



# EarthServer-2

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## Data Management Plan – Final

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## Executive Summary

The aim of the EarthServer-2 project is to establish Agile Analytics on Petabyte Data Cubes as a simple, user-friendly, and scalable paradigm. EarthServer-2 extends Copernicus/Sentinel data by creating a single 3D (x, y, t) datacube per product so that millions of images form a single, simple data space, irrespective of its size. Data with higher dimensionality is processed in a similar fashion; for instance, a weather simulation would form a single 4D (x, y, z, t) datacube. The project developed standards based data access and processing methods for these huge datasets, enabling diverse multidimensional data to be combined, manipulated and extracted by both experts and casual users.

Data management is a major focus of the EarthServer-2 project, which addresses problems such as searching, filtering and analysing huge (100TB+) datasets that, due to their size, cannot be processed on the client side. The tools and standards developed during EarthServer-2 will improve the accessibility and reuse of these datasets.

This document sets out the final Data Management Plan (DMP) for the EarthServer-2 project. The DMP includes a data register that has been maintained as a “live” document and updated as new data became available to the project. This final version of the DMP is a snapshot taken February 1<sup>st</sup> 2018 and contains all the datasets which have been added during the course of the project.

## List of acronyms and abbreviations

C3S	Copernicus Climate Change Service
CDS	C3S's Climate Data Store
CSDS	Climate Science Data Service
CITE	Communication & Information Technologies Experts S.A.
DoA	Description of Action
DMP	Data Management Plan
EODS	Earth Observation Data Service
GIS	Geographical Information Systems
GRIB	GRIBed Binary format mandated by the WMO
EC	European Commission
ECMWF	European Centre for Medium-Range Weather Forecasts
EFAS	European Flood Awareness System
ESA	European Space Agency
ESAC	European Space Astronomy Centre
ESFRI	European Strategy Forum on Research Infrastructures
FP7	EU funding programme for 2007-2013
H2020	Horizon 2020 - EU Research and Innovation programme
HCMR	Hellenic Centre for Marine Research
HDF	Hierarchical Data Format
JUB	Jacobs University Bremen
LDCS	Landsat Data Cube Service
MARS	Meteorological Archive and Retrieval System
MEEO	Meteorological and Environmental Earth Observation S.r.l.
MetOcean DWG	Meteorological & Oceanographic Domain Working Group of the OGC
MSDS	Marine Science Data Service
NASA	National Aeronautics and Space Administration of the United States
NCI	National Computational Infrastructure of Australia
NetCDF	Network Common Data Form
OGC	Open Geospatial Consortium
PML	Plymouth Marine Laboratory
PSDS	Planetary Science Data Service
WCS	Web Coverage Service
WCPS	Web Coverage Processing Service
WMO	World Meteorological Organisation
WMS	Web Map Services

## 1 Introduction

The EarthServer-2 project is itself built around concepts of data management and accessibility. Its aim is to implement enabling technologies to make large datasets accessible to a varied community of users. The intention is not to create new datasets but to make existing datasets (identified at the start of the project) easier to access and manipulate, encouraging data sharing and reuse. Additional datasets have been added during the life of the project as they became available and the DMP was updated as a “live” document to reflect this. This, final, version of the Data Management Plan is a snapshot taken February 1<sup>st</sup> 2018.

## 2 Data Organisation, Documentation and Metadata

Data is accessible through the Open Geospatial Consortium (OGC) Web Coverage Processing Service <sup>1</sup> (WCPS) and Web Coverage Service <sup>2</sup> (WCS) standards. EarthServer-2 has established data/metadata integration on a conceptual level (by integrating array queries with known metadata search techniques such as tabular search, full text search, ontologies etc.) and on a practical level (by utilizing this integrated technology for concrete catalogue implementations based on standards like ISO 19115, ISO 19119 and ISO 19139 depending on the individual service partner needs).

## 3 Data Access and Intellectual Property

Data access restrictions and intellectual property rights will remain as set by the dataset owners (see Section 6). All data used in the EarthServer-2 project is freely available, although in some cases users are asked to acknowledge data when presenting results.

## 4 Data Sharing and Reuse

The aim of EarthServer-2 is to make data available for sharing and reuse without requiring that users download the entire (potentially huge) dataset. Data is available through the OGC WCPS and WCS standard, allowing users to filter and process data at source before transferring them back to the client. Five data services have been created (Marine, Climate, Earth Observation, Planetary and Landsat), providing simple access via web portals with a user-friendly interface to filtering and analysis tools as required by the application domain.

## 5 Data Preservation and Archiving

EarthServer-2 will not generate new data; preservation and archiving is the responsibility of the upstream projects from which the original data was obtained.

1 : <http://www.opengeospatial.org/standards/wcps>

2 : <http://www.opengeospatial.org/standards/wcs>

## 6 Data Register

The data register has been maintained as a “live” document; a snapshot was created for each DMP release (see 1.1 and following sections).

The data register is based upon information and restrictions supplied by the upstream data provider matched to Horizon 2020 guidelines as below (in *italics*):

- **Data set reference and name**  
*Identifier for the data set to be produced.*
  
- **Data set description**  
*Descriptions of the data that will be generated or collected, its origin (in case it is collected), nature and scale and to whom it could be useful, and whether it underpins a scientific publication. Information on the existence (or not) of similar data and the possibilities for integration and reuse.*
  - *Standards and metadata*  
*Reference to existing suitable standards of the discipline. If these do not exist, an outline on how and what metadata will be created.*
  - *Data sharing*  
*Description of how data will be shared, including access procedures, embargo periods (if any), outlines of technical mechanisms for dissemination and necessary software and other tools for enabling re-use, and definition of whether access will be widely open or restricted to specific groups. Identification of the repository where data will be stored, if already existing and identified, indicating in particular the type of repository (institutional, standard repository for the discipline, etc.). In case the dataset cannot be shared, the reasons for this should be mentioned (e.g. ethical, rules of personal data, intellectual property, commercial, privacy-related, security-related).*
  
- **Archiving and preservation (including storage and backup)**  
*Description of the procedures that will be put in place for long-term preservation of the data. Indication of how long the data should be preserved, what is its approximated end volume, what the associated costs are and how these are planned to be covered.*

Within EarthServer-2 currently, the original data are held by upstream providers who have their own policies. In this case archiving and preservation responsibility will remain with the upstream project.

## 1.1 Marine Science Data Service

Data set reference and name	ESA OC-CCI
Organisation	ESA OC-CCI
Data set description	ESA Ocean Colour Climate Change Indicators. <a href="http://www.esa-oceancolour-cci.org/index.php?q=webfm_send/318">http://www.esa-oceancolour-cci.org/index.php?q=webfm_send/318</a>
Standards	Data will be made available through the OGC WCPS standard.
Spatial extent	Global
Temporal extent	1997-2016
Project Contact	Peter Walker (petwa@pml.ac.uk)
Upstream Contact	<a href="mailto:help@esa-oceancolour-cci.org">help@esa-oceancolour-cci.org</a>
Limitations	None
License	Free
Constraints	None
Data Format	NetCDF-CF
Access URL	<a href="http://earthserver.pml.ac.uk/rasdaman/ows?&amp;SERVICE=WCS&amp;VERSION=2.0.1&amp;REQUEST=GetCapabilities">http://earthserver.pml.ac.uk/rasdaman/ows?&amp;SERVICE=WCS&amp;VERSION=2.0.1&amp;REQUEST=GetCapabilities</a>
Archiving and preservation (including storage and backup)	Data is part of long term ESA CCI project and the original copy is maintained there.

Table 6-1: Data set description for the ESA Ocean Colour Climate Change Indicators.

Data set reference and name	ESA OC-CCI, version 2
Organis	ESA OC-CCI

ation	
Data set description	The ESA Ocean Colour Climate Change Initiative provides a multi sensor long timeseries of ocean colour parameters. These include Rrs at varying frequencies and derived products such as Chlorophyll. These variables are vital to understanding the health of the oceans and can be used as a monitoring tool. As new processing systems come online and historical data go through phased reprocessing by the data creators a new version of OCCCI is processed.
Standards	Data is available through the OGC WCS/WCPS standard.
Spatial extent	Global
Temporal extent	1997-2016 available as daily, weekly and monthly composites
Project Contact	Olly Clements (olcl@pml.ac.uk)
Upstream Contact	<a href="mailto:help@esa-oceancolour-cci.org">help@esa-oceancolour-cci.org</a>
Limitations	None
License	Free
Constraints	None
Data Format	NetCDF-CF
Access URL	<a href="http://earthserver.pml.ac.uk/rasdaman/ows?&amp;SERVICE=WCS&amp;VERSION=2.0.1&amp;REQUEST=GetCapabilities">http://earthserver.pml.ac.uk/rasdaman/ows?&amp;SERVICE=WCS&amp;VERSION=2.0.1&amp;REQUEST=GetCapabilities</a>
Archiving and preservation (including storage and backup)	Data is part of long term ESA CCI project and the original copy is maintained there.

Table 6-2: Data set description for the ESA Ocean Colour Climate Change, version 2.

<b>Data set reference and name</b>	<b>ESA OC-CCI, version 3</b>
Organisation	<b>ESA OC-CCI</b>
Data set description	The ESA Ocean Colour Climate Change Initiative (OCCCI) provides a multi sensor long timeseries of ocean colour parameters. These include Rrs at varying frequencies and derived products such as Chlorophyll. These



	variables are vital to understanding the health of the oceans and can be used as a monitoring tool. As new processing systems come online and historical data go through phased reprocessing by the data creators a new version of OCCCI is processed.
Standards	Data is available through the OGC WCS/WCPS standard.
Spatial extent	Global
Temporal extent	1997-2016 available as daily, weekly and monthly composites
Project Contact	Olly Clements (olcl@pml.ac.uk)
Upstream Contact	<a href="mailto:help@esa-oceancolour-cci.org">help@esa-oceancolour-cci.org</a>
Limitations	None
License	Free
Constraints	None
Data Format	NetCDF-CF
Access URL	<a href="http://earthserver.pml.ac.uk/rasdaman/ows?&amp;SERVICE=WCS&amp;VERSION=2.0.1&amp;REQUEST=GetCapabilities">http://earthserver.pml.ac.uk/rasdaman/ows?&amp;SERVICE=WCS&amp;VERSION=2.0.1&amp;REQUEST=GetCapabilities</a>
Archiving and preservation (including storage and backup)	Data is part of long term ESA CCI project and the original copy is maintained there.

*Table 6-3: Data set description for the ESA Ocean Colour Climate Change, version 3.*

<b>ESA OC-CCI, version 3.1</b>	
<b>Data set reference and name</b>	
<b>Organisation</b>	<b>ESA OC-CCI</b>
<b>Data set description</b>	The ESA Ocean Colour Climate Change Initiative provides a multi sensor long timeseries of ocean colour parameters. These include Rrs at varying frequencies and derived products such as Chlorophyll. These variables are vital to understanding the health of the oceans and can be used as a monitoring tool. As new processing systems come online and historical data go through phased reprocessing by the data creators a new version of OCCCI is processed.
<b>Standards</b>	Data is available through the OGC WCS/WCPS standard.
<b>Spatial extent</b>	Global
<b>Temporal extent</b>	1997-2016 available as daily, weekly and monthly composites
<b>Project Contact</b>	Olly Clements (olcl@pml.ac.uk)
<b>Upstream Contact</b>	<a href="mailto:help@esa-oceancolour-cci.org">help@esa-oceancolour-cci.org</a>
<b>Limitations</b>	None
<b>License</b>	Free
<b>Constraints</b>	None
<b>Data Format</b>	NetCDF-CF
<b>Access URL</b>	<a href="http://earthserver.pml.ac.uk/rasdaman/ows?&amp;SERVICE=WCS&amp;VERSION=2.0.1&amp;REQUEST=GetCapabilities">http://earthserver.pml.ac.uk/rasdaman/ows?&amp;SERVICE=WCS&amp;VERSION=2.0.1&amp;REQUEST=GetCapabilities</a>
<b>Archiving and preservation (including storage and backup)</b>	Data is part of long term ESA CCI project and the original copy is maintained there.

Table 6-4: Data set description for the ESA Ocean Colour Climate Change, version 3.1.

<b>OLCI - Sentinel 3 - Global</b>	
<b>Data set reference and name</b>	

Organis ation	ESA
Data set descripti on	SENTINEL-3 Ocean and Land Colour Instrument (OLCI) sensor provides light reflectance data and derived Chlorophyll. Data are available as single chlorophyll coverages and aggregated coverages including all available Rrs Bands
Standar ds	Data is available through the OGC WCS/WCPS standard.
Spatial extent	Global
Tempor al extent	2017-ongoing available as individual scenes
Project Contact	Olly Clements (olcl@pml.ac.uk)
Upstre am Contact	<a href="mailto:cmems@pml.ac.uk">cmems@pml.ac.uk</a>
Limitati ons	None
License	Free
Constrai nts	None
Data Format	NetCDF-CF
Access URL	<a href="http://earthserver.pml.ac.uk/rasdaman/ows?&amp;SERVICE=WCS&amp;VERSION=2.0.1&amp;REQUEST=GetCapabilities">http://earthserver.pml.ac.uk/rasdaman/ows?&amp;SERVICE=WCS&amp;VERSION=2.0.1&amp;REQUEST=GetCapabilities</a>
Archivi ng and preserva tion (includi ng storage and backup)	Data is maintained in its original form by CMEMS.

Table 6-5: Data set description for the ESA Global S-3A OLCI.

<b>Data set referen ce and name</b>	
Organis ation	ESA
Data set descripti on	SENTINEL-3 Ocean and Land Colour Instrument (OLCI) sensor provides light reflectance data and derived Chlorophyll. Data are available as single chlorophyll coverages and aggregated coverages including all available Rrs Bands

Standards	Data is available through the OGC WCS/WCPS standard.
Spatial extent	Lat(47:67) Lon(-15:13)
Temporal extent	2017-ongoing available as individual scenes
Project Contact	Olly Clements (olcl@pml.ac.uk)
Upstream Contact	<a href="mailto:cmems@pml.ac.uk">cmems@pml.ac.uk</a>
Limitations	None
License	Free
Constraints	None
Data Format	NetCDF-CF
Access URL	<a href="http://earthserver.pml.ac.uk/rasdaman/ows?&amp;SERVICE=WCS&amp;VERSION=2.0.1&amp;REQUEST=GetCapabilities">http://earthserver.pml.ac.uk/rasdaman/ows?&amp;SERVICE=WCS&amp;VERSION=2.0.1&amp;REQUEST=GetCapabilities</a>
Archiving and preservation (including storage and backup)	Data is maintained in its original form by CMEMS.

*Table 6-6: Data set description for the ESA S-3A UK.*

<b>OLCI - Sentinel 3 - North Atlantic</b>	
Data set reference and name	
Organisation	<b>ESA</b>
Data set description	SENTINEL-3 Ocean and Land Colour Instrument (OLCI) sensor provides light reflectance data and derived Chlorophyll. Data are available as single chlorophyll coverages and aggregated coverages including all available Rrs Bands
Standards	Data is available through the OGC WCS/WCPS standard.
Spatial extent	Lat(20:66) Lon(-46:13)
Temporal extent	2017-ongoing available as individual scenes
Project Contact	Olly Clements (olcl@pml.ac.uk)
Upstream Contact	<a href="mailto:cmems@pml.ac.uk">cmems@pml.ac.uk</a>
Limitations	None
License	Free
Constraints	None
Data Format	NetCDF-CF
Access URL	<a href="http://earthserver.pml.ac.uk/rasdaman/ows?&amp;SERVICE=WCS&amp;VERSION=2.0.1&amp;REQUEST=GetCapabilities">http://earthserver.pml.ac.uk/rasdaman/ows?&amp;SERVICE=WCS&amp;VERSION=2.0.1&amp;REQUEST=GetCapabilities</a>
Archiving and preservation (including storage and backup)	Data is maintained in its original form by CMEMS.

*Table 6-7: Data set description for the ESA North Atlantic S-3A OLCI.*

## 1.2 Climate Science Data Service

Data set reference and name		ECMWF ERA-interim reanalysis
Organisation	ECMWF	
Data set description	<p>A selection of ERA-Interim reanalysis parameters is provided. ERA-interim is a global atmospheric reanalysis produced by ECMWF. It is the replacement of ERA-40 and extends back to 1 Jan 1979. Reanalysis data are global data sets describing the recent history of the atmosphere, land surface, and oceans. Reanalysis data are used for monitoring climate change, for research and education, and for commercial applications. Currently, five surface parameters are available: 2m air temperature, precipitation, mean sea level pressure, sea surface temperature, soil moisture. Further, three parameters on three different pressure levels (500, 850 and 1000 hPa) are provided: temperature, geopotential and relative humidity. More information to ERA-interim data is available under <a href="http://onlinelibrary.wiley.com/doi/10.1002/qj.828/full">http://onlinelibrary.wiley.com/doi/10.1002/qj.828/full</a>. In addition to these parameters, a large portion of the ERA-interim database is also available on an "on-demand" basis through the MARS-Rasdaman connection.</p>	
Standards	Data will be made available through the OGC WCS/WCPS standard.	
Spatial extent	Global (Longitude: -180 to 180, Latitude: -90 to 90); Spatial resolution: 0.5 x 0.5 deg	
Temporal extent	1 Jan 1979 to 31 Dec 2015 (6-hourly resolution)	
Project Contact	Stephan Siemen (ECMWF)	
Upstream Contact	Dick Dee (ECMWF)	
Limitations	None	
License	Free, but no redistribution	
Constraints	None	
Data Format	GRIB	
Access URL	<a href="http://earthserver.ecmwf.int/rasdaman/ows">http://earthserver.ecmwf.int/rasdaman/ows</a>	
Archiving and preservation (including storage and backup)	Stored in MARS archive - original data will be kept without time limit	

Table 6-8: Data set description for the ERA-Interim reanalysis parameters.

Data set reference and name	GloFAS river discharge forecast data
Organisation	ECMWF / JRC
Data set description	Data is part of the Global Flood Awareness System (GloFAS) ( <a href="http://www.globalfloods.eu">www.globalfloods.eu</a> ). The GloFAS system produces daily flood forecasts in a pre-operational manner. More information about the data can be found under <a href="http://www.hydrol-earth-syst-sci.net/17/1161/2013/hess-17-1161-2013.pdf">http://www.hydrol-earth-syst-sci.net/17/1161/2013/hess-17-1161-2013.pdf</a>
Standards	Data will be made available through the OGC WCS/WCPS standard.
Spatial extent	Global (Longitude: -180 to 180, Latitude: -60 to 90); Spatial resolution: 0.1 x 0.1 deg
Temporal extent	1 April 2008 up to now
Project Contact	Stephan Siemen (ECMWF)
Upstream Contact	Florian Pappenberger (ECMWF)
Limitations	
License	Free, but no redistribution
Constraints	None
Data Format	NetCDF-CF
Access URL	<a href="http://earthserver.ecmwf.int/rasdaman/ows">http://earthserver.ecmwf.int/rasdaman/ows</a>
Archiving and preservation (including storage and backup)	TBD

Table 6-9: Data set description for the Global Flood Awareness System.

Data set reference and name	ERA river discharge data
Organisation	ECMWF / JRC
Data set description	
Standards	Data will be made available through the OGC WCS/WCPS standard.
Spatial extent	Global (Longitude: -180 to 180, Latitude: -90 to 90); Spatial resolution: 0.1 x 0.1 deg
Temporal extent	1 January 1981 up to now
Project Contact	Stephan Siemen (ECMWF)
Upstream Contact	Florian Pappenberger (ECMWF)
Limitations	
License	Free, but no redistribution
Constraints	None
Data Format	NetCDF-CF
Access URL	<a href="http://earthserver.ecmwf.int/rasdaman/ows">http://earthserver.ecmwf.int/rasdaman/ows</a>

Table 6-10: Data set description for the ERA river discharge data.

Data set reference and name	Global ECMWF Fire Forecasting model data, as part of the Copernicus Emergency Management Service
Organisation	ECMWF
Data set description	<p>The European Forest Fire Information System (EFFIS) is currently being developed in the framework of the Copernicus Emergency Management Services to monitor and forecast fire danger in Europe. The system provides timely information to civil protection authorities in 38 nations across Europe (<a href="http://forest.jrc.ec.europa.eu/effis/about-effis/effis-network/">http://forest.jrc.ec.europa.eu/effis/about-effis/effis-network/</a>) and mostly concentrates on flagging regions which might be at high danger of spontaneous ignition due to persistent drought. GEF is the modelling component of EFFIS and implements the three most used fire danger rating systems; the US NFDRS, the Canadian FWI and the Australian MARK-5. The dataset extends from 1980 to date and is updated once a month when new ERA-Interim fields become available. Following indices are available via GEF: (i) Fire Weather Index (FWI), (ii) Fire Danger Index (FDI) and (iii) Burning Index (BI). Further information are available under <a href="http://journals.ametsoc.org/doi/full/10.1175/JAMC-D-15-0297.1">http://journals.ametsoc.org/doi/full/10.1175/JAMC-D-15-0297.1</a></p>
Standards	Fire Weather Index data will be made available through the OGC WCS/WCPS standard.
Spatial extent	Global (Longitude: -180 to 179.297, Latitude: 89.4628 to -89.4628); Spatial resolution: 0.703 x 0.703 deg
Temporal extent	1 January 1980 up to now
Project Contact	Stephan Siemen (ECMWF)
Upstream Contact	Francesca Di Giuseppe (ECMWF)
Limitations	
License	Free
Constraints	None
Data Format	NetCDF-CF
Access URL	Available in beta version at the moment: <a href="http://apps.ecmwf.int/datasets/data/geff-reanalysis/">http://apps.ecmwf.int/datasets/data/geff-reanalysis/</a>
Archiving and preservation (including storage and backup)	Stored in MARS archive - original data will be kept without time limit

*Table 6-11: Data set description for Global ECMWF Fire Forecasting model data, as part of the Copernicus Emergency Management Service.*



Data set reference and name	CAMS Regional Air Quality - Reanalysis data
Organisation	ECMWF
Data set description	CAMS is the Copernicus Atmosphere Monitoring Service and will deliver various products (near-real-time, reanalysis, etc.) of European and global atmospheric composition on an operational basis. CAMS produces daily air quality ensemble reanalysis for the air quality parameters Particulate Matter 10 (PM10), Particulate Matter 2.5 (PM25), Nitrogen Dioxide (NO2), and Ozone (O3).
Standards	Data will be made available through the OGC WCS/WCPS standard.
Spatial extent	Europe (Longitude: -25.0 to 45.0, Latitude: 70.0 to 30.0); Spatial resolution: 0.1 x 0.1 deg
Temporal extent	2014 - 2016; hourly resolution
Project Contact	Stephan Siemen (ECMWF)
Upstream Contact	Miha Razinger (ECMWF)
Limitations	None
License	Free
Constraints	None
Data Format	NetCDF-CF
Access URL	<a href="http://www.regional.atmosphere.copernicus.eu/">http://www.regional.atmosphere.copernicus.eu/</a>
Archiving and preservation (including storage and backup)	Data is available for download at the URL provided.

Table 6-12: Data set description for CAMS Regional Air Quality - Reanalysis data.

### 1.3 Earth Observation Data Service

Data set reference and name	<b>MOD 04 - Aerosol Product; MOD 05 - Total Precipitable Water; MOD 06 - Cloud Product; MOD 07 - Atmospheric Profiles; MOD 08 - Gridded Atmospheric Product; MOD 11 - Land Surface Temperature and Emissivity; MOD 35 - Cloud Mask;</b>
Organisation	<b>NASA</b>
Data set description	There are seven MODIS Level 3 Atmosphere Products, each covering a different temporal scale: Daily, 8-Day, and Monthly. Each of these Level 3 products contains statistics de-rived from over 100 science parameters from the Level 2 Atmosphere products: Aerosol, Precipitable Water, Cloud, and Atmospheric Profiles. A range of statistical summaries (scalar statistics and 1- and 2-dimensional histograms) are computed, depending on the Level 2 science parameter. Statistics are aggregated to a 1° x 1° equal-angle global grid. The daily product contains ~700 statistical summary parameters. The 8-day and monthly products contain ~900 statistical summary parameters.
Standards	Data is available through the OGC WCS/WCPS standard.
Spatial extent	Global
Temporal extent	2000 - today
Project Contact	<a href="mailto:mantovani@meeo.it">mantovani@meeo.it</a>
Upstream Contact	<a href="http://modaps.nascom.nasa.gov/services/user/">http://modaps.nascom.nasa.gov/services/user/</a>
Limitations	
License	
Constraints	The distribution of the MODAPS data sets is funded by NASA's Earth-Sun System Division (ESSD). The data are not copyrighted; however, in the event that you publish data or results using these data, we request that you include the following acknowledgment: "The data used in this study were acquired as part of the NASA's Earth-Sun System Division and archived and distributed by the MODIS Adaptive Processing System (MODAPS)." We would appreciate receiving a copy of your publication, which can be forwarded to <a href="mailto:MODAPSUSO@lists.nasa.gov">MODAPSUSO@lists.nasa.gov</a> .
Data Format	GeoTIFF (generated from HDF)
Access URL	<a href="http://eodataservice.org">eodataservice.org</a>
Archiving and preservation (including storage and backup)	Data is part of Level-2 MODIS Atmosphere Products

Table 6-13: Data set description for the MODIS Level 3 Atmosphere Products.

Data set reference and name	<b>SMOS Level 2 Soil Moisture (SMOS.MIRAS.MIR_SMUDP2); SMOS Level 2 Ocean Salinity (SMOS.MIRAS.MIR_OSUDP2)</b>
Organisation	<b>ESA</b>
Data set description	<p>ESA's Soil Moisture Ocean Salinity (SMOS) Earth Explorer mission is a radio telescope in orbit, but pointing back to Earth not space. Its Microwave Imaging Radiometer using Aperture Synthesis (MIRAS) radiometer picks up faint microwave emissions from Earth's surface to map levels of land soil moisture and ocean salinity.</p> <p>These are the key geophysical parameters, soil moisture for hydrology studies and salinity for enhanced understanding of ocean circulation, both vital for climate change models.</p>
Standards	Data is available through the OGC WCS/WCPS standard.
Spatial extent	Global
Temporal extent	12-01-2010 - today
Project Contact	<a href="mailto:mantovani@meeo.it">mantovani@meeo.it</a>
Upstream Contact	
Limitations	
License	<a href="https://earth.esa.int/web/guest/-/revised-esa-earth-observation-data-policy-7098">https://earth.esa.int/web/guest/-/revised-esa-earth-observation-data-policy-7098</a>
Constraints	
Data Format	GeoTIFF (generated from measurements geo-located in an equal-area grid system ISEA 4H9)
Access URL	<a href="http://eodataservice.org">eodataservice.org</a>
Archiving and preservation (including storage and backup)	Data is part of Level-2 SMOS Products

*Table 6-14: Data set description for ESA's Soil Moisture Ocean Salinity parameters.*

<b>Data set reference and name</b>		<b>Landsat8 L1T</b>
Organisation	<b>ESA</b>	
Data set description	Level 1 T- Terrain Corrected	
Standards	Data is available through the OGC WCS/WCPS standard.	
Spatial extent	European	
Temporal extent	2014 - today	
Project Contact	<a href="mailto:mantovani@meeo.it">mantovani@meeo.it</a>	
Upstream Contact	EO-Support ( <a href="https://earth.esa.int/web/guest/contact-us">https://earth.esa.int/web/guest/contact-us</a> )	
Limitations		
License		
Constraints	Acceptance of ESA Terms and Conditions <sup>3</sup>	
Data Format	GeoTIFF	
Access URL	<a href="http://eodataservice.org">eodataservice.org</a>	
Archiving and preservation (including storage and backup)	<p>ESA is an International Co-operator with USGS for the Landsat-8 Mission. Data is downlinked via Kiruna and Matera (KIS and MTI) stations whenever the satellite passes over Europe, starting from November 2013. Typically the station's will receive 2 or 3 passes per day each and there will be some new scenes for each path, in accordance with the overall mission acquisition plan.</p> <p>The Neustrelitz data available on the portal from May 2013 to December 2013</p> <p>Data will be processed to either L1T or L1Gt product format as soon as it is downlinked. The target time is for scenes to be available for download within 3 hours of reception.</p> <p><a href="https://landsat8portal.eo.esa.int/faq/">https://landsat8portal.eo.esa.int/faq/</a></p>	

Table 6-15: Data set description for Landsat8 L1T parameters.

<b>Data set reference and name</b>		<b>Sentinel2</b>
Organisation	<b>ESA</b>	
Data set description	Level-1C Feature layers (NDVI, Cloudmask, RGB)	
Standards	Data is available through the OGC WCS/WCPS standard.	
Spatial extent	Italy	

<sup>3</sup> : <https://earth.esa.int/web/guest/terms-conditions>

Temporal extent	2015 - today
Project Contact	<a href="mailto:mantovani@meeo.it">mantovani@meeo.it</a>
Upstream Contact	eosupport@copernicus.esa.int
Limitations	<a href="https://sentinel.esa.int/documents/247904/690755/Sentinel_Data_Legal_Notice">https://sentinel.esa.int/documents/247904/690755/Sentinel_Data_Legal_Notice</a>
License	<a href="https://sentinel.esa.int/documents/247904/690755/Sentinel_Data_Legal_Notice">https://sentinel.esa.int/documents/247904/690755/Sentinel_Data_Legal_Notice</a>
Constraints	
Data Format	JPG2000 for L1C GeoTIFF for feature layers generated from L1C
Access URL	<a href="http://eodataservice.org">eodataservice.org</a>
Archiving and preservation (including storage and backup)	

Table 6-16: Data set description for Sentinel2 Level-1C parameters.

Data set reference and name	Sentinel2
Organisation	ESA
Data set description	Level-1C
Standards	Data is available through the OGC WCS/WCPS standard.
Spatial extent	Global
Temporal extent	2015 - today
Project Contact	<a href="mailto:mantovani@meeo.it">mantovani@meeo.it</a>
Upstream Contact	
Limitations	<a href="https://sentinel.esa.int/documents/247904/690755/Sentinel_Data_Legal_Notice">https://sentinel.esa.int/documents/247904/690755/Sentinel_Data_Legal_Notice</a>
License	<a href="https://sentinel.esa.int/documents/247904/690755/Sentinel_Data_Legal_Notice">https://sentinel.esa.int/documents/247904/690755/Sentinel_Data_Legal_Notice</a>
Constraints	
Data	JPG2000 / netCDF

Format	
Access URL	<a href="http://eodataservice.org">eodataservice.org</a>
Archiving and preservation (including storage and backup)	

Table 6-17: Data set description for Sentinel2 / Sentinel3 parameters.

Data set reference and name	Sentinel3
Organisation	ESA
Data set description	Level-2
Standards	Data is available through the OGC WCS/WCPS standard.
Spatial extent	Global
Temporal extent	2018 - today
Project Contact	<a href="mailto:mantovani@meeo.it">mantovani@meeo.it</a>
Upstream Contact	
Limitations	<a href="https://sentinel.esa.int/documents/247904/690755/Sentinel_Data_Legal_Notice">https://sentinel.esa.int/documents/247904/690755/Sentinel_Data_Legal_Notice</a>
License	<a href="https://sentinel.esa.int/documents/247904/690755/Sentinel_Data_Legal_Notice">https://sentinel.esa.int/documents/247904/690755/Sentinel_Data_Legal_Notice</a>
Constraints	
Data Format	JPG2000 / netCDF
Access URL	<a href="http://eodataservice.org">eodataservice.org</a>
Archiving and preservation (including storage and backup)	

Table 6-18: Data set description for Sentinel3 parameters.

Data set reference and name	Hydro Estimator
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Organisation	<b>NOAA</b>
Data set description	The Hydro-Estimator (H-E) uses infrared (IR) data from NOAA's Geostationary Operational Environmental Satellites (GOES) to estimate rainfall rates. Estimates of rainfall from satellites can provide critical rainfall information in regions where data from gauges or radar are unavailable or unreliable, such as over oceans or sparsely populated regions.
Standards	Data is available through the OGC WCS/WCPS standard.
Spatial extent	Global
Temporal extent	22 May 2006 - today
Project Contact	<a href="mailto:mantovani@meeo.it">mantovani@meeo.it</a>
Upstream Contact	
Limitations	<a href="https://www.star.nesdis.noaa.gov/star/productdisclaimer.php">https://www.star.nesdis.noaa.gov/star/productdisclaimer.php</a>
License	<a href="https://www.star.nesdis.noaa.gov/star/productdisclaimer.php">https://www.star.nesdis.noaa.gov/star/productdisclaimer.php</a>
Constraints	
Data Format	GeoTIFF
Access URL	<a href="http://eodataservice.org">eodataservice.org</a>
Archiving and preservation (including storage and backup)	

*Table 6-19: Data set description for Hydro Estimator.*

## 1.4 Planetary Science Data Service

Data set reference and name	<b>MGS MOLA GRIDDED DATA RECORDS</b>
Organisation	<b>JACOBSUNI</b>
Data set description	MARS ORBITER LASER ALTIMETER
Standards	Data will be made available through the OGC WCPS standard.
Spatial extent	GLOBAL
Temporal extent	NOT APPLICABLE (Derived from multiple experimental data records)
Project Contact	<a href="mailto:an.rossi@jacobs-university.de">an.rossi@jacobs-university.de</a>
Upstream Contact	geosci@wunder.wustl.edu
Limitations	None
License	Free
Constraints	None
Data Format	PDS standard (GDAL-compatible .IMG or alike)
Access URL	<a href="http://access.planetserver.eu:8080/rasdaman/ows">http://access.planetserver.eu:8080/rasdaman/ows</a>
Archiving and preservation (including storage and backup)	Data is part of long-term NASA PDS archives and the original copies are maintained there.

Table 6-20: Data set description for Mars Orbiter LASER Altimeter data.

Data set reference and name	<b>MRO-M-CRISM-3-RDR-TARGETED-V1.0</b>
Organisation	<b>JACOBSUNI</b>
Data set description	TRDR - Targeted Reduced Data Records contain data calibrated to radiance or I/F.
Standards	Data will be made available through the OGC WCPS standard.
Spatial extent	Local
Temporal extent	Variable
Project Contact	<a href="mailto:an.rossi@jacobs-university.de">an.rossi@jacobs-university.de</a>
Upstream Contact	geosci@wunder.wustl.edu
Limitations	None
License	Free
Constraints	None
Data Format	PDS standard (GDAL-compatible .IMG or alike)
Access URL	<a href="http://access.planetserver.eu:8080/rasdaman/ows">http://access.planetserver.eu:8080/rasdaman/ows</a>
Archiving and preservation (including storage and backup)	Data is part of long term NASA PDS archives and the original copies are maintained there



Table 6-21: Data set description for MRO-M-CRISM Targeted Reduced Data Records.

Data set reference and name	<b>MRO-M-CRISM-5-RDR-MULTISPECTRAL-V1.0</b>
Organisation	<b>JACOBSUNI</b>
Data set description	MRDR - Multispectral Reduced Data Records contain multispectral survey data calibrated, mosaicked, and map projected.
Standards	Data will be made available through the OGC WCPS standard.
Spatial extent	REGIONAL/GLOBAL
Temporal extent	Not applicable. Derived data from multiple acquisition times.
Project Contact	<a href="mailto:an.rossi@jacobs-university.de">an.rossi@jacobs-university.de</a>
Upstream Contact	geosci@wunder.wustl.edu
Limitations	None
License	Free
Constraints	None
Data Format	PDS standard (GDAL-compatible .IMG or alike)
Access URL	http://access.planetserver.eu:8080/rasdaman/ows
Archiving and preservation (including storage and backup)	Data is part of long term NASA PDS archives and the original copies are maintained there

Table 6-22: Data set description for MRO-M-CRISM Multispectral Reduced Data Records.

Data set reference and name	<b>LRO-L-LOLA-4-GDR-V1.0</b>
Organisation	<b>JACOBSUNI</b>
Data set description	LRO LOLA Gridded Data Record
Standards	Data will be made available through the OGC WCPS standard.
Spatial extent	Global
Temporal extent	NOT APPLICABLE (Derived from multiple experimental data records)
Project Contact	<a href="mailto:an.rossi@jacobs-university.de">an.rossi@jacobs-university.de</a>
Upstream Contact	geosci@wunder.wustl.edu
Limitations	None
License	Free
Constraints	None
Data Format	PDS standard (GDAL-compatible .IMG or alike)
Access URL	http://access.planetserver.eu:8080/rasdaman/ows
Archiving and preservation	Data is part of long term NASA PDS project and the original copies are maintained there

Data set reference and name	<b>LRO-L-LOLA-4-GDR-V1.0</b>
(including storage and backup)	

Table 6-23: Data set description for LRO LOLA gridded data.

Data set reference and name	<b>MEX-M-HRSC-5-REFDR-DTM-V1.0</b>
Organisation	<b>JACOBSUNI</b>
Data set description	Mars Express HRSC topography
Standards	Data will be made available through the OGC WCPS standard.
Spatial extent	LOCAL
Temporal extent	VARIABLE
Project Contact	<a href="mailto:an.rossi@jacobs-university.de">an.rossi@jacobs-university.de</a>
Upstream Contact	psahelp@rssd.esa.int
Limitations	None
License	Free
Constraints	None
Data Format	PDS standard (GDAL-compatible .IMG or alike)
Access URL	<a href="http://access.planetserver.eu:8080/rasdaman/ows">http://access.planetserver.eu:8080/rasdaman/ows</a>
Archiving and preservation (including storage and backup)	Data is part of long term ESA PSA project and the original copies are maintained there.

Table 6-24: Data set description for Mars Express HRSC topography parameters.

Data set reference and name	<b>CH1-ORB-L-M3-4-L2-REFLECTANCE-V1.0</b>
Organisation	<b>JACOBSUNI</b>
Data set description	Chandrayaan-1 Moon Mineralogy Mapper (M3)
Standards	Data will be made available through the OGC WCPS standard.
Spatial extent	LOCAL
Temporal extent	VARIABLE
Project Contact	<a href="mailto:an.rossi@jacobs-university.de">an.rossi@jacobs-university.de</a>
Upstream Contact	geosci@wunder.wustl.edu
Limitations	None
License	Free
Constraints	None
Data Format	PDS standard (GDAL-compatible .IMG or alike)
Access URL	<a href="http://moon.planetserver.eu:8080/rasdaman/ows">http://moon.planetserver.eu:8080/rasdaman/ows</a>

Archiving and preservation (including storage and backup)	Data is part of long term NASA PDS project and the original copies are maintained there
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*Table 6-25: Data set description for Moon Mineralogy Mapper (M3) parameters.*

## 1.5 Landsat Data Cube Service

Data set reference and name	Landsat
Organisation	ANU/NCI
Data set description	<a href="http://geonetwork.nci.org.au/geonetwork/srv/eng/metadata.show?id=24&amp;currTab=simple">http://geonetwork.nci.org.au/geonetwork/srv/eng/metadata.show?id=24&amp;currTab=simple</a>
Standards	Data is available at OGC WCS standard.
Spatial extent	Longitude: 108 – 155, Latitude: -10 - -45, Universal Transverse Mercator (UTM) and Geographic Lat-Lon
Temporal extent	1997-now
Project Contact	<a href="mailto:Ben.Evans@anu.edu.au">Ben.Evans@anu.edu.au</a>
Upstream Contact	<a href="mailto:datacollections@nci.org.au">datacollections@nci.org.au</a>
Limitations	None
License	Commonwealth of Australia (Geoscience Australia) 2015. Creative Commons Attribution 4.0 International Australia License. <a href="https://creativecommons.org/licenses/by/4.0/">https://creativecommons.org/licenses/by/4.0/</a>
Constraints	Commonwealth of Australia (Geoscience Australia) 2015. Creative Commons Attribution 4.0 International Australia License. <a href="https://creativecommons.org/licenses/by/4.0/">https://creativecommons.org/licenses/by/4.0/</a>
Data Format	GeoTIFF [NetCDF-CF conversion currently underway]
Access URL	<a href="http://rasdaman.nci.org.au/rasdaman/ows">http://rasdaman.nci.org.au/rasdaman/ows</a>
Archiving and preservation (including storage and backup)	This data collection is part of the Research Data Storage Infrastructure program, which aims for long-term preservation.

Table 6-26: Data set description for Landsat data.