

Continuity of Earth Observation Data for Australia: Research and Development Dependencies to 2020 Annex

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Cover Image

Depiction of the various active geostationary and low Earth orbit Earth observation satellites operating over Australia. Source: Adapted with permission from a graphic by the secretariat of the Group on Earth Observations (GEO) and from various member agencies of the Committee on Earth Observation Satellites (CEOS).

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Contents

Preface.....	1
A R&D Projects included in Survey	3
B Australian EO-dependent Programs.....	7
C Survey Questions.....	15
C.1 Survey Overview and Instructions.....	15
C.2 Survey Table 1: Department, Program.....	16
C.3 Survey Table 2: Key Project Listing.....	17
C.3.1 Key Project Listing: Part 1 (preliminary survey) projects.....	17
C.3.2 Key Project Listing: Part 2 (detailed survey) projects.....	17
C.4 Survey Table 3: Project Overview.....	18
C.5 Survey Table 4: EO Data Requirements.....	19
C.6 Survey Table 5: EO Data Supply.....	20
C.7 Survey Table 6: Continuity and Future Trends.....	21
D Instrument Details for Priority Data Types.....	23
E Priority Data Types – Continuity Outlook.....	33
E.1 Priority Data Type Scenarios.....	33
E.1.1 Low Resolution Optical (>80m).....	33
E.1.2 Medium Resolution Optical (10-80m).....	34
E.1.3 High Resolution Optical (<10m).....	35
E.1.4 Synthetic Aperture Radars (SAR).....	36
E.1.5 Passive Microwave Radiometry.....	39
E.1.6 Radar Altimetry.....	41
E.1.7 Hyperspectral Imagery.....	42
E.1.8 Lidar.....	43
E.1.9 Ocean Colour.....	44
References	45
Glossary	47

List of Figures

Figure E-1 Low Resolution Optical Data Continuity Options.....	33
Figure E-2 Medium Resolution Optical Data Continuity Options.....	35
Figure E-3 C-Band SAR Data Continuity Options.....	36
Figure E-4 L-Band SAR Data Continuity Options.....	37
Figure E-5 X-Band SAR Data Continuity Options.....	38
Figure E-6 Passive Microwave Data Continuity Options.....	40
Figure E-7 Passive Microwave Data Continuity Options.....	41
Figure E-8 Hyperspectral Data Continuity Options.....	42
Figure E-9 Lidar Data Continuity Options.....	43
Figure E-10 Ocean Colour Data Continuity Options.....	44

List of Tables

Table A-1 CEODA-R&D Projects.....	3
Table A-2 All Organisations Contacted during CEODA-R&D Survey.....	6
Table B-1 Australian Programs Dependent on EOS Data.....	8
Table D-1 Low Resolution Optical Instrument Details.....	23
Table D-2 Medium Resolution Optical Instrument Details.....	24
Table D-3 SAR Instrument Details.....	25
Table D-4 Passive Microwave Instrument Details.....	26
Table D-5 Radar Altimeter Instrument Details.....	27
Table D-6 Hyperspectral Instrument Details.....	28
Table D-7 Lidar Instrument Details.....	29
Table D-8 Ocean Colour Instrument Details.....	30
Table D-9 Agencies and Countries of Origin.....	31

PREFACE

This document is an Annex to the main report: *Continuity of Earth Observation Data for Australia: Research and Development Dependencies to 2020*. It contains the following appendices that provide more detail and data in support of the sections in the main report:

Appendix A – R&D Projects Included the Study: with details of organisations, contacts, project objectives, etc.

Appendix B – Australian EO-dependent Operational Programs: details the 91 current EOS data programs being undertaken by Federal and State agencies in Australia, which were discussed in terms of project linkages in **Section 2**.

Appendix C – Survey Questions.

Appendix D – Instrument Details for Priority Data Types: provides technical characteristics for all the instruments discussed in the continuity outlook discussions.

Appendix E – Priority Data Types – Continuity Outlook: details and timelines in addition to the discussion in **Section 5**.

A R&D PROJECTS INCLUDED IN SURVEY

The R&D projects sampled in Part 2 (Detailed Survey) of the CEODA-R&D Survey are listed in [Table A-I](#).

Table A-I CEODA-R&D Projects

Organisation	Contact	Project
Antarctic Climate & Ecosystems CRC	Jan L Lieser	CryoSat-2 Calibration and Validation in the East Antarctic
Australian Antarctic Division	Rob Massom	Mapping and Monitoring of Antarctic Fast Ice Using SAR
Australian Bureau of Agricultural and Resource Economics and Sciences/CSIRO Land and Water	Lucy Randall/ Juan Pablo Guerschmann	Monitoring and reporting on groundcover in rangelands
Australian Institute of Marine Science	Craig Steinberg	Development of a Great Barrier Reef 1 km SST Hot Spot and Degree Heating Week Product
Australian National University	Paul Tregoning	Interpretation of GRACE temporal gravity for hydrological and mass balance studies
Bureau of Meteorology/CAWCR	John Le Marshall	Satellite Data Assimilation (NWP, Weather, Climate Monitoring and Prediction)
Bureau of Meteorology/CAWCR	John Le Marshall	Satellite Data Application (Non NWP)
Charles Darwin University	Stefan Maier	Savanna Burning - Development of Remote Sensing Methodologies for Estimation of Bushfire Emissions
Charles Sturt University	Remy Dehaan	Developing techniques to detect weeds in crops using high resolution remote sensing data from UAVs
CRC for Spatial Information	Clive Fraser	Feature Extraction from Multi-source Airborne and Space-borne Imaging and Ranging Data
CSIRO Ecosystems Sciences	Darius Culvenor	Monitoring and measuring forest plantation health and condition from satellite data.
CSIRO Exploration and Mining / WA Centre of Excellence for 3D Mineral Mapping	Tom Cudahy	Building remote and drill core spectral technologies that deliver a public, web-accessible, digital 3D mineral map of Australia
CSIRO	Cindy Ong	Greenhouse gas mapping; Evaluation of mid infrared spectropxy for detection and quantification of methane
CSIRO	Cindy Ong	ERSDAC Soil Mapping: Use of hyperspectral sensing technology for soil mapping and precision agriculture
CSIRO Land and Water	Arnold Dekker	Coastal Water Quality Monitoring for Australia using Earth Observation
CSIRO Land and Water	Arnold Dekker	Feasibility study for operationalising earth observation of inland water quality
CSIRO Land and Water	Arnold Dekker	Coastal habitat mapping using high spatial resolution satellite and airborne data
CSIRO Land and Water	Tim McVicar	Eco-hydrological changes of high water yielding catchments
CSIRO Land and Water	Alex Held	TERN AusCover: Production and delivery of nationally consistent long-time series of satellite-/airborne-based land-surface biophysical map products and next generation remote sensing research data that is validated for Australian conditions.

Organisation	Contact	Project
CSIRO Marine & Atmospheric Research	David Griffin	BLUELink: Ocean observation assimilation and modelling
CSIRO Marine & Atmospheric Research	Stuart Young	Assess, validate and improve models for global 3-D distribution of clouds and aerosols
CSIRO Marine & Atmospheric Research	Ross Mitchell	Australian Climate Change Science Program: Characterization of Australian Continental Aerosol to determine their role in climate
CSIRO Marine & Atmospheric Research	Edward King	IMOS Satellite Remote Sensing Facility
CSIRO Marine & Atmospheric Research	Edward King	WIRADA - Gridded Foundation Data Services: mapping precipitation, evapotranspiration, and open water (with flood volume estimation)
Curtin University	Merv Lynch	NCRISTERN: Delivery and validation of satellite products on atmospheric and biophysical variables
Department of Sustainability and Environment	Andrew Mellor	Forests and Parks Monitoring and Reporting System: mapping forest extent and disturbance
Department of Defence, DSTO	Vittala Shettigara	Hyperspectral Imaging (Future capabilities for Defence)
Department of Defence, DSTO	Mark Preiss	Imaging Radar Applications for Defence
Department of Employment, Economic Development and Innovation	Andrew Robson	Remote Sensing- based Precision Agriculture Tools for the Sugar Industry
Department of Environment and Resources	Peter Scarth	National fractional cover product (photosynthetic, non-photosynthetic and bare ground fractions) for improved woody cover and groundcover estimates
Department of Environment and Resources	John Armston	Improved mapping of regrowth and biomass prediction using the Landsat time-series and radar imagery from the Japanese ALOS satellite
Department of Primary Industries	Elizabeth Morse-McNabb	Victorian Land Use Information System (VLUIS): integrates land tenure, land use and land cover (MODIS) data for the state at the cadastral parcel, annually
Department of Primary Industries	Des Whitfield	Satellite based information systems for improved irrigation management
Department of Primary Industries	David Ball	Port Phillip Bay Baywide Seagrass Monitoring Program
Geoscience Australia	Simon Oliver	Unlocking the Landsat Archive
Geoscience Australia	Norman Mueller	Emergency Response: floods and fire scars
Geoscience Australia	Leo Lymburner	Dynamic Land Cover Mapping: MODIS time series analysis
Geoscience Australia	Mike Craig	Continental Resource & Energy Systems: continent-scale geoscience information and interpretive products for future resource and energy discoveries under cover
Geoscience Australia	Laura Gow	Paleovalleys Project: mapping palaeochannels and groundwater
Landgate	Andrew Buchanan	FloodMap: mapping daily surface water and soil moisture across Australia
Landgate	Brendon McAtee	Extending Firewatch products
Landgate	Brendon McAtee	CarbonWatch: planning, monitoring and quantification of biosequestration projects
Monash University	Jeffrey Walker	Active/Passive Microwave Soil Moisture Remote Sensing
Monash University	Jeffrey Walker	MoistureMap: A Soil Moisture Monitoring, Prediction and Reporting System for Sustainable Land and Water Management

Organisation	Contact	Project
Office of Environment and Heritage	Rachael Thomas	Flood regime monitoring of semi-arid region floodplain wetlands
Parks Victoria	Steve Shelley	Mapping of Salix spp. In the Bogong Region of Victoria
University of Adelaide	Ken Clarke	Spatial and temporal monitoring of soil erosion risk
University of Adelaide	Megan Lewis	Allocating water and maintaining springs in the Great Artesian Basin
University of New South Wales	Anthony Milne	Using Multi-temporal SAR to Investigate Flood Dynamics in Semi-Arid Wetland
University of New South Wales	Tony Milne	International Forest Carbon Initiative (IFCI)
University of Queensland	Stuart Phinn	Joint Remote Sensing Research Program
University of Sydney	Thomas Landgrebe	VirGO - Virtual Geological Observatory; plate-tectonic GIS
University of Tasmania	Arko Lucieer	TerraLuma - UAVs for environmental remote sensing
University of Tasmania	Christopher Watson	IMOS Sub-Facility 11e: Satellite Altimetry Calibration and Validation
University of Technology Sydney	Alfredo Huete	Validation and Continuity Assessments of VIIRS
University of Wollongong	Laurie Chisholm	Examining the spatio-temporal dynamics of live fuel moisture patterns and their influence on fire activity in SE Australia

Table A-2 All Organisations Contacted during CEODA-R&D Survey

Organisation	Survey Response	Projects in Initial Survey	Projects in Detailed Survey
Antarctic Climate & Ecosystems CRC	Yes	2	1
Australian Antarctic Division	Yes	7	1
Australian Bureau of Agricultural and Resource Economics and Sciences	Yes	4	1
Australian Institute of Marine Science	Yes	3	1
Australian National University	Yes	3	1
Centre for Australian Weather and Climate Research	Yes	4	2
Charles Darwin University	Yes	2	1
Charles Sturt University	Yes	4	1
CRC for Spatial Information	Yes	1	1
CSIRO Earth Science and Resource Engineering	Yes	9	3
CSIRO Ecosystems Sciences	Yes	8	1
CSIRO Land and Water	Yes	6	5
CSIRO Livestock Industry	No	N/A	N/A
CSIRO Marine & Atmospheric Research	Yes	11	5
CSIRO Mathematics, Informatics and Statistics	No	N/A	N/A
CSIRO Plant Industry	No	N/A	N/A
Curtin University	Yes	8	1
Defence Science and Technology Organisation	Yes	5	2
Department of Employment, Economic Development and Innovation	Yes	2	1
Department of Environment and Resource Management	Yes	16	2
Department of Primary Industries	Yes	6	3
Department of Sustainability and Environment	Yes	9	1
Flinders University	No	N/A	N/A
Geoscience Australia	Yes	10	5
Landgate	Yes	12	3
Monash University	Yes	10	2
Murdoch University	No	N/A	N/A
Office of Environment and Heritage	Yes	4	1
Parks Victoria	Yes	1	1
RMIT University	No	N/A	N/A
University of Adelaide	Yes	7	2
University of Melbourne	No	N/A	N/A
University of New England	No	N/A	N/A
University of New South Wales	Yes	4	2
University of Queensland	Yes	5	1
University of South Australia	No	N/A	N/A
University of Southern Queensland	No	N/A	N/A
University of Sydney	Yes	5	1
University of Tasmania	Yes	6	2
University of Technology Sydney	Yes	8	1
University of Wollongong	Yes	5	1
UNSW@ADFA	No	N/A	N/A

B AUSTRALIAN EO-DEPENDENT PROGRAMS

The following table details the 91 current EOS data programs being undertaken by Federal and State agencies in Australia, which were discussed in terms of project linkages in [Section 2.3.3](#). This information is derived from the set of 92 programs documented by Geoscience Australia in the *CEODA-Ops* report (2011)¹.

Nine Societal Benefit Areas (SBA) deemed to have global significance have been defined by the Global Earth Observation System of Systems (GEOSS; CEOS, 2010). As detailed in [Section 2.3.1](#), these nine areas are:

- Disasters;
- Health;
- Energy;
- Climate;
- Agriculture;
- Ecosystems;
- Biodiversity;
- Water; and
- Weather.

To emphasise common objectives and outcomes, each of the 91 Australian EOS programs in [Table B-1](#) has been associated with one or more of the GEOSS SBA. A description of each program is available in the *CEODA-Ops* report (Geoscience Australia, 2011).

Survey respondents mentioned an additional ten operational programs with linkages to their R&D projects, namely:

- 93 AuScope;
- 94 BLUELink;
- 95 Carbon Farming Initiative (CFI);
- 96 Coastal Vulnerability;
- 97 Coral Reef Watch;
- 98 National Plan for Environmental Information (NPEI);
- 99 National State of the Forests Report (ABARES);
- 100 National Water Commission (NWC);
- 101 North Australia Fire Information (NAFI); and
- 102 Reef Rescue.

¹ The original numbering of programs (from 1 to 92) that was used in Geoscience Australia (2010) has been retained in [Table B-1](#), although program 26 is not included due to insufficient EOS usage. Accordingly, the total number of sample programs being considered was reduced to 91.

Table B-1 Australian Programs Dependent on EOS Data
Source: CEODA-Ops Report (Geoscience Australia, 2011)

Prog ID	Jurisdiction	Lead Portfolio	Program/ Product Name	Sensor Data Type					GEO Societal Benefits Area
				Optical			SAR	Passive M/wave	
				Low	Med	High			
1	AGD	EMA	Emergency Management Australia	✓	✓	✓	✓	✓	Disasters
2	DAFF	BRS, DAFF, CLWRA, MDBA, DCCEE, DEWHA, NT DIPE, QLD DNRM, SA DWLBC, VIC DPI, TAS DPIWE	Australian Collaborative Land Use Mapping Program (ACLUMP)	✓	✓		✓		Agriculture, Ecosystems, Biodiversity
3	DAFF	DAFF	Caring For Our Country	✓	✓				Agriculture, Ecosystems, Biodiversity
4	DAFF	DAFF, AFMA	National Fisheries Production Database, Australian Fish Distributions and Fishing Areas	✓					Ecosystems, Water
5	DAFF	DAFF	National Forest Inventory		✓				Climate, Ecosystems, Biodiversity
6	DAFF	DAFF	National Land and Water Resources Audit	✓	✓				Climate, Agriculture, Ecosystems, Biodiversity
7	DCCEE	DFAT, DCCEE, CSIRO, AusAID, GA	International Forest Carbon Initiative (IFCI)	✓	✓	✓	✓		Energy, Agriculture, Ecosystems
8	DCCEE	DCCEE, CSIRO	National Carbon Accounting System (NCAS)		✓	✓			Energy, Climate, Ecosystems
9	DEWHA	DEWHA	Approvals and Wildlife		✓				Ecosystems, Biodiversity
10	DEWHA	DEWHA (Australian Antarctic Division)	Australian Antarctic Division, Australian Antarctic Data Centre	✓	✓	✓	✓	✓	Climate, Ecosystems, Biodiversity, Water
11	DEWHA	MDBA	Murray Darling Basin Plan	✓	✓	✓	✓		Climate, Agriculture, Water
12	DEWHA	DEWHA, DAFF	National Vegetation Information System (NVIS)		✓				Agriculture, Ecosystems, Biodiversity

Prog ID	Jurisdiction	Lead Portfolio	Program/ Product Name	Sensor Data Type					GEO Societal Benefits Area
				Optical			SAR	Passive M/wave	
				Low	Med	High			
13	DEWHA	DEWHA, BoM	National Weather and Climate	✓				✓	Disasters, Climate, Weather
14	DEWHA	DEWHA	Parks Australia			✓			Ecosystems, Biodiversity, Water
15	DEWHA	GBRMPA	Predictive Ocean Atmosphere Model for Australia (POAMA), ReefTEMP	✓	✓	✓			Ecosystems, Biodiversity, Water
16	DEWHA	AAD, GA, DCCEE, BoM	Satellite Altimetry	✓					Disasters, Water, Weather
17	DEWHA	DEWHA, States	State of Environment (SOE)	✓	✓	✓			Ecosystems, Biodiversity, Water
18	DEWHA	DEWHA	Supervising Scientist Division		✓	✓	✓		Climate, Ecosystems, Biodiversity
19	DEWHA	DEWHA (ERIN)	Sustainable Environment and Water Use	✓	✓	✓			Health, Biodiversity, Water
20	DEWHA	CSIRO, BoM	Water Information Research and Development Alliance (WIRADA)	✓	✓		✓	✓	Climate, Agriculture, Water
21	DIAC	ACBPS	Border Protection				✓		Disasters
22	DIISR	CSIRO, TERN, DEWHA	AusCover-TERN	✓	✓		✓		Energy, Climate, Ecosystems, Biodiversity, Water
23	DIISR	CSIRO, GRDC	Biomass Monitoring	✓	✓				Agriculture
24	DIISR	CSIRO, BoM, DEWHA, DIISR	Centre for Weather and Climate Research (CAWCR)	✓			✓	✓	Climate, Weather
25	DIISR	CSIRO, State geological surveys, GA	International Hyperspectral Imaging Satellite Programs		✓	✓			Ecosystems, Water, Weather
27	DIISR	CSIRO, IMOS, AIMS, DEWHA	Ocean Colour Monitoring	✓	✓				Ecosystems, Biodiversity, Water
28	DIISR	CSIRO, Landgate (WA), AGRIC (WA)	Pastures from Space	✓					Agriculture

Prog ID	Jurisdiction	Lead Portfolio	Program/ Product Name	Sensor Data Type					GEO Societal Benefits Area
				Optical			SAR	Passive M/wave	
				Low	Med	High			
29	DIISR	CSIRO, GSWA, GSQ, Ausscope, UWA, Curtin University, Industry, GA	WA Centre of Excellence (CoE) for 3D Mineral Mapping (C3DMM)		✓	✓			Energy
30	RET	GA, CSIRO	Coastal Monitoring		✓	✓			Ecosystems, Biodiversity, Water
31	RET	GA, DFAT	LoSaMBA		✓	✓			Disasters, Water
32	RET	GA, BRS	National Land Cover Mapping	✓	✓				Disasters, Agriculture, Ecosystems, Biodiversity
33	RET	GA, States	National Topographic Mapping		✓	✓			Disasters, Water
34	RET	GA	Petroleum Acreage and Release	✓	✓	✓	✓		Energy, Water
35	RET	GA, CSIRO	Pre-competitive Mineral Prospecting Research		✓	✓			Energy
36	RET	GA	Sentinel Hotspots	✓					Disasters, Weather
37	PM&C	AEC	Electoral Mapping			✓			Health
38	ACT	ACTPLA	ACT Planning and Land Authority		✓				Disaster, Ecosystems, Biodiversity
39	ANZLIC	ANZLIC	DEM and Surface Modelling			✓			Disasters, Energy, Ecosystems, Water
40	NSW	DECCW	DustWatch	✓					Disasters, Health, Agriculture, Weather
41	NSW	Department of Planning & Local Government & Shires Associations	Electronic Housing Code Pilot (EHC)		✓				Health
42	NSW	DECCW	Elevation and vegetation structural mapping		✓				Disasters, Ecosystems, Water
43	NSW	DECCW	Groundwater Dependent Ecosystems (GDE) Water Balance	✓					Agriculture, Ecosystems, Water

Prog ID	Jurisdiction	Lead Portfolio	Program/ Product Name	Sensor Data Type					GEO Societal Benefits Area
				Optical			SAR	Passive M/wave	
				Low	Med	High			
44	NSW	DECCW	Groundwater Quality and Coastal GDE Mapping		✓				Health, Ecosystems, Water
45	NSW	DECCW	Inland wetland inventory and monitoring	✓	✓	✓			Ecosystems, Biodiversity, Water
46	NSW	DECCW	Mapping Wetland Inundation Histories for Iconic NSW Wetlands		✓				Ecosystems, Biodiversity, Water
47	NSW	DECCW	Marine Monitoring Reporting and Evaluation	✓					Ecosystems, Biodiversity, Water
48	NSW	OOW	Monitoring: State of the Catchments		✓				Health, Ecosystems, Biodiversity, Water
49	NSW	DECCW	NSW High-Resolution Vegetation Monitoring Program		✓	✓			Disasters, Agriculture, Ecosystems, Biodiversity
50	NSW	DECCW	NSW Woody Vegetation Monitoring Program (NSW SLATS)		✓				Climate, Agriculture, Ecosystems
51	NSW	DECCW	Rural Floodplain Management	✓	✓	✓			Disasters, Agriculture, Water
52	NSW	DECCW /Industry	Sea Surface Temperature and Height Anomaly	✓			✓		Disasters, Climate, Water, Weather
53	NSW	LPMA	Topographic Mapping Program		✓	✓			Agriculture, Water
54	NSW	LPMA	Valuation for Taxation Purposes		✓				Agriculture
55	NSW	DECCW	Vegetation Monitoring – Grassland	✓	✓	✓			Agriculture, Ecosystems
56	NSW	LPMA	Western Lands Monitoring and Compliance		✓				Agriculture
57	NSW / VIC	BF CRC	Grasslands curing assessment	✓					Disasters, Climate, Agriculture
58	NSW, Vic, Qld, SA	CRCSI / LPMA / UNSW	Radar Watch		✓		✓		Disasters, Water

Prog ID	Jurisdiction	Lead Portfolio	Program/ Product Name	Sensor Data Type					GEO Societal Benefits Area
				Optical			SAR	Passive M/wave	
				Low	Med	High			
59	NT	NTLIS, NREA	Rangeland monitoring		✓				Agriculture, Ecosystems, Biodiversity
60	NT	Bushfires NT	Fire mapping: National Parks and Arnhem Land Fire Management Area	✓	✓				Disasters
61	QLD	DERM	Biomass monitoring				✓		Disasters, Agriculture, Ecosystems
62	QLD	DERM	Groundcover monitoring		✓				Agriculture
63	QLD	DERM	QLUMP land-use program		✓				Agriculture, Ecosystems, Biodiversity
64	QLD	DERM	Queensland Wetland mapping and Classification		✓				Ecosystems, Biodiversity, Water
65	QLD	DERM	Reef Catchment Monitoring (RCM)		✓				Ecosystems, Biodiversity, Water
66	QLD	DERM	Regional ecosystem mapping		✓				Agriculture, Ecosystems, Biodiversity
67	QLD	DERM	Soil exposure assessment		✓				Agriculture, Biodiversity, Water
68	QLD	DERM	Statewide Landcover and Tree Study (SLATS)		✓				Agriculture, Ecosystems, Biodiversity
69	SA	DWLBC	Imagery Baseline Data Project		✓	✓			Agriculture, Biodiversity, Water
70	SA	DWLBC	Statewide Native Vegetation Detection		✓	✓			Agriculture, Ecosystems, Biodiversity
71	TAS	DPIW	TASVEG			✓			Agriculture, Ecosystems, Biodiversity
72	VIC	DSE	Bushfire areas and tree cover	✓	✓	✓			Disaster, Ecosystems, Biodiversity
73	VIC	DPI	Evapo-transpiration modelling		✓				Agriculture, Water
74	VIC	DPI, DSE	Land use	✓	✓	✓			Agriculture, Ecosystems

Prog ID	Jurisdiction	Lead Portfolio	Program/ Product Name	Sensor Data Type					GEO Societal Benefits Area
				Optical			SAR	Passive M/wave	
				Low	Med	High			
75	VIC	DSE	Native vegetation extent and condition	✓	✓				Ecosystems, Biodiversity
76	WA	Landgate	Agimage - SW of WA		✓				Agriculture, Water
77	WA	Landgate	Carbon Watch	✓	✓	✓			Energy, Climate
78	WA	Landgate, FESA	Emergency management	✓	✓	✓			Disasters, Ecosystems, Weather
79	WA	DEC	Fire Mapping and Modelling	✓	✓				Disasters, Weather
80	WA	Landgate	FireWatch Program	✓	✓	✓			Disasters, Climate, Ecosystems, Weather
81	WA	Landgate	FloodMap Program	✓	✓	✓			Disasters, Water
82	WA	DEC	Land Audit and Compliance		✓	✓			Agriculture, Ecosystems
83	WA	Landgate, CSIRO, DEC, DAFWA, DoW, DPI	Land Monitor Project - SW of WA	✓	✓	✓			Agriculture, Water
84	WA	DEC	Marine Mapping and Monitoring		✓				Climate, Ecosystems, Water
85	WA	DOW	Monitoring Groundwater Decline		✓	✓			Agriculture, Water
86	WA	Landgate	OceanWatch Program	✓	✓	✓			Ecosystems, Water
87	WA	Water Corporation	Urban Monitor			✓			Water
88	WA	Water Corporation	Vegetation Monitoring		✓				Ecosystems, Biodiversity, Water
89	WA	Water Corporation	Vegetation Monitoring and cover estimates		✓				Disasters, Ecosystems, Biodiversity, Water
90	WA	DEC	Vegetation Monitoring.		✓	✓			Ecosystems, Biodiversity
91	WA	Landgate	Vegetation Watch Program	✓	✓	✓			Disasters, Ecosystems, Biodiversity
92	WA	Landgate	WALIS	✓	✓	✓			Health, Climate, Ecosystems, Biodiversity

C SURVEY QUESTIONS

The survey comprised six worksheets requesting input, prefaced with an instruction worksheet. The content of these worksheets is detailed below.

C.1 Survey Overview and Instructions

This survey intends to provide as complete a picture as possible of the Australian Earth observation R&D community, identifying issues that are key in ensuring continuity of data supply for future development and innovation. For this reason it is comprehensive, and we ask for your patience and thoroughness through the survey completion, interview, and follow-up stages of the process. Sufficient time should be allowed to ensure a good quality outcome.

Survey fields to be completed are marked in orange. Responses to those fields marked in darker orange should be selected from the drop down list presented.

The survey is to be completed in two parts.

PART 1: Questions for Department or Research Theme/Program Leaders which oversee multiple EO R&D Teams.

This part captures theme/program level information within a given organisation. Respondents are asked to complete, to the extent possible, *Tables 1 and the first half of 2 and return to the survey team ahead of a 15-20 minute phone interview* with a member of the survey team. This phone interview will review the responses provided, and identify which specific individual projects and points of contact should be surveyed in more detail.

Table 1. Research Program/Theme/Department Information

High level details of the organisation/agency responding to the survey.

Table 2. [First Half] Listing of Research Projects/Teams and Activities within the Program/Division/Department

Listing of projects relevant to the survey within the research program, with points of contact.

Identification of the projects to be included in PART 2 of the survey.

PART 2: Questions for Individual Project/Team Activity Leaders.

This part captures more detailed project information. There may be multiple projects for each organisation and/or team leader. Respondents are asked to complete, to the extent possible, *the second half of Table 2, and Tables 3-9 and return to the survey team ahead of an extended interview (1-2 hours, by phone or face-to-face where possible)* with a member of the survey team. This interview will review the responses provided, clarify where required, and identify any follow-up inquiries.

Table 2. [Second Half] Listing of Research Projects/Teams and Activities within the Program/Division/Department

Listing of projects outcomes, societal and operational benefits, resources and EO importance.

Table 3. Project Overview

Objectives, collaboration, and reference materials for the project.

Table 4. EO Data Requirements

Current EO data requirements, supply, and future requirements by instrument type.

Table 5. EO Data Supply

Current EO data supply overview, agreements, calibration and validation, volumes and costs by instrument.

Make one copy of this table for each instrument that is a part of the project's data supply.

Table 6. Continuity and Future Trends

Project continuity, emerging technology, sensor types, and potential new applications.

C.2 Survey Table 1: Department, Program

High-level details of the organisation/agency responding to the survey.

Please provide inputs in the highlighted cells:

1.1	Organisation Details	Notes	
1.1.1	Full Name		
1.1.2	Abbreviation/Acronym		
1.1.3	Street Address		
1.1.4	Postal Address		
1.1.5	Agency/Group Website		
1.2	Organisation Contact Details	Notes	
1.2.1	Organisational Point of Contact Name		
1.2.2	Agency Role/Title		
1.2.3	Telephone		
1.2.4	Email		
1.2.5	Suggest top three best dates/times for the survey team to contact you.	Initial call to review pre-populated survey table 2, <i>Activity Listing</i> . Approximate time 15 minutes.	

C.3 Survey Table 2: Key Project Listing

Listing of projects relevant to the survey within the research program, theme, or department. Identification of the projects to be included in PART 2 of the survey.

Please provide inputs in the highlighted cells.

C.3.1 Key Project Listing: Part 1 (preliminary survey) projects

Please include all activities that are relevant to the survey.

Please suggest up to five to be surveyed.

Project Name	<i>Full Name and Abbreviation</i>	
Survey	<i>Yes/No</i>	
Project Point of Contact	<i>Name</i>	
	<i>Title</i>	
	<i>Phone</i>	
	<i>Email</i>	
Brief Activity Description	<i><25 words</i>	
Potential for Application	<i>Start/end year, duration</i>	

C.3.2 Key Project Listing: Part 2 (detailed survey) projects

Societal Benefit Area	<i>Up to 3 from drop down list. Click here to see list</i>	See Table 3.5
		<i>other/none (specify)</i>
Links to Operational Programs	<i>Up to 3 from drop down list. Click here to see list</i>	See Appendix B
		<i>other/none (specify)</i>
Annual Budget Range	<i>Select from drop down list.</i>	See Note 1
Current FTE Staff	<i>Full time equivalent staff.</i>	
EO Data Importance	<i>Select from drop down list.</i>	Satellite – see Note 2
		Airborne – see Note 2

Notes for Survey Table 2:

- (1) up to \$100,000;
\$100,000 to \$500,000;
\$500,000 to \$1,000,000; or
\$1,000,000+.
- (2) Essential – primary input in support of the project’s outcomes;
Advantageous – secondary input but is not necessary to achieve the project’s outcomes;
Opportunistic – used on an *ad hoc* basis; or
Promising – not currently used but could be useful.

C.4 Survey Table 3: Project Overview

3.1	Objectives, Main Activities, and Outcomes	Notes	
3.1.1	Project	<i>Project Name and Number from Table 2. Key Projects Listing</i>	
3.1.2	Describe the objectives and main activities.		
3.1.3	Examples that demonstrate the outcomes of the project highlighting tangible benefits and/or the role of EO data.		
3.2	Please provide up to five activity background references		
3.2.1	Reference 1	<i>List links and/or attachments provided. May include, but not limited to, scientific papers, websites, promotional materials, and brochures.</i>	
3.2.2	Reference 2		
3.2.3	Reference 3		
3.2.4	Reference 4		
3.2.5	Reference 5		
3.3	Collaboration	Notes	
3.3.1	Is the activity part of a larger internal and/or external program?		
3.3.2	Describe any domestic collaboration.	<i>Where possible, include specific names of missions, instruments, countries, groups and/or scientists involved. Example activities of interest include, but are not limited to, calibration and validation, and applications development.</i>	
3.3.3	Describe any international collaboration.		
3.4	Access to Research Data Sets		
3.4.1	Does this project have access to restricted EO data?	<i>Restricted in the sense that they are available only to certain activities for a period (i.e. PI exclusive). Does not indicate classified, i.e. for defence purposes.</i>	
3.4.2	If yes, can you describe those data sets, their currency, and their conditions of use?		

C.5 Survey Table 4: EO Data Requirements

For each Instrument Data Type (see Table 4.1) being used, respondents were asked to supply the following information:

Supply	Requirement	Select from Dropdown	See Note 1
	Supply Source(s)	<i>Instrument(s), Specify if Airborne</i>	
	Substitute Available	<i>Select from Dropdown</i>	Yes/Partial/No
	Substitute(s)	<i>Specify Options, indicate if Supply is Airborne</i>	
Technical Requirements	Spatial Resolution	<i>Min, Max, Typical in m²</i>	
	Maximum Extent of Coverage	<i>Select from dropdown list</i>	See Note 2
	Coverage Area	<i>Km²</i>	
	Coverages Required	<i>#/year</i>	
	Specific Regions of Interest	<i>i.e. coastal, QLD, troposphere, etc</i>	
	Temporal Coverage	<i>Select from dropdown list</i>	See Note 3
	Latency	<i>Select from dropdown list</i>	See Note 4
	Continuity and Coordination Requirements	<i>i.e. seasonal, coordinated with other observations, etc.</i>	
	Other Technical Requirements	<i>Spectral resolution, wavebands, others</i>	
Future Requirements	2 year	Requirement	See Note 1
		Expected to be met	Yes/No/Partially
	5 year	Requirement	See Note 1
		Expected to be met	Yes/No/Partially
	10 year	Requirement	See Note 1
		Expected to be met	Yes/No/Partially

Notes for Survey Table 4:

- (1) Essential – primary input in support of the project’s outcomes;
 Advantageous – secondary input but is not necessary to achieve the project’s outcomes; or
 Opportunistic – used on an *ad hoc* basis.
 Promising – not currently used but could be useful.
- (2) Global;
 Asia-Pacific;
 National;
 State;
 Regional;
 Research Site(s); or
 Other.
- (3) Daily;
 Monthly;
 Quarterly;
 Annually;
 Triennially; or
 Other (specify in ‘other tech. requirements’)
- (4) Hours;
 Days;
 Weeks; or
 Other (specify in ‘other tech. requirements’)

C.6 Survey Table 5: EO Data Supply

5.1	Supply Instrument Details <i>Overview</i>		
5.1.1	Instrument Name		
5.1.2	Instrument Agency		
5.1.3	Instrument Mission		
5.1.4	Instrument Type	Select from dropdown list.	See Table 4.1
5.1.5	Requirement	Select from dropdown list.	See Section 4.3.1
5.1.6	Supply Start Year		
5.1.7	Expected Supply End Year		
	<i>Supply Details</i>		
5.1.8	Agreement Type	Select from dropdown list.	See Note 1
		5.1.8 Other	
5.1.9	Unique Agreement Terms and Conditions	Any terms and conditions uniquely applicable to your supply arrangement? For example, restricted usage, restricted redistribution, specific acquisition requests allowed, etc.	
5.1.10	Agreement Duration	Specify agreement start and/or end dates (if applicable).	
5.1.11	Physical Supply Route	Select from dropdown list.	See Note 2
		5.1.11 Other	
5.1.12	Current Infrastructure Obstacles	Any infrastructure issues specific to this instrument, i.e. downlink or acquisition coverage, timeliness, storage, processing.	
5.1.13	Anticipated Future Data Supply	Is the data supply from this instrument expected to continue? Are there any known risks to continuity of supply? If so, briefly describe.	
	<i>Supply Data Quality</i>		
5.1.14	Quality Control Procedures	Describe the quality control procedures or your sources of ground calibration data used for this supply source.	
	<i>Data Volumes</i>		
5.1.15	Data Volume	Specify approx. data volumes in terabytes [TB], [TB/year].	See Note 3
5.1.16	Scenes	Specify approx. number of scenes [#], [#]/year.	
	<i>Data Costs</i>		
5.1.17	Data Cost	Specify approx. data cost in AUD.	See Note 4

Notes for Survey Table 5:

- (1) Public Good (No Agreement) – data supplied without a substantive agreement in place (i.e. create a free web account).
Public Good (Research Agreement) – data supplied for free with a research agreement outlining access terms. This may or may not include rights to request new acquisitions.
Public Good (Third Party) – data provided for free through a third party (e.g. Geoscience Australia).
Data Reception Agreement – data supplied as a part of a ground station data reception agreement.
Cost Recovery – data supplied on a cost recovery basis specified in a research agreement.
Commercial – data supplied on commercial terms and at market prices.
Other – data exchange for value adding (e.g. Cal/Val), other as specified in the survey responses.
- (2) Satellite Downlink
Physical Media Delivery
ftp/Internet Download
Other (specify)
- (3) For Historical and New Annual Acquisitions
- (4) For Acquisitions, Storage and Processing of both Total Lifetime Cost and Average Annual Total Cost

C.7 Survey Table 6: Continuity and Future Trends

6.1	Project Continuity	Notes	
6.1.1	Expected Project Continuity	<i>Current plans for the continuity of the project, including funding cycle and status if available.</i>	
6.1.2	Planned Project Termination Date	<i>If applicable.</i>	
6.2	Future Technical Trends	Notes	
6.2.1	Additional Sensor Types	<i>Do you foresee additional sensor types in particular become more relevant to your project activity. (i.e. emergence of SAR, Hyperspectral, others)</i>	
6.2.2	New Sensor Types and Technology	<i>Do you foresee the emergence of any new sensor types or technologies of particular relevance to your project activity?</i>	
6.2.3	Detailed Technical Requirements	<i>In the course of the research, what improvements do you foresee in detailed technical requirements which will limit or drive advancement? For example improved spatial or spectral resolution, wider spectral range, improved frequency or latency of observations, others?</i>	
6.2.4	Future Data Volumes	<i>Do you expect significant changes in future data volumes? For example, due to a change in sensor type, coverage area, or frequency. If so, please indicate a timeframe and a rough estimate of the increase.</i>	
6.2.5	Potential Infrastructure Impacts	<i>What infrastructure impact would you foresee with the emergence of additional or new sensor types? For example to support additional acquisition, storage or processing.</i>	
6.2.6	Who do you think should be responsible for EOS data quality in Australian research?		
6.3	New Application Areas	Notes	
6.3.1	Future Pre-Operational Applications	<i>Are there any examples of applications that will emerge from the basic remote sensing research being conducted?</i>	
6.3.2	Future Operational Applications	<i>Are there any examples of pre-operational applications that could progress to operational in the project?</i>	
	Future Collaboration		
6.4.1	Domestic Collaboration	<i>Are there any particular domestic or international groups that you would like to collaborate with in the future? Be as specific as possible, including specific researchers, programs, facilities, institutes, countries, and/or sensors. Also indicate how this would enable the potential for future development of research or applications.</i>	
6.4.2	International Collaboration		

D INSTRUMENT DETAILS FOR PRIORITY DATA TYPES

Table D-1 Low Resolution Optical Instrument Details

Current Sensor Status and Agency*	Mission(s) and Duration	Spectral Bands	Spatial Resolution	Swath Width	Repeat Cycle	Data Access
AVHRR NOAA Operational	NOAA-15: 1998-2011 NOAA-16: 2000-2012 NOAA-17: 2002-2014 NOAA-18: 2005-2015 NOAA-19: 2009-2016 MetOp-A: 2006-2013 MetOp-B: 2012-2017 MetOp-C: 2016-2021 1998-2021	6 bands VIS-TIR	1.1 km	3000 km	Twice daily	WIS (WMO)
MODIS NASA Operational	Terra: 1999-2013 Aqua: 2002-2013 1999 - 2013	36 bands VIS-TIR	250 m (bands 1-2) 500 m (bands 3-7) 1000 m (bands 8-36)	2330 km	16 days	Open Access
MERIS ESA Operational	Envisat: 2002-2013	15 bands VIS-NIR	Ocean: 1040 x 1200 m, Land & coast: 260 x 300 m	1150 km	3 days	Open Access
VIIRS NOAA/NASA/ EUMETSAT Operational	NPP: 2011-2016 JPSS-1: 2017-2023 JPSS-2: 2023-2029 2011-2029	22 bands VIS-TIR	400 m - 1.6 km	3000 km	16 days	Open Access
OLCI EC/ESA/ EUMETSAT Approved	Sentinel-3 A: 2013-2020 Sentinel-3 B: 2014-2022 Sentinel-3 C: 2020-2027 2013-2027	21 bands VNIR-SWIR	300 m	1270 km	27 days	Open Access
SGLI JAXA Approved	GCOM-C1: 2014-2019 GCOM-C2: 2018-2023 GCOM-C3: 2022-2027 2014-2027	19 bands VIS-TIR	250 m, 500 m, 1000 m	VNR: 1150 km, IRS: 1400 km	3 days	Constrained Access
SLSTR EC/ESA/ EUMETSAT Approved	Sentinel-3 A: 2013-2020 Sentinel-3 B: 2014-2022 Sentinel-3 C: 2020-2027 2013-2027	9 bands VNIR-SWIR-TIR	500 m (1000m TIR)	1675 km	27 days	Open Access

* Operating agency listed first.

Table D-2 Medium Resolution Optical Instrument Details

Current Sensor Status and Agency*	Mission(s) and Duration	Spectral Bands	Spatial Resolution	Swath Width	Repeat Cycle	Data Access
MSS, TM, ETM+ USGS/NASA Operational	Landsat-5: 1984-2012 Landsat-7: 1999-2012 1984-2012	TM: 7 bands VIS-TIR ETM+: 8 bands VIS-TIR MSS: 4 bands VIS-NIR	TM: 30 m MS, 120 m TIR ETM+: 15 m PAN, 30 m MS, 60 m TIR MSS: 80 m	185 km	16 days	Open Access
OLI, TIRS USGS/NASA Approved	LDCM: 2012-2017	OLI: 9 bands VIS-SWIR TIRS: 2 bands TIR	OLI: 15 m PAN, 30 m MS TIRS: 100m	185 km	16 days	Open Access
HRVIR, HRG CNES Operational	SPOT-4: 1998-2013 SPOT-5: 2002-2014 1998-2014	HRVIR: 4 bands VIS-SWIR HRG: 4 bands VIS-SWIR	HRVIR: 10 m PAN or 20 m MS HRG: 5 m PAN, 10 m MS	117km	26 days	Commercial
ASTER METI/NASA Operational	Terra: 1999-2013	3 bands VIS-NIR; 3 bands SWIR; 5 bands TIR	15 m VNIR, 15 m horizontal stereo, 25m vertical stereo, 30 m SWIR, 90 m TIR	60 km	16 days	Open Access
SLIM-6, SLIM-6-22 UKSA Operational	UK-DMC: 2003-2011 UK-DMC-2: 2009-2014 2003-2014	3 bands VIS-NIR	SLIM-6: 32 m SLIM-6-22: 22 m	SLIM-6: 648 km SLIM-6-22: 638 km	5 days	Constrained Access
AWiFS, LISS-III ISRO Operational	RESOURCESAT-2: 2011-2016 RESOURCESAT-2A: 2013-2018 2011-2018	AWiFS: 4 bands VIS-SWIR LISS-III: 5 bands VIS-SWIR	AWiFS: 55 m LISS-III: 23.5 m	AWiFS: 730 km LISS-III: 141 km	26 days	Access By Request
IRS, MUX, WFI-2 INPE/CAST Approved	CBERS-3: 2012-2015 CBERS-4: 2014-2017 2012-2017	IRS: 4 bands VIS-TIR MUX: 4 bands VIS WFI-2: 4 bands VIS-NIR	IRS: 40 m PAN, SWIR, 80 m TIR MUX: 20 m WFI-2: 64 m	IRS: 120 km MUX: 120 km WFI-2: 866 km	26 days	Open Access
MSI EC/ESA Approved	Sentinel-2 A: 2013-2020 Sentinel-2 B: 2014-2022 Sentinel-2 C: 2020-2027 2013-2027	13 bands VNIR-SWIR	10m for 4 bands in VNIR, 60 m for 3 dedicated atmospheric correction bands, 20 m for remaining bands	290 km	10 days	Open Access

* Operating agency listed first.

Table D-3 SAR Instrument Details

Current Sensor Status and Agency*	Mission(s) and Duration	Spectral Bands	Spatial Resolution	Swath Width	Repeat Cycle	Data Access
C-Band						
SAR CSA Operational	Radarsat: 1995-2012 Radarsat-2: 2007-2015 RCM-1: 2014-2021 RCM-2: 2015-2022 RCM-3: 2015-2022 1995-2022	C-band, up to 4 polarisation modes (HH, VV, HV, VH)	1 – 100 m depending on mode	20 – 500 km depending on mode	Radarsat: 24 days RCM: 12 days	Radarsat: Commercial RCM: Under Discussion
ASAR ESA Operational	Envisat: 2002-2013	C-band, 5 polarisation modes (VV, HH, VV/HH, HV/HH, or VH/VV)	30 m, 150 m, or 950 m depending on mode	5 km, 100 km, 400 km depending on mode	35 days	Open Access
C-Band SAR EC/ESA Approved	Sentinel-1 A: 2013-2020 Sentinel-1 B: 2014-2022 Sentinel-1 C: 2019-2026 2013-2026	C-band, 4 polarisation modes (HH, VV, HH+HV, VV+VH)	9 – 50 m depending on mode	20 – 400 km depending on mode	12 days	Open Access
L-Band (Future Options Only - No Current Supply)						
L-Band SAR JAXA Approved	ALOS-2: 2013-2017	L-band	1 – 10 m depending on mode	30 – 360 km depending on mode	14 days	Under Discussion
SAR-L CONAE/ASI Approved	SAOCOM 1A: 2014-2019 SAOCOM-2A: 2015-2020 SAOCOM 1B: 2016-2021 SAOCOM-2B: 2016-2021 2014-2021	L-band	10 – 100 m	20 – 350 km	16 days	Under Discussion
X-Band						
X-Band SAR DLR Operational	TerraSAR-X: 2007-2013 TanDEM-X: 2012-2015 TerraSAR-X2: 2015-2022 2007-2022	X-band, 4 polarisation modes	1 -16 m depending on mode	5 – 100 km depending on mode	11 days	Commercial
SAR-2000 ASI Operational	COSMO-SkyMed 1: 2007-2014 COSMO-SkyMed 2: 2007-2014 COSMO-SkyMed 3: 2008-2015 COSMO-SkyMed 4: 2010-2017 2007-2017	X-band, 5 polarisation modes (VV, HH, HV, VH, HH/HV + VV/VH)	1 – 100 m depending on mode	10 – 200 km depending on mode	16 days	Commercial/ Military
PazSAR-X CDTI Approved	PAZ: 2012-2017	X-band	1 – 18m depending on mode	5 – 100 km depending on mode	11 days	Constrained Access
WSAR NSOAS/CAST Proposed	HY-3A: 2012-2017 HY-3B: 2017-2022 HY-3C: 2022-2027 2012-2027	X-band	1 – 10 m depending on mode	40 – 150 km depending on mode		

* Operating agency listed first.

Table D-4 Passive Microwave Instrument Details

Current Sensor Status and Agency*	Mission(s) and Duration	Spectral Bands	Spatial Resolution	Swath Width	Repeat Cycle	Data Access
TMI NASA Operational	TRMM: 1997-2013	5 frequencies, microwave	2.5 km vertical, 18 km horizontal	790 km		Open Access
SSM/I and SSM/IS NOAA/US DoD Operational	SSM/I: DMSP F-14: 1997-2011 DMSP F-15: 1999-2013 SSM/IS: DMSP F-16: 2003-2012 DMSP F-17: 2006-2013 DMSP F-18: 2009-2014 DMSP F-19: 2012-2017 DMSP F-20: 2014-2019 1997-2019	24 frequencies, microwave	17 – 70 km depending on frequency	SSM/I: 1400 km SSM/IS: 1700 km		WIS (WMO)
MWRI NRSCC, CAST, NSMC-CMA Operational	FY-3A: 2008-2011 FY-3B: 2010-2013 FY-3C: 2013-2016 FY-3D: 2015-2018 FY-3F: 2019-2022 2008-2022	12 channels, 6 frequencies, microwave	7.5 – 51 km	1400 km		Constrained Access
MIRAS ESA Operational	SMOS: 2009-2012	L-band	33 – 50 km	1050 km hexagonal	23 days	Open Access
MADRAS ISRO/CNES Operational	Megha-Tropiques: 2011-2015	5 frequencies, microwave	40 km	1700 km		Constrained Access
Aquarius CONAE Operational	SAC-D: 2011-2017	L-band	100 km	300 km	7 days	Open Access
AMSR-2 JAXA Approved	GCOM-W1: 2012-2017 GCOM-W2: 2016-2021 GCOM-W3: 2020-2025 2012-2025	7 frequencies, microwave	5 – 50 km depending on frequency	1450 km		Constrained Access
GMI NASA Approved	GPM Core: 2013-2018	5 frequencies, microwave	10 km along track and cross track	800 km		Open Access
L-band Radiometer NASA Approved	SMAP: 2014-2017	L-band		40 km		Open Access
SAR-L ISRO Considered	RISAT-3: 2016-2021	L-band	1.5 – 35 m	10 – 120 km	12 days	Constrained Access

* Operating agency listed first.

Table D-5 Radar Altimeter Instrument Details

Current Sensor Status and Agency*	Mission(s) and Duration	Spectral Bands	Spatial Resolution	Swath Width	Repeat Cycle	Data Access
POSEIDON-2, -3, and -3B CNES/NASA/ NOAA/EUMETSAT Operational	Jason-1: 2001-2013 Jason-2: 2008-2013 Jason-3: 2014-2017 2001-2017	Ku-band, C-band	Basic measurement: 1/ sec (6 km along track), Raw measurement: 20/ sec (300 m along track)	10 day cycle, 300 km between tracks at equator	10 days	Open Access
RA-2 ESA Operational	Envisat: 2002-2013	Ku-band, S-band			35 days	Open Access
SIRAL ESA Operational	CryoSat-2: 2010-2013	Ku-band	45 cm range, 250 m along track	Footprint 15 km	369 days	Open Access
ALT NSOAS, CAST Operational	HY-2A: 2011-2012	2 frequencies, microwave	16 km	16 km	14 days	Constrained Access
AltiKa CNES Approved	SARAL: 2012-2014	K-band, Ka-band				Constrained Access
SRAL EC/ESA Approved	Sentinel-3 A: 2013-2021 Sentinel-3 B: 2014-2022 Sentinel-3 C: 2020-2027 2013-2027	Dual freq radar altimeter; Ku-band, C-band	300 m	Profiling	27 days	Open Access

* Operating agency listed first.

Table D-6 Hyperspectral Instrument Details

Current Sensor Status and Agency*	Mission(s) and Duration	Spectral Bands	Spatial Resolution	Swath Width	Repeat Cycle	Data Access
Hyperion NASA Operational	EO-1: 2000-2013	10 nm spectral resolution for 220 bands, VIS-SWIR	30 m	7.5 km	16 days	Open Access
HYC ASI Approved	PRISMA: 2013-2018	VIS-SWIR	30 m	30 km		Constrained Access
HSI DLR Approved	EnMAP: 2015-2020	VIS-SWIR	30 m	30 km	21 days	Open Access

* Operating agency listed first.

Table D-7 Lidar Instrument Details

Current Sensor Status and Agency*	Mission(s) and Duration	Spectral Bands	Spatial Resolution	Swath Width	Repeat Cycle	Data Access
CALIOP NASA Operational	CALIPSO: 2006-2013	532 nm (polarization-sensitive), 1064 nm, VIS and NIR	Vertical sampling: 30 m, 0 – 40 km	333 m along-track		Open Access
ALADIN ESA Approved	ADM-Aeolus: 2013-2017	UV: 355 nm	One wind profile every 200 km along track, averaged over 50 km	Along line 285 km parallel to satellite ground track	7 days	Open Access
ATLID ESA Approved	EarthCARE: 2013-2016	Laser at 355 nm	300 m horizontal		25 days	Open Access
ATLAS NASA Considered	ICESat-II: 2016-2018	VIS-NIR laser	66 m spots separated by 170 m		183 days	Open Access
CO2 Lidar NASA Considered	ASCENDS: 2020-2023	1.57 μ m, SWIR		200 m		Open Access
HSRL NASA Considered	ACE: 2020-2023	532 nm (polarization-sensitive), 1064 nm, 355 nm	Vertical sampling: 30-60 m, 2 to 40 km	333 m along-track		Open Access
HDWL NASA Considered	3D Winds: 2030-2033	2.051 μ m and 0.355 μ m	300 km along track horizontal resolution	View 45 degrees of nadir at four azimuth angles: 45, 135, 225, 315 deg.	12 days	Open Access
Laser Altimeter NASA Considered	LIST: 2030-2033				365 days	Open Access

* Operating agency listed first.

Table D-8 Ocean Colour Instrument Details

Current Sensor Status and Agency*	Mission(s) and Duration	Spectral Bands	Spatial Resolution	Swath Width	Repeat Cycle	Data Access
MODIS NASA Operational	Terra: 1999-2013 Aqua: 2002-2013 1999 - 2013	36 bands VIS-TIR	250 m (bands 1-2) 500 m (bands 3-7) 1000 m (bands 8-36)	2330 km	16 days	Open Access
OCM ISRO Operational	OCEANSAT-2: 2009-2014	8 channels, VIS-NIR	236 m x 360 m	1400 km	2 days	Open Access
VIIRS NOAA/NASA/ EUMETSAT Operational	NPP: 2011-2016 JPSS-1: 2017-2023 JPSS-2: 2023-2029 2011-2029	22 bands VIS-TIR	400 m - 1.6 km	3000 km	16 days	Open Access
SGLI JAXA Approved	GCOM-C1: 2014-2019 GCOM-C2: 2018-2023 GCOM-C3: 2022-2027 2014-2027	19 bands VIS-TIR	250 m, 500 m, 1000 m	VNR: 1150 km, IRS: 1400 km	3 days	Constrained Access
MERIS ESA Operational	Envisat: 2002-2013	15 bands VIS-NIR	Ocean: 1040 x 1200 m Land & coast: 260 x 300 m	1150 km	3 days	Open Access
OLCI EC/ESA/ EUMETSAT Approved	Sentinel-3 A: 2013-2020 Sentinel-3 B: 2014-2022 Sentinel-3 C: 2020-2027 2013-2027	21 bands VNIR-SWIR	300 m	1270 km	27 days	Open Access

* Operating agency listed first.

Table D-9 Agencies and Countries of Origin

Agency	Country	Agency	Country
ASI	Italy	ISRO	India
CAST	China	JAXA	Japan
CDTI	Spain	METI	Japan
CNES	France	NASA	USA
CONAE	Argentina	NOAA	USA
CSA	Canada	NRSCC	China
DLR	Germany	NSMC-CMA	China
EC	Europe	NSOAS	China
ESA	Europe	UKSA	UK
EUMETSAT	Europe	US DoD	USA
INPE	Brazil	USGS	USA

E PRIORITY DATA TYPES – CONTINUITY OUTLOOK

E.1 Priority Data Type Scenarios

Section 5 in the main report provides an overview of EO data availability and summarises the future data supply scenario for each of the Priority Data Types. This appendix presents some additional information for each of the Priority Data Types.

The supply scenarios in this report are derived primarily from the CEOS Missions, Instruments and Measurements (MIM) database, recently updated by ESA (CEOS, 2011).

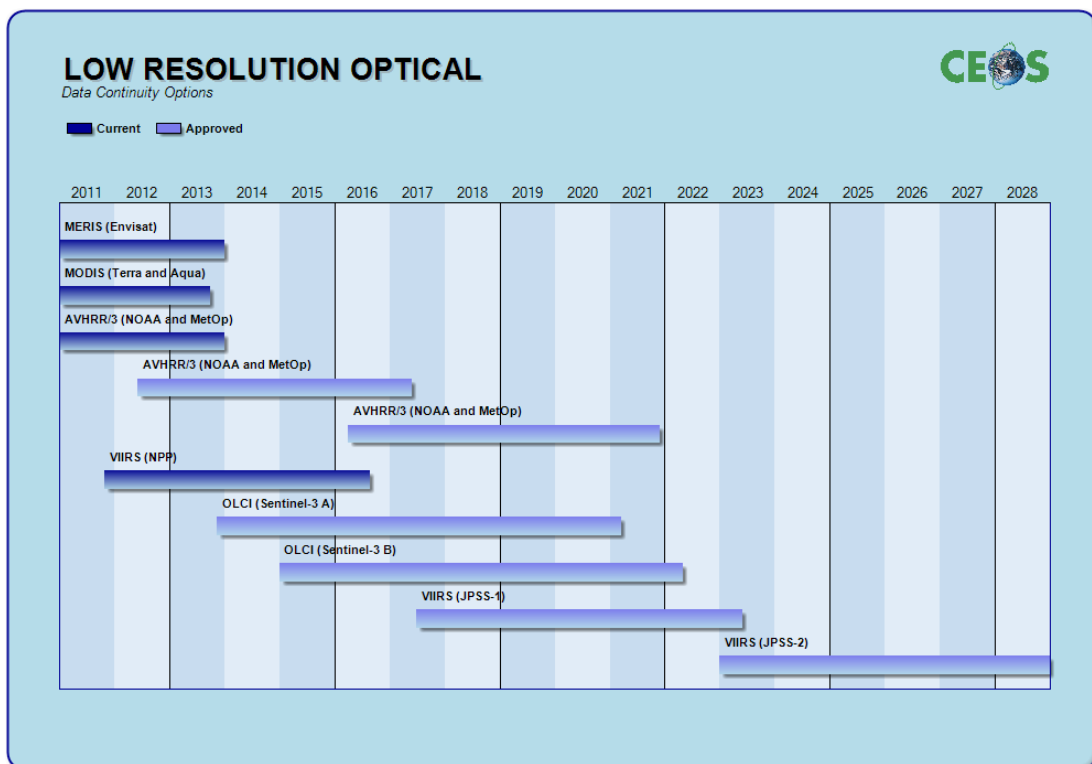
Appendix D presents information tables for those instruments cited in the supply outlook for each of the Priority Data Types identified.

E.1.1 Low Resolution Optical (>80m)

Low Resolution Optical Sensors are the most common instrument type featured in the CEOS database and are operated and planned by a very large number of agencies, both large and small. According to the MIM there are currently 31 Low Resolution Optical Sensors in operation, and a further 24 are now in development or being considered.

The Low Resolution Optical instrument continuity options are reflected in Figure E-1.

Figure E-1 Low Resolution Optical Data Continuity Options



Continued free access to VIIRS data is highly likely for Australian researchers, both via the DAAC system and by direct HRPT broadcast to users with suitable reception facilities.

Most of the MERIS use by Australian researchers recorded by the survey is actually in support of water quality studies, suggesting that requirements might also be met by the **Ocean Colour** class of instruments, of which a number are in planning or operation. VIIRS is indicated in the CEOS database as also being an Ocean Colour instrument.

As the EO data type most used by Australian researchers, Low Resolution Optical Data is being acquired concurrently by several R&D centres, predominantly from the on-line archives of MODIS and AVHRRR, and via the Australian national facilities for direct broadcast reception and redistribution. The national satellite processing facility for MODIS/AVHRR/VIIRS data ensures efficiency in infrastructure and usage.

Data access policy is not seen as a major risk for this data class, particularly given its importance to operational meteorology and the prevalence of the arrangements under the WMO framework of which Australia makes good use. While there are uncertainties related to all of Australia's major suppliers (notably Europe), these are considered to be relatively small.

Many researchers use rolling composites of this data type—like the 16-day MODIS dataset—and do not have urgent data delivery requirements. For inland, coastal and ocean colour, near real time delivery is needed. The assumption is that similar Internet-delivery or direct-broadcast distribution systems would be in place for JPSS and Sentinel-3, and that these would satisfy researcher needs.

E.1.2 Medium Resolution Optical (10-80m)

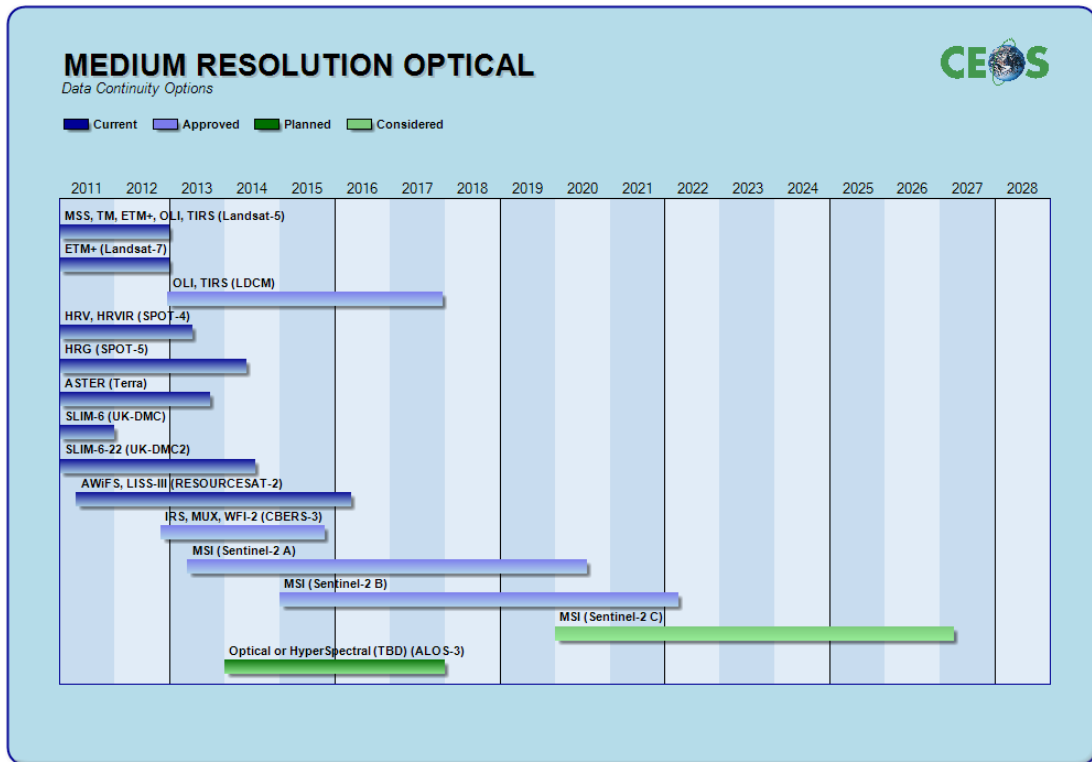
There are many instruments planned in this class, by many agencies. Medium Resolution Optical sensors are a very common instrument type featured in the CEOS database. According to the MIM, there are currently 22 Medium Resolution Optical sensors in operation, and a further 15 in development or being considered.

SPOT: SPOT data is not widely used by the surveyed researchers, presumably because the commercial data policy makes it unaffordable for most R&D projects. SPOT series continuity is guaranteed through the commercial venture by EADS to launch SPOT-6 (2012) and SPOT-7 (2014). These data, however, will have a higher spatial resolution of 8m, and are therefore classified as High Resolution Optical for the purposes of this study.

ASTER: There is no known replacement planned for the ASTER payload, a cooperative arrangement between METI (Japan) and NASA. ASTER is not widely used in Australian R&D—three projects cited it as essential, mostly for resource exploration related research. The multi-band IR capabilities of ASTER are not repeated on planned sensors, other than perhaps Hyperspectral missions such as EnMAP (2015). Sentinel-2 offers nine bands in the VNIR and SWIR, and this may offer a satisfactory alternative, depending on the specific requirements of individual projects for IR data.

The Medium Resolution Optical instrument continuity options are reflected in [Figure E-2](#).

Figure E-2 Medium Resolution Optical Data Continuity Options



E.1.3 High Resolution Optical (<10m)

The CEOS database is generally limited in scope to government systems, although grey areas exist—RapidEye and DMC are listed, but WorldView-1, for example, is not. According to the MIM there are currently 20 High Resolution Optical sensors in operation, and a further 12 being developed or considered. The majority of these sensors are being developed independently of CEOS, and therefore are not documented in the CEOS Handbook.

Government space agencies are careful not to disrupt commercial markets by providing open access to data that might compete in this area.

While Very High Resolution data was once supplied exclusively by US companies, this situation is changing. The launch of Pleiades can be expected to introduce increased competition into the pricing of this data type, which may present an opportunity for increased application by Australian researchers. This data type is not currently used in large quantities by researchers in Australia due to the high cost of data from both satellite and airborne platforms.

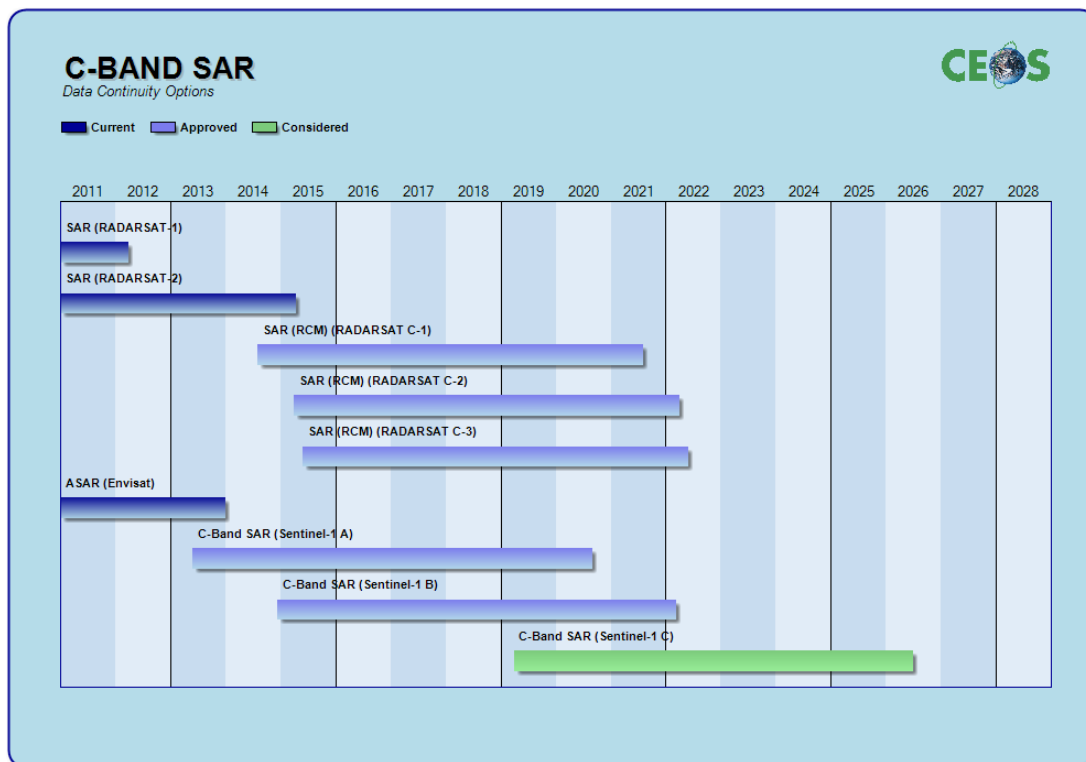
E.1.4 Synthetic Aperture Radars (SAR)

This data type covers the three different bands of SAR (C-, L-, and X-band) needed by Australian researchers. The major sources of EO data in each of these bands are somewhat varied.

C-Band SAR

The C-Band SAR instrument continuity options are reflected in [Figure E-3](#).

Figure E-3 C-Band SAR Data Continuity Options



Currently, data from the ASAR instrument on ESA's Envisat is provided to a few R&D projects under the terms of a research agreement with ESA. Without this agreement, under current ESA data access policy, the ASAR data would only be provided on a commercial basis through one of the two commercial consortia engaged for this purpose. Envisat is operating beyond its design life. Operations are scheduled to complete as the Sentinels come on-line from 2013.

Data from Radarsat-1 & 2 is sourced by the IFCI project by special agreement with CSA. Once again, without such an agreement, the data would have to be purchased. Radarsat-1 is expected to operate into 2012, with Radarsat-2 operating until 2015; data is distributed commercially by Canadian company MDA.

The Sentinel-1 series (ESA) aims to provide free and open access to C-band SAR data for all users from mid-2013, with operational continuity for two decades. This would likely represent the favoured SAR data of choice for Australian researchers and dominate future usage. Sentinel-1 is designed to ensure continuity of C-band data from the successful ERS-1/2/Envisat series and the dataset would have similar characteristics.

The impact of the Sentinel series on the business model adopted for the Radarsat follow-on series (RCM) is unclear. Canada's investment is known to be related to sovereign claims on Arctic resources and to the control and monitoring of shipping lanes. The data access policy that will apply to RCM is unclear, and the

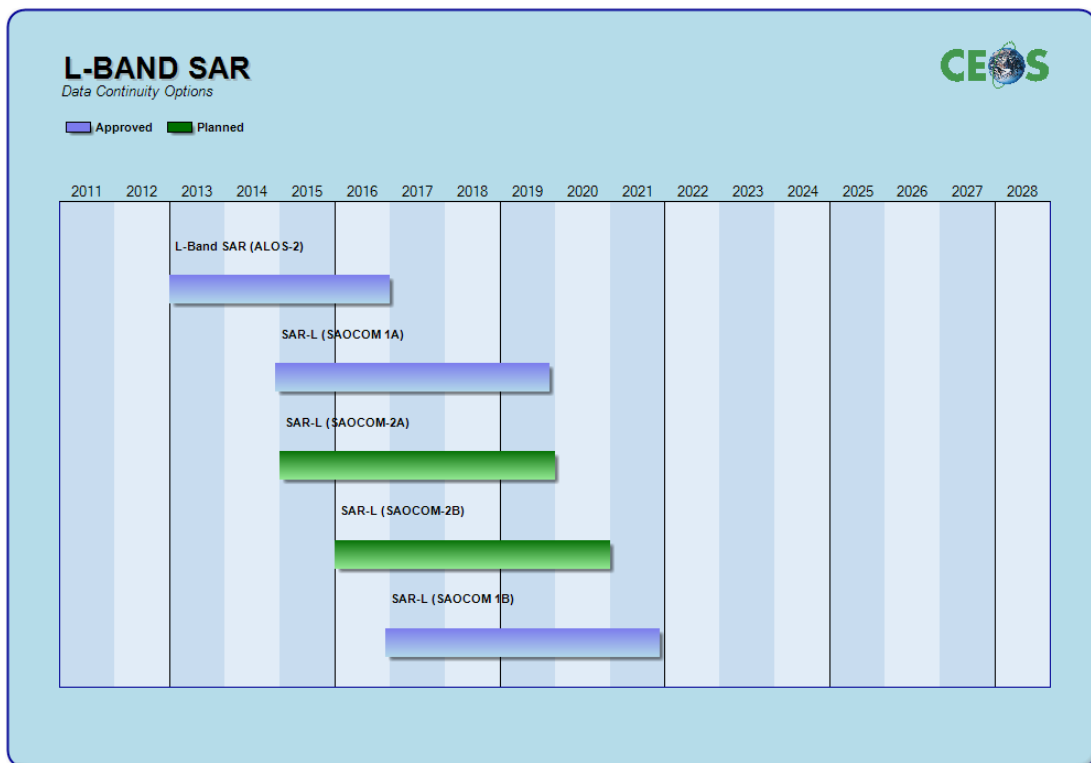
presence of Sentinel-1 data may encourage a public good policy.

The European and Canadian series offer substantial capacity and high quality data and would continue to satisfy Australian research needs.

L-Band SAR

The L-Band SAR instrument continuity options are reflected in [Figure E-4](#).

Figure E-4 L-Band SAR Data Continuity Options



The termination of ALOS in April 2011 concluded the only operational source of space-borne L-band SAR data (the PALSAR instrument), having been distributed in Australia by Geoscience Australia. Data was free of charge for public good purposes and charged commercially for other uses.

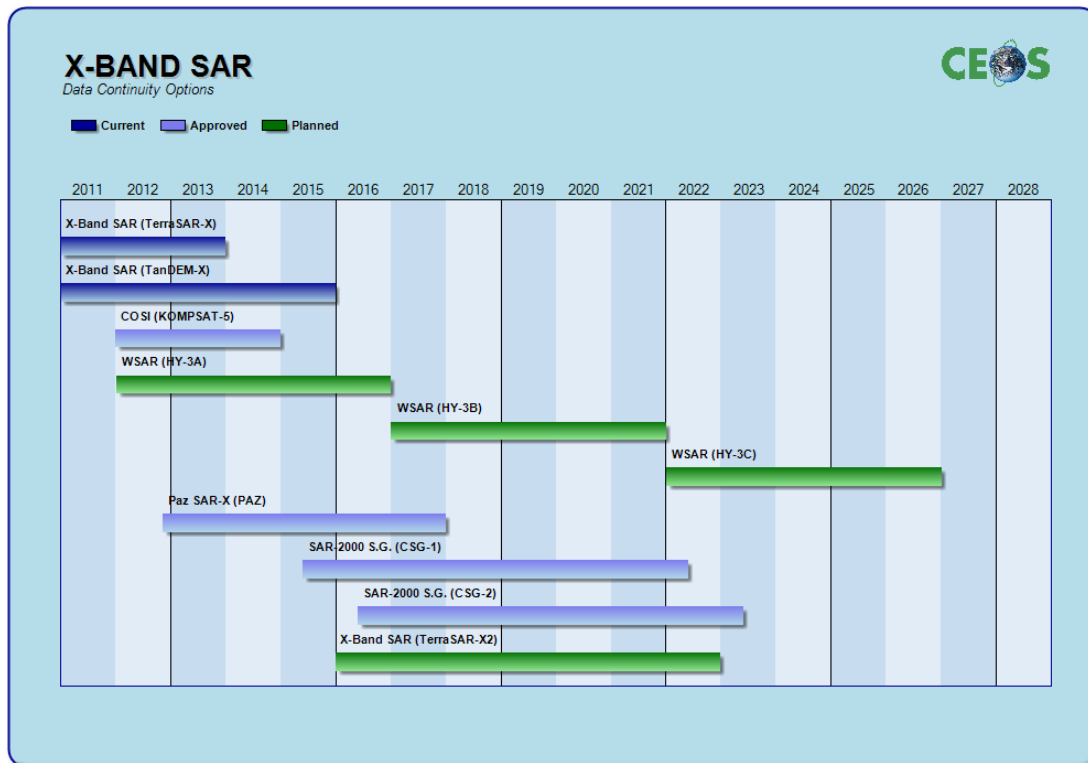
L-band data is highly prized for its value in vegetation and forestry studies, and the termination of ALOS was a significant loss to research in support of programs such as the International Forest Carbon Initiative. The best prospect for recommencement of the supply of appropriate data is the SAOCOM 1A mission being planned by CONAE (Argentina) in 2013. CONAE have a partnership with ASI (Italy) for commercial distribution of the data in Europe. The data access policy and system capacity are not yet clear, but efforts are being made to secure the data for forest carbon applications on a public good basis. Beyond this, the terms for access to the SAOCOM SAR data remain uncertain.

ALOS-2 PALSAR data will also be available from 2013, but it is anticipated that the data policy may still emphasise commercial distribution.

X-Band SAR

The X-Band SAR instrument continuity options are reflected in [Figure E-5](#).

Figure E-5 X-Band SAR Data Continuity Options



European government PPP missions provide the only available source of space-borne X-band SAR data. Germany's TerraSAR-X/TanDEM-X missions (DLR) are anticipated to operate through to 2013 and 2015 respectively. Data is provided commercially to Australian researchers, or through government channels for DSTO use. The four-satellite COSMO-SkyMed series from Italy (ASI) supplies data commercially and is anticipated to do so through to 2017, with satellites launched earlier in the series expiring progressively from 2014. The CEOS Database indicates that ESA, DLR, ASI, CSA and JAXA all plan follow-on missions to those identified above.

KOMPSAT-5 is the latest in the series of polar orbiting missions developed by KARI (Korea), and this is scheduled for launch in late 2011. Little is known of this mission, the associated data access policy or prospective distribution arrangements.

The Chinese HY-3 series (also from 2012) is of some interest in that it plans continuity of X-band observations over a number of years, through the launch of 3 successive satellites, and thus warrants further consideration.

Other-bands—China's HJ series of satellites will include S-band SAR from 2012. ESA's BIOMASS mission (launch date to be determined) will offer P-band SAR.

Opportunities and Risks

The MIM Database identifies around eight confirmed planned missions (or mission series). A larger number of SAR missions are indicated in the MIM database as 'planned or considered'. Of these, three are C-band, two are L-band, and eight are X-band.

C-band—The open data access policy and continuity of supply offered by the Sentinel series represents a significant opportunity for Australian R&D users of SAR data, given that hitherto, other than through limited research agreements, SAR data has usually been supplied on a commercial basis. However, data access policy and funding issues are yet to be resolved.

L-band—The prospects for access to L-band SAR to support initiatives such as vegetation monitoring and forest carbon assessments in Australia are limited. Supply is predicated on the willingness of CONAE to adopt an open data policy, and also on the deployment of a data system being with sufficient capacity and sophistication to support global users. ALOS-2 will also provide an alternative source of supply, although it may only be available at commercial rates. Opportunities for access to ALOS-2 data may present themselves through research agreements associated with, for example, GEO activities such as the Forest Carbon Tracking task or the Global Forest Observations Initiative.

X-band—There will be multiple operational channels for the commercial supply of X-band SAR data, as there are at present. Commercial prices may limit the research uptake, but the data will be available. The Chinese HY-3 series may warrant consideration as an alternate source, particularly if the associated data access policy is favourable to researchers.

E.1.5 Passive Microwave Radiometry

The CEOS database identifies 11 satellite-based Passive Microwave Radiometers currently in operation, and 13 instruments being planned or developed. They can be broadly categorised as either multi-purpose microwave radiometers, specialist soil moisture and ocean salinity instruments, rainfall study instruments, or altimetry correction instruments.

The Passive Microwave instrument continuity options are reflected in [Figure E-6](#).

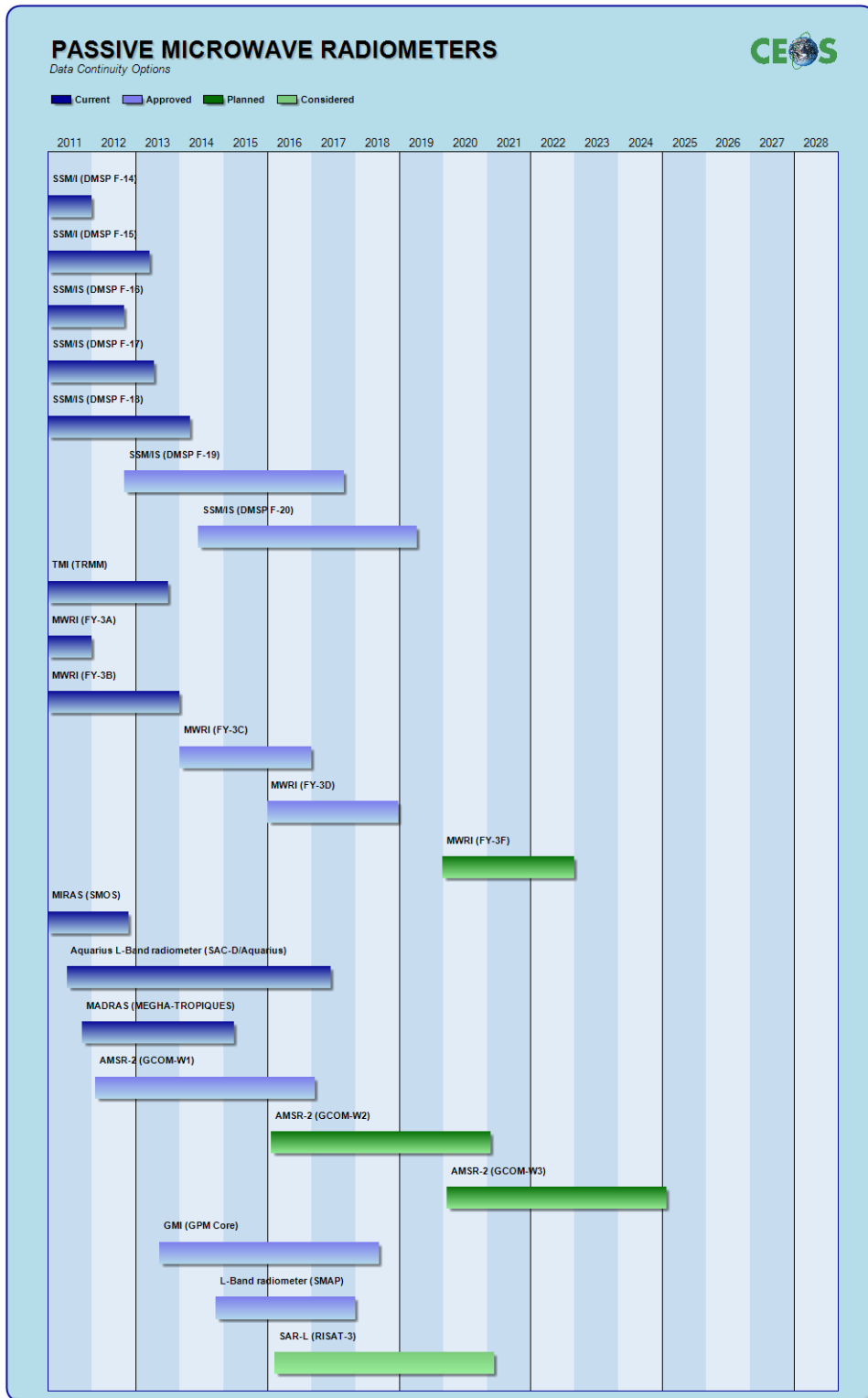
Space agency interest in water cycle measurements is increasing world-wide, with their coordination bodies (CEOS and GEO) known to be considering major new initiatives to improve coordination and continuity of key measurements. The sudden loss of AMSR-E has encouraged the research community to place greater emphasis on readiness for the GCOM-W series. Having noted the impact of the loss of AMSR-E on operational capabilities, this may also have encouraged Japan to develop stronger guarantees for GCOM-W series continuity. Australian researchers will presumably have the same opportunity to access the AMSR data in future, noting efforts by NOAA and JAXA to distribute this material via WMO systems like the GTS. A contingency source could be the MWRI instruments on board the Chinese FY-3 series platforms. These options may merit further investigation.

It is presumed that Australia will continue to enjoy privileged access to the SSM/I data from the DMSP series.

The GPM mission may provide significant opportunities by way of rainfall measurement capabilities at unprecedented frequency over Australian territory, surpassing existing capabilities and filling in gaps between rain gauges and radars. This mission is much anticipated by many operational and research groups in Australia, and it is presumed that access arrangements will be such that they satisfy the strict latency requirements often associated with weather forecasting.

The recently launched Megha-Tropiques mission represents a new source of data from a new partnership (France-India), and presents an opportunity for Australian researchers. The risk is that the data system will not support Australian requirements and this requires further investigation.

Figure E-6 Passive Microwave Data Continuity Options



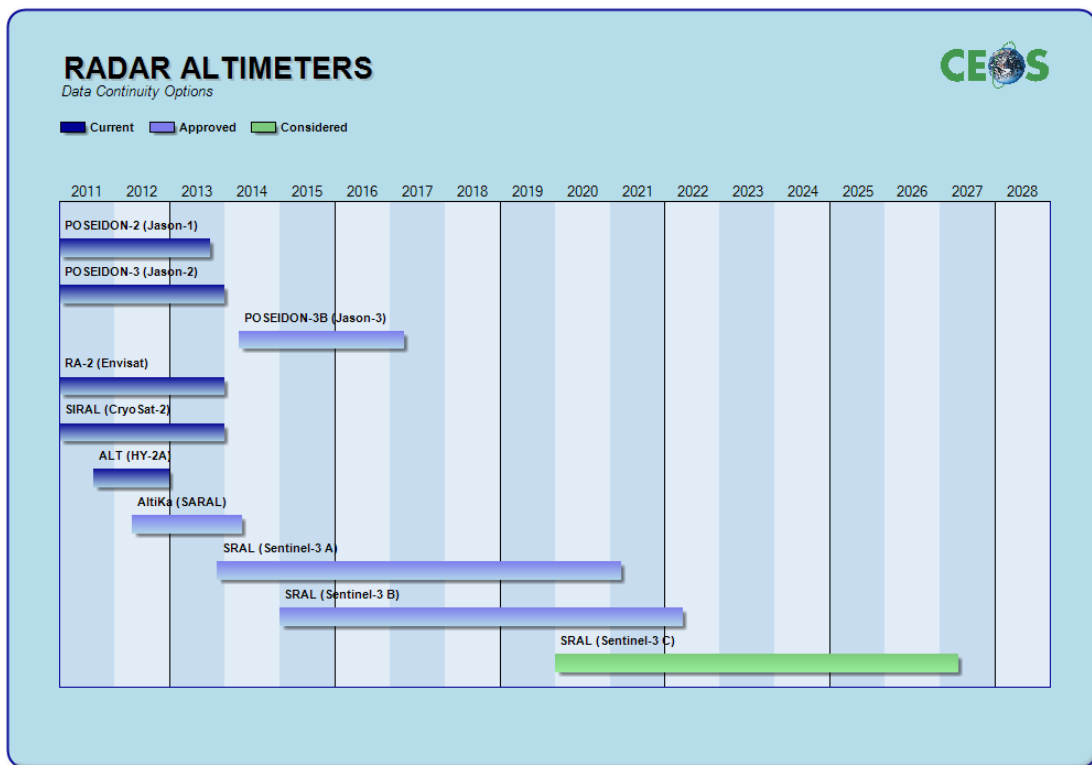
E.1.6 Radar Altimetry

There are a limited number of instruments in this class recorded in the CEOS Database, which identifies ten different instruments, although some feature on several different satellites in a series. Six of these are currently in operation, with the POSEIDON instrument being the main source of continuity. The recent launch of the Chinese HY-2A mission (featuring the ALT instrument), and the coming launch of the joint French-Indian SARAL mission (with the AltiKa instrument) in April 2012 are of potential interest.

The POSEIDON (Jason) series has been the main vehicle for international coordination between NASA, NOAA, CNES and EUMETSAT. Space agency coordination, and to some extent the user community interface, is managed in part through the CEOS Ocean Surface Topography Virtual Constellation (OST-VC). This coordination is generally effective, though is highly dependant on adequate funding to the participating organisations. The ongoing challenge is to maintain continuity of the three to four altimeters required to enable operational applications.

The Radar Altimeter instrument continuity options are reflected in [Figure E-7](#).

Figure E-7 Passive Microwave Data Continuity Options



RA-2 (Envisat) —The Envisat mission was launched in March 2002, and is now deep into its extended operations period. In October 2010, as a part a fuel saving strategy associated with its transition into its end of life operations phase, the Envisat orbit was adjusted, making it non-repeating and imposing some limitations on global coverage. However, the mission and RA-2 instrument remain operational, and funded for extended operations through to December 2013.

While still only a mission concept, NASA's **KaRIN** instrument (SWOT, 2020 launch) is envisioned to be a swath mapping Radar Altimeter. Most current altimeters provide just one point measurement, directly below the spacecraft. KaRIN would provide a swath of point measurements across the orbit path. Coverage of inland water areas, such as rivers and lakes, also appears in the mission requirements, and this may open up new application areas.

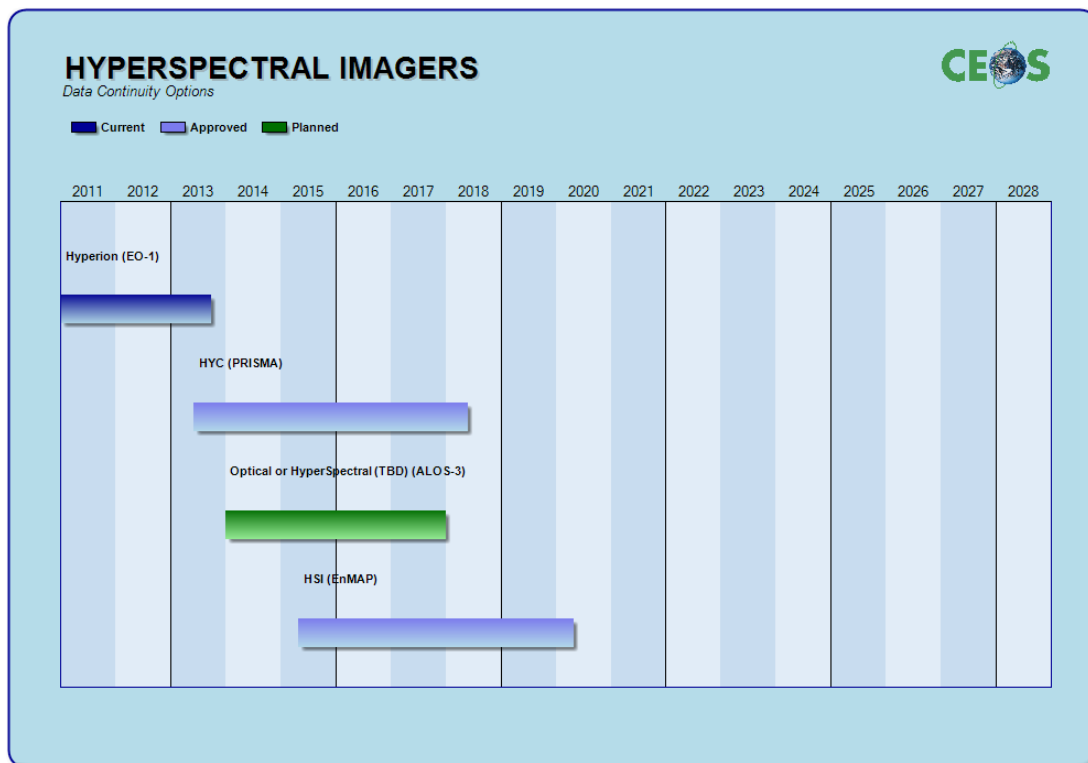
E.1.7 Hyperspectral Imagery

While the CEOS Database does not yet recognise Hyperspectral imagers as a category, only four or five missions could be considered to be carrying Hyperspectral imagers.

The Hyperion data from EO-1 is currently provided by USGS at no cost, with a policy similar to that which applies to their Landsat data. This mission, however, is assumed to be very near to its end of life.

The Hyperspectral instrument continuity options are reflected in [Figure E-8](#).

Figure E-8 Hyperspectral Data Continuity Options



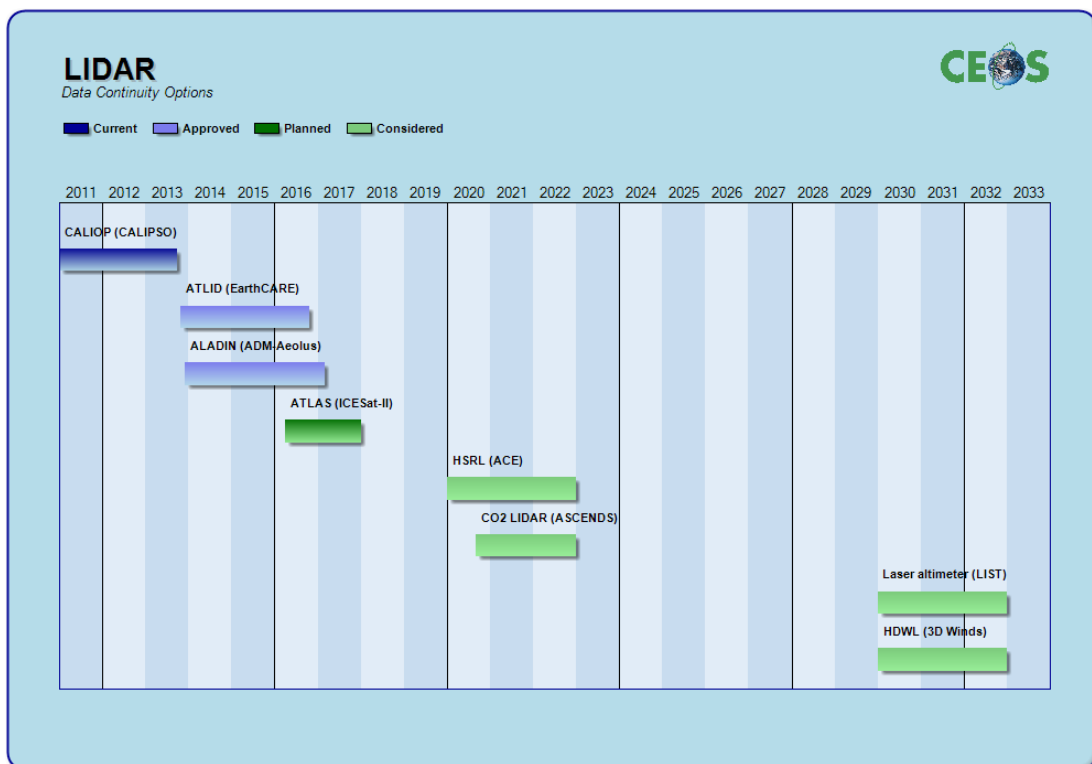
E.1.8 Lidar

The CALIOP Lidar on CALIPSO is the only current satellite Lidar instrument. There are currently two satellite Lidar instruments being developed by CEOS agencies, with five others being considered for future development. The operational instrument (CALIOP), both instruments being developed, and three of the five being considered are focused on atmospheric measurements. The remaining two being considered are focused on land surface measurements with the earliest of the two not considered for launch before 2016.

Lidar data will continue to be available only on an experimental or ‘one-off’ mission basis, rather than in any sustained fashion.

The Lidar instrument continuity options are reflected in [Figure E-9](#).

Figure E-9 Lidar Data Continuity Options



For Lidar land measurements, airborne platforms will continue to be the most important supply source. The supply of airborne Lidar instruments from commercial, and in-house sources appears to be sufficient, based on current needs. However, airborne instruments are naturally limited by their rate of coverage, and can incur significant direct costs to the researchers. R&D projects will naturally be limited to sectors for which airborne Lidar characteristics and costs can be accommodated.

E.1.9 Ocean Colour

There are only a few dedicated Ocean Colour instruments expected in the near future. The most promising are the ESA OLCI (Sentinel-3) and JAXA SGLI (GCOM-C) sensors. ISRO has proposed re-flying OCM on an OCEANSAT-3 mission in 2014, and NASA is considering flying the OES instrument on PACE in 2019. However, neither of these missions are currently approved. NASA is also considering flying a multi-band spectrometer on its ACE mission, but this mission is only at the study stage, scheduled for launch in 2020.

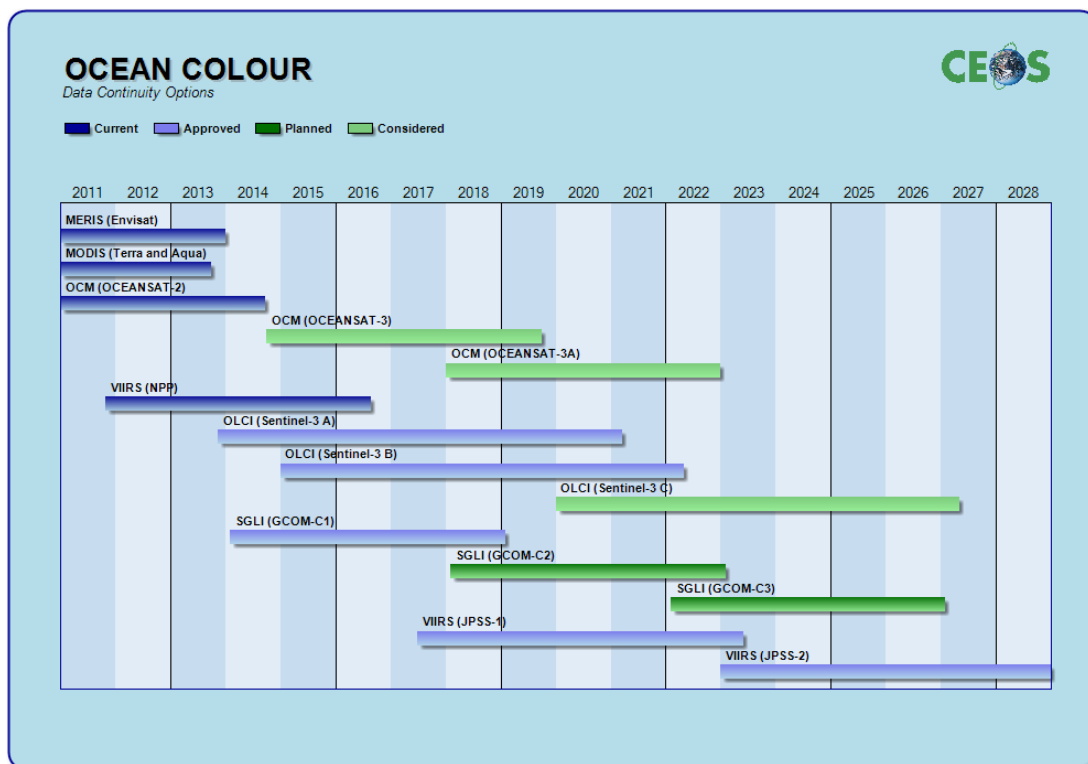
The joint NOAA/NASA VIIRS instrument is on the NPP spacecraft that launched in October 2011, with follow-on flights planned on NOAA's JPSS-1 (2017–2023) and JPSS-2 (2023-2029) missions. There is concern amongst some of the surveyed users, however, that VIIRS may not fully satisfy the needs of the Ocean Colour community.

The MIM database lists three Ocean Colour instruments in operation, a further two being developed and four more being considered. There are two Ocean Colour instruments (OCS and SZS) under development by Russia's meteorological service ROSHYDROMET, but are not considered to be open, in practical terms, to data sharing.

Korea is considering flying a follow-on mission to GOCI in 2018, which may be of potential interest, in particular if Australian coverage could be negotiated.

The Ocean Colour instrument continuity options are reflected in [Figure E-10](#). The current, near, and mid term continuity of Ocean Colour observations appears to be good. In the short-term there may be risks of failure of the ageing MODIS and MERIS sensors, but OCM and VIIRS provide contingency.

Figure E-10 Ocean Colour Data Continuity Options



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GLOSSARY

AAD	Australian Antarctic Division
AARNet	Australian Academic and Research Network
AATSR	Advanced Along-Track Scanning Radiometer
ABARES	Australian Bureau of Agricultural and Resource Economics and Sciences
ABI	Advanced Baseline Imager
ACBPS	Australian Customs and Border Protection Service
ACCESS	Australian Community Climate and Earth System Simulator
ACLUMP	Australian Collaborative Land Use Mapping Program
ACT	Australian Capital Territory (territory of Australia)
ACTPLA	ACT Planning and Land Authority (Australia)
AEB	Agência Espacial Brasileira (Brazilian Space Agency)
AEC	Australian Electoral Commission
AEISS	Advanced Electronic Image Scanning System
AERONET	Aerosol Robotic Network (NASA)
AFMA	Australian Fisheries Management Authority
AGD	Attorney-General's Department
AGRIC	WA Department of Agriculture and Food (Australia)
AGSNET	Aerosol Ground Stations Network (CSIRO)
AIMS	Australian Institute for Marine Science
AIRS	Atmospheric Infra-Red Sounder
ALI	Advanced Land Imager
ALISEO	Aerospace Leap-frog Imaging Stationary interferometer for Earth Observation
ALOS	Advanced Land Observing Satellite (JAXA, Japan)
AltiKa	Ka-band Altimeter (CNES)
ALUM	Australian Land Use and Management System
AMAZÔNIA-I	Brazilian satellite named for the region in Brazil
AMI/SAR/Image	Active Microwave Instrumentation/Synthetic Aperture Radar/Image Mode
AMSR-2	Advanced Microwave Scanning Radiometer-2
AMSR-E	Advanced Microwave Scanning Radiometer – EOS
ANU	Australian National University
ANZLIC	Australian and New Zealand Land Information Council
Aqua	NASA mission collecting data on Earth's water cycle (USA)

Aquarius	NASA Instrument comprising three L-Band radiometers and a scatterometer
ASAR	Advanced Synthetic Aperture Radar
ASI	Agenzia Spaziale Italiana (Italian Space Agency)
ASTER	Advanced Spaceborne Thermal Emission and Reflection Radiometer
Astrium	SPOT Image parent company, a subsidiary of EADS
ATSR	Along Track Scanning Radiometer
AusAID	Australian Government overseas aid program
AVHRR	Advanced Very High Resolution Radiometer (NOAA)
AWFI	Advanced Wide Field Imager
AWiFS	Advanced Wide Field Sensor
AWiFSSAT	Advanced Wide Field Sensor Satellite
Beijing-1	China DMC+4 microsatellite
BFCRC	Bushfire Cooperative Research Centre (Australia)
BJ-1	See Beijing-1
BNSC	British National Space Centre
BoM	Bureau of Meteorology (Australia)
BRLK	ROSHYDROMET Synthetic Aperture Radar
BRS	Bureau of Rural Science (Australia)
BSRN	Baseline Surface Radiation Network
Bushfires NT	Team responsible for Bushfire Act in NT Department of Natural Resources, Environment, the Arts and Sport (Australia)
C3DMM	WA Centre of Excellence for 3D Mineral Mapping (Australia)
CALIPSO	Cloud-Aerosol Lidar and Infrared Pathfinder Satellite Observations
Cal/Val	Calibration and Validation of EO data
Cartosat	Series of satellites maintained by ISRO for cartographic applications (India)
CAST	China Academy of Space Technology
CAWCR	Centre for Weather and Climate Research (Australia)
CBERS	China-Brazil Environmental Remote Sensing satellite
CCD	Charged Coupled Device
CDTI	Centro para el Desarrollo Tecnológico Industrial (Center for Development of Industrial Technology, Spain)
CEODA-Ops	Continuity of Earth Observation Data for Australia: Operational Requirements to 2015 for Lands, Coasts and Oceans (Geoscience Australia, 2011)
CEOS	Committee on Earth Observation Satellites: established in 1984 to coordinate Earth Observation provided by satellite missions; members and associates from civil agencies responsible for developing international Earth Observation programs and/or managing related ground facilities.

CEOS MIM	CEOS Missions, Instruments and Measurements database
CEOS WGCV	CEOS Working Group on Cal/Val
CGMS	Coordination Group for Meteorological Satellites
CHRIS	Compact High Resolution Imaging Spectrometer
CNES	Centre National d'Etudes Spatiales (French Space Agency)
COCTS	China Ocean Colour and Temperature Scanner
COMDISPLAN	Commonwealth Disaster Plan (Australia)
COMS	Communications, Oceanography and Meteorology Satellite (Korea)
CONAE	COMision Nacional de Actividades Espaciales (Argentina)
COSI	COrea SAR Instrument (KOMPSAT-5, Korea)
COSMIC	Constellation Observing System for Meteorology, Ionosphere and Climate
COSMO	COnstellation of small Satellites for the Mediterranean basin Observation
COSMO-SkyMed	COSMO satellite series
CPR	Cloud Profiling Radar
CRC	Cooperative Research Centre (Australia)
CRCSI	Cooperative Research Centre for Spatial Information (Australia)
CRESDA	Centre for Resources, Satellite Data and Application (China)
CSA	Canadian Space Agency
CSG	COSMO-SkyMed Second Generation
CSIRO	Commonwealth Scientific and Industrial Research Organisation (Australia)
CSST	CSIRO Space Sciences and Technology (Australia)
CZI	Coastal Zone Imager
DAFF	Department of Agriculture, Fisheries and Forestry (Australia)
DAFWA	WA Department of Agriculture and Food (Australia)
DCCEE	Department of Climate Change and Energy Efficiency (Australia)
DEC	WA Department of Environment and Conservation (Australia)
DECCW	NSW Department of Environment, Climate Change and Water (Australia)
DEH	Department of Environment and Heritage (Australia)
DEM	Digital Elevation Model
DERM	Queensland Department of Environment and Resource Management (Australia)
DEWHA	Department of the Environment, Water, Heritage and the Arts (Australia)
Deimos-1	DMI satellite, part of the DMC (Spain)
DFAT	Department of Foreign Affairs and Trade (Australia)
DigitalGlobe	Private USA satellite system operator and digital image product provider (formerly EarthWatch, and WorldView Imaging Corporation)
DIGO	Defence Imagery and Geospatial Organisation (Australia)

DIISR	Former Department of Innovation, Industry, Science and Research (Australia)
DIISRTE	Department of Industry, Innovation, Science, Research and Tertiary Education (Australia) – formerly DIISR
DIPE	NT Department of Infrastructure, Planning and Environment (Australia)
DLR	Deutsches Zentrum für Luft- und Raumfahrt (German Space Agency)
DMAC	DubaiSat-1 Medium Aperture Camera
DMC	Disaster Monitoring Constellation (Consortium of European and African countries)
DMCii	DMC International Imaging (UK)
DMI	Deimos Imaging, part of the Deimos Space Group (Spain)
DMSP	Defense Meteorological Satellite Program (USA)
DNRM	Queensland Department of Natural Resource Management (Australia)
DPI (Vic)	Victorian Department of Primary Industry (Australia)
DPI (WA)	WA Department of Primary Industry (Australia)
DPIWE	Tasmanian Department of Primary Industry, Water and Environment (Australia)
DoD	Department of Defense (USA)
DOW	WA Department of Water (Australia)
DSE	Victorian Department of Sustainability and Environment (Australia)
DubaiSat	EIAST satellite, with receiving station in Dubai (United Arab Emirates)
DWLBC	SA Department of Water, Land, Biodiversity and Conservation (Australia)
EADS	European Aeronautic Defence and Space Company
EarthCARE	ESA cloud and aerosol mission (Europe)
EC	European Commission
ECV	Essential Climate Variable
ECMWF	European Centre for Medium-Range Weather Forecasts
EHC	Electronic Housing Code (Australia)
EIAST	Emirates Institution for Advanced Science and Technology (United Arab Emirates)
EMA	Emergency Management Australia
EnMAP	Environmental Mapping and Analysis Program (Germany)
Envisat	Environmental Satellite (ESA)
EO	Earth Observation
EOS	Earth Observations from Space
ERIN	Environmental Resources Information Network (Australia)
EROS	Earth Resources Observation and Science

ERS	European Remote Sensing satellite (ESA)
ERSDAC	Earth Remote Sensing Data Analysis Centre (Japan)
ERTS	Earth Resource Technology Satellite (renamed to Landsat)
ESA	European Space Agency
ETM+	Enhanced Thematic Mapper Plus
EUMETSAT	European Organisation for the Exploitation of Meteorological Satellites
FAPAR	Fraction of Absorbed Photosynthetically Active Radiation
FCI	Flexible Combined Imager
FMCW	Frequency Modulated Continuous Wave (Radar)
FORMOSAT	Series of satellites managed by NSPO (Taiwan)
FY	FengYun (wind and cloud) polar orbiting meteorological satellite series (China)
GA	Geoscience Australia
GAC	Global Area Coverage
GB	Gigabyte (10 ⁶ KB)
GCOS	Global Climate Observing System
GCOM-CI	Global Change Observation Mission – Climate series (Japan)
GCOM-WI	Global Change Observation Mission – Water series (Japan)
GDE	Groundwater Dependent Ecosystems
GEO	Group on Earth Observations: Intergovernmental body established in 2002 that encourages members to coordinate projects, strategies and investments for Earth observation.
GeoEye	Private USA company providing satellite and aerial imagery and services
GEOSS	Global Earth Observation System of Systems: Being developed by GEO based on 10 year plan from 2005 to advance and demonstrate societal benefits of Earth observation in nine specific areas: Disasters, Health, Energy, Climate, Agriculture, Ecosystems, Biodiversity, Water and Weather.
Geoton-LI	ROSKOSMOS high resolution imaging Vis/IP radiometer
GFOI	Global Forest Observation Initiative
GFZ	GeoForschungZentrum Potsdam (National German Research Centre for Earth Science)
GIS MS	GeoEye Imager System – Multispectral
GIS PAN	GeoEye Imager System – Panchromatic
GISTDA	Geo-Informatics and Space Technology Development Agency (Thailand)
GLAS	Geoscience Laser Altimeter System
GMES	Global Monitoring for Environment and Security (ESA)
GOCI	Geostationary Ocean Colour Imager (Korea)
GOES-R	Geostationary Operational Environmental Satellite R-Series (NOAA)

GOES-S	Geostationary Operational Environmental Satellite S-Series (NOAA)
GPM	Global Precipitation Measurement mission
GPS	Global Positioning System (USA)
GRACE	Gravity Recovery and Climate Experiment (NASA)
GRDC	Grain Research and Development Corporation (Australia)
GSD	Ground Sampling Distance
GSQ	Geological Survey of Queensland (Australia)
GSWA	Geological Survey of WA (Australia)
GTS	Global Telecommunication System (WMO)
HHI	Hyperion Hyperspectral Imager
HICO	Hyperspectral Imager for the Coastal Ocean
HiRI	High Resolution Imager
HISUI	Hyperspectral Imager Suite, ALOS-3 (Japan)
HJ	Huan Jing (environment) satellite series (China)
HPC	High Performance Computing
HPCCC	High Performance Computing and Communications Centre
HPSC	High Performance Scientific Computing facility (CSIRO)
HRG	High Resolution Geometrical
HRPIC	High Resolution Panchromatic Imaging Camera
HRS	High Resolution Stereoscope
HRTC	High Resolution Technological Camera (Panchromatic)
HRVIR	High Resolution Visible and Infra-Red
HSC	High Sensitivity Camera
HSI	Hyperspectral Imager
HSTC	High Sensitivity Technological Camera
HY	HaiYang (ocean) satellite series (China)
HYC	HYperspectral Camera
HySI	Hyperspectral Imager
HyspIRI	Hyperspectral Infrared Imager
IASI	Infrared Atmospheric Sounding Interferometer
IFCI	International Forest Carbon Initiative
IKONOS	Lockheed Martin / GeoEye commercial satellite—after the Greek word <i>eikōn</i> , meaning ‘image’
Imager (INSAT)	Very High Resolution Radiometer (ISRO)
IMCRA	Integrated Marine and Coastal Regionalisation of Australia
IMOS	Integrated Marine Observing System (Australia)
IMS-I	Indian MicroSatellite – I

INCAS	Indonesian National Carbon Accounting System (Indonesia)
Ingenio	Also knowns as SEOSAT, Satélite Español de Observación de la Tierra (Spanish System for Earth Observation Satellite) (CDTI, ESA)
INPE	Instituto Nacional de Pesquisas Espaciais (Institute of Spatial Research, Brazil)
INSAT	Indian National Satellite System
IR	Infrared
IRS	Infrared Sounding instrument
IRS-P6	Indian Remote Sensing satellite, also known as RESOURCESAT-1
ISA	International Space Agency
ISRO	Indian Space Research Organisation
ITT	International Telephone & Telegraph (corporation, USA)
iVEC	WA collaborative supercomputing, storage and visualisation centre
JAXA	Japan Aerospace Exploration Agency
JMA	Japan Meteorological Agency
JMR	Jason-1 Microwave Radiometer (successor to TMR)
JPSS	Joint Polar Satellite System (NASA)
KALPANA-I	Meteorological satellite named for the Indian-born American Astronaut Dr Kalpana Chawla (India)
KARI	Korea Aerospace Research Institute
KaRIN	Ka-band Radar INterferometer
KB	Kilobyte (2^{10} bytes)
KMSS	ROSHYDROMET MultiSpectral Imager (VIS)
KOMPATS	KOrea Multi-Purpose SATellite
Landgate	WA Statutory Authority responsible for Land Information and Geographic Data (Australia)
Landsat	Originally known as the Earth Resource Technology Satellite, renamed in 1975 (USA)
LDPCM	Landsat Data Continuity Mission, also Landsat-8 (USA)
LISS-III	Linear Imaging Self Scanner - III
LISS-IV	Linear Imaging Self Scanner - IV
LoSaMBA	Law of the Sea and Maritime Boundaries Advice (Australia)
LPDAAC	Land Products Distributed Active Archive Centre, USGS
LPMA	NSW Land and Property Management Authority (Australia)
MB	Megabyte (10^3 KB)
MBEI	Multi-Band Earth Imager
MCSI	Multiple Channel Scanning Imager

MDA	MacDonald Dettwiler and Associates (Canada)
MDBA	Murray-Darling Basin Authority (Australia)
MERCI	MERIS Catalogue and Inventory
MERIS	Medium-Resolution Imaging Spectrometer
MERSI	Medium-Resolution Spectral Imager
Meteor-M	Series of Russian meteorological satellites
METI	Ministry of Economy, Trade and Industry (Japan)
Metop	Meteorological Operational—Series of polar-orbiting meteorological satellites (EUMETSAT/NOAA)
MIOSAT	MISSIONE Ottica su microSATellite (Italy)
MIR	Mid-infrared
MIRAS	Microwave Imaging Radiometer using Aperture Synthesis
MIREI	Mid-InfraRed Earth Imager
MMRS	Multispectral Medium Resolution Scanner
MODIS	MODerate-Resolution Imaging Spectroradiometer (NASA)
Monitor-E	Monitor Experimental (Russia)
MoU	Memorandum of Understanding
MS	Multispectral (Camera or Imager)
MSC	MultiSpectral Camera
MSI	MultiSpectral Imager
MSMR	Multifrequency Scanning Microwave Radiometer
MSS	MultiSpectral Scanner
MSU-MR	Multispectral Scanning Imager–Radiometer (visible/IR)
MTG-II	Meteosat Third Generation – Imager Mission I
MTSAT	Series of Japanese meteorological satellites (JMA)
MUX	Multispectral Camera
MVIRS	Moderate Resolution Visible and Infra-Red Imaging Spectroradiometer
MVISR	Multispectral Visible and Infra-Red Scan Radiometer
MWR	Microwave Radiometer
MWRI	Microwave Radiation Imager
MxT	Multi-spectral CCD Camera
NASA	National Aeronautics and Space Administration (USA)
NASRDA	National Space Research and Development Agency (Nigeria)
NCAS	National Carbon Accounting System (Australia)
NCI	National Computing Infrastructure
NDVI	Normalised Difference Vegetation Index
NEDF	National Elevation Data Framework (Australia)

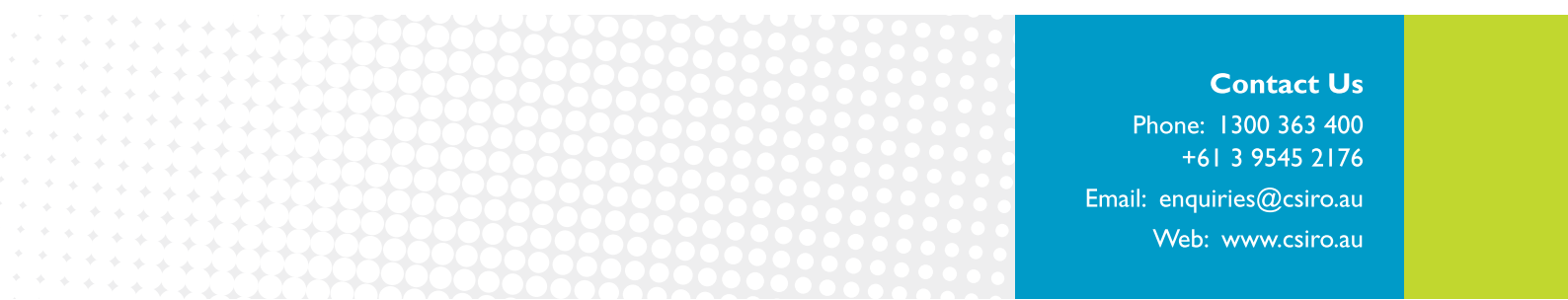
NEO	National Earth Observation group within Geoscience Australia (formerly the Australian Centre for Remote Sensing, ACRES)
NEON	National Ecological Observatory Network
NigeriaSat	Nigeria Satellite series
NIR	Near Infrared (electromagnetic radiation with wavelength near the red end of the visible spectrum)
NIRST	New Infrared Sensor Technology
NLWRA	National Land and Water Resources Audit (Australia)
NMP EO-1	New Millennium Program Earth Observing mission 1
NOAA	National Oceanic and Atmospheric Administration (USA)
NPOESS	National Polar-orbiting Operational Environmental Satellite System (USA)
NPEI	National Plan for Environmental Information
NPP	NPOESS Preparatory Project (USA)
NRSCC	National Remote Sensing Center of China
NRSTRG	National Remote Sensing Technical Reference Group (Australia)
NSAU	National Space Agency of Ukraine
NSPO	National Space Program Office (Taiwan)
NSW	New South Wales (state of Australia)
NT	Northern Territory (territory of Australia)
NT DNREAS	Northern Territory Department of Natural Resources, Environment, the Arts and Sport
NTLIS	NT Land Information System (Australia)
NVIS	National Vegetation Information System (Australia)
NWP	National Weather Program (BoM, Australia)
OCEANSAT	OCEAN SATellite series (India)
OCM	Ocean Colour Monitor
OCS	Ocean Colour Scanner
OLCI	Ocean and Land Colour Imager
OLI	Operational Land Imager
OOW	NSW Office of Water (Australia)
ORBIMAGE	Orbital Imaging Corporation, now GeoEye (USA)
OrbView	OrbImage/GeoEye satellite series (also known as SeaStar)
ORFEO	Optical and Radar Federated Earth Observation (France & Italy)
PAN	Panchromatic (Camera or Imager)
PAZ	Also known as SEOSAR, Satélite Español de Observación SAR (SAR Observation Spanish Satellite) (CDTI)
PB	Petabyte (10^{12} KB)
PM&C	Department of the Prime Minister and Cabinet (Australia)

PMR	Passive Microwave Radiometer
POAMA	Predictive Ocean Atmosphere Model for Australia
PPP	Public-Private Partnership
PRISMA	Precursore IperSpettrale della Missione Operativa (Italy)
PROBA	PRoject for OnBoard Autonomy (ESA)
PSA	A panchromatic imager (aka Gamma-L) (Russia)
QLUMP	Queensland Land Use Monitoring Program (Australia)
QuickBird	High resolution satellite owned and operated by DigitalGlobe (USA)
R&D	Research and Development
RADAR	RADio Detection And Ranging
RADARSAT	RADAR SATellite (Canada)
RADARSAT C	RADAR SATellite Constellation (Canada)
RapidEye	German geospatial information provider (now Canadian-owned)
RASAT	Microsatellite imaging mission of Tubitak-Uzay; After the Turkish word meaning 'observation' (Turkey)
RCM	Radarsat Constellation Mission (Canada)
RCM	DERM Reef Catchment Monitoring (Australia)
RDSA	A multispectral imager (aka Gamma-C) (Russia)
REDD	Reducing Emissions from Deforestation and Forest Degradation
RESOURCESAT	RESOURCE SATellite (India)
Resurs DK1	Resurs – High Resolution 1 (Russia)
Resurs P	Resurs P Environmental Satellite (Russia)
RET	Department of Resources, Energy and Tourism (Australia)
RGB	Red Green Blue (generally refers to visible light)
RISAT	Radar Imaging SATellite (India)
ROSHYDROMET	Russian Federal Service for Hydrometeorology and Environmental Monitoring
ROSKOSMOS	Russian Federal Space Agency
RSI	Remote Sensing Instrument (Taiwan)
S-Band SAR	S-Band Synthetic Aperture Radar
SA	South Australia (state of Australia)
SAC-C	Satelite de Aplicaciones Cientificas – C (Satellite for Scientific Applications – C, Argentina)
SAC-D	Satelite de Aplicaciones Cientificas – D (Satellite for Scientific Applications – D, Argentina)
SAGNAC	For French physicist George Sagnac (<i>cf.</i> Sagnac interference)
SANSA	South African National Space Agency

SAOCOM	SATérite Argentino de Observación COnd Microondas (Argentine Microwaves Observation Satellite)
SAR	Synthetic Aperture Radar
SAR 2000	Synthetic Aperture Radar – 2000
SAR-2000 S.G.	SAR–2000 Second Generation
SAR-L	L-Band Synthetic Aperture Radiometer
SAR-X	X-Band Synthetic Aperture Radiometer
SARAL	Satellite with ARgos and ALtiKa
SBA	Societal Benefit Area, defined by GEOSS
SeaWiFS	Sea-viewing Wide Field-of-view Sensor
Sentinel	Radar imaging satellite missions supporting GMES
Severjanin	X-band Synthetic Aperature Radar (Russia)
SGLI	Second generation GLObal Imager (Japan)
Sich-2	Small ocean observation satellite (Ukraine)
SIRAL	SAR Interferometer Radar Altimeter
SLATS	Statewide Landcover and Tree Study (Queensland, Australia)
SLIM-6	Surrey Linear IMager – 6 channel
SLIP-EM	WA Shared Land Information Platform Emergency Management (Australia)
SLSTR	Sea and Land Surface Temperature Radiometer
SMAP	Soil Moisture Active Passive (NASA)
SMOS	Soil Moisture and Ocean Salinity (ESA)
SNSB	Swedish National Space Board
SOE	State of Environment (Australia)
SPOT	Système Probatoire d'Observation de la Terre (France)
SPU	Space Policy Unit (Australia)
SRAL	SAR Radar Altimeter
SSM/I	Special Sensor Microwave Imager
SST	Sea Surface Temperature
SumbandilaSat	Sumbandila Satellite (from a Venda word, chosen by school children, meaning 'lead the way') (South Africa)
SumbandilaSat Imager	A 6 spectral band (visible range) line scanner
SWIR	Short-wave Infrared
SZS	Shore Zone Scanner
TanDEM-X	TerraSAR-X add-on for Digital Elevation Measurement (Germany)
TB	Terabyte (10 ⁹ KB)
TERN	Terrestrial Ecosystem Research Network (Australia)

Terra	A multi-national NASA scientific research satellite, from the Latin word for "earth"
TerraSAR-X	Satellite acquiring X-band SAR data (Germany)
TERSS	Tasmanian Earth Resource Satellite Station (Australia)
TES	Technology Experiment Satellite (India)
TES-HYS	TES Hyperspectral Imager
THEOS	THailand Earth Observation Satellite (Thailand)
TIR	Thermal Infrared Radiometer
TIRS	Thermal InfraRed Sensor
TM	Thematic Mapper
TMI	TRMM Microwave Imager
TMPA	TRMM Multi-satellite Precipitation Analysis
TMR	TOPEX Microwave Radiometer (predecessor to JMR)
TopSat	Tactical Optical Satellite (UK)
TPM	Topex-Poseidon Mission
TRMM	Tropical Rainfall Measuring Mission (USA & Japan)
TSX-SAR	TerraSAR-X SAR
Tubitak	Space Technologies Research Institute / The Scientific and Technological Research Council of Turkey
TVMMP	Tasmanian Vegetation Mapping and Monitoring Program (Australia)
UAdel	University of Adelaide (Australia)
UAV	Unmanned Aerial Vehicles
UK-DMC	UK Disaster Monitoring Constellation (UK)
ULTRAPAN	(Cartosat-3) Panchromatic sensor
UNCLOS	United Nations Convention on the Law of the Sea
UNSW	University of NSW (Australia)
USGS	USA Geological Survey (USA)
UTS	University of Technology Sydney (Australia)
UWA	University of Western Australia (Australia)
VEN μ S	Vegetation and Environment monitoring on a New micro-Satellite (France & Israel)
VHRR	Very High Resolution Radiometer
VIIRS	Visible/Infrared Imager Radiometer Suite
VIRR	Multispectral Visible and Infra-Red Scan Radiometer
VSC	Venus Superspectral Camera
WA	Western Australia (state of Australia)
WALIS	Western Australian Land Information System (Australia)

WASTAC	Western Australian Satellite Technology and Applications Consortium (Australia)
WFC	Wide Field Camera
WFI	Wide Field Imager
WIRADA	Water Information Research and Development Alliance (Australia)
WMO	World Meteorological Organisation
WorldView	Commercial satellite (<i>cf.</i> QuickBird) owned and operated by DigitalGlobe (USA)
WV110	WorldView-110 camera (combined panchromatic and 8-band multispectral scanners)
WV60	WorldView-60 camera (panchromatic imager only)
X-Band SAR	X-Band Synthetic Aperture Radar



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