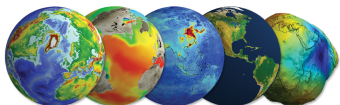
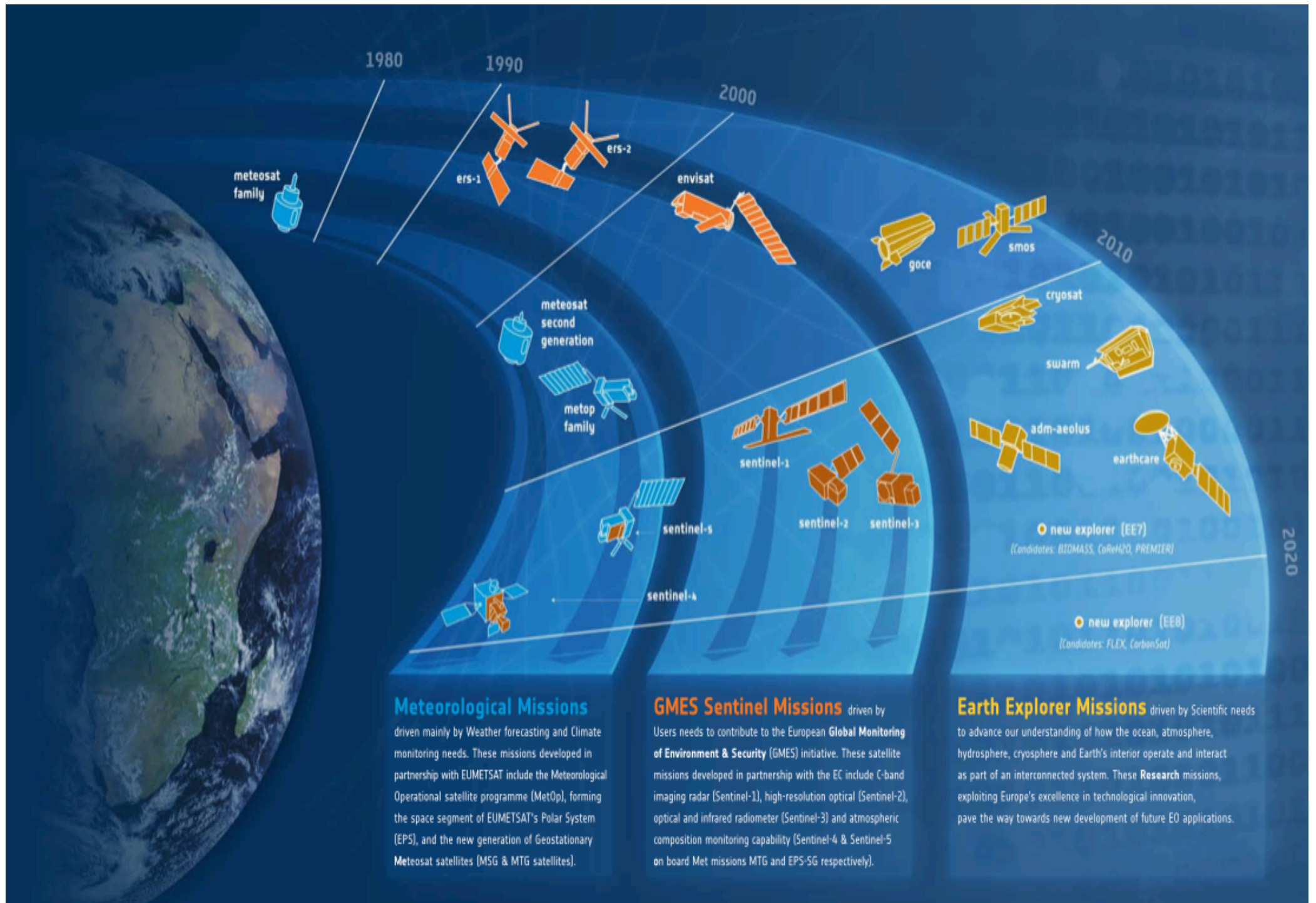


Brief overview of ESA EO Missions & Programmes

Pierre-Philippe Mathieu, ESA-EOP
SAGOMA KO Meeting, 24 Nov, Liege, Belgium





Meteorological Missions

driven mainly by Weather forecasting and Climate monitoring needs. These missions developed in partnership with EUMETSAT include the Meteorological Operational satellite programme (MetOp), forming the space segment of EUMETSAT's Polar System (EPS), and the new generation of Geostationary Meteosat satellites (MSG & MTG satellites).

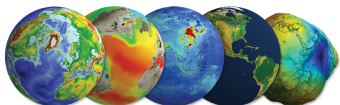
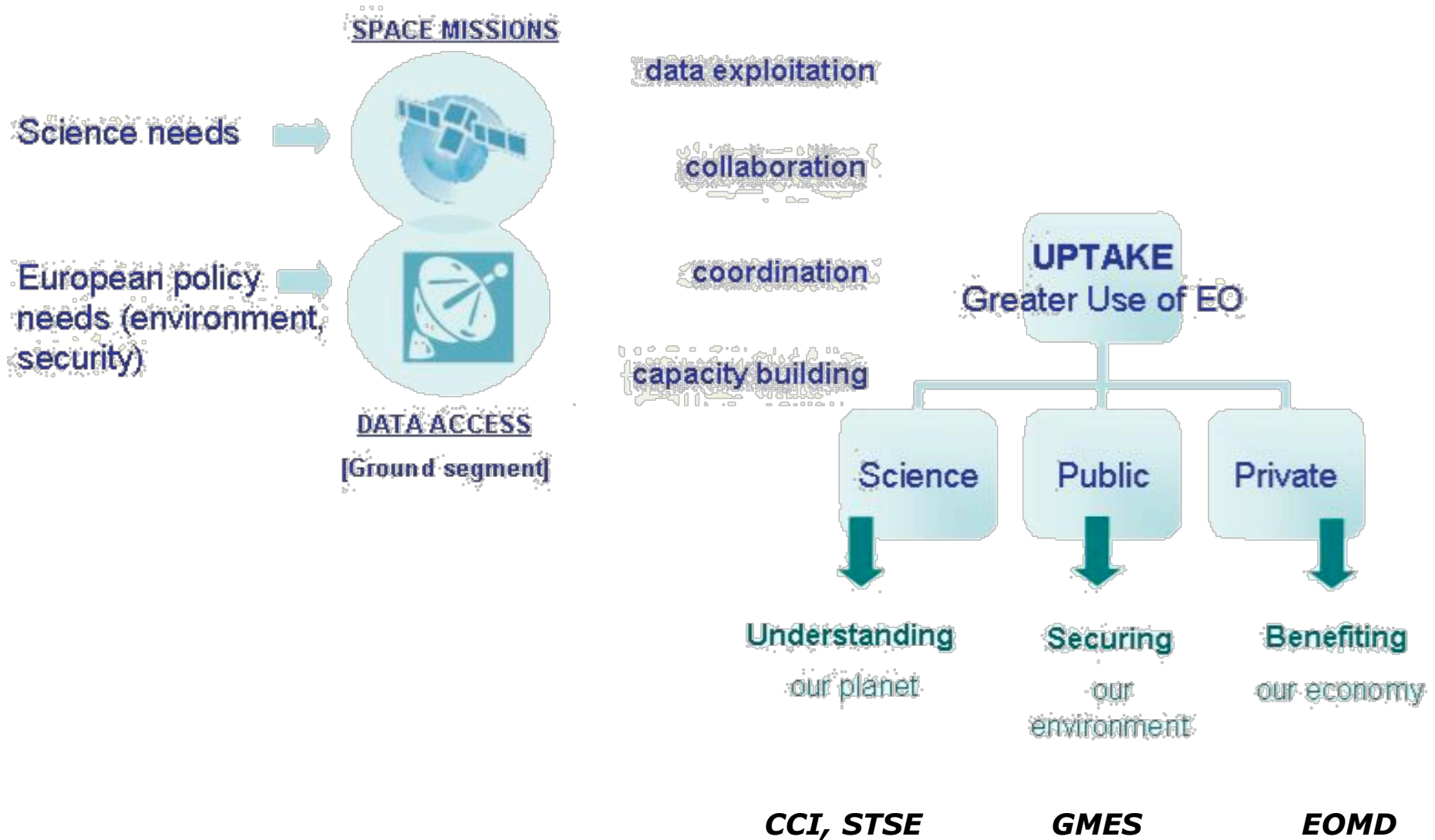
GMES Sentinel Missions

driven by Users needs to contribute to the European **Global Monitoring of Environment & Security** (GMES) initiative. These satellite missions developed in partnership with the EC include C-band imaging radar (Sentinel-1), high-resolution optical (Sentinel-2), optical and infrared radiometer (Sentinel-3) and atmospheric composition monitoring capability (Sentinel-4 & Sentinel-5 on board Met missions MTG and EPS-SG respectively).

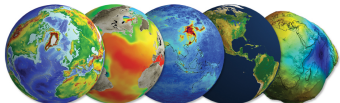
Earth Explorer Missions

driven by Scientific needs to advance our understanding of how the ocean, atmosphere, hydrosphere, cryosphere and Earth's interior operate and interact as part of an interconnected system. These **Research** missions, exploiting Europe's excellence in technological innovation, pave the way towards new development of future EO applications.

ESA EO : Overall Framework

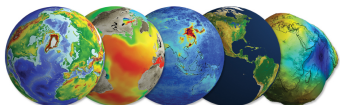
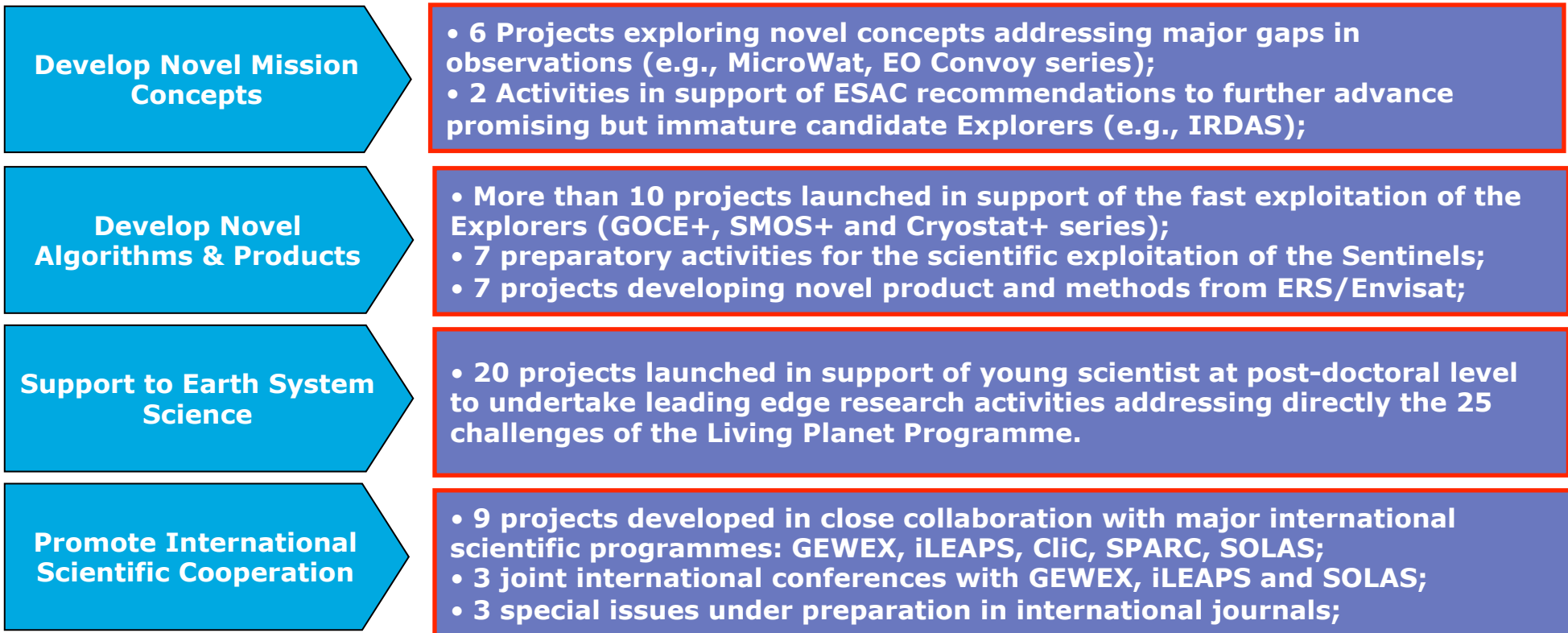


ESA EO Exploitation Programmes



Support to Science Element (STSE)

STSE provides scientific support to both future and on-going missions by taking a proactive role in the formulation of novel mission concepts and by fostering innovation and promoting novel scientific results from existing and planned mission;



Promote International Collaboration via Projects



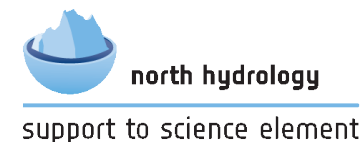
Exploring novel global multi-mission data products based on ESA data critical to the **water cycle**: Evapotranspiration, soil moisture, water vapour, surface solar irradiance and precipitation;



Fostering the development and integration of novel EO products into suitable couple models to enhance the characterisation of **key land-atmosphere processes**: 1) wetland dynamics and CH₄ emissions; 2) wildfire plume injection height and transport and 3) anthropogenic vs. natural aerosols.



Develop and validate novel products (mainly based on MERIS and ASAR) to characterise river and **lake ice dynamics in northern latitudes** and explore their impact in climate models and hydrology;



Fostering the integration of EO data into suitable couple models to enhance the characterisation of **key ocean-atmosphere processes**: 1) CO₂ fluxes; 2) Sea Spray and aerosols 3) understanding upwelling systems.



A new activity is in preparation for 2011 in support of SPARC

solas
20192

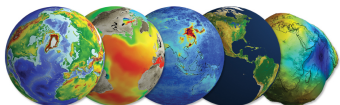


→ EARTH OBSERVATION FOR OCEAN-ATMOSPHERE INTERACTIONS SCIENCE



© ESA 2011

29 November-2 December 2011 | ESA ESRIN | Frascati (Rome), Italy

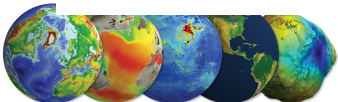


ESA Climate Change Initiative (CCI)

a global political framework

- GEOSS
 - coordinated global earth observations
 - data sharing principles
- CEOS
 - satellite component
 - virtual constellations
- GCOS
 - authoritative requirements for climate
 - climate monitoring principles

for global earth observations



Courtesy
Mark Doherty

European Space Agency

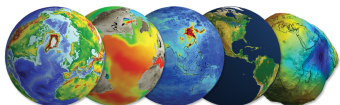
ESA Climate Change Initiative (CCI): Objectives

The objective of Climate Change Initiative is to realize the full potential of the **long-term global Earth Observation archives** that **ESA** together with its **Member states** have established over the last thirty years, as a significant **and** timely contribution to the **ECV** databases required by **UNFCCC**.

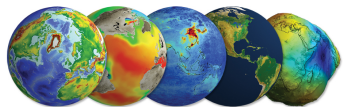
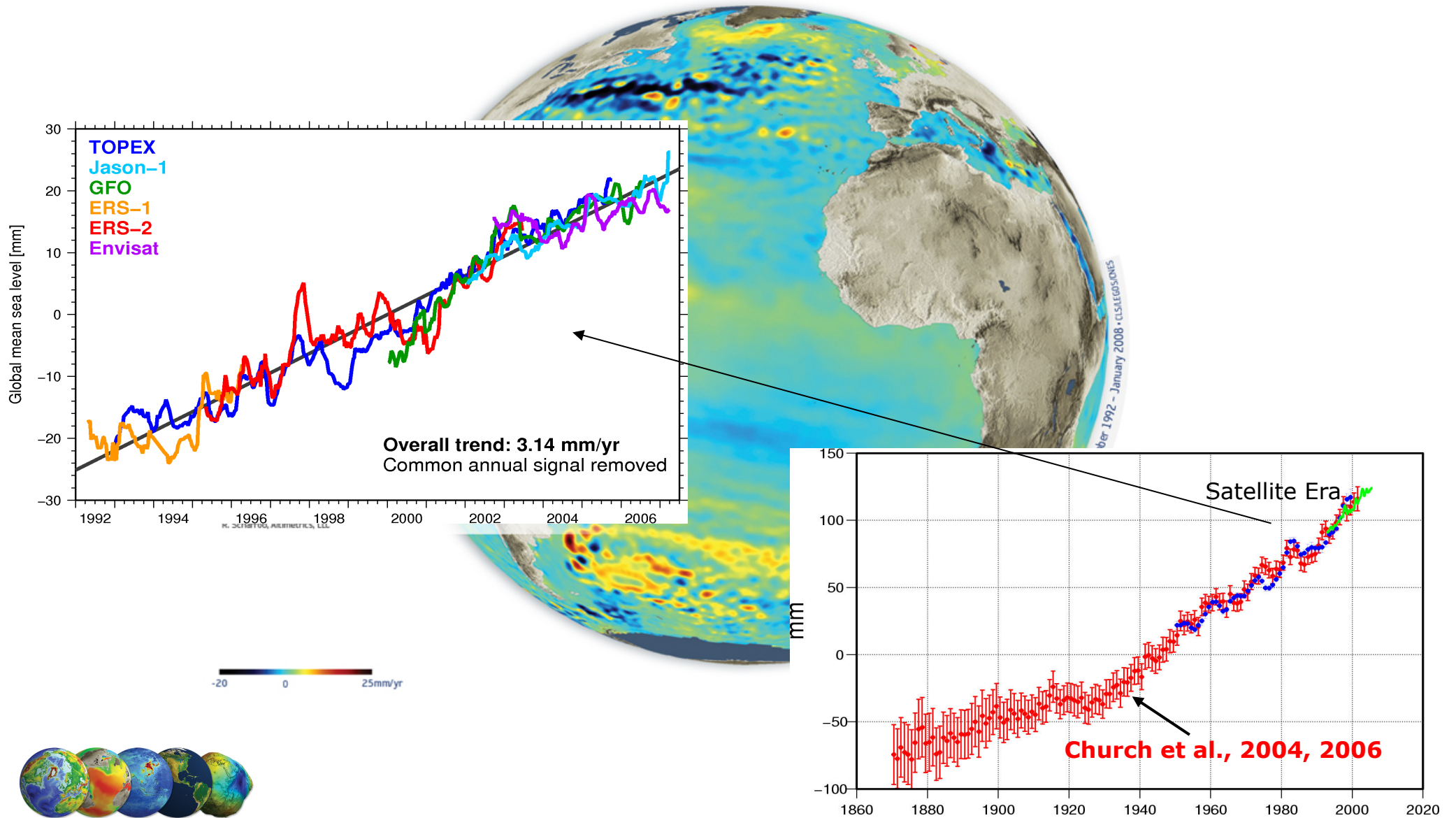
It will ensure that full capital is derived from ongoing and planned ESA missions for climate purposes, including **ERS, Envisat, the Earth Explorer** missions, relevant ESA-managed archives of **Third-Party Mission** data and, in due course, the **GMES Space Component**.

CCI Programme following Ministerial Council in 2008,
about 75MEUR over 6 years

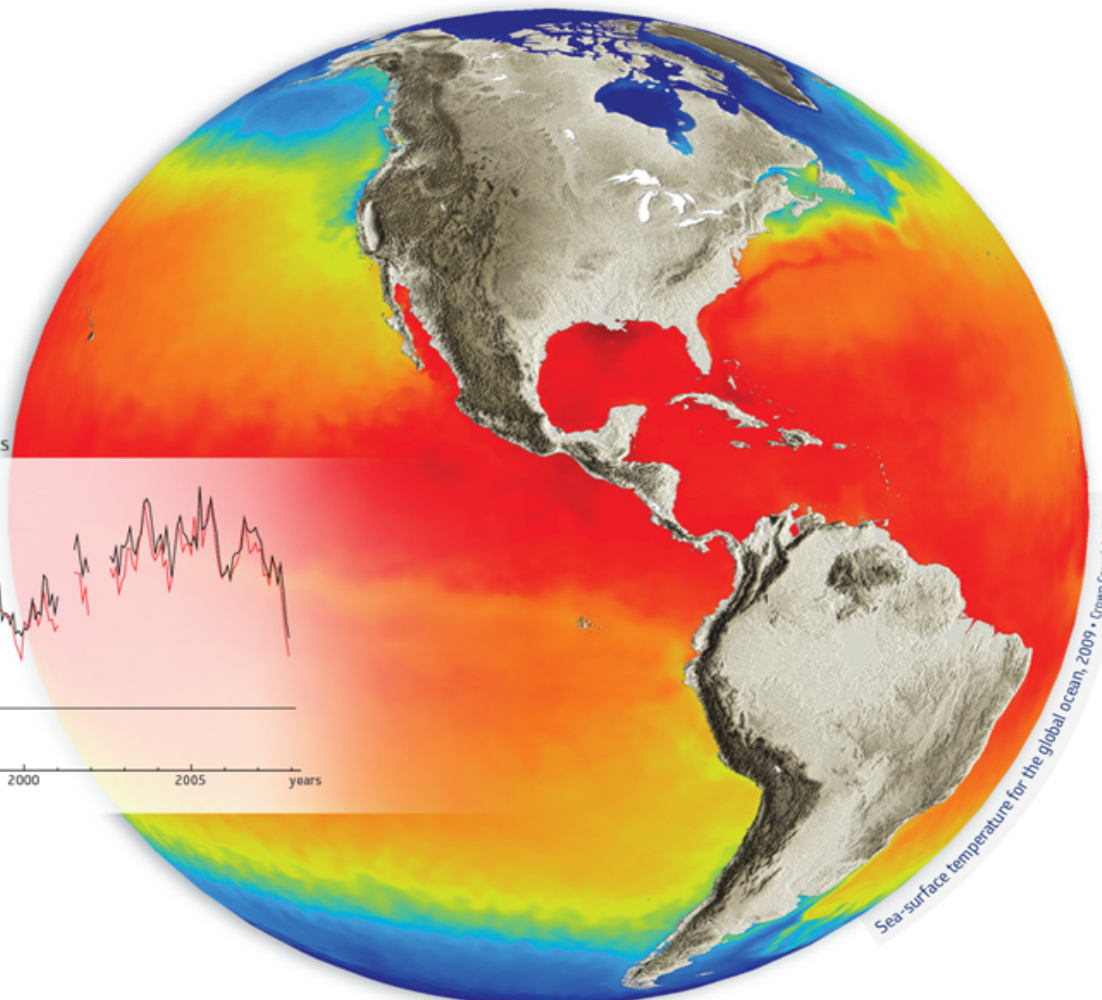
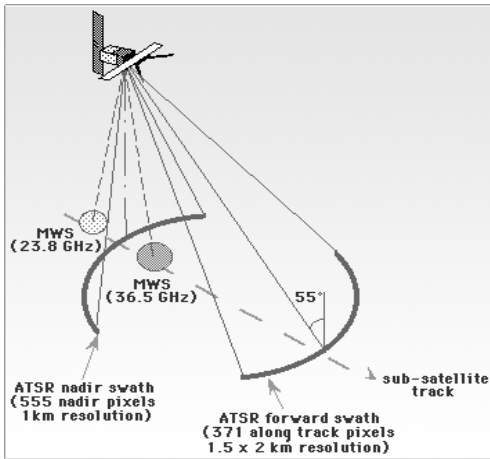
First step focus on
10 ECVs (Clouds, Ocean Colour, SST, Sea Level, Glacier, Fire Disturbances, Aerosol, GHG, Ozone, Land Cover)
+ 3 to be started (Sea-ice, Ice Sheet, Soil Moisture)



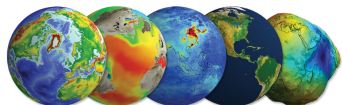
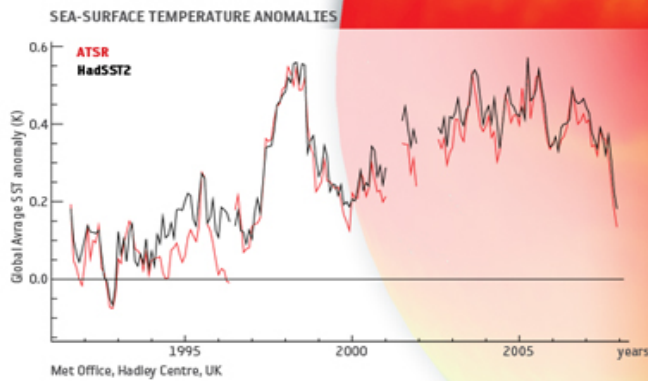
Global Mean Seal Level Rise



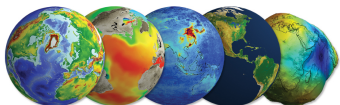
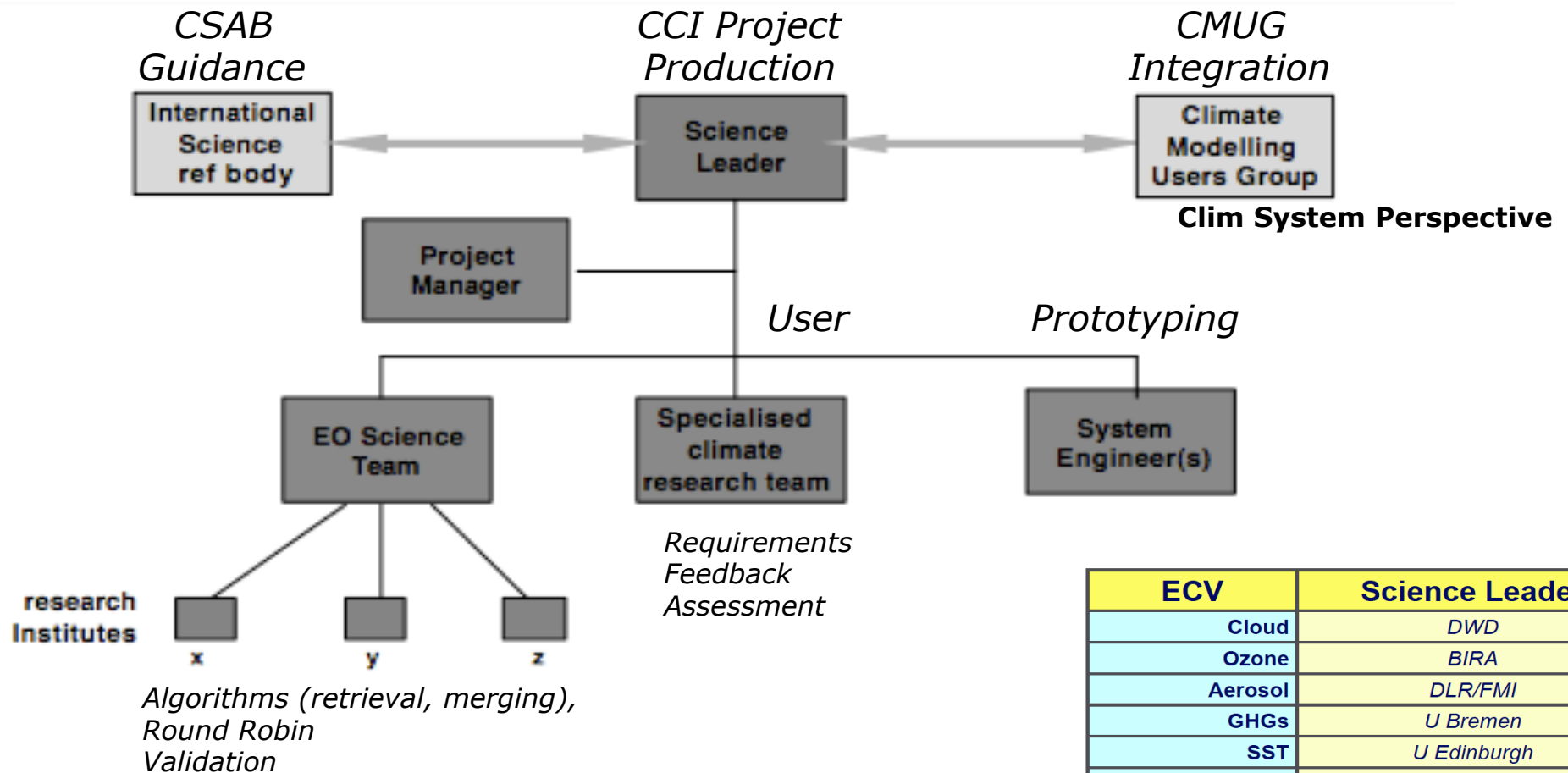
Global Ocean Warming



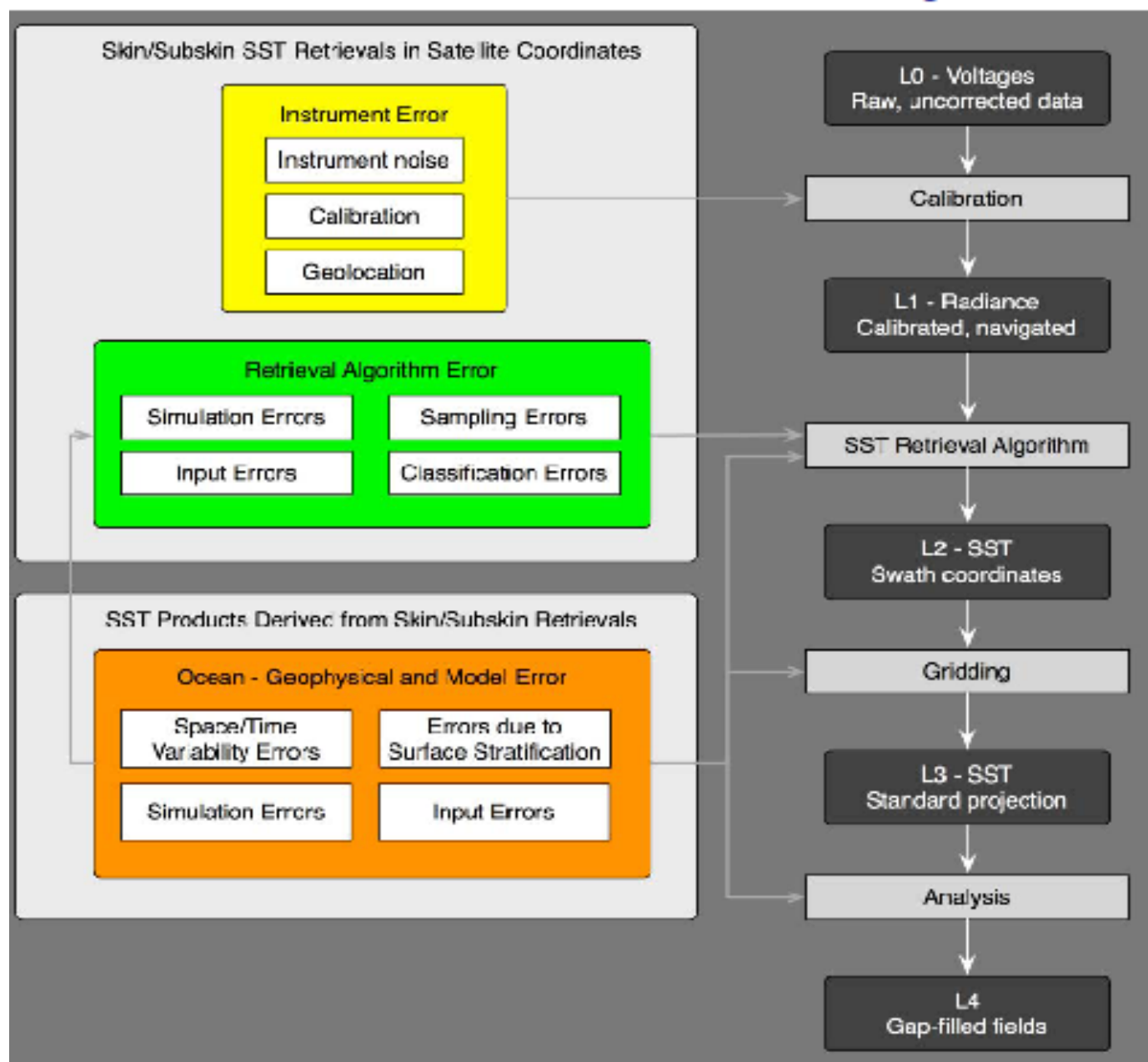
AATSR
High Accuracy
0.3K
Needed to
Capture
Climate Signal



Elements of a Programme – CCI Teams



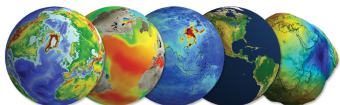
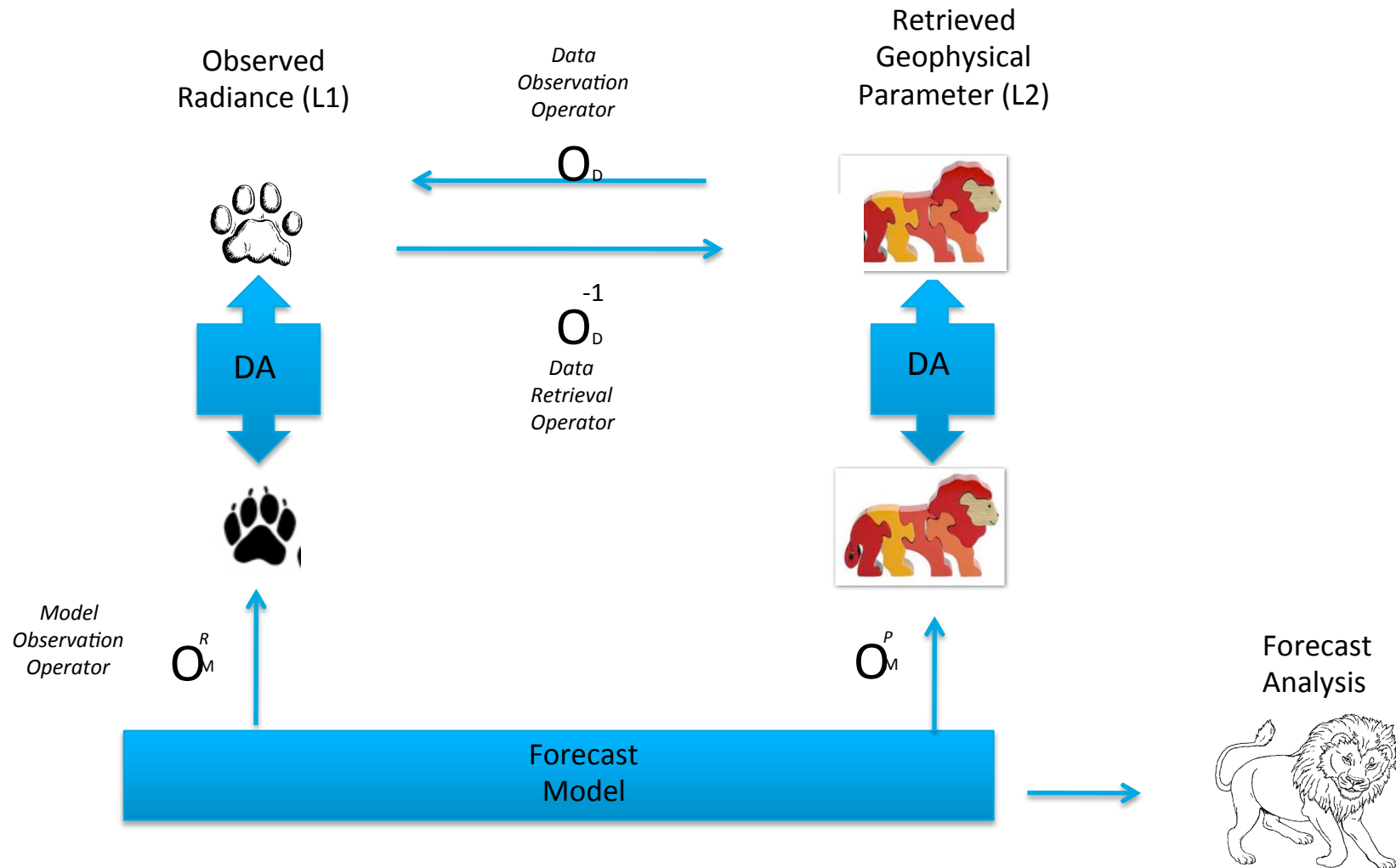
8. Uncertainty estimates



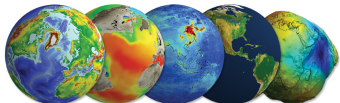
Each processing step is prone to additional error sources.

From Cornillon et al, 2010, Sea-Surface Temperature Error Budget White Paper. (<http://www.ssterrorbudget.org/ISSTST/>)

Multiple Confrontations ..



ESA EO Data Access



Revised ESA EO Data Policy

FREE DATASET:

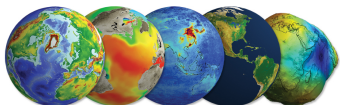
→ For data collections available on-line

- open and free of charge
- user registration done electronically
- for all uses (i.e. science and operational applications)

RESTRAINED DATASET:

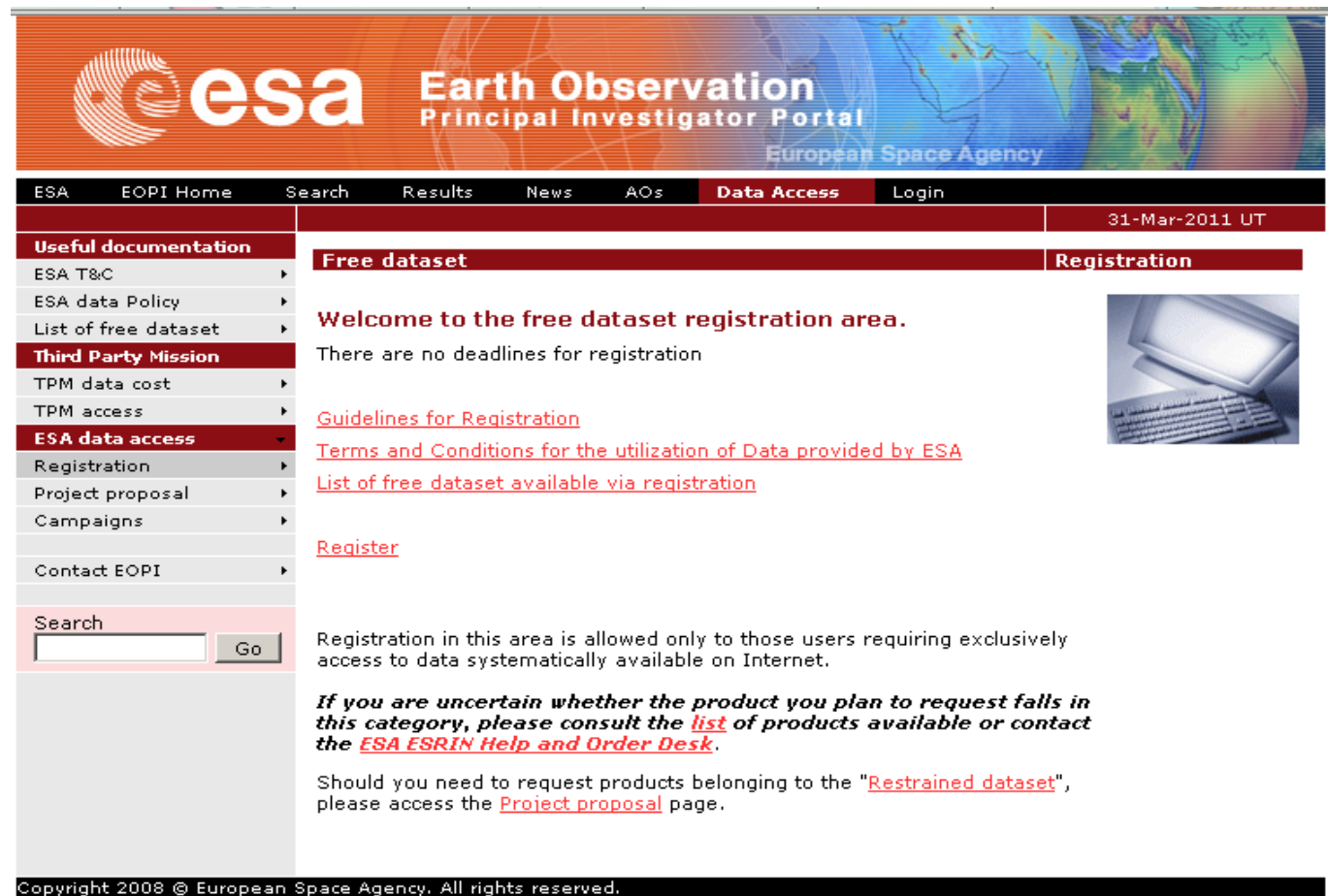
→ For all other datasets not (yet) available on-line

- project proposals received by ESA with data free of charge but with data quota limit related to processing or acquisition constraints,
- for operational SAR applications, possibility to have higher level of priority through SAR commercial Distributing Entities (or through ESA for GMES Services).

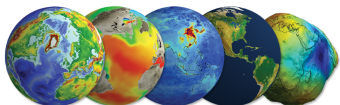


<http://eopi.esa.int/Registration>

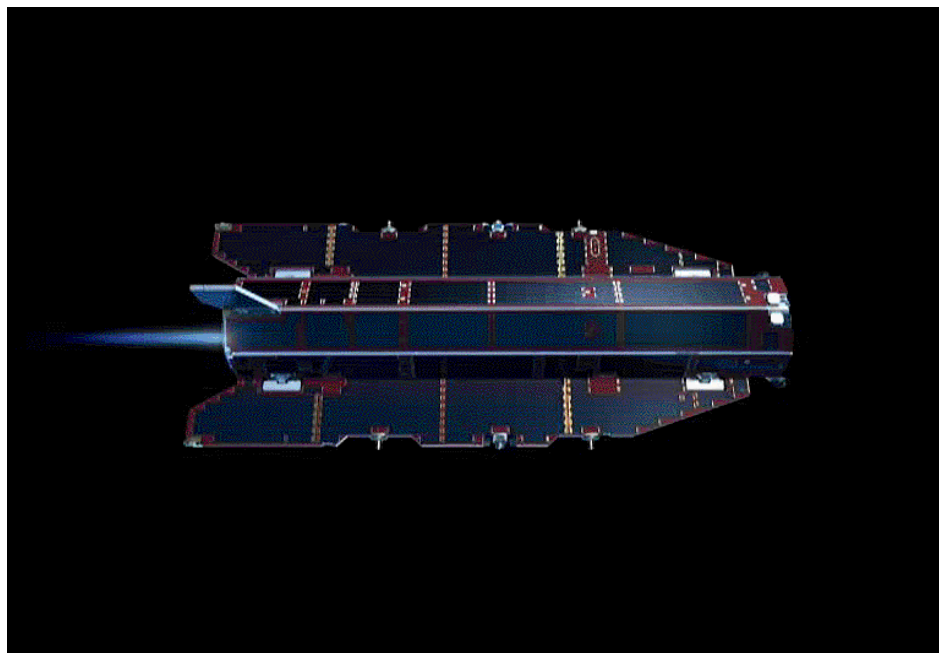
- Users may also contact the ESA's Help and Order Desk, ***EOHelp@esa.int***, for guidance on the registration process.
- Once registered, ESA's helpdesk will provide an account with ordering privileges.



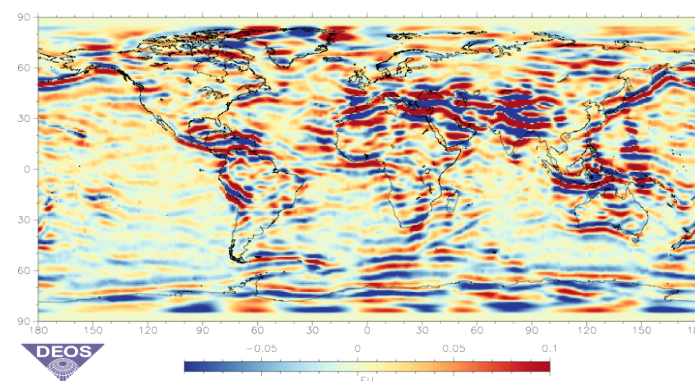
The screenshot shows the ESA Earth Observation Principal Investigator Portal. The header features the ESA logo and the text "Earth Observation Principal Investigator Portal" and "European Space Agency". The navigation bar includes links for "ESA", "EOPI Home", "Search", "Results", "News", "AOs", "Data Access", and "Login". The date "31-Mar-2011 UT" is displayed in the top right. The main content area is titled "Free dataset" and "Registration". It contains a welcome message: "Welcome to the free dataset registration area. There are no deadlines for registration." Below this are links for "Guidelines for Registration", "Terms and Conditions for the utilization of Data provided by ESA", and "List of free dataset available via registration". A "Register" link is also present. A search box is located on the left side of the page. The footer contains the copyright notice: "Copyright 2008 © European Space Agency. All rights reserved."



GOCE (Gravity Field & steady-state Ocean Circulation)



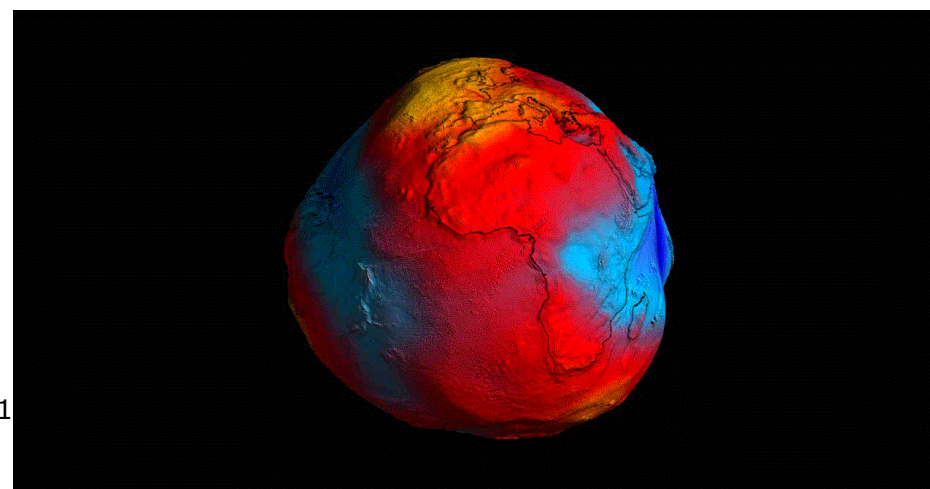
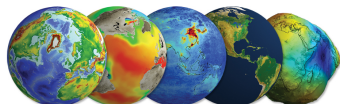
Observed gravity gradients (e.g. U_{xx})
from 260+km altitude since 2009
1-2cm geoid 100km resolution



GOCE Main Objectives

- global ocean circulation and transfer of heat
- + physics of the Earth's interior
- + sea level records, ice sheets and sea level change

New Geoid from GOCE recently unveiled
at the Fourth International GOCE User Workshop
hosted at the Technische Universität München in Munich, March 2011



<http://eo-virtual-archive1.esa.int/Index.html>

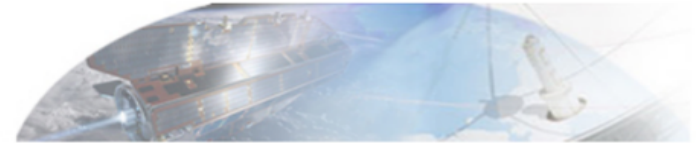
- L1b Products
- L2 Products
- GOCE Gravity Models:

EGM_GOC_2

DIR, TIM, SPW

- Variance/Covariance matrices for GOCE Gravity Models*

EGM_GVC_2



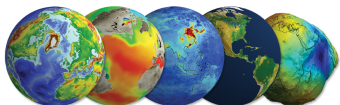
Welcome to ESA GOCE Virtual Archive

For all data published on this site, quality reports, software tools and other relevant information, please see the GOCE main website <http://earth.esa.int/GOCE/>

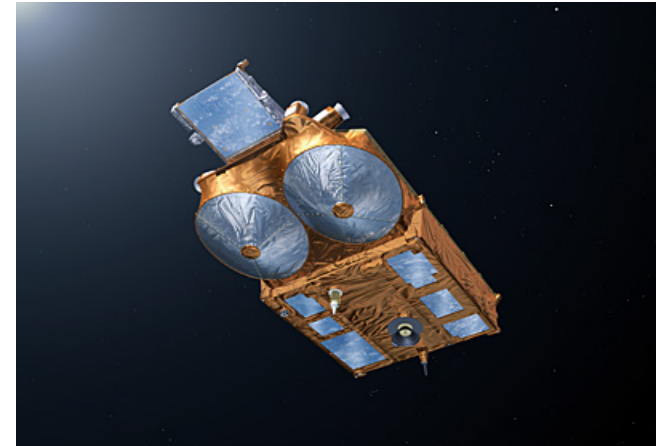
Available products:

| | | | |
|-------------------------------------|--|---------------------------------------|--|
| GOCE Gravity Models | Variance and Covariance matrices for GOCE Gravity Models | GOCE Level 2 products | GOCE Level 1b products |
|-------------------------------------|--|---------------------------------------|--|

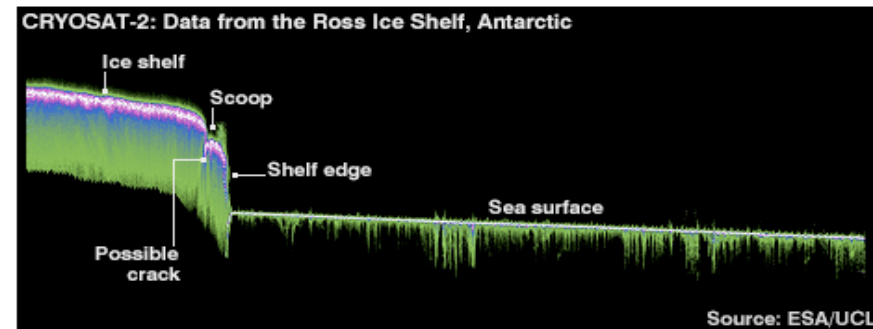
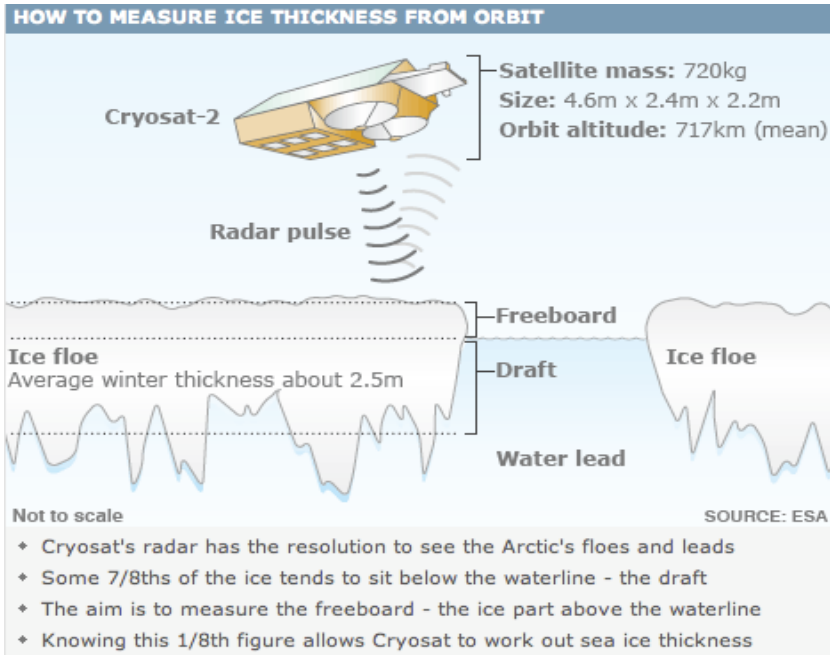
* → Only available on the VOA!



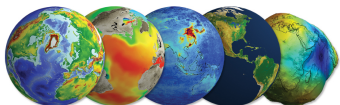
Cryosat



ESA Cryosat
Credit ESA



Cryosat tracks over the Ross Ice Shelf and Ross Sea on 11 April



esa earthnet online
European Space Agency

ESA Earth Home Missions Data Products Resources Applications

1-Apr-2011

EO Data Access

ESA Missions

- CryoSat
- SMOS
- GOCE
- Envisat
- ERS
- Proba
- ESA Earth Observation Campaigns Data
- ESA/EUMETSAT Missions
- ESA Future Missions

Third Party Missions

- Overview
- Current Missions
- Historical Missions
- Potential Missions

Services

- Site Map
- Frequently asked questions
- Glossary
- Credits
- Terms of use
- Contact us

Search GO

Advanced Search

CRYOSAT

What is Cryosat?

What is Cryosat?
CryoSat is Europe's first ice mission. It will provide multi-year elevation data at latitudes never reached before by a satellite altimeter. Cryosat-2 carries sophisticated technologies to measure changes at the margins of the vast ice sheets that overlay Greenland and Antarctica and marine ice floating in the polar oceans. By accurately measuring thickness change in both types of ice, CryoSat-2 will provide information to complete the picture and lead to a better understanding of the role ice plays in the Earth system.

Mission Operations News

Meteo upgrade for OFL altimetry products postponed
Due to technical problems, the change of the MET files announced in the news on 29 March 2011 has been postponed until further notice. Users will be duly informed when the new date for the implementation has been decided.

CORE Geographical Mode Mask
Due to some critical maintenance activities planned for Week 10 (7 - 13 March) at Kiruna, CryoSat will temporarily implement the CORE geographical mode mask instead of the usual one.

Mission Quality

- Performance Reports
- Articles and Studies
- IPF processing and baseline
- Data product status information
- Unavailability periods

Tools

- CryoSat User Tool
- BRAT
- CryoView
- Software Routines

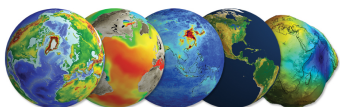
CryoSat

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

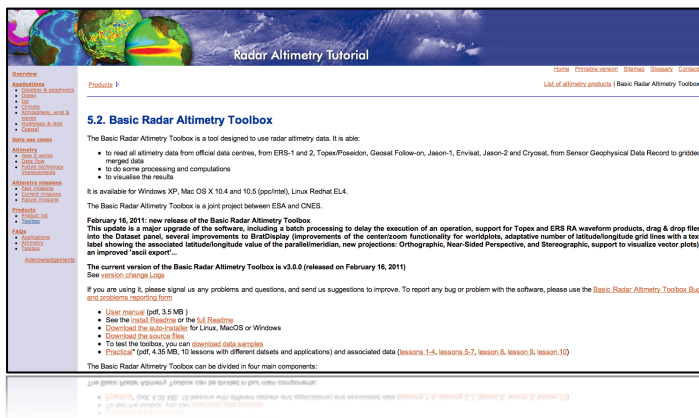
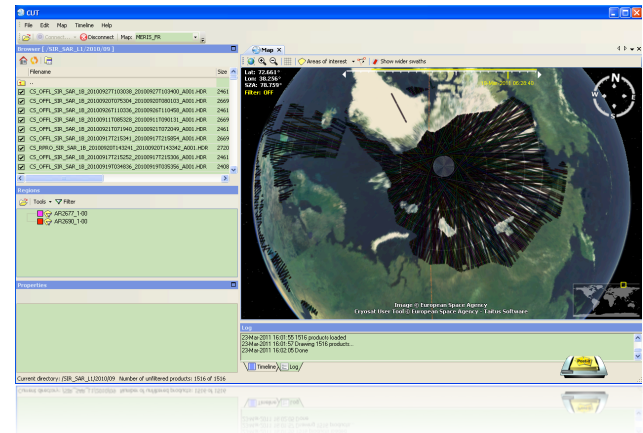


Access to CryoSat data
CryoSat Products Overview
Access to Data Sample
Download Geographical Mode Mask
Download Ground Tracks

...plus tools to read and download data, software routines, data quality, news, etc

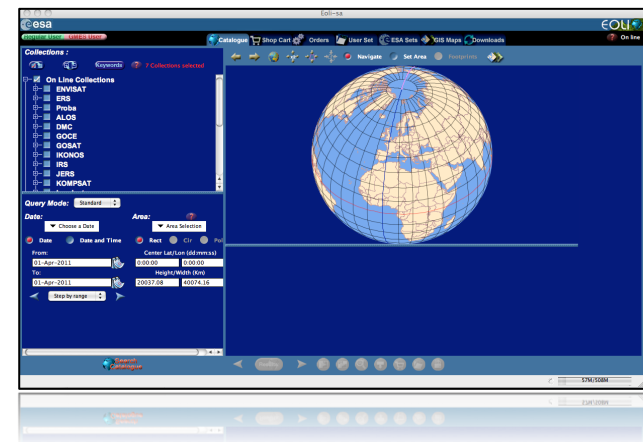


CUT is a tool which allows easy access and download of CryoSat products. It has a intuitive and user-friendly graphical user interface allowing for simultaneous product visualisation geographically on a 3D world map and temporally on a Gantt chart.



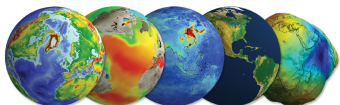
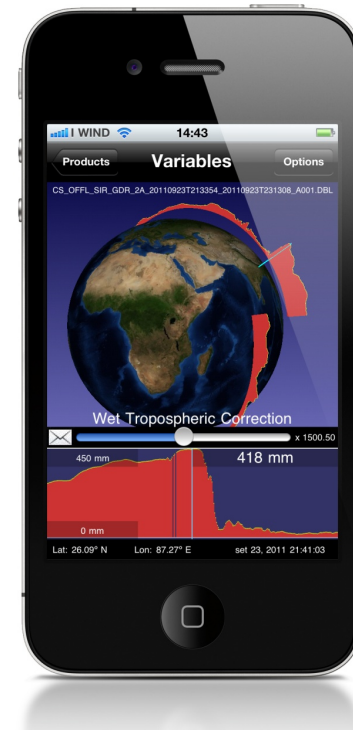
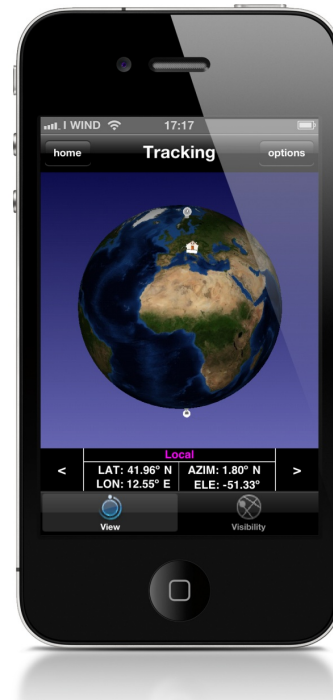
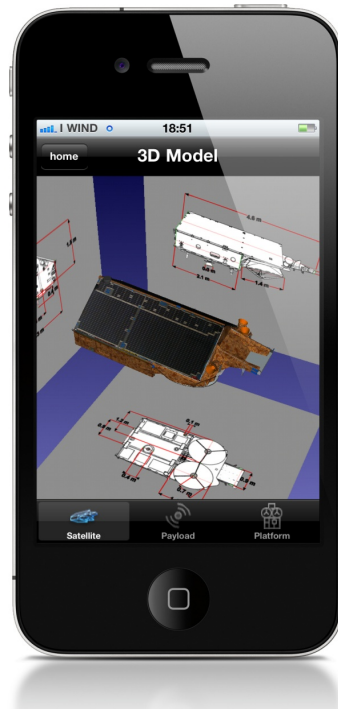
BRAT: the Basic Radar Altimetry Toolbox is a tool designed to use radar altimetry data, do some processing and computations and visualise the results

EOLI-SA is the known ESA online catalogue and ordering tool. For CryoSat is used only for browsing but ordering/downloading Cryosat products. Available July 2011

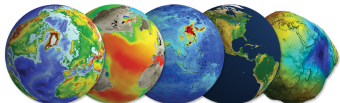


CryoView is a tool capable of opening and decoding CryoSat data. It then displays the contents as tables, graphs or as images as appropriate.

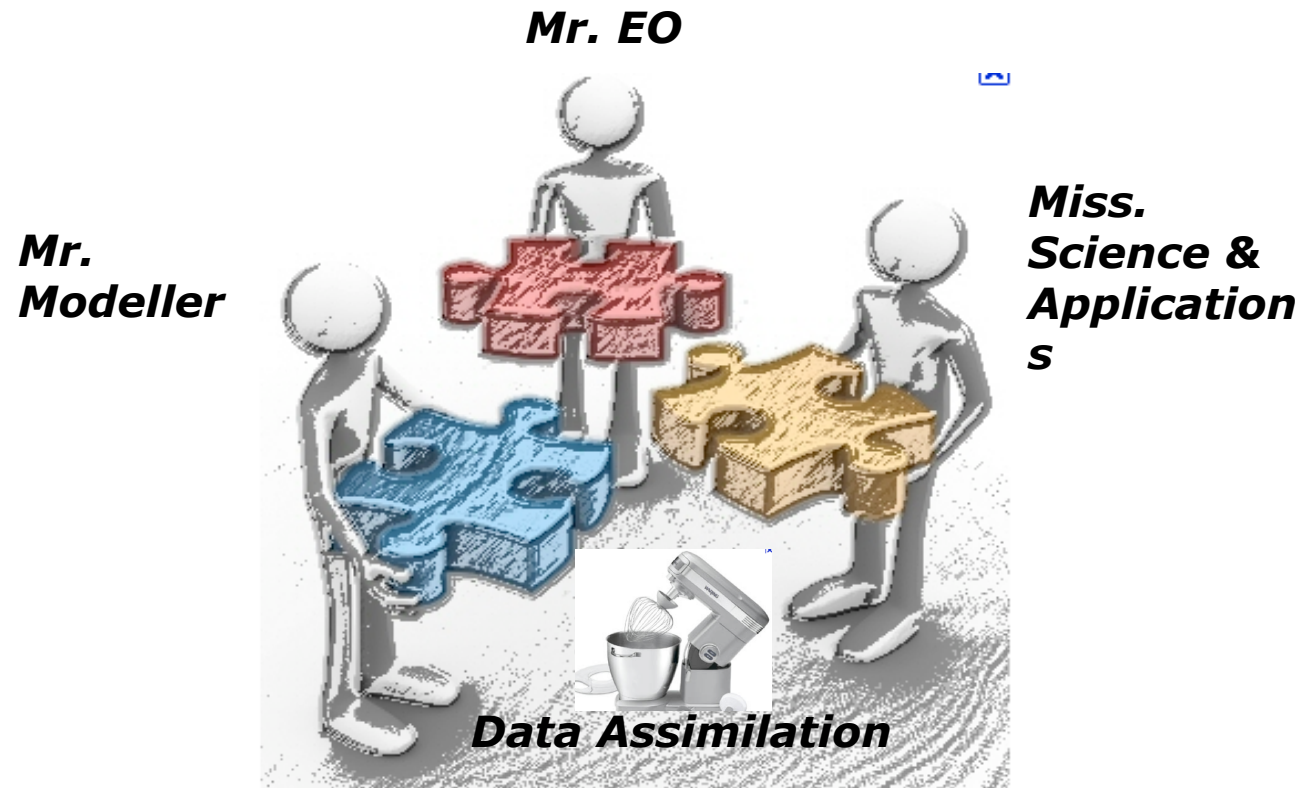
...plus other software routines



Conclusions



Confronting Data & Models



*"No one trusts a model except the man who wrote it;
Everyone trusts an observation except the man who made it."
Harlow Shapley*

