state (AUS)
SAR	Synthetic aperture radar
SBT	Surface brightness temperature
SDG	(UN) Sustainable Development Goal
SME	Small-to-medium enterprise
SoE	State of Environment. Report and reporting measures overseen by DoEE (AUS).
ST	Surface temperature
SWAMpy	Shallow Water Analytical Methods in Python
TAS	Tasmania, state (AUS)
TBC	To be confirmed
TERN	Terrestrial Ecosystem Research Network (AUS)
UK	United Kingdom of Great Britain and Northern Ireland
UK Catapult	UK Satellite Applications Catapult. UK-based technical development company.
UN	United Nations
UNECA	United Nations Economic Commission for Africa
UQ	University of Queensland (AUS)
USGS	United States Geological Survey (US)
UXD	User experience design. User-centric design principles and development.
VIC	Victoria, state (AUS)
VIIRS	Visible Infrared Imaging Radiometer Suite. Sensor on the Suomi NPP satellite.
WA	Western Australia, state (AUS)
WABSI	Western Australian Biodiversity Science Institute
WCS	Web coverage service. Standard web service for retrieval digital geospatial information.
WEF	World Economic Forum
WMS	Web map service. Standard web protocol for serving georeferenced map images.
WOFS	Water Observations from Space (DEA product)
WPS	Web processing service. Standard web service for geospatial processing services.