

→ ESA'S EARTH OBSERVATION THIRD PARTY MISSIONS

Data Access Guide – May 2018



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EOHelp – Earth Observation Help and Order Desk

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INTRODUCTION

1.1 Purpose

In addition to providing users with data from its own Earth observing (EO) satellites, the European Space Agency (ESA) has long provided users with access to a number of non-ESA EO missions — so called Third Party Missions (TPM).

The purpose of this document is to help users identify the various types of data that are available from these Missions, the kinds of applications that the data may be used for, and, importantly, the practical procedures required for access, including registration, search, selection and retrieval of the data of interest.

1.2 Scope

ESA's TPM scheme has operated for more than 30 years, providing EO data to users in Europe and around the world, and currently includes over 40 instruments on more than 35 missions. This reflects the needs of the majority of users who rely on a combination of EO data, both to increase sustainability of their service and to complement the range of observation parameters.

A TPM is a mission that is operated by any legal body, governmental or non-governmental, other than ESA, for which:

- ESA assumes some formal responsibility towards the mission operator or to which ESA contributes financially, usually through sharing of Ground Segment facilities or operations;
- ESA assumes a data distribution responsibility to a European or worldwide user community; or,
- ESA otherwise procures the right to sub-license data to users under the TPM scheme.

A list of missions currently included in the TPM scheme can be found at:

<https://earth.esa.int/web/guest/missions/3rd-party-missions/overview>

The benefits of individual TPMs are reviewed as part of the EO data portfolio on an annual basis. The review includes identification of missions – proposed either by ESA, ESA Member States or through user projects – as potential ESA TPM candidates. A technical and

scientific evaluation is performed, including review by the Earth Science Advisory Committee (ESAC), taking into consideration the mission characteristics, the type of data to be provided by the mission, as well as complementarity to both ESA and other TPMs. Emphasis is given to the potential for use in a scientific context and pre-operational applications.

In the past, the TPM scheme was focused on serving European users with regional acquisitions, but in recent years, evolving user requirements and a growing user community have broadened the geographic extent covered. Today, the TPM scheme also covers regions outside Europe, in some cases with worldwide coverage, and serves many non-European users. Furthermore, improvements in technology and the Internet have lead to an evolution in access mechanisms, with data no longer only directly receivable via transmission to European ground stations.

As more and more EO applications have evolved and are reaching maturity, the users of the TPM scheme have expanded thematically beyond pure research to include application development and pre-operational use, including those funded by ESA's programmes such as Data User Element (DUE) and Value Adding Element (VAE).

The reader should note that operational Copernicus data access is outside the scope of this document. More information on Copernicus can be found here: www.esa.int/Our_Activities/Observing_the_Earth/Copernicus

1.3 Contents and How to Use this Document

Section 2 contains commonly used acronyms and includes an index of ESA TPMs.

Section 3 explains ESA's overall data policy and the process to order and obtain data.

Section 4 helps users to understand and select data from the various types available. Available data are categorised to aid selection and a summary of available coverage – both spatial and temporal – is given. Expert users could skip this section, but less advanced users can make use of it and the ESA

online resources (<http://earth.esa.int>) to develop their understanding of the potential of the various data types.

Section 5 explains the various methods available for accessing data and also contains information on the EOHelp team and on how to get assistance with accessing and using TPM products.

Section 6 presents a summary of the Featured Datasets that are generally freely available online via Immediate Access.

Section 7 provides a more in-depth explanation of the data product characteristics for each TPM mission/instrument, along with any special conditions regarding coverage or availability.

Section 8 highlights some future/potential additions to the ESA TPM portfolio.

More information can be found on the ESA Earth Online Principal Investigator (PI) Community website: <https://earth.esa.int/web/guest/pi-community>

This guide is available online at: <https://earth.esa.int/TPM-DAG.pdf>



ACRONYMS

2.1 Organisation Acronyms

ASI	Agenzia Spaziale Italiana
CEOS	Committee on Earth Observation Satellites
CERSAT	Centre ERS d'Archivage et de Traitement (French ERS Processing and Archiving Facility)
CLS/AVISO	Collecte Localisation Satellites/Archiving, Validation and Interpretation of Satellite Oceanographic
CNES	Centre National d'Études Spatiales
CSA	Canadian Space Agency
DLR	Deutsches Zentrum für Luft- und Raumfahrt
DMCii	Disaster Monitoring Constellation Imaging International
ECMWF	European Centre for Medium-range Weather Forecasting
ESA	European Space Agency
ESAC	Earth Science Advisory Committee
ESRIN	European Space Research Institute
FMI	Finnish Meteorological Institute
GFZ	German Research Centre for Geosciences
ISRO	Indian Space Research Organisation
JAXA	Japanese Aerospace Exploration Agency
JPL	NASA Jet Propulsion Laboratory
JRC	Joint Research Centre
KARI	Korea Aerospace Research Institute
MDA	MacDonald, Dettwiler and Associates Ltd.
MOD	Italian Ministry of Defense
MOE (Japan)	Ministry of the Environment (Japan)
MUR	Italian Ministry of Research
NASA	National Aeronautics and Space Administration
NASDA	National Space Development Agency (Japan, now JAXA)
NIES	National Institute for Environmental Studies (Japan)
NIVR	Netherlands Agency for Aerospace Programmes
NSERC	Natural Sciences and Engineering Research Council of Canada
NSO	Netherlands Space Office
SNSB	Swedish National Space Board
SSC	Swedish Space Corporation
SSTL	Surrey Satellite Technology Ltd.
TEKES	National Technology Agency of Finland
USGS	United States Geological Survey
UTCSR	University of Texas Center for Space Research

2.2 Mission Acronyms

ALOS	Advanced Land Observing Satellite
Aura	Formerly EOS Chemistry
COSMO-SkyMed	COnstellation of small Satellites for Mediterranean basin Observation
DMC	Disaster Monitoring Constellation
ERS	European Remote Sensing Satellite
GOSAT	Greenhouse Gas Observing Satellite
GRACE	Gravity Recovery and Climate Experiment
IRS-P4	Indian Remote Sensing Satellite/Oceansat-1
IRS-P6	Indian Remote Sensing Satellite/Resourcesat-1
JERS-1	Japanese Earth Resources Satellite
KOMPSAT	Korea Multi-Purpose Satellite
OrbView-2	Also known as SeaStar, SeaWiFS
Pleiades	Pleiades Constellation
PROBA	Project for On-Board Autonomy
QuikSCAT	Quick Scatterometer
RADARSAT	RADAR Satellite
RapidEye	RapidEye Constellation
SPOT	Satellite Pour l'Observation de la Terre
SRTM	Shuttle Radar Topography Mission

2.3 Instrument Acronyms

ACE-FTS	Atmospheric Chemistry Experiment – Fourier Transform Spectrometer
ASAR	Advanced Synthetic-Aperture Radar
AVNIR-2	Advanced Visible and Near Infra-red Radiometer Type 2
CHRIS	Compact High Resolution Imaging Spectrometer
CZCS	Coastal Zone Color Scanner Experiment
EOC	Electro-Optical Camera
ETM+	Enhanced Thematic Mapper Plus
GRACE Instrument	Gravity Recovery and Climate Experiment Instrument
HiRI	High-Resolution Imager
HRC	High-Resolution Camera
HRG/HRS	High-Resolution Geometric/High-Resolution Stereoscopic
HRV	High-Resolution Visible Imager
HRVIR	High-Resolution Visible and Infrared Imager
LISS-III	Linear Imaging Self Scanner III
MAESTRO	Measurement of Aerosol Extinction in the Stratosphere and Troposphere Retrieved by Occultation
MSC	Multi-Spectral Camera
MSS	Multi-Spectral Scanner
NAOMI	New AstroSat Optical Modular Instrument
NSCAT	NASA Scatterometer
OCM	Ocean Colour Monitor
OLI	Operational Land Imager
OMI	Ozone Monitoring Instrument
OPS	Optical Sensor
OSA (PAN and MS)	Optical Sensor Assembly
OSIRIS	Optical Spectrograph and Infrared Imaging System
PALSAR	Phased Array type L-band Synthetic Aperture Radar
PRISM	Panchromatic Remote-sensing Instrument for Stereo Mapping
REIS	RapidEye Earth Imaging System
ROSA	Radio Occultation Sounder for the Atmosphere
SAR	Synthetic Aperture Radar
SeaWiFS	Sea-viewing Wide Field-of-view Sensor
SeaWinds	SeaWinds Scatterometer

Instrument Acronyms

SLIM-6	Surrey Linear Imager – 6 Channel
SMR	Submillimetre Radiometer
TANSO-CAI	Thermal And Near infrared Sensor for carbon Observation – Cloud and Aerosol Imager
TANSO-FTS	Thermal And Near infrared Sensor for carbon Observation – Fourier Transform Spectrometer
TIRS	Thermal Infrared Scanner
TM	Thematic Mapper
WV-110	WorldView-110 Camera

2.4 Technical Acronyms

ADEN	ALOS Data European Node
AO	Announcement of Opportunity
AUIG	ALOS User Interface Gateway
BSQ	Band Sequential
CCD	Charge-Coupled Device
DEM	Digital Elevation Model
DSM	Digital Surface Model
DUE	Data User Element
EO	Earth Observation
FBD	Fine Beam Double (Polarisation)
FBS	Fine Beam Single (Polarisation)
FP	Full Proposal
FTP (Server)	File Transfer Protocol (Server)
GCP	Ground Control Point
GIS	Geographic Information System
HDF	Hierarchical Data Format
HS	High-resolution SpotLight
IA	Immediate Access
IR	Infrared
LTAN	Local Time of Ascending Node
MS	Multi-Spectral
NDVI	Normalized Difference Vegetation Index
NIR	Near-Infrared
OSA	Optical Sensor Assembly
PAN	Panchromatic
PI	Principal Investigator
PLR	Polarimetry
PPP	Public-Private Partnership
SAR	Synthetic Aperture Radar
SC	ScanSAR
SL	SpotLight
SM	StripMap
SMAC	Simplified Model for Atmospheric Correction

Technical Acronyms

SMR	Sub-Millimetre Radiometer
ST	Staring SpotLight
SSO	Single Sign On
SW	Short Wavelength
SWIR	Shortwave Infrared
TPM	Third Party Mission
TPMO	TPM Owner/Operator
VAE	Value Adding Element
VIS	Visible
WS	Wide ScanSAR



ESA'S EARTH OBSERVATION DATA POLICY

3.1 Data Policy

ESA's Earth Observation Data Policy was defined by the ESA Member States with the objective of maximizing the beneficial use of ESA and TPM data and to stimulate balanced development of scientific, public utility and commercial applications, consistent with the given mission's objectives.

TPM data are offered in support of research and applications development, including research on long-term issues of Earth system science, research and development in preparation for future operational use, and ESA internal use.

Any user worldwide can apply for TPM data for these purposes, but restrictions may apply to users from certain countries, depending on license conditions and national security legislation in the data provider's country.

3.2 Legal

The full details of the TPM applicable Terms and Conditions (rights and obligations of the Project's PI and of ESA) are provided to the science user for acceptance and signature.

There are some general abiding principles that apply:

- The PI acknowledges the full title and ownership, including all derived rights, by the TPM owner/operator (TPMO) of all TPM data;
- The PI assumes full responsibility for the approved utilisation of data, including utilisation by co-investigators (Co-PI), for the duration of the Project;
- The PI undertakes that the data supplied shall not be copied, transferred or otherwise be made available to third parties without the written consent of ESA and/or the TPMO;
- The PI frequently reports (in writing or at ESA-organised workshops/symposia) on the Project objectives, data use, results and recommendations;
- The PI acknowledges and takes account of scheduling and processing constraints both at satellite and ground-segment level;
- The PI is authorised to undertake duplication of data as necessary for the performance of the Project, without any charges to ESA or to the TPMO.

Full details can be found online at:

<https://earth.esa.int/web/guest/pi-community>



UNDERSTANDING AND SELECTING FROM THE DATA AVAILABLE

4.1 The Different Data Types Available from ESA TPMs

Instruments whose data are available through the ESA TPM scheme can be divided into three broad categories.

Radar Imagery: These instruments transmit at frequencies of around 1–10GHz and measure the backscattered signals to generate microwave images of the Earth's surface. Both Synthetic Aperture Radars (SARs) and real aperture side-looking imaging radar systems fall into this category. The images produced have resolutions comparable to those of high to medium resolution optical imagers, but radars have the capability to 'see' through clouds, providing data on an all-weather, day/night basis.

Applications include the detection of ocean surface waves, fronts, eddies and oil slicks, detection and tracking of ships from their wakes, operational sea ice forecasting and, on land, the identification of vegetation type and cover as well as forestry and agriculture applications. The ability of SARs to penetrate cloud cover makes them particularly valuable in rainforest studies and resource monitoring applications.

Optical/Multispectral (MS) Radiometry: Visible/infrared imaging MS radiometers are used to image the Earth's atmosphere and surface across a number of spectral bands. The highest resolutions start at the sub-1m level up to medium and low resolution in the kilometre range, and swath widths can range from tens to hundreds of kilometres.

Low-resolution MS data return additional environmental information, such as land cover and ocean colour/temperature. Medium-resolution data are typically used to reveal man-made features such as towns or large roads; high resolution offers views of small roads or even the differentiation of individual houses.

Atmospheric Data: Atmospheric data are derived from several types of instruments that use various techniques and different parts of the electromagnetic spectrum to undertake measurements of the atmosphere's composition. Each atmospheric gas is characterised by its 'absorption' and 'emission' spectra, which describe how the molecules respond

to different frequencies of radiation. Remote-sensing instruments exploit these 'signatures' to provide information on atmospheric composition, using measurements over a range of wavelengths between ultraviolet and microwave.

Applications include: pollution monitoring; climatology, including studies of the carbon cycle; volcanic eruption monitoring; and operational meteorology.

4.2 Levels of Data Processing

The data observed by an instrument are typically transformed, by the application of an appropriate algorithm, into data relevant to the phenomenon of interest. For example, wind vectors over the ocean can be derived from the response given by a radiometric signal after reflection from the surface of the ocean. In most cases, several algorithms are applied in series to arrive at the desired final product. While each data provider, mission and instrument may have their own conventions, the following processing levels are based on the CEOS convention and are representative of the levels of data processing that are generally available:

- **Raw Data:** Data in their original packets, as received from a satellite.
- **Level 0:** Reconstructed unprocessed instrument data at full space-time resolution with all available supplemental information to be used in subsequent processing appended (e.g. ephemeris, health and safety).
- **Level 1:** Unpacked, reformatted Level 0 data, with all supplemental information to be used in subsequent processing appended. Optional radiometric and geometric correction (i.e., orthorectification) applied to produce parameters in physical units. Data are generally presented in full space/time resolution. A wide variety of sub-level products are possible.
- **Level 2:** Retrieved environmental variables (e.g., ocean wave height, soil moisture, ice concentration) at the same resolution and location as the Level 1 source data.
- **Level 3:** Data or retrieved environmental variables that have been spatially and/or temporally resampled (i.e., derived from Level 1 or 2 products).

Such resampling may include averaging and compositing.

Each Level represents a step in the process of transforming physical information (raw, Level 0, Level 1) into relevant geophysical information (Level 2, Level 3).

4.3 Summary of Current and Potential Third Party Missions and Instruments

Missions and instruments under the TPM scheme are divided into two categories: Current and Potential.

Current – referring to the availability through the TPM scheme – comprise missions/instruments that are either active or have ceased operations. Archived data and/or new acquisitions may be available, depending on the particular mission/instrument.

Potential missions may in future be available via the ESA TPM scheme. These missions have either been launched recently, are planned for launch soon, are existing/past missions for which a data agreement with ESA is under discussion and thus not yet in place, or for which agreements are in place, but technical implementation is not yet finalised.

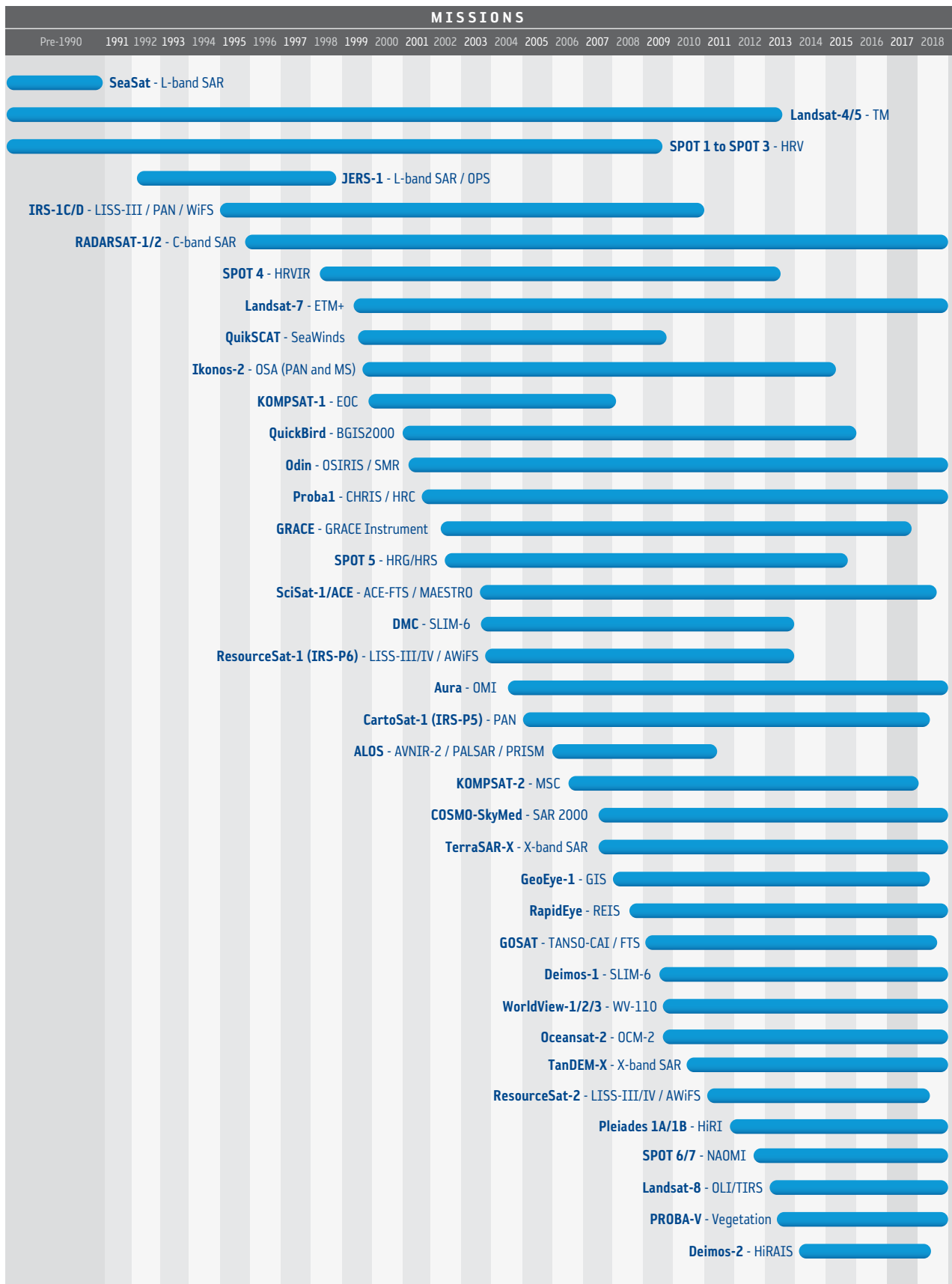
CURRENT		
	Mission	Instrument
Optical (Very High Resolution)	Deimos-2	HiRAIS
	GeoEye-1	GIS
	Ikonos-2	OSA (PAN and MS)
	KOMPSAT-2	MSC
	Pleiades 1A/1B	HiRI
	QuickBird	BGIS2000
	SPOT 6/7	NAOMI
	WorldView-1/2/3	WV-110
Other	GRACE	GRACE Instrument
Radar	ALOS	PALSAR
	JERS-1	L-band SAR
	QuikSCAT	SeaWinds
	SeaSat	L-band SAR
Radar (Very High Resolution)	COSMO-SkyMed	SAR 2000
	RADARSAT-1/2	C-band SAR
	TerraSAR-X	X-band SAR
	TanDEM-X	X-band SAR

POTENTIAL		
	Mission	Instrument
Optical (Low/Med Resolution)	Nimbus-7	CZCS
	OrbView-2	SeaWiFS
Optical (Med/High Resolution)	Landsat 1-5	MSS

CURRENT		
	Mission	Instrument
Atmospheric Data	Aura	OMI
	GOSAT	TANSO-CAI / TANSO-FTS
	Odin	OSIRIS / SMR
	SciSat-1/ACE	ACE-FTS / MAESTRO
Optical (Low/Med Resolution)	PROBA-V	Vegetation
	Landsat-8	TIRS
	Oceansat-2	OCM-2
Optical (Med/High Resolution)	ALOS	AVNIR-2 / PRISM
	CartoSat-1 (IRS-P5)	PAN
	Deimos-1	SLIM-6
	DMC	SLIM-6
	IRS-1C/D	LISS-III / PAN / WiFS
	JERS-1	OPS
	KOMPSAT-1	EOC
	Landsat-4/5	TM
	Landsat-7	ETM+
	Landsat-8	OLI
	Proba-1	CHRIS / HRC
	RapidEye	REIS
	ResourceSat-1 (IRS-P6)	LISS-III/IV / AWiFS
	ResourceSat-2	LISS-III/IV / AWiFS
	SPOT 1 to SPOT 3	HRV
	SPOT 4	HRVIR
	SPOT 5	HRG/HRS

4.4 Timeline of Current Missions

The following timeline shows the instrument type and temporal coverage for the Current missions.



4.5 ESA Archive Copies/Collections

In addition to providing access to new/archive data from suppliers, ESA also maintains archives of certain data previously requested and delivered through the TPM Programme. These select data copies/collections are made available online to new users via Immediate Access.

4.6 Featured Datasets

ESA offers access to a number of predefined Featured Datasets, which provide easy access to thematic, systematically processed data.

A catalogue of Featured Datasets is available in Chapter 7 and more information can be found on ESA's Earth Online website at: <https://tpm-ds.eo.esa.int/collections>

4.7 Understanding Your Information Needs Versus the Data Capabilities

There are a number of resources available on ESA's Earth Online (<https://earth.esa.int>) to help match end-user needs with the available data, including technical details such as instrument and product specifications. Earth Online also includes pages dedicated to ESA TPMs, accessible here: <https://earth.esa.int/web/guest/missions/3rd-party-missions/overview>

The Earth Online PI Community pages (<https://earth.esa.int/web/guest/pi-community>) offer more information for researchers on applying for data, as well as scientific results and related news.

In addition, CEOS – supported by ESA – has published the *Earth Observation Handbook* in both print and online editions. This publication contains information on the capabilities and plans of space agencies' EO programmes.

Earth Observation Handbook:

www.eohandbook.com

Capabilities:

www.eohandbook.com/cop21/capabilities/sat_earth_observation.html

Measurements:

www.eohandbook.com/cop21/capabilities/earth_observation_plans.html

Database of Missions:

<http://database.eohandbook.com>

A special page has been developed for the Earth Observation Handbook online in support of ESA TPM users, which can be accessed here: <http://database.eohandbook.com/esatpm/search.aspx>



HOW TO DISCOVER AND ACCESS THIRD PARTY MISSION DATA

5.1 ESA Earth Online

The first point of entry for TPM data discovery is ESA Earth Online: <http://earth.esa.int>

Here users can find information on all EO data that is accessible through ESA, including TPM data. Users can also find:

- mission and instrument news and descriptions;
- collection descriptions;
- product technical descriptions;
- data access links; and,
- information on select Earth/environmental topics and the applications of satellite data.

In the Data Access/Browse Data Products menu, users can browse by satellite, instrument, application, processing level and product type.

In the Missions/3rd Party Missions menu; missions, instruments and collections under the TPM scheme are shown. It can be accessed directly at: <https://earth.esa.int/web/guest/missions/3rd-party-missions/overview>

5.2 ESA Earth Online PI Community

The PI Community is accessible using the main menu

of Earth Online, or directly here: <https://earth.esa.int/web/guest/pi-community>

This web site allows users to:

- apply for access to data;
- access information on researchers, tools, training materials and events;
- find publications on scientific results and news; and,
- access an online searchable database of science projects.

An area dedicated to applying for data from TPM missions is available at: <https://earth.esa.int/web/guest/pi-community/apply-for-data/3rd-party>

5.3 Application for Scientific Use Data

There are three ways to apply for scientific use data, depending on the type of data being requested.

1) **Immediate Access (IA) via My EarthNet:** <https://earth.esa.int/web/guest/pi-community/myearthnet>

2) **A Full Proposal (FP)** is submitted by a PI when the data requirements are subject to specific acquisition or dissemination constraints. The proposal undergoes a proposal evaluation process and a notification is sent to the user after about six to eight weeks. If the proposal evaluation is successful, the proposal

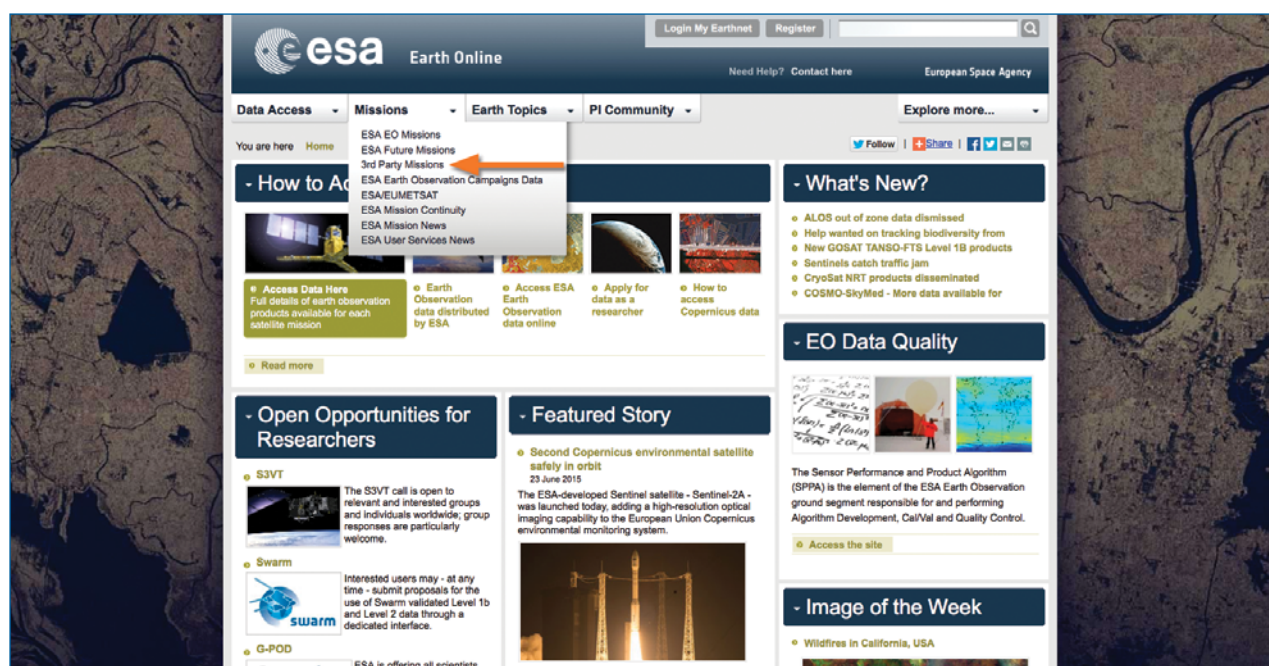


Figure 1 – ESA Earth Online and the Third Party Missions Link



Figure 2 – Earth Online PI Community

is accepted once the feasibility of data and service provision are confirmed. Following proposal acceptance, a quota of products is allocated to the project (either a number of specific acquisition requests or a volume of archive data).

Scientific data access FP's can be submitted here: <https://earth.esa.int/web/guest/pi-community/apply-for-data/full-proposal>

3) Occasionally ESA will issue an **Announcement of Opportunity (AO)** for either specific new missions or research topics. When a response to the AO is sent, and the data requested fall into the specific subject covered by the AO, an acceptance notification will be sent several weeks after the closure of the AO.

Information on current AOs can be found here: <https://earth.esa.int/web/guest/pi-community/apply-for-data/ao-s>

5.4 My EarthNet: Data Subscription Personal Area

The My EarthNet Personal Area provides users with the status of their data subscriptions (Immediate Access and Full Proposal).

For Full Proposals, it provides access to the proposal details submitted by the user, as well as the status (Initial, On-Hold, Accepted) of each proposal.

For Immediate Access, it gives users the ability to

subscribe to any TPM dataset by clicking “Add TPM data”. Once subscribed, users are provided the access details (download link or further steps).

<https://earth.esa.int/web/guest/pi-community/myearthnet>

5.5 Data Access

For data requiring the submission of a Full Proposal, the EOHelp team will advise the user on the appropriate data access channels. For data under Immediate Access, access details are provided at the end of the subscription process on MyEarthNet.

It is also possible to request access to a TPM collection from the TPM online access list: <https://tpm-ds.eo.esa.int/collections/>

5.6 TPM Online Access List

The TPM Online Access List (<https://tpm-ds.eo.esa.int/collections/>) links to the dissemination services of all the TPM data available online. The TPM Online Dissemination Services are composed of a set of servers that provide fast and easy access to online TPM EO products by coupling high bandwidth, large storage space and efficient software.

Most of the TPM Online Dissemination Services provide geographical search capability.

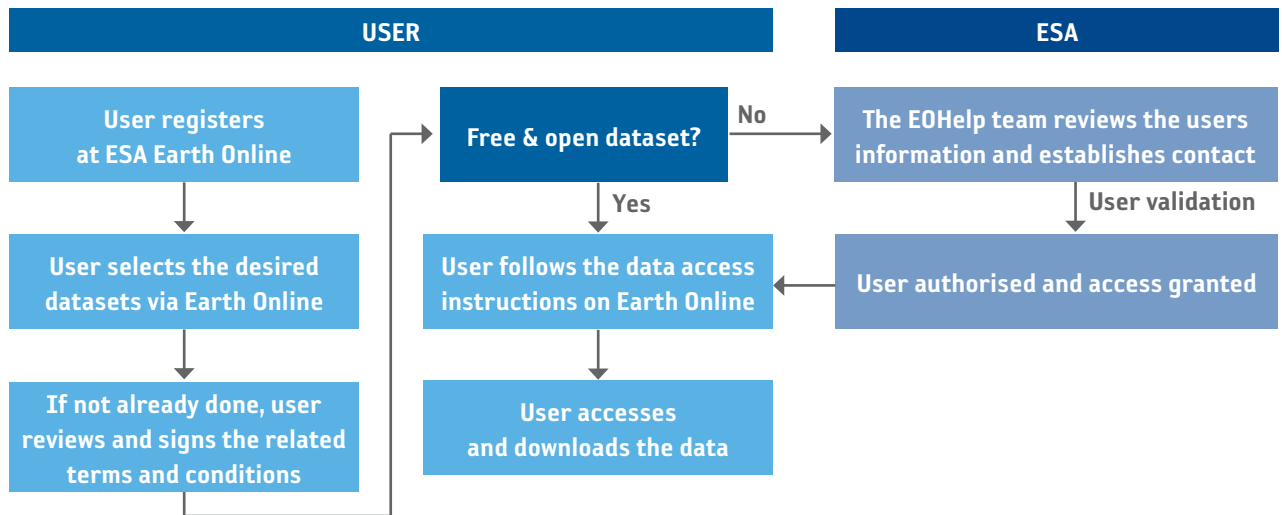


Figure 3 – Immediate Access Data Authorisation Process

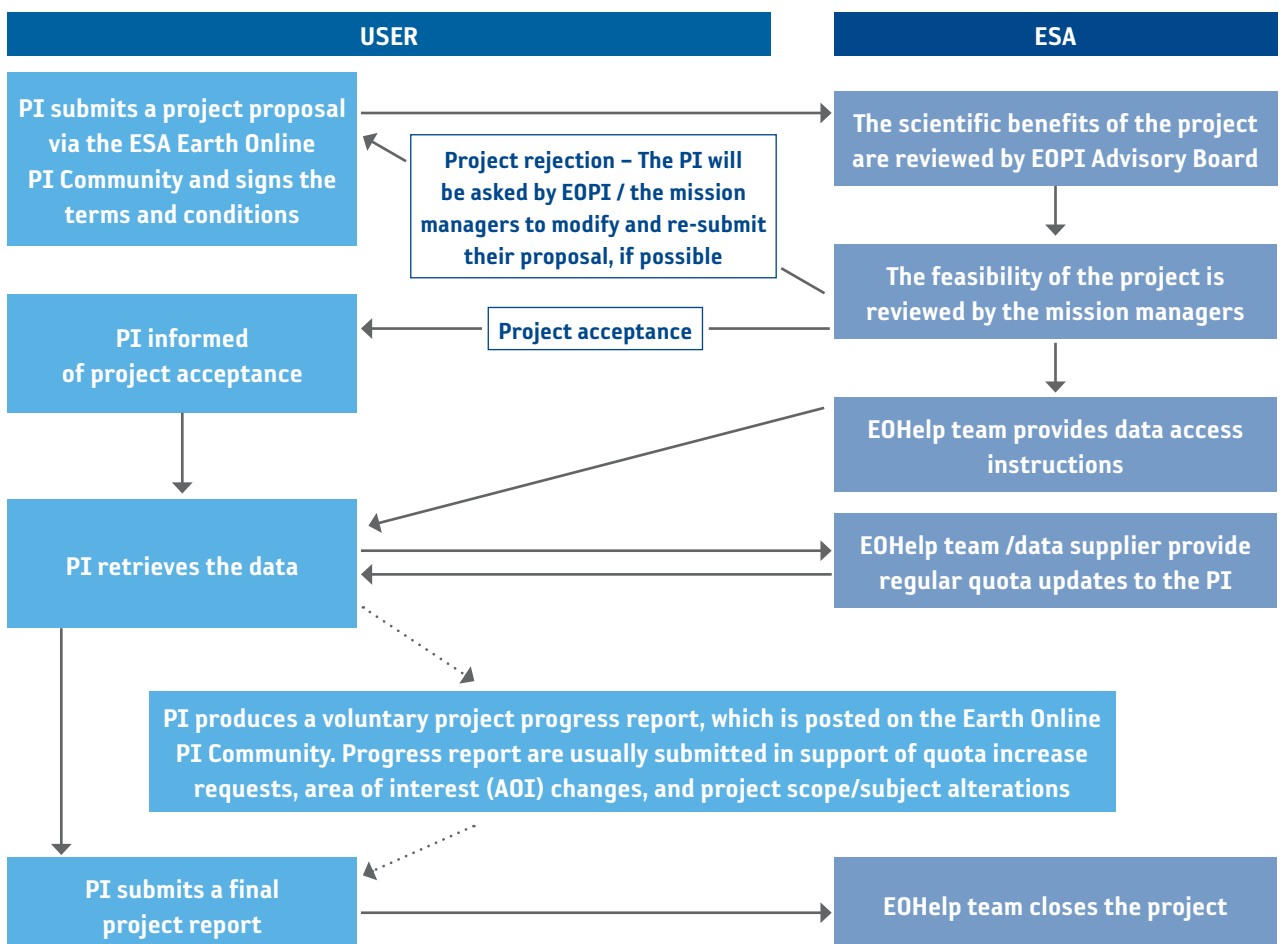


Figure 4 – Full Proposal Data Authorisation Process

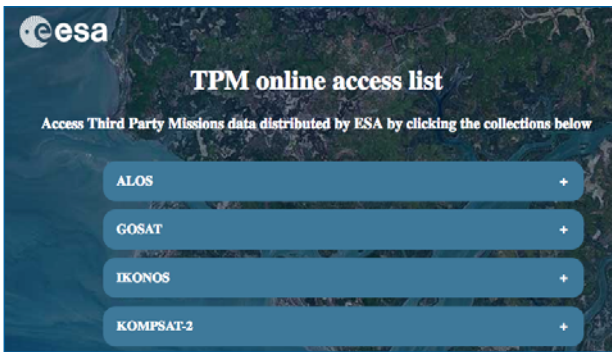


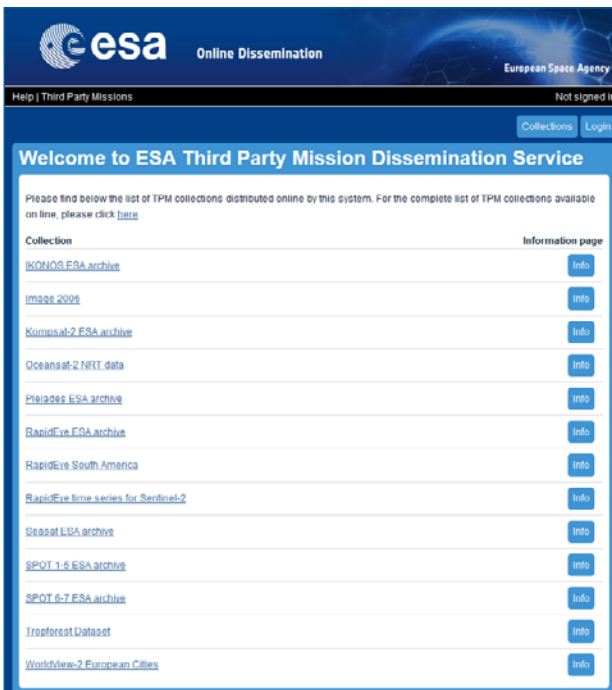
Figure 5 – ESA Third Party Missions Online Access List

5.7 TPM Online Dissemination Service

Except when mission-specific dissemination services have been implemented, most TPM online datasets are available for download from the TPM Online Dissemination Service: <https://tpm-ds.eo.esa.int>



The system lists all the available collections:

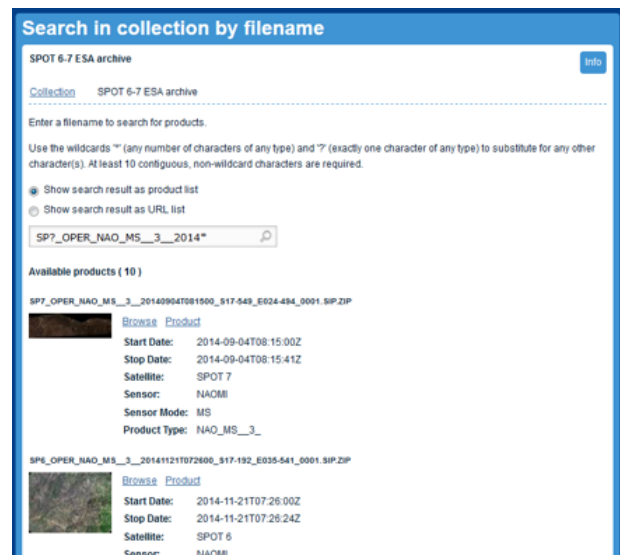


Collections are available through different mechanisms:

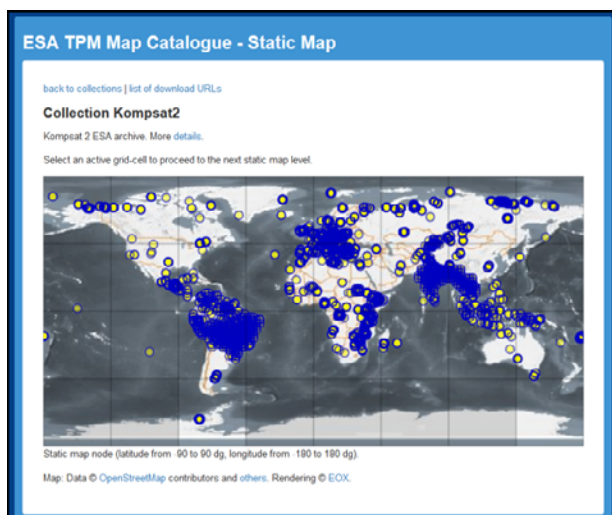
- Tree view:



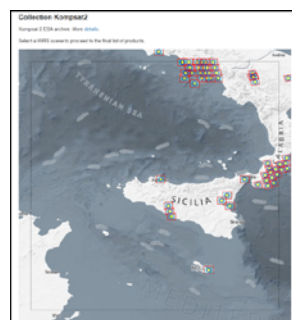
- Filename search:



- Geographical search, through which users can search products based on fixed or user-defined areas of interest and/or metadata:



Narrowing the geographical search down to the highest zoom level:



5.8 ESA EO Analysis Tools

EO Analysis Tools

ESA has made available a wide range of open source tools to facilitate the handling and exploitation of EO data. These tools include experimental data processing algorithms and increasingly provide specific support for TPM data.

A complete list can be found here:

<https://earth.esa.int/web/guest/software-tools>

Sentinel Toolboxes

ESA is developing free open source toolboxes for the scientific exploitation of the Sentinel missions. However, these can also be used for a range of other national and Third Party Missions. The toolboxes inherit functionality from historical tools developed over the last 10 years.

The toolboxes have been designed to have flexible, evolving functionality and to operate on cloud computing infrastructure. There are a number of toolboxes currently available, and more information can be found here: <http://step.esa.int/main/toolboxes>

5.9 How to Get Help

ESA's EO User Services strive to provide a user-friendly interface between the satellite systems and the data users. EOHelp is the unique contact point for ESA EO and TPM, including on-request orders, complaints handling and requests for information:

EOHelp

ESA – ESRIN

Via Galileo Galilei

I-00044 Frascati, Italy

email: eohelp@esa.int

<http://earth.esa.int/contactus>

T +39 06 941 80777

F +39 06 941 80292



FEATURED DATASETS

The following Featured Datasets are currently available.

For further technical details of each dataset's mission/instrument, please refer to the appropriate section in Chapter 7 – referenced at the bottom of each description.

6.1 ALOS African Coverage

This dataset is a collection of the best available (cloud minimal) African coverage acquired by AVNIR-2 and PRISM.

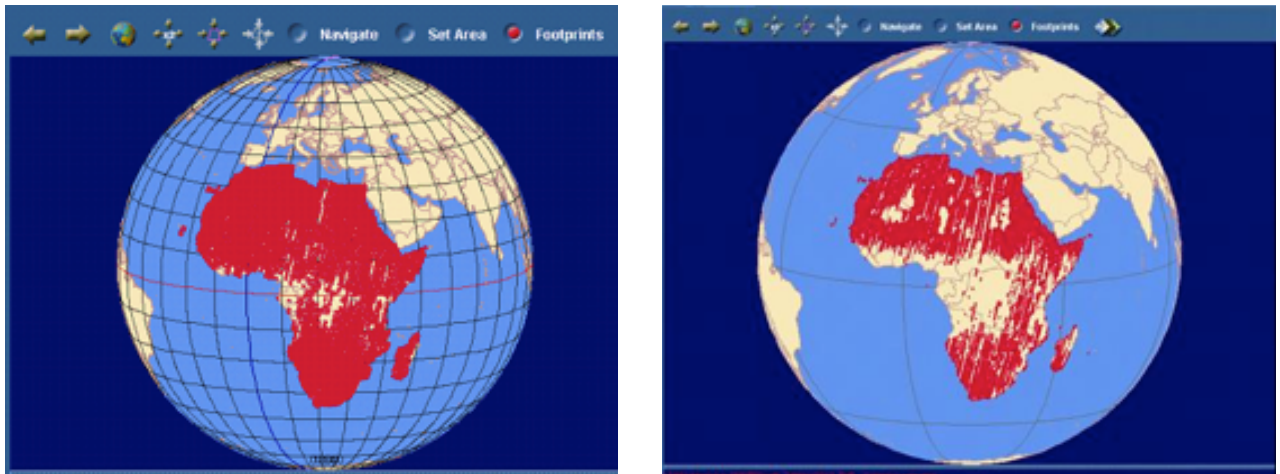


Figure 13 – ALOS AVNIR-2 (top) and PRISM (bottom) African Coverages.

ALOS African Coverage

ALOS (AVNIR-2)

Spatial and Temporal Coverage	Africa November 1 st 2006 to April 22 nd 2011.
Access Information	Data are available for immediate download via the TPM Online Access List (https://tpm-ds.eo.esa.int/collections/). Data download requires registration at: https://earth.esa.int/web/guest/-/alos-africa
Mission/Instrument Information	<i>For more details, please see Section 7.2</i>
WEBLINKS	More information: https://earth.esa.int/web/guest/-/alos-africa

6.2 ALOS International Polar Year

Initiated under the International Polar Year (IPY), ESA provides full resolution ScanSAR products from ALOS PALSAR over Antarctica. ALOS PALSAR ScanSAR

(WB1) processed products in 100m spatial resolution (L1.5) are available for Research and Application development.

International Polar Year (IPY)	
ALOS (PALSAR)	
Spatial and Temporal Coverage	In total there are around 5000 products over Antarctica for two time periods: - 25 th July to 28 th December 2008 (Cycle 21 to beginning of Cycle 24) - 1 st May to 10th November 2009 (beginning of Cycle 27 to Cycle 31)
Access Information	All data are available online for direct download
Mission/Instrument Information	<i>For more details, please see Section 7.2</i>
WEBLINKS	More information: https://earth.esa.int/aos/IPY

6.3 IMAGE2006/European Coverage

Two cloud-free coverages of Europe are available, resampled to 20m spatial resolution in national projection and 25m in European projection for orthorectified data. Data have been sourced from SPOT-4 HRVIR (20m original spatial resolution), SPOT-5 HRG (10m original spatial resolution) and Resourcesat-1 (IRS-P6) LISS III (with 23m original spatial resolution), each with four spectral bands. The

swath width is about 60km for the SPOT satellites and 140km for the IRS-P6 satellite.

More information on these datasets can be obtained from the EOHelp team or the *IMAGE2006 European Coverage – Methodology and Results* document: http://earth.esa.int/pub/ESA_DOC/Image2006-v1_01.pdf

IMAGE2006/European Coverage	
SPOT 4, SPOT 5, Resourcesat-1 (IRS-P6)	
Spatial and Temporal Coverage	Europe. 2006, with data from 2005 and 2007 used to fill any gaps
Access Information	Data are available for immediate download via the TPM Online Access List (https://tpm-ds.eo.esa.int/collections/). Data download requires registration at: https://earth.esa.int/web/guest/-/image2006
Mission/Instrument Information	<i>For more details, please see Section 7.10, 7.25.2 and 7.25.3</i>
WEBLINKS	More information: https://earth.esa.int/web/guest/-/image2006

6.4 IMAGE2007/European Coverage

Coverage captured by the DMC constellation (UK-DMC, Beijing-1 and NigeriaSat-1). Images are derived from 32m resolution optical images from the SLIM-6 instrument. The following products, with European coverage, are available:

- **L1R:** Band registered product derived from the LoR product.
- **L1T:** Orthorectified product derived from the L1R

product using manually collected GCPs from IMAGE2000 and SRTM DEM V3.1 data.

More information on these products can be found in the DMC Data Product Manual for the DMC Europe 2007 Coverage, which can be obtained from ESA Earth Online here:

<https://earth.esa.int/documents/10174/1987716/DMC-Data-Product-Manual.pdf>

IMAGE2007/European Coverage

UK-DMC, Beijing-1 and NigeriaSat-1


Spatial and Temporal Coverage	Europe. 2007, with data from 2006 used to fill any gaps
Access Information	All data are available online for direct download
Mission/Instrument Information	<i>For more details, please see Section 7.6</i>
WEBLINKS	More information: https://earth.esa.int/aos/DMC

6.5 IRS-1C/D European Coverage

Three cloud-free coverages of Europe are available.

IRS-1C/D European Coverage

IRS-1C/D

Spatial and Temporal Coverage	 <p>Europe. 3 coverages available – data from 1996 to 2004.</p>
Access Information	Data will be available during Q1 2018 for immediate download via the TPM Online Access List (https://tpm-ds.eo.esa.int/collections/). Data download requires registration at: https://earth.esa.int/web/guest/-/irs-1c-1d-european-coverage
Mission/Instrument Information	<i>For more details, please see Section 7.13</i>
WEBLINKS	More information: https://earth.esa.int/web/guest/missions/3rd-party-missions/current-missions/irs-1c

6.6 KOMPSAT-1 Coverage of 50 European Cities

Available as a sample collection of data acquired by KOMPSAT-1's Electro-Optical Camera (EOC) with no orthorectification or radiometric calibration. The

dataset includes PAN imagery at 6.6m GSD, with a swath of 17km. Data are available in TIFF format and correspond to Level 1B processing.

KOMPSAT-1 Coverage of 50 European Cities	
KOMPSAT-1 (EOC)	
Spatial and Temporal Coverage	50 European cities 1999-12-21 to current day
Access Information	Please contact EOHelp for assistance accessing this dataset.
Mission/Instrument Information	<i>For more details, please see Section 7.12</i>
WEBLINKS	More information: https://earth.esa.int/web/guest/-/kompsat-1-eoc-european-cities-dataset-3792

6.7 Landsat Cloud-free European Coverages

These two cloud-free coverages over Europe are composed of data acquired and processed by ESA at receiving stations in Fucino (Italy), Matera

(Italy), Kiruna (Sweden), Neustrelitz (Germany) and Maspalomas (Spain).

Landsat Cloud-free European Coverages	
Landsat 5/7 (TM/ETM+)	
Spatial and Temporal Coverage	Europe The periods of acquisition are as follows: – Landsat 5 TM from 1990 to 1995 – Landsat 7 ETM+ from 1999 to 2003
Access Information	Data are available for immediate download via the TPM Online Access List (https://tpm-ds.eo.esa.int/collections/). Data download requires registration at: https://earth.esa.int/web/guest/-/landsat-45-thematic-mapper-tm-system-corrected-pre-flight-radiometric-correction-and-cubic-convolution-resampling-product-1497
Mission/Instrument Information	<i>For more details, please see Section 7.14.1 and 7.14.2</i>
WEBLINKS	More information: https://earth.esa.int/web/guest/-/landsat-45-thematic-mapper-tm-system-corrected-pre-flight-radiometric-correction-and-cubic-convolution-resampling-product-1497

6.8 RapidEye South America

In collaboration with Planet Labs, ESA has made this collection of low cloud cover Level 3A tiles freely available via the TPM programme. The RapidEye Earth

Imaging System (REIS) provides data at 5 metre spatial resolution (multispectral, orthorectified).

RapidEye South America	
RapidEye (REIS)	
Spatial and Temporal Coverage	This dataset covers more than 6 million km ² of South American countries (Argentina, Bolivia, Chile, Ecuador, Paraguay, Peru and Uruguay). Images were acquired from 2013 to 2015 (mostly 2015).
Access Information	Data are available for immediate download via the TPM Online Access List (https://tpm-ds.eo.esa.int/collections/). Data download requires registration at: https://earth.esa.int/web/guest/-/rapideye-south-america-dataset
Mission/Instrument Information	<i>For details please see Section 7.22</i>
WEBLINKS	More information: https://earth.esa.int/web/guest/-/rapideye-south-america-dataset

6.9 RapidEye Time Series for Sentinel-2

Carried out by ESA in collaboration with Planet Labs in order to produce 5-day revisit time-series datasets over selected sites – similar to that produced by the Sentinel-2 mission.

The RapidEye Earth Imaging System (REIS) provides

data at 5m spatial resolution (multispectral L3A orthorectified). The products are radiometrically and sensor corrected similar to the Sentinel-2 Level 1B basic product, but have geometric corrections applied during orthorectification using Digital Elevation Models (DEMs) and GCPs.

RapidEye Take 5	
RapidEye (REIS)	
Spatial and Temporal Coverage	Two high-resolution time series were collected for the following periods: – February to June 2013 over sites in Argentina, Belgium, Chesapeake Bay, China, Congo, Egypt, Ethiopia, Gabon, Jordan, Korea, Morocco, Paraguay, South Africa and Ukraine. – April to September 2015 for a further ten sites: Limburgerhof, Railroad Valley, Libya, Algeria, Figueres, Mauritania, Barrax, ESRIN, Uyuni Salt Lake.
Access Information	Data are available for immediate download via the TPM Online Access List (https://tpm-ds.eo.esa.int/collections/). Data download requires registration at: https://earth.esa.int/web/guest/-/rapideye-level-3a-time-series-dataset-for-sentinel-2
Mission/Instrument Information	<i>For details please see Section 7.22</i>
WEBLINKS	More information: https://earth.esa.int/web/guest/-/rapideye-level-3a-time-series-dataset-for-sentinel-2

6.10 SPOT 4/5 Take 5

At the end of their operational lives SPOT 4 and 5 were placed into orbits that resulted in 5-day revisit times – consistent with the operation of Sentinel-2. SPOT 4/5 Take 5 data collected over a selection of international

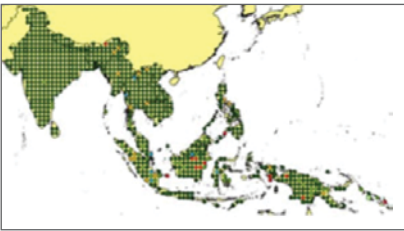

sites allowed users to prepare for Sentinel-2 by testing their methods and applications, as well as to showcase the utility of the derived products.

SPOT 4/5 Take 5	
SPOT 4/5	
Spatial and Temporal Coverage	SPOT 4 Take 5 (January 29 th – June 19 th , 2013) sites: www.cesbio.ups-tlse.fr/multitemp/?page_id=1685 SPOT 5 Take 5 (April 8 th – September 8 th , 2015) sites: www.cesbio.ups-tlse.fr/multitemp/?page_id=4699
Access Information	Level 1C and 2A time series are available for free online via the SPOT Take 5 website: https://spot-take5.org
Mission/Instrument Information	<i>For more details, please see Sections 7.25.2 and 7.25.3</i>
WEBLINKS	More information: https://earth.esa.int/web/guest/data-access/spot-5-sentinel-2-take-5-dataset

6.11 TropForest 2010

Covers tropical forest areas in South East Asia and South America. The data were acquired by the ALOS, Deimos-1 and KOMPSAT-2 satellites with the goal of creating a harmonised geo-database of ready-to-

use satellite imagery to support 2010 global forest assessments performed by the Joint Research Centre (JRC) of the European Commission and the FAO.

TropForest 2010	
ALOS, Deimos-1 and KOMPSAT-2	
Spatial and Temporal Coverage	  <p>2009 to 2010</p> <p>The products are located at the crossing points of the geographical grid ($1^\circ \times 1^\circ$) and have a size of 20×20 km.</p>
Access Information	Data are available for immediate download via the TPM Online Access List (https://tpm-ds.eo.esa.int/collections/). Data download requires registration at: https://earth.esa.int/web/guest/-/tropforest
Mission/Instrument Information	<i>For more details, please see Section 7.2, 7.5, 7.13</i>
WEBLINKS	More information: https://earth.esa.int/web/guest/-/tropforest

6.12 WorldView-2 European Cities

Coverage has been provided by European Space Imaging. Very High Resolution satellite imagery collected by WorldView-2 was delivered to complete ESA's Urban Atlas, which provides coverage of

European Urban Areas with more than 100,000 inhabitants. An 8-Band MS + PAN bundle of archive data is available.

WorldView-2 European Cities	
WorldView-2	
Spatial and Temporal Coverage	European Urban Areas with more than 100,000 inhabitants, acquired from February 2011 to October 2013. 290 of the 305 2010 Urban Atlas Zones are covered, as well as 5 Urban Atlas Zones in Croatia – totaling 537.502 km ² .
Access Information	Data are available for immediate download via the TPM Online Access List (https://tpm-ds.eo.esa.int/collections/). Data download requires registration at: https://earth.esa.int/web/guest/-/worldview-2-european-cities-dataset
Mission/Instrument Information	<i>For more details, please see Section 7.27</i>
WEBLINKS	More information: https://earth.esa.int/web/guest/-/worldview-2-european-cities-dataset



A CLOSER LOOK AT THE DATA AVAILABLE – CURRENT MISSIONS

7.1 TPM Data Availability

Section 4 of this guide provides a summary of measurement categories, spatial and temporal coverage, and products available through the ESA TPM scheme.

This section presents additional details on the missions and instruments and the products they offer. Note that in this section, processing levels (i.e., Level 1B, etc.) reflect the language used by the data providers and may not necessarily conform to the CEOS standard provided for illustration in Section 4.

Each instrument and product is categorized per the adjacent legend.



Optical: **LOW-MED** ($\geq 100\text{m}$)
MED-HIGH ($1.5 - 100\text{m}$)
VERY HIGH ($\leq 1.5\text{m}$)



Radar: **MED-HIGH** ($> 5\text{m}$)
VERY HIGH ($\leq 5\text{m}$)



Atmospheric Data



Other data



Coverage: **G**: Global
E: European
E-C: European Cities
NAf: North Africa
ME: Middle East

7.2 ALOS

ALOS was developed by JAXA and carried two optical instruments and an L-band active microwave sensor payload. Applications include cartography, regional observation, disaster observation and resources surveying.




ESA built and operated the European/African ground segment for ALOS, known as the ALOS Data European Node (ADEN). In exchange, ESA receives full data rights over the ADEN zone (Europe, Africa, Middle East) for distribution to all users residing in the zone.

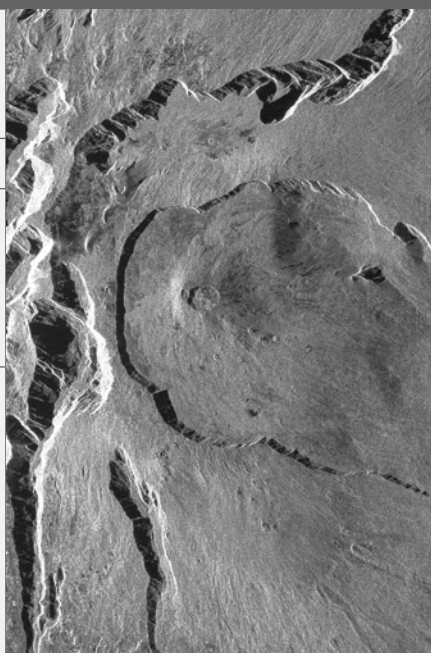

Unless already held in the ESA archive, project data outside of the ADEN zone is no longer available via the TPM scheme.



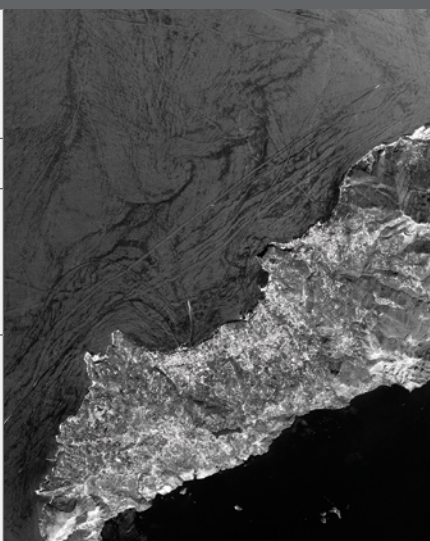

Data outside the ADEN zone are available at: www.gportal.jaxa.jp/gp/top/html



Figure 15 – ADEN Ground Station Coverage

ALOS / AVNIR-2		 MED-HIGH	 G	2006-2011
Instrument & agency (& any partners)	Advanced Visible and Near Infra-red Radiometer Type 2 JAXA			
Type	Medium/High-resolution optical imager			
Measurements & applications	Medium/High-resolution multispectral imager for land applications, which include environmental monitoring, agriculture and forestry, and disaster monitoring.			
Technical characteristics	Wavebands: VIS: 0.42–0.50µm, 0.52–0.60µm, 0.61–0.69µm; NIR: 0.76–0.89µm Spatial resolution: 10m Swath width: 70km			
Products				
ALOS.AVNIR.2	The AVNIR-2 Processing Software at ADEN performed radiometric and geometric corrections and generated Level 1A, Level 1B1 and Level 1B2 products.			
Level 1A	AVNIR-2 raw data extracted from the Level 0 data, expanded and generated lines are added.			
Level 1B1	Radiometrically corrected data derived from Level 1A data with the absolute calibration coefficient included.			
Level 1B2	Geometrically corrected data derived from Level 1B1 data. There are several correction options available including geo-referenced (R) and geo-coded data (G).			
Level 1C	Geometrically corrected data derived from Level 1B1 data (ortho-corrected).			
ALOS African Coverage – Featured Dataset	See Section 6.1 for more details.			
TropForest 2010 – Featured Dataset	AVNIR-2 contributed to the TropForest 2010 project. See Section 6.11 for more details.			
Full archive	ESA has developed a new ground segment in order to offer ALOS users online access to all mission data. The deployment of the new ground segment will be gradual and slightly different for each sensor. AVNIR-2 data will be available for immediate download from Q4 2018. More information is available here: https://earth.esa.int/web/guest/missions/3rd-party-missions/historical-missions/alos .			
WEBLINKS				
https://earth.esa.int/web/guest/missions/3rd-party-missions/historical-missions/alos				
				

ALOS / PALSAR		MED-HIGH	G	2006-2011
Instrument & agency (& any partners)	Phased Array type L-band Synthetic Aperture Radar JAXA (METI, Japan)			
Type	Imaging Microwave Radar.			
Measurements & applications	High-resolution microwave imaging of land and ice for use in environmental monitoring, agriculture and forestry, disaster monitoring, Earth resource management and interferometry.			
Technical characteristics	Waveband: Microwave – L-Band 1270 MHz High-res (F): 7–44m or 14–88m resolution, swath: 40–70km ScanSAR (W): 35–77m or 70–154m resolution, swath: 250–360km Polarimetry (P): 24–88m resolution, swath: 30 km			
Products				
ALOS.PALSAR.FBS	Fine Mode Single Polarisation (FBS); single polarization (HH or VV).			
ALOS.PALSAR.FBD	Fine Beam Double Polarisation (FBD); double polarization (HH/HV or VV/VH).			
ALOS.PALSAR.WB1	ScanSAR Burst mode 1 (WB1); single polarization. The same data rate as that of the high-resolution mode or half this rate.			
ALOS.PALSAR.PLR	Polarimetry (PLR); Observation with four polarizations simultaneously.			
PALSAR FBS, FBD and PLR Mode data are available as Level 1.0, 1.1 and 1.5.				
PALSAR WB1 data are available at Level 1.0 and 1.5.				
Level 1.0: This level corresponds to raw data products ready to be processed into Single Look Complex (Level 1.1) or Precision Images (Level 1.5) products. Data type is 8 bit. The data in ScanSAR mode is not divided into individual scans.				
Level 1.1: Processing includes range compression and one look azimuth compression.				
Level 1.5: Radiometric and geometric corrections are performed on top of the L1.1 processing, provided in ground range geometry, multi-look in range and azimuth. PALSAR products are available in CEOS format (BSQ: Band Sequential).				
ALOS International Polar Year (IPY) – Featured Dataset	See Section 6.2 for more details.			
Full archive	Data are available for immediate download via the TPM Online Access List (https://tpm-ds.eo.esa.int/collections/). Data download requires registration at: https://earth.esa.int/web/guest/-/alos-palsar-fbs-fbd-and-plr-products PALSAR WB1 mode data will be available for immediate download from Q2 2018. More information can be found here: https://earth.esa.int/web/guest/missions/3rd-party-missions/historical-missions/alos			
WEBLINKS				
PALSAR: https://earth.esa.int/web/guest/-/alos-palsar-fbs-fbd-and-plr-products				
				

ALOS / PRISM		 MED-HIGH	 G	2006-2011
Instrument & agency (& any partners)	Panchromatic Remote-sensing Instrument for Stereo Mapping JAXA			
Type	Medium/High-resolution optical imagers.			
Measurements & applications	High-resolution panchromatic stereo imager for land applications, which include cartography, digital terrain models, civil planning, agriculture and forestry.			
Technical characteristics	Waveband: VIS-NIR: 0.52–0.77µm (panchromatic) Spatial resolution: 2.5m Swath widths: 35km (triplet stereo observations), 70km (nadir observations)			
Products				
ALOS.PRISM	The PRISM Processing Software performs radiometric and geometric corrections and generates Level 1A, Level 1B1 and Level 1B2 products.			
Level 1A	PRISM raw data extracted from the Level 0 data, expanded and generated lines are added.			
Level 1B1	Radiometrically corrected data derived from Level 1A data with the absolute calibration coefficient included.			
Level 1B2	Geometrically corrected data derived from Level 1B1 data. There are several correction options available including geo-referenced (R) and geo-coded data (G). ALOS products follow the standard CEOS format convention. The detailed product format specifications have been defined and are maintained by JAXA.			
Level 1C	Geometrically corrected data derived from Level 1B1 data (ortho-corrected).			
ESA Archive Copy/Collection	ALOS data acquired by ESA (plus some worldwide data resulting from data exchange with JAXA) are currently available following the submission of a Full Proposal. Quota limits apply.			
ALOS African Coverage	Featured Dataset. See Section 6.1 for more details.			
Data access notes	PRISM data will be available for immediate download from Q4 2018. More information can be found here: https://earth.esa.int/web/guest/missions/3rd-party-missions/historical-missions/alos			
WEBLINKS				
https://earth.esa.int/web/guest/missions/3rd-party-missions/historical-missions/alos				
				

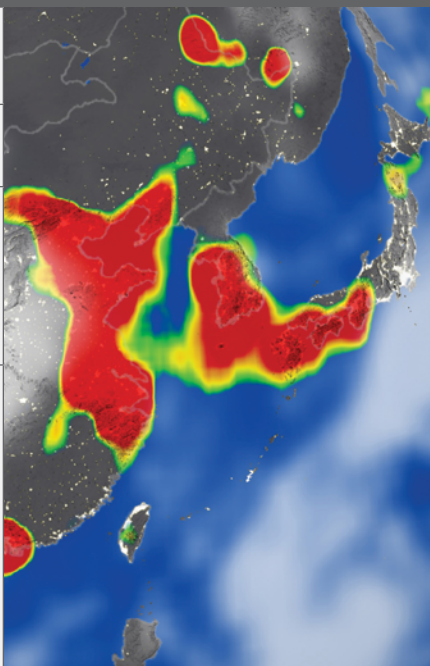

7.3 Aura

Aura (formerly EOS/Chem-1) is the chemistry mission of NASA with the overall objective to study the chemistry and dynamics of Earth's atmosphere from the ground through the mesosphere.

The Ozone Monitoring Instrument (OMI) is a nadir-viewing UV/VIS imaging spectrograph that measures the solar radiation backscattered by the Earth's atmosphere and surface over the entire wavelength range from 270 to 500nm, with a spectral resolution

of about 0.5nm. The design is of GOME heritage, flown on ERS-2, as well as of SCIAMACHY and GOMOS heritage, flown on Envisat.

The overall objective is to monitor ozone and other trace gases and to monitor tropospheric pollutants worldwide. The OMI instrument is a contribution of the Netherlands Agency for Aerospace Programmes (NIVR) in collaboration with the Finnish Meteorological Institute (FMI) to the EOS Aura mission.

AURA / OMI		AD	G	2004
Instrument & agency (& any partners)	Ozone Monitoring Instrument NSO, NASA			
Type	High-resolution nadir-scanning SW spectrometer.			
Measurements & applications	Mapping of ozone columns, key air quality components (NO ₂ , SO ₂ , BrO, OCIO and aerosols), measurements of cloud pressure and coverage, global distribution and trends in UV-B radiation.			
Technical characteristics	Wavebands: UV: 270–314nm and 306–380nm (~0.01µm – ~0.40µm) VIS: 350–500nm (~0.40µm – ~0.75µm) Swath widths: 2600km Spatial resolutions: 13 × 24km or 36 × 48km depending on the product. Also has zoom modes (13 × 13km), for example for urban pollution detection.			
Products				
NASA_OMI	Aura OMI complete NASA dataset (NASA_OMI) – Level 1B, Level 2, Level 2G, and Level 3 + Climatology Products. The following descriptions are from the OMI Data User's Guide (see the links below for more information).			
Level 1B	OMI Radiometrically Calibrated and Geo-located Radiance Products. The GDPS algorithm takes the raw sensor measurements (Level 0 data), calibration, and spacecraft attitude and ephemeris information to produce radiometrically calibrated and geo-located radiances.			
Level 2	OMI Orbital Atmospheric Products. The OMI Level 2 (orbital swaths) products contain the geophysical parameters (at ground-pixel resolution) derived from radiometrically calibrated and geo-located radiances (Level 1B product).			
Level 2G	OMI Global Binned Atmospheric Products. Level 2G (L2G) datasets contain one day's worth of Level 2 data (typically 14 orbits) ordered by ground position rather than by time.			
Level 3	OMI Global Gridded Atmospheric Products. OMI Level 3 daily global products are produced by using best pixel data over small equal angle grids covering the whole globe.			
Data access notes	Data are available through the Aura OMI website: http://disc.sci.gsfc.nasa.gov/Aura/data-holdings/OMI			
WEBLINKS OMI Data User's Guide: http://disc.sci.gsfc.nasa.gov/Aura/additional/documentation/README.OMI_DUG.pdf				
				




7.4 COSMO-SkyMed

COSMO-SkyMed is a four-spacecraft constellation, conceived by Agenzia Spaziale Italiana (ASI) and funded by the Italian Ministry of Research (MUR) and the Italian Ministry of Defense (MOD).

Each of the four satellites is equipped with a SAR instrument and is capable of operating in all visibility conditions at high resolution and in real time. The

overall objective of this program is global EO and the relevant data exploitation for the needs of the military community as well as for the civil (institutional, commercial) community.

COSMO-SkyMed's archive and tasking data are now available to the scientific user community for research and application development.

COSMO-SkyMed /SAR 2000  VERY HIGH  G		2007
Instrument & agency (& any partners)	Synthetic Aperture Radar – 2000 ASI	
Type	Imaging Microwave Radar	
Measurements & applications	All-weather images of ocean, land and ice for monitoring of land surface processes, ice, environmental monitoring, risk management, environmental resources, maritime management, Earth topographic mapping.	
Technical characteristics	<p>Waveband: Microwave: X-band, 9.6 GHz, with choice of 5 polarisation modes (VV, HH, HV, VH, HH/HV + VV/VH)</p> <p>Spatial resolutions: Stripmap: 3–15m, ScanSAR: 30 or 100m, dual polarisation mode (PING-PONG): 15m.</p> <p>Swath widths: Stripmap: 40km, ScanSAR: 100 or 200m, dual polarisation mode (PING-PONG): 30km.</p>	



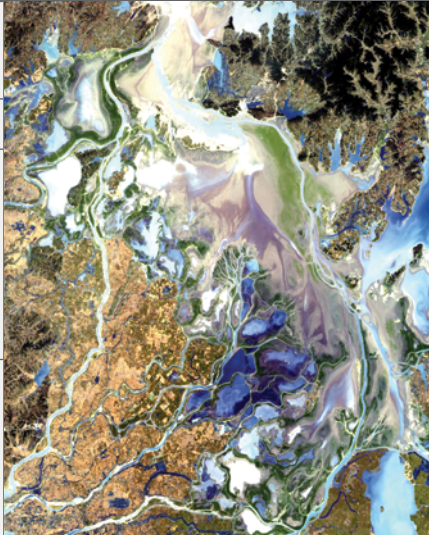

Products	
COSMO-SkyMed.SCN_HUGE	COSMO-SkyMed ScanSAR Huge Region mode. 200 × 200km scene size.
COSMO-SkyMed.SCN_WIDE	COSMO-SkyMed ScanSAR Wide Region mode. 100 × 100km scene size.
COSMO-SkyMed.STR_PINGPONG	COSMO-SkyMed StripMap PING PONG mode. 30 × 30km scene size. Two radar polarisations selectable among HH, HV, VH and VV.
COSMO-SkyMed.STR_HIMAGE	COSMO-SkyMed StripMap HIMAGE mode. 40 × 40km scene size.
<p>COSMO-SkyMed products are available at a number of different processing levels:</p> <p>Level 1A (1A_SCSB and 1A_SCSU)</p> <p>Single-look Complex Slant product, RAW data focused in slant range-azimuth projection, which is the sensor natural acquisition projection; product contains In-Phase and Quadrature of the focused data, weighted and radiometrically equalised.</p> <p>The processing of the 1A_SCSU product differs from that of the 1A_SCSB product in the following ways:</p> <ul style="list-style-type: none"> – a non-weighted processing is performed, which means that windowing is not applied on the processed bandwidth; and, – radiometric equalisation (in terms of compensation of the range antenna pattern and incidence angle) is not performed; hence only compensation of the antenna transmitter gain and receiver attenuation and range spreading loss is applied. <p>Level 1B (1B_DGM)</p> <p>Detected Ground Multi-look product obtained by detecting, multi-looking and projecting the COSMO-SkyMed products SAR Standard SAR Higher Level Auxiliary products Single-look Complex Slant data onto a grid regular in ground. Note: Spotlight Mode products are not multi-looked.</p> <p>Level 1C/1D – Geocoded product: GEC (1C level product) and GTC (1D level product)</p> <p>Obtained by projecting the 1A product onto a regular grid in a chosen cartographic reference system. In the case of Level 1C, the surface is the Earth ellipsoid, while for the Level 1D a Digital Elevation Model is used to approximate the real Earth surface. Level 1D data are constituted by the Backscattering coefficient of the observed scene, multi-looked (except for Spotlight Mode), including the annexed Incidence Angles Mask.</p>	
ESA Archive Copy/Collection	Data will be available for immediate download via the TPM Online Access List in Q1 2018 (https://tpm-ds.eo.esa.int/collections/).
Full archive and new acquisitions	<p>ESA offers access to COSMO-SkyMed data for research and application development (both archived and new acquisitions). Archive data availability can be checked on the COSMO-SkyMed products catalogue, which is accessible after registration.</p> <p>More information can be found here: https://earth.esa.int/aos/cosmoskymed</p>
<p>WEBLINKS</p> <p>COSMO-SkyMed: https://earth.esa.int/web/guest/missions/3rd-party-missions/current-missions/cosmo-skymed</p>	



7.5 Deimos-1

Deimos-1 is a part of the Disaster Monitoring Constellation (DMC), lead by SSTL. The DMC includes a network of five first-generation and two second-generation Low Earth Orbit microsatellites, with Deimos-1 being a first-generation satellite operated by DMCii.



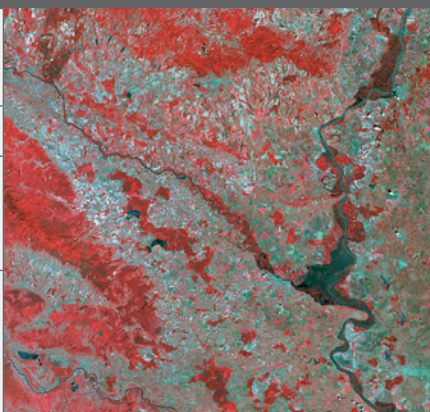

The objective of Deimos-1 is to provide a daily global imaging capability at medium resolution (22m) in three spectral bands. Applications include rapid-response disaster monitoring and mitigation. The DMC satellites carry a multispectral camera (SLIM-6) in a Sun-synchronous orbit.

Deimos-1 / SLIM-6		 MED-HIGH	 G	2009
Instrument & agency (& any partners)	Surrey Linear Imager – 6 Channel DMCii			
Type	Medium-resolution Optical Imager.			
Measurements & applications	Deimos-1 is a small EO satellite built by SSTL and forms part of the DMC. The satellite provides imagery for commercial applications, government use, forestry, agriculture, environment, emergencies and disaster rapid-response.			
Technical characteristics	Waveband: VIS: 0.63–0.69µm, 0.52–0.61µm NIR: 0.77–0.90µm Swath width: 650km Spatial resolution: 22m			
Products				
TropForest 2010 – Featured Dataset	Deimos-1 SLIM-6 contributed to the TropForest 2010 project. See Section 6.11 for access details.			
Full archive	ESA offers access to the full Deimos-1 archive for research and application development. More information can be found here: https://earth.esa.int/aos/deimos			
WEBLINKS				
DEIMOS-1: https://earth.esa.int/web/guest/missions/3rd-party-missions/current-missions/deimos-1				
				

7.6 DMC

The DMC, coordinated by DMCii, is a network of Low Earth Orbit microsatellites. The objective is to provide a daily global imaging capability at medium resolution (22–32m) in three spectral bands (R, G, NIR), for rapid-



response disaster monitoring and mitigation. The DMC satellites all carry SLIM-6 MSC multispectral cameras and are placed into Sun-synchronous orbits.

DMC / SLIM-6		 MED-HIGH	 E	2003-2013
Instrument & agency (& any partners)	Surrey Linear Imager – 6 Channel DMCii (SSTL, UKSA, NASRDA, NRSCC)			
Type	Medium-resolution Optical Imager			
Measurements & applications	Visible and NIR imagery in support of crop monitoring, environmental resource and disaster management.			
Technical characteristics	Waveband: VIS and NIR Spatial resolution: 22–32m Swath width: two beams of 300km			
Products				
IMAGE2007/European Coverage – Featured Dataset	Only available as a part of the IMAGE2007/European Coverage Featured Dataset. See Section 6.4 for access details.			
WEBLINKS				
DMC (SLIM-6): https://earth.esa.int/web/guest/-/dmc-multispectral-imager-orthorectified-product-5652				

7.7 GOSAT

GOSAT is a Japanese climate change EO mission, developed by JAXA. The mission carries two thermal and near infrared sensors for carbon observation – a Fourier Transform Spectrometer (TANSO-FTS) and a

Cloud and Aerosol Imager (TANSO-CAI). The objective of the mission is to provide monitoring of the sources and sinks of CO₂ on a sub-continental scale in support of the Kyoto protocol.


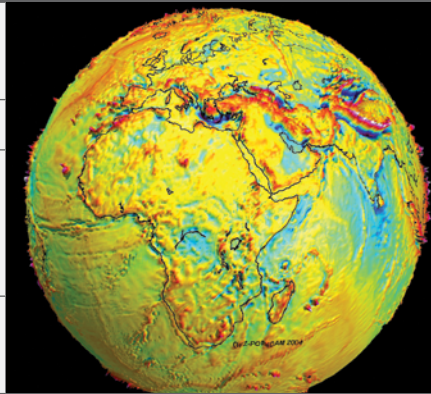

GOSAT / TANSO-CAI		AD	G	2009
Instrument & agency (& any partners)	Thermal And Near infrared Sensor for carbon Observation - Cloud and Aerosol Imager (TANSO-CAI) JAXA [MOE (Japan), NIES (Japan)]			
Type	Imaging multispectral radiometer (vis/IR).			
Measurements & applications	Measurement of cloud and aerosol for calibration of TANSO-FTS.			
Technical characteristics	Wavebands: 0.380µm, 0.678µm, 0.870µm, 1.62µm Spatial resolutions: 0.5km (0.380µm, 0.678µm, 0.870µm bands), 1.5km (1.62µm band) Swath widths: 1000km (0.380µm, 0.678µm, 0.870µm bands), 750km (1.62µm band)			
Products				
GOSAT TANSO-CAI Level 1B/L1B+	CAI data are composed of four bands and provided as two-dimensional datasets with a swath of approximately 1,000km. L1B data have been processed in reply to requests not to interpolate in consideration of further processing into cloud flag, aerosol property, and cloud property data products. L1B+ products, on the other hand, have been processed based on requests, to make them easier for positional and band-to-band registration, which is an important element for an imager, even by using interpolation.			
GOSAT TANSO-CAI L2 Cloud Flag	The L2 cloud flag product contains cloud flag information derived from the TANSO-CAI L1B data. A cloud flag is derived with respect to each pixel in the CAI reference band (Band 3).			
GOSAT TANSO-CAI L3 Global Radiance Distribution (all pixels)	The level 3 CAI global radiance distribution (all pixels) product is the product using CAI L1B+ product as input. It is provided in an HDF5-formatted file. Each file contains data for three days.			
GOSAT TANSO-CAI L3 Global Reflectance Distribution (clear sky)	The Level 3 CAI global reflectance distribution data product is processed by collecting the image data with minimum reflectance from the Cloud and Aerosol Imager (TANSO-CAI)'s Level 1B data for 30 days. The product shows the surface of the globe clear of clouds in most areas. It is provided in an HDF5-formatted file. Each file contains data for three days.			
Full archive and new acquisitions	Data are available for immediate download via the TPM Online Access List (https://tpm-ds.eo.esa.int/collections/). Data download requires registration at: https://earth.esa.int/web/guest/-/gosat-cai-l1-l2-l3-full-archive-and-new-products . For more information see: https://earth.esa.int/aos/gosat			
WEBLINKS				
GOSAT: https://earth.esa.int/web/guest/missions/3rd-party-missions/current-missions/gosat				
				

GOSAT / TANSO-FTS		AD	G	2009
Instrument & agency (& any partners)	Thermal And Near infrared Sensor for carbon Observation - Fourier Transform Spectrometer (TANSO-FTS) JAXA (MOE (Japan), NIES (Japan))			
Type	Atmospheric temperature and humidity sounder and atmospheric chemistry instrument.			
Measurements & applications	Global CO ₂ and CH ₄ distribution.			
Technical characteristics	Wavebands: 0.758–0.775µm, 1.56–1.72µm, 1.92–2.08µm, 5.56–14.3µm Spatial resolution: 10.5km Swath width: 160km			
Products				
GOSAT TANSO-FTS Level 1B	The GOSAT data processing system applies geometric and radiometric correction to Level 0 data to produce Level 1B products. Five observation modes are available: day observation mode 1, night observation mode 1, day observation mode 2, target mode (day), target mode (night).			
GOSAT TANSO-FTS L2 CH ₄ Column Abundance	CH ₄ column abundances obtained by the TANSO-FTS in the shortwave infrared (SWIR) bands.			
GOSAT TANSO-FTS L2 CO ₂ Column Abundance	CO ₂ column abundances obtained by the TANSO-FTS in the SWIR bands.			
GOSAT TANSO-FTS L3 CH ₄ Global Distribution	Monthly average of the CH ₄ column abundances of every 2.5-degree lattice across the globe, which is retrieved by interpolating with the monthly total of L2 CH ₄ column abundances (SWIR). Each file contains data for 1 month.			
GOSAT TANSO-FTS L3 CO ₂ Global Distribution	Monthly average of the CO ₂ column abundances of every 2.5-degree lattice across the globe, which is retrieved by interpolating with the monthly total of L2 CO ₂ column abundances (SWIR). Each file contains data for one month.			
Full archive and new acquisitions	Data are available for immediate download via the TPM Online Access List (https://tpm-ds.eo.esa.int/collections/). Data download requires registration at: https://earth.esa.int/web/guest/-/gosat-tanso-fts For more information see: https://earth.esa.int/aos/gosat			
WEBLINKS				
GOSAT: https://earth.esa.int/web/guest/missions/3rd-party-missions/current-missions/gosat				

7.8 GRACE

The Gravity Recovery and Climate Experiment (GRACE) mission was a joint project between NASA and Deutsches Zentrum für Luft- und Raumfahrt (DLR). The twin satellites were built by Astrium and launched together using a ROCKOT in 2002. The mission was operated by the German Satellite Operations Centre until its end in October 2017.

The primary science objective of GRACE was to measure the Earth's gravity field and time variability with unprecedented accuracy. The secondary science objective was to obtain approximately 150 very precise globally distributed vertical temperature and humidity profiles of the atmosphere per day using the GPS radio occultation technique.





GRACE / GRACE Instrument		OTHER	 G	2002 – 2017
Instrument & agency (& any partners)	GRACE Instrument NASA, DLR			
Type	Gravity instrument.			
Measurements & applications	Global models of the mean and time variable Earth gravity field. Gravity, magnetic and geodynamic measurements; soil moisture; ocean topography/currents.			
Technical characteristics	Wavebands: 24GHz and 32GHz Resolution: 400km horizontal			
Products				
<p>A number of Level 1B and Level 2 GRACE products are available.</p> <p>Level-1B data products are the result of a possibly irreversible processing applied to both the Level-1A and Level-0 data at NASA/JPL. The data are correctly time-tagged and data sample rate is reduced from the higher rates of the previous levels. Collectively, the processing from Level-0 to Level-1B is called the Level-1 Processing. This level also includes the ancillary data products generated during this processing and the additional data needed for further processing.</p> <p>Level-2 data products include the static and time-variable (monthly) gravity field and related data products derived from the application of Level-2 processing at GFZ, UTCSR and JPL to the previous level data products. This level also includes the ancillary data products such as GFZ's Level-1B short-term atmosphere and ocean de-aliasing product (AOD1B) generated during this processing.</p>				
Full archive	All GRACE Level-1B/-2 products are available to the user community via the GFZ/ISDC archive (local registration required): http://isdc.gfz-potsdam.de/grace-isdc			
WEBLINKS JPL/PODAAC: http://podaac.jpl.nasa.gov/gravity/grace				
				

7.9 Ikonos-2

Ikonos-2 was a high-resolution commercial imaging satellite owned by DigitalGlobe/GeoEye.

Ikonos-2 carried MS and PAN instruments, known as the Optical Sensor Assembly (OSA). The outputs of





these instruments were combined in post-processing into a synthesized product known as the Geo Ortho Kit.

IKONOS-2 / OSA (PAN and MS)		 VERY HIGH	 E, ME	1999–2015
Instrument & agency (& any partners)	Optical Sensor Assembly (PAN and MS) DigitalGlobe/GeoEye			
Type	Very High-resolution Optical Imager			
Measurements & applications	Land, landscape topography, natural disasters, floods, landslides			
Technical characteristics	Wavebands: Band 1 (blue) 0.45–0.53µm Band 2 (green) 0.52–0.61µm Band 3 (red) 0.64–0.72µm Band 4 (near infrared) 0.77–0.88µm Swath width: 113 × 13km Spatial resolutions: 0.82m (PAN), 3.28m (MS)			
Products				
ESA Archive Copy/Collection	ESA maintains an archive of data previously requested through the TPM scheme. It consists of Ikonos-2 black-and-white images with radiometric and geometric corrections bundled with Ikonos-2 MS images.			
Data access notes	Archive data acquired between 2000 and 2008 (over Europe and the Middle East) is available to all approved scientific users. Data are available for immediate download via the TPM Online Access List (https://tpm-ds.eo.esa.int/collections/). Data download requires registration at: https://earth.esa.int/web/guest/-/ikonos-2-geo-ortho-kit-5692			
WEBLINKS				
IKONOS-2: https://earth.esa.int/web/guest/missions/3rd-party-missions/current-missions/ikonos-2				
				

7.10 ResourceSat-1 (IRS-P6)

IRS-P6, also known as ResourceSat-1, was an EO mission in the Indian Remote Sensing Satellite (IRS) series of Indian Space Research Organization (ISRO). IRS-P6 was the continuation of the IRS-1C/1D missions with considerably enhanced capabilities.

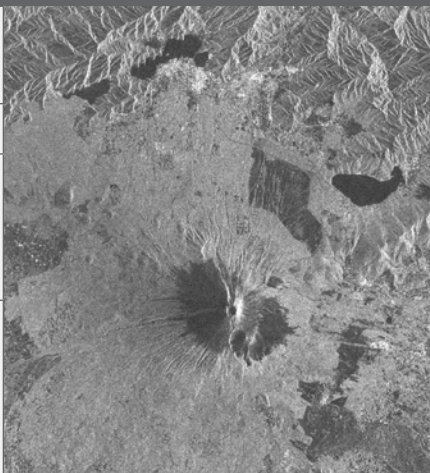

The overall objective of the mission was to provide continued remote-sensing data services on an operational basis for integrated land and water resources management.



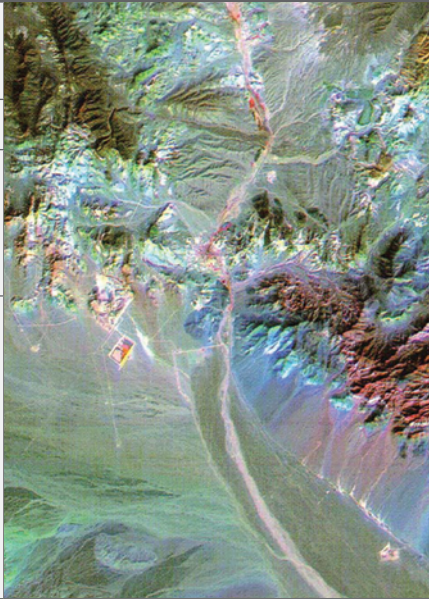

ResourceSat-1 (IRS-P6) / LISS-III/IV / AWiFS		 MED-HIGH	 G	2003–2013
Instrument & agency (& any partners)	LISS-III/IV / AWiFS ISRO			
Type	Optical Imagers			
Measurements & applications	Data is used for vegetation type assessment, resource assessment, crop stress detection, crop production forecasting, forestry, land use and land cover change.			
Technical characteristics	Wavebands: VIS: 0.52–0.59µm, 0.62–0.68µm, NIR: 0.77–0.86µm, SWIR: 1.55–1.75µm Swath width: 141km (LISS-III), 70km (LISS-IV), 740km (AWiFS) Resolution: 23.5m (LISS-III), 5.8m (LISS-IV), 55m (AWiFS)			
Products				
IMAGE2006/European Coverage – Featured Dataset	ResourceSat-1 (LISS-III) contributed to the IMAGE2006/European Coverage. See Section 6.3 for more details.			
Full archive	ESA offers access to the full ResourceSat-1 archive for research and application development. More information can be found here: earth.esa.int/aos/resourcesat			
WEBLINKS				
Resourcesat-1 (IRS-P6): https://earth.esa.int/web/guest/missions/3rd-party-missions/current-missions/resourcesat-1				
				

7.11 JERS-1

JERS-1 was launched in February 1992 reaching end of life in October 1998. It was a radar/optical mission led by NASDA (now JAXA). The overall objectives were the generation of global data sets with SAR and OPS sensors aimed at surveying resources, establishing an integrated EO system, and verifying instrument/system performances.

The mission applications focused on survey of geological phenomena, land usage, observation of coastal regions, geologic maps, environment and disaster monitoring and demonstration of two-pass SAR interferometry for change detection.





JERS-1 / L-band SAR		MED-HIGH	E-S	1992-1998
Instrument & agency (& any partners)	L-band Synthetic Aperture Radar JAXA			
Type	Imaging Microwave Radar			
Measurements & applications	Applications include ocean observations such as waves or ice sheets, selected land features such as mountainous terrain or agricultural fields, and geological data.			
Technical characteristics	Waveband: 1275MHz (L-Band) Swath width: 75km Resolution: 18m (range) × 18m (azimuth at three looks)			
Products				
JERS-1.SAR.PRI	The SAR Precision Image product is a multi-look (speckle-reduced), ground range, system corrected image. It is the appropriate product for most users interested in remote-sensing applications. The product is calibrated and corrected for the SAR antenna pattern and range-spreading loss: radar backscatter can be derived from the product for geophysical modelling, but no correction is applied for terrain-induced radiometric effects. The image is not geocoded and terrain distortion (foreshortening and layover) has not been removed.			
Full archive	All optical and SAR data acquired by ESA ground stations is currently being reprocessed. Data will be available from Q1 2018 via direct download through the TPM Online Access List: https://tpm-ds.eo.esa.int/collections			
WEBLINKS				
JERS-1: https://earth.esa.int/web/guest/missions/3rd-party-missions/historical-missions/jers-1				
				

JERS-1 / OPS		 MED-HIGH	 E-S	1992–1998
Instrument & agency (& any partners)	Optical Sensor JAXA			
Type	Medium-resolution Optical Imager			
Measurements & applications	Medium-resolution multispectral imager for land applications which include environmental monitoring, agriculture and forestry, disaster monitoring.			
Technical characteristics	Wavebands: VIS: 0.42–0.50µm, 0.52–0.60µm, 0.61–0.69µm NIR: 0.76–0.89µm SWIR: (~1.3µm – ~3.0µm) Swath width: 75km Resolution: 18.3m (range) × 24.2m (azimuth)			
Products				
OPS (Optical Sensor) Very Near Infrared Radiometer (VNIR) System Corrected Products – Level 1 (JERS-1.OPS.SYC)	<p>Only the VNIR products are available as ESA TPM data.</p> <p>All four bands are corrected with vertical and horizontal de-stripping and the radiometry values are expanded from the range [0,63] to [0,255]. No geometrical correction is applied on Level 1 products.</p> <p>The pixel size of approximately 18 × 24.2m for raw data is newly dimensioned to 18 × 18m for System Corrected data using a cubic convolution algorithm. Raw data images have 3200 lines of 4096 pixels. System corrected images have 4096 lines of 4512 pixels including left and right filled pixels. Radiometric correction is applied.</p> <p>The JERS-1 OPS digital products are recorded in a format that conforms to the CEOS Standard Family Format conventions.</p>			
Full archive	<p>All optical and SAR data acquired by ESA ground stations is currently being reprocessed. Data will be available from Q1 2018 via direct download through the TPM Online Access List:</p> <p>https://tpm-ds.eo.esa.int/collections</p>			
WEBLINKS				
JERS-1: https://earth.esa.int/web/guest/missions/3rd-party-missions/historical-missions/jers-1				
				

7.12 KOMPSAT-1

KOMPSAT-1 was a high-resolution optical mission launched by Korea in 1999, which carried a PAN camera (EOC) in support of cartography applications.

Through a TPM agreement, ESA makes a sample dataset of European cities available from the satellite.

KOMPSAT-1 / EOC		 MED-HIGH	 E-C	1999–2008
Instrument & agency (& any partners)	Electro-Optical Camera KARI			
Type	High-resolution Optical Imager			
Measurements & applications	High-resolution stereo imager for land applications of cartography and disaster monitoring, including the production of scale maps and digital elevation models.			
Technical characteristics	Waveband: VIS: 0.51–0.73µm Swath width: 17km Spatial resolution: 6.6m			
Products				
KOMPSAT-1 Coverage of 50 European Cities – Featured Dataset	See Section 6.6 for more details.			
Data access notes	Only available as a part of the KOMPSAT-1 Coverage of 50 European Cities Featured Dataset. See Section 6.6 for access details.			
WEBLINKS KOMPSAT-1: https://earth.esa.int/web/guest/missions/3rd-party-missions/historical-missions/kompsat-1				
				



7.13 KOMPSAT-2


KOMPSAT-2, also referred to as Arirang-2, has been developed by KARI to provide continuity from the KOMPSAT-1 mission.


The main mission objectives of KOMPSAT-2 are to provide surveillance of large-scale disasters and support disaster response, acquire independent high-resolution images for Geographic Information

Systems (GIS), assist the composition of printed maps and digitized maps for domestic and overseas territories, inform decisions around the balanced development of Korean territories, and to survey natural resources.

KOMPSAT-2 carries the MSC (Multi-Spectral Camera) instrument.

KOMPSAT-2 / MSC		 VERY HIGH	 G	2006
Instrument & agency (& any partners)	Multi-Spectral Camera KARI (ELOP)			
Type	Very High-resolution Optical Imager			
Measurements & applications	Surveillance of and response to large-scale disasters, acquisition of independent high-resolution images for GIS, composition of printed and digitized maps for domestic and overseas territories, balanced development of Korean territories, survey of natural resources, and continuation of satellite EO after KOMPSAT-1.			
Technical characteristics	Wavebands: Panchromatic VIS: 0.50–0.90µm VIS: 0.45–0.52µm, 0.52–0.60µm, 0.63–0.69µm NIR: 0.76–0.90µm Swath width: 15km Spatial resolutions: 1m (PAN), 4m (MS)			
Products				
KOMPSAT-2.MSC.BUNDLE ESA Archive Copy/Collection	The collection covers several European cities plus other select areas worldwide. Data are available for immediate download via the TPM Online Access List (https://tpm-ds.eo.esa.int/collections/). Data download requires registration at: https://earth.esa.int/web/guest/-/kompsat-2-msc-bundle-5683			
TropForest 2010 – Featured Dataset	KOMPSAT-2 MSC contributed to the TropForest 2010 project. See Section 6.11 for more details.			
WEBLINKS KOMPSAT-2: https://earth.esa.int/web/guest/missions/3rd-party-missions/current-missions/kompsat-2				







7.14 Landsat






The Landsat Project is a joint initiative of the US Geological Survey (USGS) and NASA. Landsat's Global Survey Mission is to establish and execute a data acquisition strategy that ensures repetitive acquisition of observations over the Earth's land mass, coastal boundaries and coral reefs.

The full dataset acquired by European ground stations (around 1 million scenes) is now available online via direct download.

7.14.1 Landsat-4/5

Landsat Thematic Mapper (TM) was a multispectral scanning radiometer that operated on board






Landsat-4 and -5. The TM sensors provided nearly continuous coverage from July 1982 to 2013.

Landsat-4/5 / TM		 MED-HIGH	 E, E-S, NAF, ME	1982–2013
Instrument & agency (& any partners)	Thematic Mapper USGS, NASA			
Type	Imaging Multi-spectral Radiometer (VIS/IR)			
Measurements & applications	Measures surface radiance and emittance, land cover state and change (e.g. vegetation type). Used as multipurpose imagery for land applications.			
Technical characteristics	Wavebands: VIS-TIR, 7 bands: 0.45–12.50µm Swath width: 185km Spatial resolutions: VIS-SWIR, 30m; TIR: 120m			
Products				
Ortho Corrected LANDSAT.TM.GTC (L1T) or LANDSAT.TM.GEC (L1Gt) – Full archive	This dataset contains all the Landsat -4/5 Thematic Mapper high-quality ortho-rectified L1T (or L1Gt where not enough GCPs are available) dataset acquired by ESA over the Fucino, Matera, Kiruna and Maspalomas visibility masks, as well as campaign data over Malindi, Bishkek, Chetumal, Libreville and O'Higgins. The temporal coverage is April 1984 to October 2011. Data are available for immediate download via the TPM Online Access List (https://tpm-ds.eo.esa.int/collections/). Data download requires registration at: https://earth.esa.int/web/guest/-/landsat-5-thematic-mapper-geolocated-terrain-corrected-systematic-processing			
Landsat Cloud-free European Coverages – Featured Dataset	Landsat-5 TM data are also available as a part of the Landsat Cloud-free European Coverages Featured Dataset. See Section 6.7 for more details.			
WEBLINKS				
Landsat: https://earth.esa.int/aos/landsat TM/ETM+: https://earth.esa.int/web/guest/missions/3rd-party-missions/historical-missions/landsat-tmetm				
				 

7.14.2 Landsat-7

The Landsat Enhanced Thematic Mapper Plus (ETM+) was introduced with Landsat-7. ETM+ data cover the

visible, near-infrared, shortwave and thermal infrared spectral bands of the electromagnetic spectrum.

Landsat-7 / ETM+		 MED-HIGH	 E-S	1999
Instrument & agency (& any partners)	Enhanced Thematic Mapper Plus USGS, NASA			
Type	Imaging Multispectral Radiometer (VIS/IR)			
Measurements & applications	Measures surface radiance and emittance, land cover state and change (e.g. vegetation type). Used as multipurpose imagery for land applications.			
Technical characteristics	Wavebands: VIS-TIR: 8 bands 0.45–12.5µm Swath width: 185km Spatial resolutions: PAN: 15m, VIS-SWIR: 30m, TIR: 60m			
Products				
Ortho Corrected LANDSAT.ETM.GTC (L1T) or LANDSAT.ETM.GEC (L1Gt) – Full archive and new acquisitions	This dataset contains all the Landsat-7 Enhanced Thematic Mapper Plus high-quality ortho-rectified L1T (or L1Gt where not enough GCPs are available) dataset acquired by ESA over the Kiruna, Maspalomas, Matera and Neustrelitz visibility masks. Data are available for immediate download via the TPM Online Access List (https://tpm-ds.eo.esa.int/collections/). Data download requires registration at: https://earth.esa.int/web/guest/-/landsat-7-etm-enhanced-thematic-mapper-plus-geolocated-terrain-corrected-systematic-processing			
Landsat Cloud-free European Coverages – Featured Dataset	Landsat-7 ETM+ data are also available as a part of the Landsat Cloud-free European Coverages Featured Dataset. See Section 6.7 for more details.			
WEBLINKS				
Landsat: https://earth.esa.int/aos/landsat TM/ETM+: https://earth.esa.int/web/guest/missions/3rd-party-missions/historical-missions/landsat-tm-etm				
				




7.14.3 Landsat-8

The Operational Land Imager (OLI) and the Thermal Infrared Scanner (TIRS) are the two instruments carried on board Landsat-8.

These two sensors provide seasonal coverage of the global landmass at a spatial resolution of 30m (visible, NIR, SWIR), 100m (thermal) and 15m (panchromatic). The spectral coverage and radiometric performance (accuracy, dynamic range and precision) are designed to detect and characterise multi-decadal land cover

change in concert with historic Landsat data.



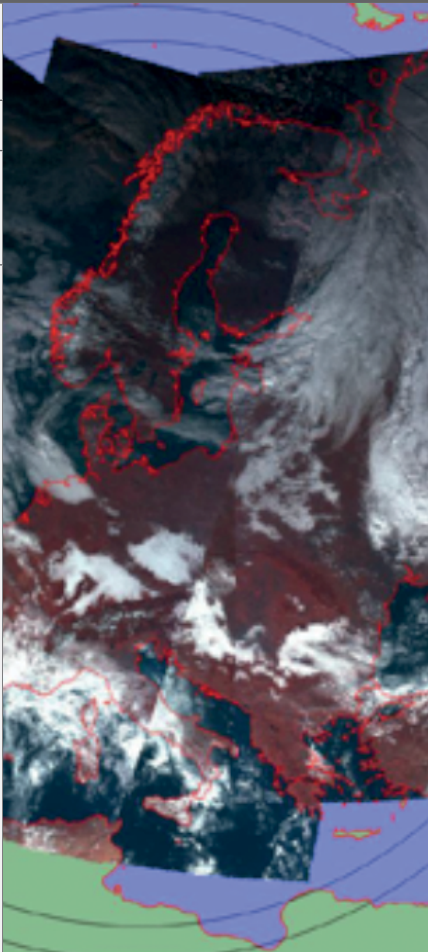
The OLI provides two new spectral bands in respect to the Landsat-7 ETM+ instrument, one tailored especially for detecting cirrus clouds and the other for coastal zone observations, and the TIRS collects data for two more narrow thermal bands. The nominal schedules expect the collection of at least 400 OLI and TIRS scenes per day, where each scene is a digital image covering a 185 × 180km surface area.

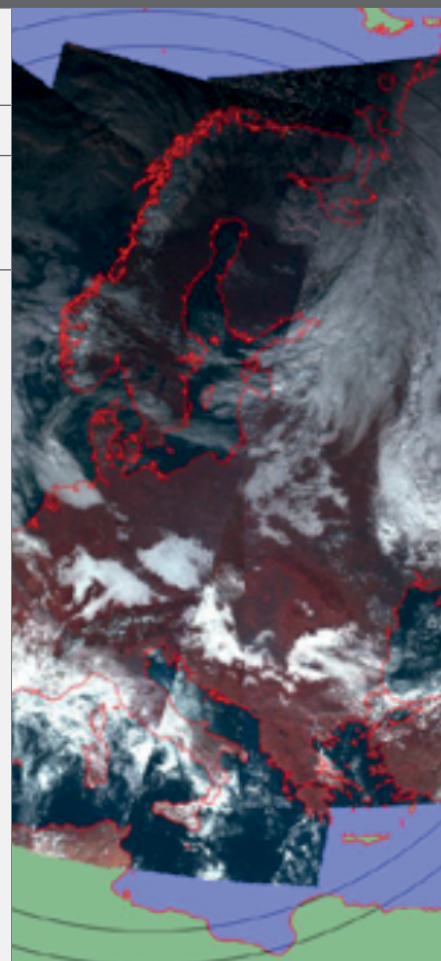
Landsat-8 / OLI/TIRS		MED-HIGH (OLI), LOW-MED (TIRS)	E-S	2013
Instrument & agency (& any partners)	Operational Land Imager/Thermal Infrared Sensor USGS, NASA			
Type	Imaging Multispectral Radiometer (vis/IR)			
Measurements & applications	Measures surface radiance and emittance, land cover state and change. Used as multipurpose imagery for land applications including Earth resource and environmental monitoring, agriculture and forestry, disaster monitoring and assessment, and ice & snow cover mapping.			
Technical characteristics	OLI Wavebands: VIS–SWIR: 9 bands: 0.43–2.3µm Resolutions: PAN: 15m, VIS–SWIR: 30m Swath width: 185km TIRS Wavebands: TIR: 10.5µm and 12µm Resolution: 100m Swath width: 185km			
Products				
LANDSAT 8 OLI-TIRS European Coverage (LANDSAT.OLI-TIRS.L1T (L1Gt))	Data acquired by the Neustrelitz ground station from July 2013 up to December 2014, plus regular acquisitions by receiving stations in Matera and Kiruna (April–September only) from December 2013 to present. Landsat-8 Level 1 products combine data from the two Landsat instruments OLI and TIRS, and can be either L1T (Orthorectified) or L1gT (Geometrically corrected).			
Real-time acquisitions	ESA provides access to real-time acquisitions here: http://landsat8-realtime.eo.esa.int/observer/			
Full archive	Landsat-8 OLI/TIRS products are processed systematically and are available online: https://earth.esa.int/aos/landsat8			
WEBLINKS				
Landsat-8 OLI/TIRS: https://earth.esa.int/web/guest/missions/3rd-party-missions/current-missions/landsat-oli-tirs				
ESA Earth Online Landsat-8 Portal: https://landsat8portal.eo.esa.int/portal				
				

7.15 Oceansat-2

Oceansat-2 (a follow-on of IRS-P4/Oceansat-1) is an Indian Space Research Organisation (ISRO) mission focused on oceanography and sea-ice monitoring, surface winds and ocean surface strata, ocean colour, suspended sediments, atmospheric aerosols, chlorophyll concentrations, phytoplankton blooms, the identification of potential fishing zones and assessment of primary productivity, among other applications. The mission carries the Ocean Colour Monitor 2 (OCM-2), the Radio Occultation Sounder for the Atmosphere (ROSA) and a scatterometer.

ESA started acquiring OCM-2 data operationally at the Neustrelitz ground station in Germany from the 1st of January 2016, providing coverage over the North Sea, northern Mediterranean Sea and part of the Atlantic Ocean.

Oceansat-2 / OCM-2		 LOW-MED	 E	2009
Instrument & agency (& any partners)	Ocean Colour Monitor 2 ISRO			
Type	Medium-resolution spectro-radiometer			
Measurements & applications	Spectro-radiometer providing observations in eight VIS-NIR spectral bands for various marine applications.			
Technical characteristics	Wavebands:			
	(nm)	Application		
	404-424	Yellow substance absorption		
	431-451	Chlorophyll absorption		
	476-496	Chlorophyll and other pigments		
	500-520	Turbidity and suspended sediments		
	546-566	Chlorophyll reference		
	610-630	Total suspended matter estimation		
	725-755	Atmospheric correction		
	845-885	Atmospheric correction/aerosol optical thickness		
	Swath width: 1420km			
	Spatial resolutions: 236m (azimuth) × 360m (range)			
				



Products	
Near-real Time Acquisitions	<p>Level 1B</p> <p>Level 2B AO / Level 2C AO (aerosol optical depth)</p> <p>Level 2B CL / Level 2C CL (chlorophyll)</p> <p>Level 2B DA / Level 2C DA (vertical diffuse attenuation coefficients)</p> <p>Level 2B SE / Level 2C SE (suspended matter concentration)</p> <p>(Level 2C products are in Lambert Conformal Conic projection)</p>
Data access notes	<p>Data are available for immediate download via the TPM Online Access List (https://tpm-ds.eo.esa.int/collections/). Data download requires registration at: https://earth.esa.int/web/guest/-/oceansat-2-nrt-data-over-europe</p>
WEBLINKS Oceansat-2: https://earth.esa.int/web/guest/missions/3rd-party-missions/current-missions/oceansat-2	

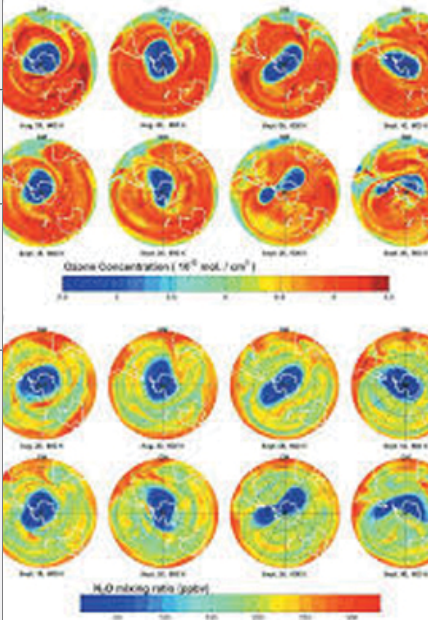



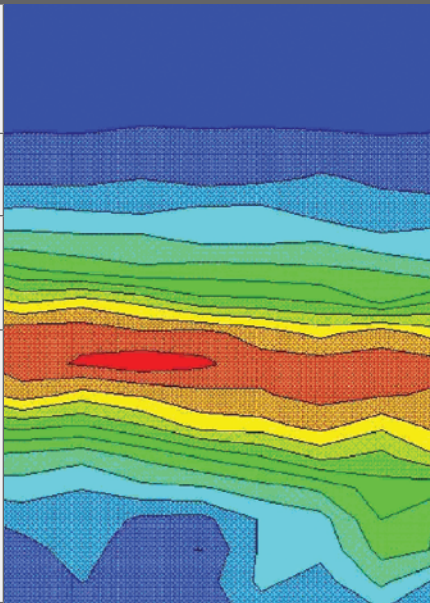

7.16 Odin

Odin is an international aeronomy and astronomy minisatellite mission led by Sweden, with Canada, France and Finland as partners. The project is carried out and funded jointly by the space agencies of Sweden (SNSB), Canada (CSA and NSERC), Finland (TEKES), and France (CNES). The Swedish Space Corporation (SSC) is responsible for spacecraft system design and development, with a spacecraft operations centre located at Esrange at a latitude of 68°N. Odin carries the Optical Spectrograph and Infrared Imaging

System (OSIRIS) and Sub-Millimetre Radiometer (SMR) instruments, both of which are well suited for atmospheric gas detection.

The Odin mission objectives are mainly astronomy and aeronomy applications, including atmospheric research: observation of stratospheric ozone chemistry, mesospheric ozone science, summer mesospheric science and coupling of atmospheric regions.





Odin / SMR		AD	G	2001
Instrument & agency (& any partners)	Sub-millimetre Radiometer SNSB (CSA, CNES, TEKES)			
Type	Atmospheric Temperature & Humidity Sounder and Atmospheric Chemistry Instrument			
Measurements & applications	Measures global distributions of ozone and species of importance for ozone chemistry: ClO, HNO ₃ , H ₂ O, N ₂ O, (HO ₂ , H ₂ O ₂). Measures temperature in the height range 15–100km			
Technical characteristics	Wavebands: Microwave: 118.7 GHz + 4 bands in the region 480–580GHz: Tuneable measures 2–3 × 1 GHz regions at a time. Swath width: N/A, but measures in the altitude range 5–100km Spatial resolutions: Vertical resolution 1.5–3km, along track 600km			
Products				
SMR Level 1 and 2	A number of Level 1 and 2 SMR products are available, mapping the global distribution of ozone and chemical species important for ozone chemistry.			
Data access notes	Systematically processed global data are available to scientific users, see: earth.esa.int/aos/odin			
WEBLINKS				
ODIN: https://earth.esa.int/web/guest/missions/3rd-party-missions/current-missions/odin				
				

Odin / OSIRIS		AD	G	2001
Instrument & agency (& any partners)	Optical Spectrograph and Infra-Red Imaging System CSA (SNSB, CNES, TEKES)			
Type	Atmospheric Chemistry (Limb-scanning SW Spectrometer)			
Measurements & applications	Detects aerosol layers and abundance of species such as O ₃ , NO ₂ , OClO, BrO and NO. Consists of spectrograph and IR imager.			
Technical characteristics	Wavebands: Spectrograph: UV–NIR: 0.28–0.80µm; IR Imager: NIR: 1.26µm, 1.27µm, 1.52µm Swath width: N/A, but measures in the altitude range 5–100km Spatial resolution: Spectrograph: 1km at limb, Imager: 1km in vertical			
Products				
OSIRIS Level 1 and 2	A number of Level 1 and 2 OSIRIS products are available.			
Data access notes	Systematically processed global data are available to scientific users. See the link below for more details.			
WEBLINKS				
ODIN: https://earth.esa.int/web/guest/missions/3rd-party-missions/current-missions/odin				
				

7.17 Pleiades 1A/1B

Pleiades is a two-spacecraft constellation of CNES, introducing advanced technologies in EO. Starting with the first launch in 2011, the Pleiades programme follows the SPOT satellite series services.

The identical twin satellites deliver very-high optical resolution imagery (0.5m) and offer a daily revisit capability to any point on the globe.

Pleiades 1A/1B / HiRI		 VERY HIGH	 G	2011
Instrument & agency (& any partners)	High-Resolution Imager CNES			
Type	Very High-resolution Optical Imager			
Measurements & applications	Very High-resolution optical imagery for cartography, land use, risk management, agriculture and forestry, civil planning and mapping, digital terrain models, and defence.			
Technical characteristics	<p>Wavebands: 4 bands + PAN:</p> <p>Near IR (0.77–0.91µm)</p> <p>Red (0.61–0.71µm)</p> <p>Green (0.50–0.60µm)</p> <p>Blue (0.44–0.54µm)</p> <p>PAN (0.47–0.84µm)</p> <p>Swath width: 20km swath at nadir. Agile platform giving ±50 degrees off-track.</p> <p>Resolutions: Panchromatic: 0.5m, Multispectral: 2m</p>			
Products				
Primary or Orthorectified	<p>Primary Product: processing level closest to the natural image acquired by the sensor. This product restores perfect collection conditions: the sensor is placed in rectilinear geometry, and the image is clear of all radiometric distortion.</p> <p>Standard Orthorectified: georeferenced images in Earth geometry, corrected from acquisition and terrain off-nadir effects.</p> <p>Tailored Orthorectified: custom orthorectification using a more precise 3D model provided by the client or acquired for the purpose.</p>			
ESA Archive Copy/Collection	Data are available for immediate download via the TPM Online Access List (https://tpm-ds.eo.esa.int/collections/). Data download requires registration at: https://earth.esa.int/web/guest/-/pleiades_esa			
Full archive and new acquisitions	Requests for worldwide archive data and future acquisitions are subject to approval following the submission of a Full Proposal. Please see here for more information: https://earth.esa.int/aos/pleiades			
WEBLINKS Pleiades: https://earth.esa.int/web/guest/missions/3rd-party-missions/current-missions/pleiades-hr				
				





7.18 Proba-1



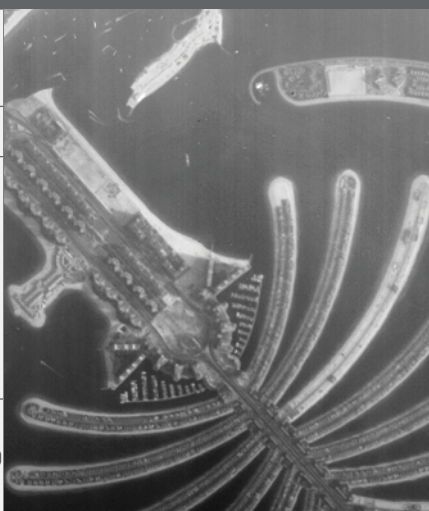

The Proba mission was originally an ESA technology demonstration mission, started in mid-1998 and funded within the frame of ESA's General Support Technology Programme.

Intended as a one-year mission, Proba was launched on the 22nd of October 2001 and since 2004 has been managed by ESA's Ground Segment Department within the Directorate of Earth Observation at ESA/ESRIN. While it remains an ESA mission, Proba is funded as a TPM and its data are distributed using the

mechanism of the TPM scheme.

Proba carries a Compact High-Resolution Imaging Spectrometer (CHRIS) – the only currently operational European spectrometer with contiguous bands and multi-angle acquisition capability – and High-Resolution Camera (HRC), which has a primary function of education and public outreach imagery. Applications include environmental monitoring in the land, atmospheric and marine domains.

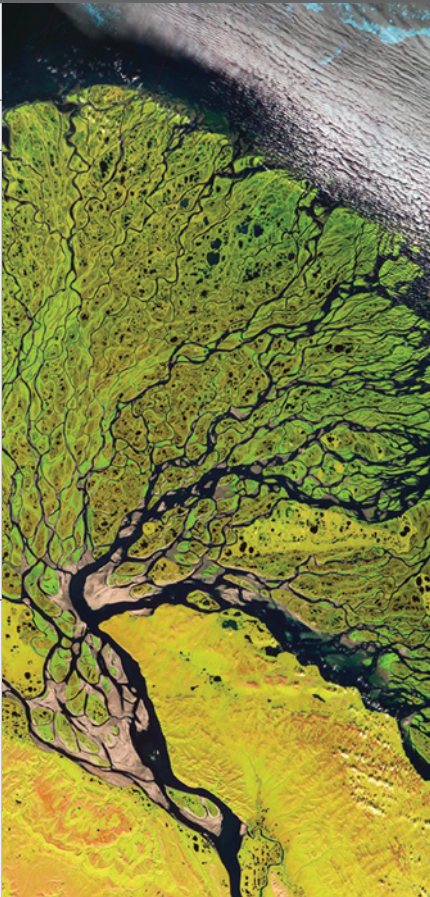
Proba / CHRIS		 MED-HIGH	 G	2001
Instrument & agency (& any partners)	Compact High-Resolution Imaging Spectrometer ESA (UKSA, SSTL, DMCii)			
Type	Imaging Multispectral Radiometer (VIS/IR)			
Measurements & applications	Supports a range of land, ocean and atmospheric applications, including agricultural science, forestry, environmental science, atmospheric science and oceanography.			
Technical characteristics	Wavebands: VIS–NIR: 400–1050nm (63 contiguous spectral bands at a spatial resolution of 36m; or 18 bands at full spatial resolution of 18m) Spatial Resolutions: 36m or 18m depending on wavebands selected Swath width: 14km			
Products				
Level 1A	CHRIS acquires a set of up to five multi-angle images of each target during each acquisition sequence; these images are acquired when Proba is pointing at distinct angles with respect to the target. CHRIS Level 1A products include five formal CHRIS imaging modes, classified as modes 1 to 5, and are delivered in HDF data files.			
– MODE 1	Full swath width, 62 spectral bands, 773nm/1036nm, nadir ground sampling distance 34m @ 556km			
– MODE 2: WATER BANDS	Full swath width, 18 spectral bands, nadir ground sampling distance 17m @ 556km			
– MODE 3: LAND CHANNELS	Full swath width, 18 spectral bands, nadir ground sampling distance 17m @ 556km			
– MODE 4: CHLOROPHYL BAND SET	Full swath width, 18 spectral bands, nadir ground sampling distance 17m @ 556km			
– MODE 5: LAND CHANNELS	Half swath width, 37 spectral bands, nadir ground sampling distance 17m @ 556km			
Data access notes	Data will be available from Q1 2018 for immediate download via the TPM Online Access List (https://tpm-ds.eo.esa.int/collections/).			
WEBLINKS				
PROBA-1: https://earth.esa.int/web/guest/missions/esa-operational-eo-missions/proba				
				

Proba / HRC		 MED-HIGH	 G	2001
Instrument & agency (& any partners)	High-Resolution Camera ESA			
Type	High-resolution Optical Imager			
Measurements & applications	Primarily intended for technology development, education and general public information purposes. Applications include agriculture, forestry, land cover mapping, vegetation, ocean and coastal information (coastal geomorphology), and water monitoring (water management).			
Technical characteristics	5m geometrical resolution at 600km, a field of view of 0.504° and a 1024 × 1024 pixel CCD detector.			
Products				
Level 1A	The data are grey scale images containing 1024 × 1024 pixels. HRC data are supplied in BMP format.			
Data access notes	Data will be available from Q1 2018 for immediate download via the TPM Online Access List (https://tpm-ds.eo.esa.int/collections/).			
WEBLINKS PROBA-1: https://earth.esa.int/web/guest/missions/esa-operational-eo-missions/proba				
				

7.19 PROBA-V

PROBA-V extends the 15-year dataset established by the Vegetation instruments on SPOT-4/5, delivering global coverage every two days for uses including climate impact assessments, surface water resource management, agricultural monitoring and food security estimates.

The SPOT Vegetation dataset has close to 10,000 registered users around the globe and has contributed to hundreds of scientific papers over 15 years. But with further SPOT satellites lacking the capacity to carry Vegetation instruments, Proba-V has been designed to meet the future needs of the user community.

PROBA-V / Vegetation		LOW-MED	G	2013
Instrument & agency (& any partners)	Vegetation ESA (BELSPO)			
Type	Imaging multispectral radiometer (vis/IR)			
Measurements & applications	<p>Latitudes 35–75°N and 35–56°S are covered daily, and between 35°N and 35°S every two days. Uses include climate impact assessments, surface water resource management, agricultural monitoring and food security estimates. Ideal for monitoring plant and forest growth as well as inland water bodies.</p> <p>The Vegetation instrument can distinguish between different land cover types and plant species, including crops, to reveal their health, as well as detect water bodies and vegetation burn scars.</p>			
Technical characteristics	<p>Wavebands: Equivalent spectral bands to SPOT Vegetation: Blue (438–486nm); Red (615–696nm); Near IR (772–914nm); SWIR (1564–1634nm).</p> <p>Spatial Resolutions: 100m at Nadir, 333m on full field of view.</p> <p>Swath width: 102° field of view with 2250km wide swath.</p>			

Products	
Level 1/Level 3 TOA/TOC Products	<p>The Proba-V Vegetation L1C/P and synthesis products (S1 = daily, S10 = 10-day) ensure coverage of all significant landmasses worldwide with, in the case of a 10-day synthesis product, a minimum effect of cloud cover, resulting from selection of cloud-free acquisitions during the 10-day period.</p> <p>The Vegetation instrument is pre-programmed with an indefinite repeated sequence of acquisitions. This nominal acquisition scenario allows a continuous series of identical products to be generated, thus continuing the existing long time series of the SPOT-Vegetation products.</p> <p>The synthesis products also allow pixel-to-pixel comparison for long time series (geo-location repeatability).</p> <p>Four kinds of products are available:</p> <ul style="list-style-type: none"> – L1C/P: Radiometrically corrected Level 1B data (i.e., unprojected TOA reflectance), given per strip/camera. Pixel digital numbers are converted to radiance values. Image remains in raw sensor geometry (unprojected). Variable resolution: 100–350m (VNIR), 200–660m (SWIR). – S1 TOA: Proba-V Level 3 Top Of Atmosphere (no atmospheric corrections applied) daily synthesis product. – S1 TOC: Proba-V Level 3 Top Of Canopy (atmospheric corrections applied) daily synthesis product. – S10 TOC: Proba-V Level 3 Top Of Canopy (atmospheric corrections applied) 10-day synthesis product.
100m Products	S1 TOA, S1 TOC and S10 TOC
333m Products	L1C/P, S1 TOA, S1 TOC and S10 TOC
1 km Synthesis Products	S1 TOA, S1 TOC and S10 TOC
Data access notes	<p>Data are processed systematically and freely available online within 48 hours at: http://proba-v.vgt.vito.be/en</p> <p>Data are also available through the Proba-V Mission Exploitation Platform (MEP) at: https://proba-v-mep.esa.int/</p> <p>A Full Proposal is required for 100m/333m near-real-time data.</p> <p>More detailed access information is available here: https://earth.esa.int/web/guest/-/proba-v-1km-333m-and-100m-products</p>
WEBLINKS Proba-V: https://earth.esa.int/web/guest/missions/esa-operational-eo-missions/proba-v	


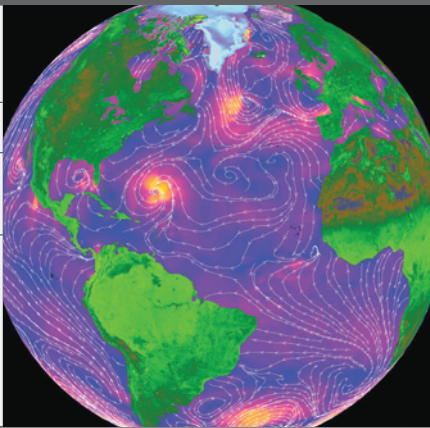



7.20 QuikSCAT

QuikSCAT was a NASA/JPL mission that provided continuity of data from NASA Scatterometer (NSCAT). QuikSCAT carried the SeaWinds instrument and provided all-weather, high-resolution measurements of near-surface winds over global oceans. The data were used to determine atmospheric forcing, ocean response and air-sea interaction mechanisms on various spatial and temporal scales. QuikSCAT was also used in operational weather forecasting as well as in scientific research, by combining wind data with measurements from scientific instruments in other

disciplines to provide a better understanding of the mechanisms of global climate change and weather patterns.

Due to technical failure (the antenna stopped rotating in November 2009), the SeaWinds instrument no longer collects ocean wind vector data. However, it still provides calibration data for other on-orbit scatterometers, enabling the continuation of a climate-quality wind vector dataset.




QuikSCAT / SeaWinds		MED-HIGH	 G	1999–2009
Instrument & agency (& any partners)	SeaWinds Scatterometer NASA			
Type	Radar Scatterometer			
Measurements & applications	Measurement of surface wind speed and direction.			
Technical characteristics	Waveband: Microwave: 13.402GHz			
	Spatial resolution: 25km Swath width: 1600km Accuracy: Speed: 2–3.5m/s, Direction: 20°			
Products				
QuikSCAT.Q2.E2:	This product provides a dataset collocating backscatter and wind measurements from SeaWinds (L2A & L2B products from JPL/PO.DAAC) together with the wind fields from the European Centre for Medium-range Weather Forecasting (ECMWF) re-analysis.			
QuikSCAT.Q2.I2:	This product provides a dataset collocating the measurements from SeaWinds (L2B products from JPL/PO.DAAC), together with measurements from the radiometer SSM/I (NASA/MSFC-DAAC product) on-board the F13 and F14 satellites.			
QuikSCAT.Q2.O2:	The QO product consists of collocated SeaWinds Level 2B datasets, and also – for investigators authorized by JPL/PO.DAAC – Level 2A datasets, together with ERS-2/RA OPR datasets. Collocation areas are determined by applying the following criteria: 25km for the maximum distance between two measurements and 1 hour for the time window. Both minimal and total levels are available for this product.			
QuikSCAT.Q2.T2:	This product is a dataset collocating backscatter and wind measurements from SeaWinds (L2A & L2B products from JPL/PO.DAAC) with measurements from the TOPEX NASA Radar Altimeter (GDR-M product from CLS/AVISO).			
QuikSCAT.Q2.W2:	This product is a dataset collocating backscatter and wind measurements from SeaWinds (L2A & L2B products from JPL/PO.DAAC) together with wind measurements from the European AMI-Wind Scatterometer on-board ERS-2 (WNF product from CERSAT).			
Data access notes	Systematically processed data may be downloaded via HTTP or FTP in HDF format. More information is available via the EOHelp team.			
WEBLINKS				
QuikSCAT: https://earth.esa.int/web/guest/missions/3rd-party-missions/historical-missions/quikscat				
				

7.21 RADARSAT-1/2

The RADARSAT family consists of a pair of Canadian remote-sensing satellites.

RADARSAT-1 was Canada's first commercial EO satellite and was developed to monitor the planet's natural resources and environmental changes. It was equipped with a SAR instrument that could be steered to collect data over a 1,175km wide area using seven beam modes.

RADARSAT-2 is a jointly funded satellite mission of CSA and MDA, representing a Canadian government/industry partnership in a commercial venture. RADARSAT-2 provides continuity from RADARSAT-1 and has the objectives of developing an EO satellite business through a private sector-led arrangement with the federal government and offering data for new applications tailored to market needs.

RADARSAT-1/2 / C-band SAR		 VERY HIGH	 G	1993
Instrument & agency (& any partners)	C-band Synthetic Aperture Radar CSA (MDA)			
Type	Imaging Microwave Radars			
Measurements & applications	All-weather images of ocean, ice and land surfaces. Used for monitoring of coastal zones, polar ice, sea ice, sea state, geological features, vegetation and land surface processes.			
Technical characteristics	RADARSAT-1 Waveband: Microwave C-band 5.405GHz HH, VV, HV, VH polarisation – Includes fully polarimetric imaging modes, and left/right looking capability. Spatial resolutions: Standard: 25 × 28m (4 looks) Wide beam (1/2): 48–30 × 28m/32–25 × 28m (4 looks) Fine resolution: 11–9 × 9m (1 look) ScanSAR (N/W): 50 × 50m/100 × 100m (2–4/4–8 looks) Extended (H/L): 22–19 × 28m/63–28 × 28m (4 looks) Ultrafine: 3m Swath widths: Standard: 100km (20–49o) Wide beam: 165km/150km (20–31/31–39o) Fine resolution: 45km (37–48o) ScanSAR (W): 510km (20–49o) Extended: 75km/170km (50–60/10–23o) Ultrafine: 10–20km	RADARSAT-2 Waveband: Microwave: C band 5.405GHz HH, VV, HV, VH polarization – includes Quad polarization imaging modes. Spatial resolutions: Standard: 27– 17 × 25m (4 looks); Wide: 40– 19 × 25m (4 looks); Fine: 10– 7 × 8m (1 look); ScanSAR (N/W): 80– 38 × 60m/160–172 × 100m (4/8 looks); Extended (H/L): 18–16 × 25m/60–23 × 25m (4 looks); Ultra-Fine: 4.6– 2.1 × 2.8m (1 look) Swath widths: Standard: 100km (inc.: 20–49 deg); Wide: 150km (inc.: 20–45°); Fine: 50km (inc.: 30–50 °); ScanSAR (N/W): 300/500km (inc.: 20–46/20–49 °); Extended (H/L): 75/170km (inc.: 49–60/10–23 °); Ultra-Fine: 20km (inc.: 20–49o)		


Products/Beam Modes	
<p>RADARSAT-1 products are available at Level 0 (Signal data – RAW), Level 1 (Georeferenced – SLC, SGF, SGX, SCN, SCW), and Level 2 (Geocoded – SSG, SPG).</p> <p>RADARSAT-2 products table: http://gs.mdacorporation.com/SatelliteData/Radarsat2/Types.aspx</p> <p>There are a number of SAR beam modes in which RADARSAT-1 & 2 can operate, both single and dual polarisation.</p>	
<p>Wide Beam Mode (RADARSAT.SAR.W)</p> <p><i>R-1 & 2: single & dual-pol</i></p>	<p>The Wide Swath Beam Mode allows imaging of wider swaths than Standard Beam Mode, but at the expense of slightly coarser spatial resolution.</p>
<p>Fine Beam Mode (RADARSAT.SAR.F)</p> <p><i>R-1: single pol</i></p> <p><i>R-2: single & dual-pol</i></p>	<p>The Fine Resolution Beam Mode is intended for applications that require finer spatial resolution. Products from this beam mode have a nominal ground swath of 50km.</p>
<p>Extended Low (Low Incidence) (RADARSAT.SAR.EL)</p> <p><i>R-1 & 2: single pol</i></p>	<p>In the Extended Low Incidence Beam Mode, a single Extended Low Incidence Beam, EL1, is provided for imaging in the incidence angle range from 10–23° with a nominal ground swath coverage of 170km.</p>
<p>Standard Beam Mode (RADARSAT.SAR.S)</p> <p><i>R-1: single pol</i></p> <p><i>R-2: single & dual-pol</i></p>	<p>Standard Beam Mode allows imaging over a wide range of incidence angles with a set of image quality characteristics that provides a balance between fine resolution and wide coverage, and between spatial and radiometric resolutions.</p>
<p>Extended High (High Incidence) (RADARSAT.SAR.EH)</p> <p><i>R-1 & 2: single pol</i></p>	<p>In the Extended High Incidence Beam Mode, six Extended High Incidence Beams, EH1 to EH6, are available for imaging in the 49–60° incidence angle range. Since these beams operate outside the optimum scan angle range of the SAR antenna, some degradation of image quality, becoming progressively more severe with increasing incidence angle, can be expected when compared with the Standard Beams.</p>
<p>ScanSAR Wide (RADARSAT.SAR.SCW)</p> <p><i>R-1 & 2: single & dual-pol</i></p>	<p>The ScanSAR Wide Beam Mode provides coverage of a ground swath approximately triple the width of the Wide Swath Beam Mode swaths.</p>
<p>ScanSAR Narrow (RADARSAT.SAR.SCN)</p> <p><i>R-1 & 2: single & dual-pol</i></p>	<p>The ScanSAR Narrow Beam Mode provides coverage of a ground swath approximately double the width of the Wide Swath Beam Mode swaths.</p>
<p>ESA Archive Copy/Collection</p>	<p>From Q2 2018 ESA will also maintain an archive of data previously requested through the TPM scheme, and will make these select data copies available to users online at: https://tpm-ds.eo.esa.int/collections/</p>
<p>Full archive and new acquisitions</p>	<p>ESA is offering limited quantities of worldwide archive RADARSAT-1/2 data and future RADARSAT-2 acquisitions for scientific uses and application development. Data are processed on request, subject to approval following the submission of a Full Proposal: https://earth.esa.int/aos/RADARSAT</p>
<p>WEBLINKS</p> <p>RADARSAT-1/2: https://earth.esa.int/web/guest/missions/3rd-party-missions/current-missions/radarsat</p>	



7.22 RapidEye

RapidEye is a commercial EO mission, operated by Planet Labs, which comprises a constellation of five minisatellites. The mission provides high-resolution



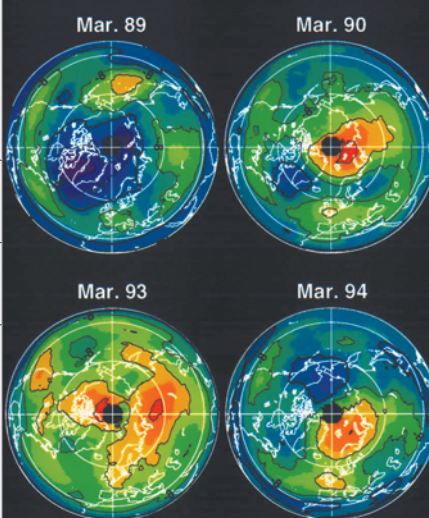

(5m) MS imagery and applications include agriculture, forestry, energy & infrastructure, environment and security & emergency management.



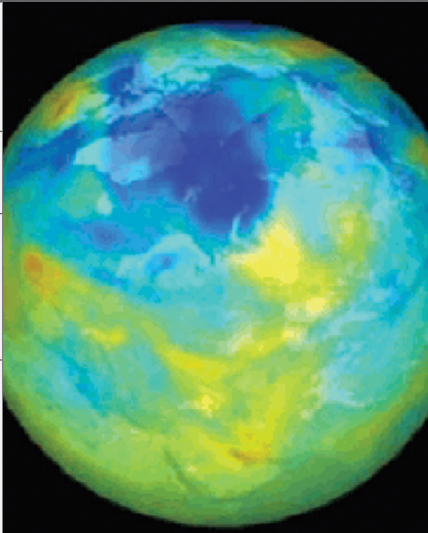

RapidEye / REIS		MED-HIGH	G	2008
Instrument & agency (& any partners)	RapidEye Earth Imaging System Planet Labs			
Type	High-resolution Optical Imager			
Measurements & applications	High-resolution images with short observing cycle for commercial and scientific applications including cartography, land surface, digital terrain models, disaster management, and environmental monitoring.			
Technical characteristics	Wavebands: – Blue: 440–510nm – Green: 520–590nm – Red: 630–690nm – Red Edge: 690–730nm – Near IR: 760–880nm Spatial resolution: 6.5m (resampled on the ortho product to 5m) Swath width: 77km			
Products				
RAPIDEYE.REIS – Level 1B and Level 3A (Archive)	<p>RapidEye 1B Basic is radiometric and sensor corrected. It is the least processed of the RapidEye image products. This product is designed for customers who wish to do their own geometric correction and is accompanied by all the needed information for processing the data into a geo-corrected form.</p> <p>The RapidEye Ortho product (L3A) is ortho-corrected using ground control and DEMs, then cut to the RapidEye tile grid.</p> <p>Each covers a 25 × 25km area with an overlap between adjoining tiles and is optimal for covering smaller project areas that require accurately referenced imagery.</p>			
RapidEye South America – Featured Dataset	See Section 6.8 for details.			
RapidEye Time Series for Sentinel-2 – Featured Dataset	See Section 6.9 for details.			
ESA Archive Copy/Collection	ESA maintains an archive of data previously requested through the TPM scheme. Data are available for immediate download via the TPM Online Access List (https://tpm-ds.eo.esa.int/collections/). Data download requires registration at: https://earth.esa.int/web/guest/-/rapideye-esa-archive			
Full archive and new acquisitions	Global Level 1B and Level 3A archive data and future acquisitions are available on-request from Planet Labs following the submission and approval of a Full Proposal: https://earth.esa.int/aos/rapideye			
WEBLINKS				
RapidEye: https://earth.esa.int/web/guest/missions/3rd-party-missions/current-missions/rapideye				

7.23 SciSat-1/ACE

SciSat-1 is a CSA atmospheric science mission carrying the Atmospheric Chemistry Experiment-Fourier Transform Spectrometer (ACE-FTS) instrument. The instrument measures the vertical distribution of trace gases, in particular the regional polar O₃ budget, as well as pressure and temperature (derived from CO₂ lines).

SciSat-1 also carries the Measurement of Aerosol Extinction in the Stratosphere and Troposphere Retrieved by Occultation (MAESTRO) instrument, a dual-channel optical spectrometer in the shortwave to thermal infrared range. The instrument can be used to generate column measurements for ozone, nitrogen dioxide and aerosol/cloud extinction.

SciSat-1/ACE / MAESTRO		 AD	 G	2003
Instrument & agency (& any partners)	Measurements of Aerosol Extinction in the Stratosphere and Troposphere Retrieved by Occultation CSA			
Type	Atmospheric Chemistry – Limb-scanning SW Spectrometer			
Measurements & applications	Chemical processes involved in the depletion of the ozone layer.			
Technical characteristics	Wavebands: UV–NIR: 0.285–1.03µm (1–2nm spectral resolution) Spatial resolution: Approximately 1–2km vertical Swath width: FOV 1.25mrad			
Products				
Level 2 Version 1.1 (ACE_MAESTRO_L2V1.1)	Solar occultation spectra are used to retrieve vertical profiles of temperature and pressure, aerosols, and trace gases (O ₃ , NO ₂ , H ₂ O, OClO, and BrO) involved in middle atmosphere ozone distribution. The use of two overlapping spectrometers (280–550nm, 500–1030nm) improves the stray light performance.			
Data access notes	Systematically processed global data are available via Immediate Access. The data are provided in CSV spreadsheet format.			
WEBLINKS SciSat-1/ACE: https://earth.esa.int/web/guest/missions/3rd-party-missions/current-missions/scisat				
				

SciSat-1/ACE / ACE-FTS		 AD	 G	2003
Instrument & agency (& any partners)	Atmospheric Chemistry Experiment – Fourier Transform Spectrometer CSA			
Type	Atmospheric Chemistry – Limb-scanning IR Spectrometer			
Measurements & applications	Measure and understand the chemical processes that control the distribution of ozone in the Earth's atmosphere, especially at high altitudes.			
Technical characteristics	Wavebands: SWIR–TIR: 2–5.5µm, 5.5–13µm (0.02–1cm resolution) Spatial resolution: 2–6km Swath width: 4–150km			
Products				
Level 2 Version 1.0 (ACE_FTS_L2V1.0)	<p>The Level 2 V1.0 product includes pressure and temperature profiles of the following trace gases: H₂O, O₃, N₂O, CO, CH₄, NO, NO₂, HNO₃, HF, HCl, N₂O₅, ClONO₂, CFC-11, CFC-12, COF₂, HCFC-22, HDO, and SF₆.</p> <p>The ACE-FTS measurements are recorded every 2 seconds, which corresponds to a measurement spacing of 2–6km (decreasing at lower altitudes due to refraction). The typical altitude spacing changes with the orbital beta angle.</p> <p>For historical reasons, the retrieved results are interpolated onto a 1km grid using a piecewise quadratic method. For ACE-FTS version 1.0, the results were reported only on the interpolated grid (every 1km from 0.5 to 149.5km).</p>			
Level 2 Version 2.2 (ACE_FTS_L2V2.2)	The Level 2 V2.2 includes the retrieval of 28 main isotopes, and four subsidiary isotopologues from the ACE-FTS spectra. For versions 2.0, 2.1 and 2.2, both the retrieval grid and the 1km grid profiles are available.			
Data access notes	Systematically processed global data is available via Immediate Access. The data are provided in CSV spreadsheet format.			
WEBLINKS				
SciSat-1/ACE: https://earth.esa.int/web/guest/missions/3rd-party-missions/current-missions/scisat				
				

7.24 SeaSat

Launched in 1978, SeaSat was a NASA/JPL experimental EO mission, which carried the first space borne SAR. During its brief 106-day lifetime, SeaSat collected more information about the oceans than had been acquired in the previous 100 years of shipboard research.

The SAR instrument provided a wealth of information on diverse ocean phenomena such as sea-surface winds and temperatures, surface and internal waves, currents, sea ice, wind, and rainfall, thus giving the first

global view of ocean circulation. It pioneered satellite oceanography and proved the viability of imaging radar for studying our planet. SeaSat's SAR instrument also provided spectacular images of Earth's land surfaces, thus demonstrating the immense potential of the SAR observation technology and generating great interest in satellite active microwave remote sensing.

SeaSat / L-band SAR		MED-HIGH	G	1978
Instrument & agency (& any partners)	L-band Synthetic Aperture Radar NASA/JPL			
Type	Imaging Microwave Radar			
Measurements & applications	Measurement of sea-surface winds and temperatures, wave heights, atmospheric liquid water content, sea ice features and ocean topography.			
Technical characteristics	Waveband: 1.275GHz (L-band) Spatial resolution: 25m (azimuth) × 25m (range) Swath width: 100km			
Products				
SAR Single Look Complex Image Product (SEA_SLC_1P)	The SEA_SLC_1P product is comparable to the ESA SLC/IMS images generated for ASAR and ERS platforms. Data are processed to an unweighted Doppler bandwidth of 1200Hz, without sidelobe reduction. The product is suitable for interferometric, calibration and quality analysis applications.			
SAR Precision Image (SEA_PRI_1P)	The format of the SeaSat SAR Precision Image is based on the general definition of the SAR CEOS format. Sidelobe reduction is applied to achieve a nominal PSLR of less than -21dB. The image is not geocoded and terrain distortion has not been removed.			
Level-1 SAR Ellipsoid Geocoded Precision Image (SEA_GEC_1P)	The SEA_GEC_1P product is generated by geocoding of data processed to the SEA_PRI_1P product specification. Products are generated in UTM map coordinates, with output pixel spacing at 12.5m. Geocoding is undertaken on the approximation that all image points lie on the surface of the WGS84 ellipsoid adjusted for a local representative vertical datum. It should be noted that mapping distortions will occur as a consequence of terrain relief.			
Data access notes	Data are available for immediate download via the TPM Online Access List (https://tpm-ds.eo.esa.int/collections/). Data download requires registration at: https://earth.esa.int/web/guest/-/seasat Data is available from 13 th July 1978 to 10 th October 1978 over the range 70 N, 10 S, 125 W, 20 E.			
WEBLINKS				
SeaSat: https://earth.esa.int/web/guest/missions/3rd-party-missions/historical-missions/seasat				
				

7.25 SPOT

The SPOT EO system is designed by CNES and operated by Airbus Defence and Space/Spot Image. It has been in operation since February 1986 offering exceptional temporal coverage. Archived and new data satellites are available through an agreement between ESA and Airbus Defence and Space/Spot Image.



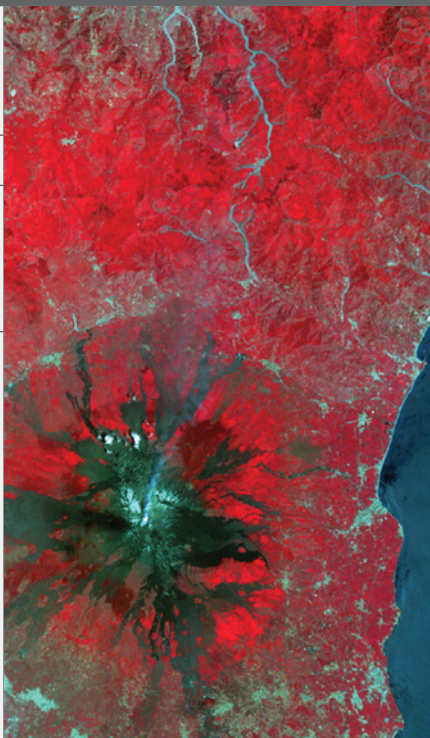
7.25.1 SPOT 1 to SPOT 3

The SPOT EO system designed by CNES began operations on the 22nd of February 1986 with the launch of SPOT 1, which carried two High-Resolution Visible (HRV) imagers. SPOT 1 generated more than 2.7 million Earth images in its 17 years of operation.

On the 22nd of January 1990, SPOT 2 joined its

predecessor in orbit, carrying the same imaging instruments, and generating a further 6.5 million Earth images in its almost 20-year lifespan.

The final first generation SPOT satellite was launched on the 26th of September 1993, again carrying HRV imagers.

SPOT 1-3 / HRV		 MED-HIGH	 G	1986-2009
Instrument & agency (& any partners)	High-Resolution Visible Imager CNES, Airbus Defence and Space/Spot Image			
Type	Medium/High-resolution Optical Imagers			
Measurements & applications	Cartography, land surface, agriculture and forestry, civil planning and mapping, digital terrain models, environmental monitoring, coastal applications.			
Technical characteristics	Wavebands: VIS: Band 1: 0.5-0.59µm; Band 2: 0.61-0.68µm; NIR: Band 3: 0.79-0.89µm; Panchromatic: VIS: 0.51-0.73µm Spatial resolutions: 20m (or 10m panchromatic) Swath width: 117km (i.e., 60km + 60km with 3km overlap), steerable up to ±27 degrees off-track.			



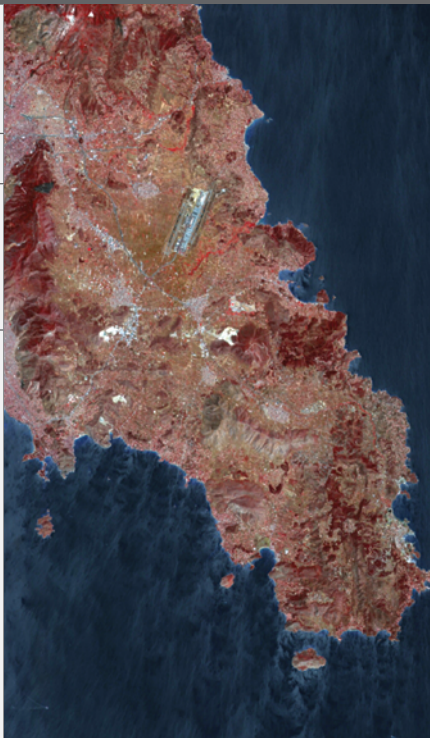
Products	
HRV Archive Data – Level 1A , Level 1B , Level 2A	<p>Global Level 1A/1B/2A SPOT 1–3 HRV products are available on request from the Airbus DS archive following submission and approval of a Full Proposal.</p> <p>Level 1A: Radiometric correction of distortions due to differences in sensitivity of the elementary detectors of the viewing instrument. Intended for users who wish to do their own geometric image processing.</p> <p>Level 1B: Radiometric correction identical to that of level 1A. Geometric correction of systematic effects (panoramic effect, Earth curvature and rotation). Internal distortions of the image are corrected for measuring distances, angles and surface areas. Specially designed product for photo-interpreting and thematic studies.</p> <p>Level 2A: Radiometric correction identical to that of level 1A. Geometrical correction done in a standard cartographic projection (UTM WGS84 by default) not tied to ground control points. Allowing for possible differences in location, this product is used to combine the image with geographical information of various types (vectors, raster maps and other satellite images).</p>
ESA Archive Copy/Collection	Data are available for immediate download via the TPM Online Access List (https://tpm-ds.eo.esa.int/collections/). Data download requires registration at: https://earth.esa.int/web/guest/-/esa-spot-collection-dataset
Full archive and new acquisitions	ESA is offering access to the full SPOT archive and new acquisitions free of charge for approved scientific research and application development purposes: http://earth.esa.int/aos/SPOT
WEBLINKS SPOT Series: https://earth.esa.int/web/guest/missions/3rd-party-missions/current-missions/spot	



7.25.2 SPOT 4

In March 1998, SPOT 4 joined the SPOT family, bringing with it new capabilities, including the VEGETATION instrument and upgraded HRV imagers (HRVIR). To ensure continuity of service, HRVIR had the same geometric imaging characteristics (a swath of 60km

per instrument and oblique viewing capability of 27° on each side of the local vertical), but its performance had been increased by adding a new shortwave infrared spectral band (SWIR).

SPOT 4 / HRVIR		 MED-HIGH	 G	1998–2013
Instrument & agency (& any partners)	High-Resolution Visible and Infrared Imager CNES, Airbus Defence and Space/Spot Image			
Type	Medium/High-resolution Optical Imager			
Measurements & applications	Cartography, land surface, agriculture and forestry, civil planning and mapping, digital terrain models, environmental monitoring, coastal applications.			
Technical characteristics	<p>Wavebands:</p> <p>VIS: Band 1: 0.5–0.59µm; Band 2: 0.61–0.68µm; NIR: Band 3: 0.79–0.89µm; SWIR: Band 4: 1.58–1.75µm; Panchromatic: VIS: 0.61–0.68µm</p> <p>Spatial resolutions: 20m (or 10m panchromatic)</p> <p>Swath width: 117km (i.e., 60km + 60km with 3km overlap), steerable up to ±27 degrees off-track</p>			

Products	
HRVIR Archive Data – Level 1A , Level 1B , Level 2A	<p>Global Level 1A/1B/2A SPOT 4 HRVIR products are available on request from the Airbus DS archive following submission and approval of a Full Proposal.</p> <p>Level 1A: Radiometric correction of distortions due to differences in sensitivity of the elementary detectors of the viewing instrument. Intended for users who wish to do their own geometric image processing.</p> <p>Level 1B: Radiometric correction identical to that of level 1A. Geometric correction of systematic effects (panoramic effect, Earth curvature and rotation). Internal distortions of the image are corrected for measuring distances, angles and surface areas. Specially designed product for photo-interpreting and thematic studies.</p> <p>Level 2A: Radiometric correction identical to that of level 1A. Geometrical correction done in a standard cartographic projection (UTM WGS84 by default) not tied to ground control points. Allowing for possible differences in location, this product is used to combine the image with geographical information of various types (vectors, raster maps and other satellite images).</p>
ESA Archive Copy/Collection	Data are available for immediate download via the TPM Online Access List (https://tpm-ds.eo.esa.int/collections/). Data download requires registration at: https://earth.esa.int/web/guest/-/esa-spot-collection-dataset
IMAGE2006/European Coverage – Featured Dataset	SPOT 4 contributed to the IMAGE2006/European Coverage. See Section 6.3 for more details.
SPOT 4/5 Take 5 – Featured Dataset	See Section 6.10 for more details.
Full archive and new acquisitions	ESA is offering access to the full SPOT archive and new acquisitions free of charge for approved scientific research and application development purposes: http://earth.esa.int/aos/SPOT .
WEBLINKS SPOT Series: https://earth.esa.int/web/guest/missions/3rd-party-missions/current-missions/spot	



7.25.3 SPOT 5

In May 2002, SPOT 5 was added to the SPOT family. Compared to its predecessors, SPOT 5 offered greatly enhanced capabilities due to its improved resolution and provided an ideal balance between high-resolution and wide-area coverage with its twin High-Resolution Geometric (HRG) instruments.

Another key feature was the unprecedented acquisition capability of the High-Resolution

Stereoscopic (HRS) imaging instrument, which had the ability to take stereo pair images quasi-simultaneously. Stereo pair imagery is vital for applications that require 3D terrain modelling.

The satellite operated nominally until March 2015, after which the SPOT 5 Take 5 Programme commenced (see Section 6.10).




SPOT 5 / HRG		MED-HIGH	G	2002–2015
Instrument & agency (& any partners)	High-Resolution Geometric CNES, Airbus Defence and Space/Spot Image			
Type	High-resolution Optical Imagers			
Measurements & applications	Twin HRG instruments provided high-resolution multispectral images that can be processed to produce simulated imagery of 2.5m resolution. These measurements are well suited to cartography, land surface, agriculture and forestry, civil planning and mapping, digital terrain models, and environmental monitoring applications.			
Technical characteristics	<p>Wavebands:</p> <p>VIS: Band 1: 0.50–0.59µm; Band 2: 0.61–0.68µm; NIR: Band 3: 0.79–0.89µm; SWIR: Band 4: 1.50–1.75µm; Panchromatic: 0.49–0.69µm</p> <p>Spatial resolutions:</p> <p>Panchromatic : 2.5m (supermode simulated) or 5m (at nadir)</p> <p>Multispectral: 10m (at nadir)</p> <p>Swath widths: 60km (one instrument), 117km (two instruments). Same as SPOT 4 with off-track steering capability (±27 degrees).</p>			

SPOT 5 / HRS		MED-HIGH	G	2002–2015
Instrument & agency (& any partners)	High-Resolution Stereoscopic CNES, Airbus Defence and Space/Spot Image			
Type	High-resolution Optical Imager			
Measurements & applications	High-resolution stereo instrument for various applications, such as map making and in the generation of DEMs. HRS uses the same CCD line detector design as for the HRG instrument.			
Technical characteristics	Wavebands: Panchromatic: VIS 0.49–0.69µm Spatial resolutions: 10m cross-track, 5m along-track Altitude resolution: 15m Swath widths: 120km			
Products				
HRG/HRS Archive Data – Level 1A , Level 1B , Level 2A	<p>Global Level 1A/1B/2A SPOT 5 HRG/HRS products are available on request from the Spot Image archive following submission and approval of a Full Proposal.</p> <p>Level 1A: Radiometric correction of distortions due to differences in sensitivity of the elementary detectors of the viewing instrument. Intended for users who wish to do their own geometric image processing.</p> <p>Level 1B: Radiometric correction identical to that of level 1A. Geometric correction of systematic effects (panoramic effect, Earth curvature and rotation). Internal distortions of the image are corrected for measuring distances, angles and surface areas. Specially designed product for photo-interpreting and thematic studies.</p> <p>Level 2A: Radiometric correction identical to that of level 1A. Geometrical correction done in a standard cartographic projection (UTM WGS84 by default) not tied to ground control points. Allowing for possible differences in location, this product is used to combine the image with geographical information of various types (vectors, raster maps and other satellite images).</p>			
ESA Archive Copy/Collection	Data are available for immediate download via the TPM Online Access List (https://tpm-ds.eo.esa.int/collections/). Data download requires registration at: https://earth.esa.int/web/guest/-/esa-spot-collection-dataset			
SPOTMAPS2.5	<p>SPOTMaps 2.5 is a dataset providing nationwide or regional seamless coverage, orthorectified, derived from colour imagery acquired by SPOT 5. It is available for more than 110 countries, representing a total of more than 95 million km². The dataset has a resolution of 2.5m.</p> <p>The SPOTMaps 2.5 global dataset is accessible after Full Proposal acceptance. Project proposals can be submitted from the SPOT information area: http://earth.esa.int/aos/SPOT</p>			
IMAGE2006/European Coverage Featured Dataset	SPOT 5 contributed to the IMAGE2006/European Coverage. See Section 6.3 for more details.			
SPOT 4/5 Take 5 – Featured Dataset	See Section 6.10 for more details.			
Full archive and new acquisitions	ESA is offering access to the full SPOT archive and new acquisitions free of charge for approved scientific research and application development purposes: http://earth.esa.int/aos/SPOT			
WEBLINKS SPOT Series: https://earth.esa.int/web/guest/missions/3rd-party-missions/current-missions/spot				
				

7.25.4 SPOT 6/7

SPOT 6 and 7 form an EO constellation, together with Pleiades-1A/1B, improving on the imaging capacity of their predecessor SPOT 5, while still ensuring SPOT data continuity with their 60km swath.

SPOT 6 and 7 offer 1.5m resolution in natural colour, a daily revisit to any point of the globe and can be programmed for stereo and tri-stereo acquisitions for 3D terrain modelling.



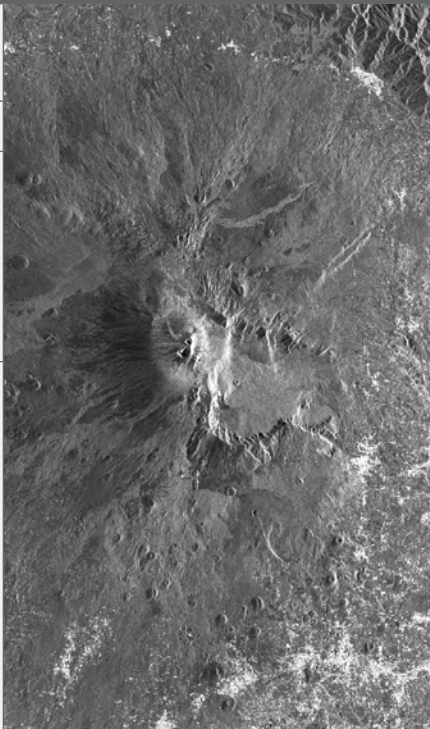
SPOT 6/7 /NAOMI		VERY HIGH	G	2012
Instrument & agency (& any partners)	New AstroSat Optical Modular Instrument/ High-Resolution Optical Imager Airbus Defence and Space/Spot Image, Azercosmos (SPOT 7)			
Type	High-resolution Optical Imagers			
Measurements & applications	Multi-purpose high-resolution optical imagery, ensuring service continuity of SPOT 4 and 5.			
Technical characteristics	Wavebands: 4 bands + PAN: Near IR (0.760–0.890µm) Red (0.625–0.695µm) Green (0.530–0.590µm) Blue (0.450–0.520µm) PAN (0.450–0.745µm) Spatial resolutions: Panchromatic: 1.5m. Multispectral: 6m Swath width: 60km at nadir.			
Products				
Archive and New Data – Primary and Orthorectified Products	<p>SPOT 6 and 7 products are available in the following modes/resolutions: Panchromatic (1.5m), Pan sharpened colour (1.5m), Multispectral (6m), Bundle (1.5m panchromatic + 6m multispectral).</p> <p>Primary: processing level closest to the natural image acquired by the sensor. This product restores perfect collection conditions: the sensor is placed in rectilinear geometry, and the image is clear of all radiometric distortion.</p> <p>Standard orthorectified: The orthorectified product is a georeferenced image in Earth geometry, corrected from acquisition and terrain off-nadir effects.</p> <p>Tailored orthorectified: when different specifications are needed, a custom orthorectification, with a more precise 3D model provided by the client or acquired for the purpose, can be provided on demand.</p>			
ESA Archive Copy/Collection	Data are available for immediate download via the TPM Online Access List (https://tpm-ds.eo.esa.int/collections/). Data download requires registration at: https://earth.esa.int/web/guest/-/spot-6_7_es			
Full archive and new acquisitions	<p>SPOT 6 and 7 products can be browsed via the Airbus Defence and Space GeoStore: www.geo-airbusds.com/en/4871-browse-and-order</p> <p>Complete archive and new acquisitions are accessible after Full Proposal acceptance. Project proposals can be submitted from the SPOT information area: http://earth.esa.int/aos/SPOT</p>			
WEBLINKS				
SPOT Series: https://earth.esa.int/web/guest/missions/3rd-party-missions/current-missions/spot				
SPOT 6/7: www.geo-airbusds.com/en/147-spot-6-7-satellite-imagery				
				
				


7.26 TerraSAR-X/TanDEM-X

TerraSAR-X and TanDEM-X are nearly identical German SAR satellites created and operated in a Public-Private Partnership (PPP) between the German Aerospace Center DLR and Airbus Defence and Space.

The scientific objective of the missions is to make multi-mode and high-resolution X-band radar data available for a wide spectrum of applications in fields such as hydrology, geology, climatology, oceanography and disaster monitoring.

TerraSAR-X and TanDEM-X are fully operational and in close formation flight. The two spacecraft provide a single-pass interferometric configuration for cartography (DEM generation) – making use of interferometry and stereometry.



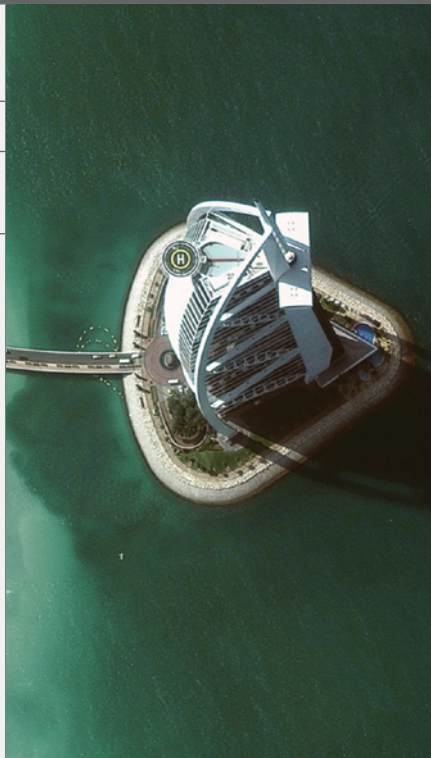



TerraSAR-X/TanDEM-X		 VERY HIGH	 G	2007 (TerraSAR-X)/2010 (TanDEM-X)
Instrument & agency (& any partners)	X-band Synthetic Aperture Radar DLR, Airbus Defence and Space			
Type	Imaging Microwave Radar			
Measurements & applications	High-resolution images for monitoring of land surface and coastal processes and for agricultural, geological and hydrological applications. TerraSAR-X and TanDEM-X operate in formation flight to facilitate DEM generation.			
Technical characteristics	Wavebands: 9.65GHz, 300MHz bandwidth, all four polarisation modes Spatial resolutions: Spotlight: 1.2 × 1–4m Stripmap: 3 × 3–6m ScanSAR: 16 × 16m Swath widths: Spotlight: 5–10km × 10km Stripmap: 30km ScanSAR: 100km			
Modes/Products				
TerraSAR-X and TanDEM-X products are available via the ESA TPM scheme in a number of different imaging modes: High-resolution SpotLight (HS), ScanSAR (SC), Wide ScanSAR (WS), SpotLight (SL), StripMap (SM), and Staring SpotLight (ST). Full product information can be found in the following guide produced by Airbus Defence and Space: http://www2.geo-airbusds.com/files/pmedia/public/r459_9_201408_tsxx-itd-ma-0009_tsx-productguide_i2.00.pdf				
Data access notes	TerraSAR-X/TanDEM-X archive and tasking products are now available to ESA TPM users after the approval of a Full Proposal: http://earth.esa.int/aos/terrasarx ESA will support as many high-quality and innovative projects as possible within the quota limit available.			
WEBLINKS TerraSAR-X /TanDEM-X: https://earth.esa.int/web/guest/missions/3rd-party-missions/potential-missions/terrasar-x				



7.27 WorldView-1/2/3

WorldView-2 is a commercial imaging satellite of DigitalGlobe. The overall objective is to meet the

growing commercial demand for high-resolution satellite imagery (0.46m PAN/1.8m MS – at nadir).

WorldView-1/2/3 WV-110		 VERY HIGH	 E-C	2009
Instrument & agency (& any partners)	WorldView-110 Camera DigitalGlobe (European Space Imaging)			
Type	Very High-resolution Optical Imager			
Measurements & applications	Multi-purpose high-resolution optical imagery.			
Technical characteristics	Wavebands: Panchromatic: 450–800nm, Multispectral: 8 bands (4 standard + 4 additional colours): 400–450nm (coastal blue) 450–510nm (blue) 510–580nm (green) 585–625nm (yellow) 630–690nm (red) 705–745nm (red edge) 770–895nm (NIR1) 860–1040nm (NIR2) Spatial resolutions: 0.46m PAN, 1.8m MS (at nadir) Swath width: 16.4km			
Products				
WorldView-2 European Cities – Featured Dataset	See Section 6.12 for more details.			
Full archive and new acquisitions	ESA offers access to the full WorldView-1/2/3 archive and new acquisitions for research and application development. ESA will support as many high-quality and innovative projects as possible within the quota limit available. More information can be found here: https://earth.esa.int/aos/worldview			
WEBLINKS				
WorldView-1: https://earth.esa.int/web/guest/missions/3rd-party-missions/current-missions/worldview-1				
WorldView-2: https://earth.esa.int/web/guest/missions/3rd-party-missions/current-missions/worldview-2				
WorldView-3: https://earth.esa.int/web/guest/missions/3rd-party-missions/current-missions/worldview-3				
				
				



FUTURE/POTENTIAL TPM

8.1 Landsat MSS

The Multi-Spectral Scanner (MSS) was launched on board ERTS-1/Landsat 1 on the 23rd July 1972. The MSS sensor was also operational on Landsat 2 to 5.

The MSS systems were the first global monitoring systems capable of producing MS data in digital format covering up to 185km². Applications include agriculture, cartography, environmental monitoring, forestry, land-use planning and oceanography.

Around 500,000 MSS scenes will be available from Q4 2018.

8.2 Nimbus-7/CZCS

The Coastal Zone Color Scanner Experiment (CZCS) was a multi-channel scanning radiometer on-board NASA's Nimbus-7 spacecraft. It was launched in October 1978 and its mission ended in June 1986. It was designed to map chlorophyll concentration in water, sediment distribution, gelbstoff concentrations as a salinity indicator, temperature of coastal waters and ocean currents.

The craft was placed in a Sun-synchronous orbit and transmission of data from all of the experiments was completed as scheduled. For the first time, NASA and ESA were able to receive data on the global atmosphere in real time.

8.3 OrbView-2

OrbView-2 was an imaging satellite with an overall objective of providing quantitative data on aerosols and ocean colour/biology for the Earth science community. The Sea-viewing Wide Field-of-view Sensor (SeaWiFS) imaging system offered 8-bands multispectral at 1km spatial resolution.

