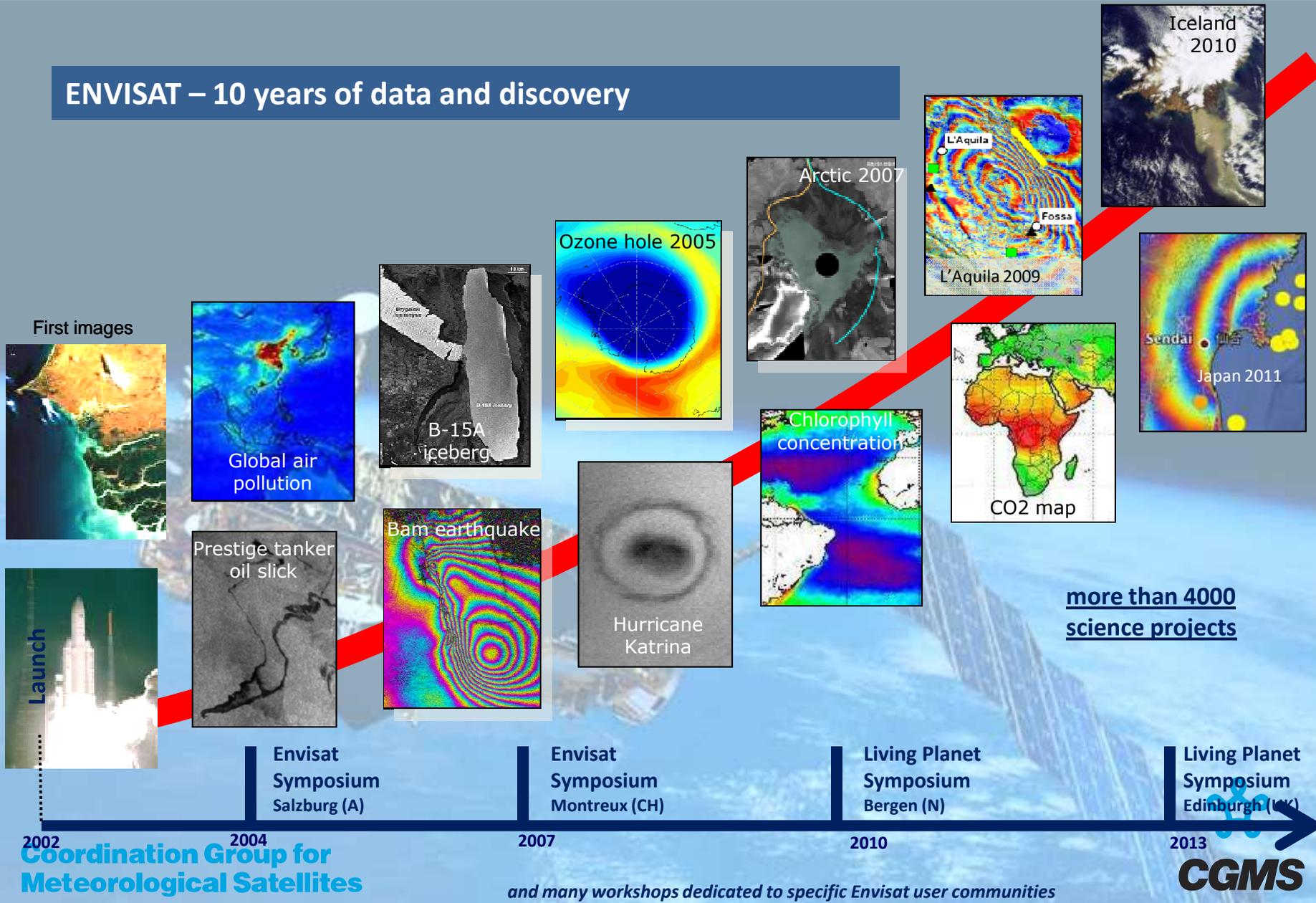




## ESA'S EARTH OBSERVATION PROGRAMMES



## ENVISAT – 10 years of data and discovery



ESA'S EARTH EXPLORER SATELLITES – HIGH-END SCIENCE RESEARCH MISSIONS

**GOCE**  
17 March 2009 -  
11 November 2013

**SMOS**  
2 Nov. 2009

**ADM  
AEOLUS**

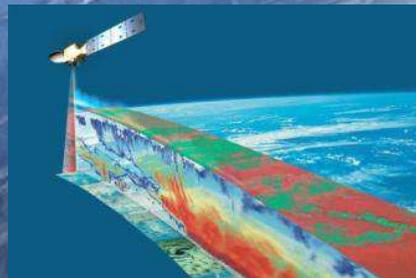
**CryoSat-2**  
8 April 2010

**SWARM**  
22 November 2013

**EARTH  
CARE**

**7<sup>th</sup> EE  
BIOMASS**

**8<sup>th</sup> EE**



**Coordination Group for  
Meteorological Satellites**

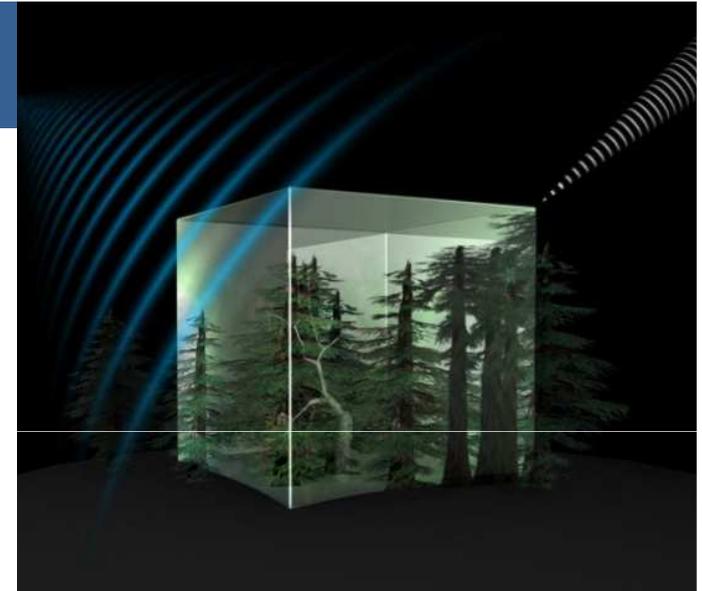
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## FUTURE EARTH EXPLORER SATELLITES

BIOMASS will be the 7<sup>th</sup> Earth Explorer:

- **BIOMASS** will provide **continuous global interferometric and polarimetric Radar observations of forested areas.**
- Essential to the understanding of the role of forests in Earth's **carbon cycle** and in **climate change.**



Candidate missions for the 8<sup>th</sup> Earth Explorer:

- **FLEX:** to provide **global maps of vegetation fluorescence**
- **CarbonSat:** quantify and monitor the **distribution of carbon dioxide and methane.**

## THE ESA CLIMATE CHANGE INITIATIVE

- **EO satellites deliver global, consistent and long-term data for Essential Climate Variables**, constituting the foundation supporting Climate Research and Applications
- **GMES Sentinels will provide long-term continuity for monitoring our planet**
- Gaps in time series => irreversible damage to the foundation underpinning Climate Research



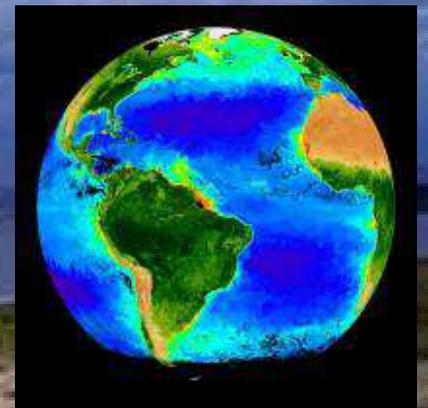
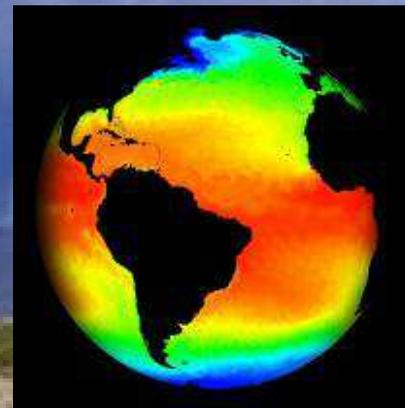
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## ESSENTIAL CLIMATE VARIABLES UNDER THE ESA CCI

- Cloud Properties
- Carbon Dioxide, Methane & others GHGs
- Ozone
- Aerosol properties
- Sea Surface Temperature
- Sea Level
- Sea Ice
- Ocean Colour
- Glaciers and ice caps
- Land cover
- Fire disturbance
- Soil moisture



## METEOROLOGICAL MISSIONS

- Cooperation model:
  - **ESA** develops and launches the European meteorology missions
  - **EUMETSAT** operates them
- Currently Meteosat Second Generation (MSG) in GEO and MetOp in LEO
- MSG-3 and MetOp-B successfully launched in 2012
- MeteoSat Third Generation (MTG) and MetOp Second Generation (Post-EPS) under development



## GMES SPACE COMPONENT – UPCOMING LAUNCHES

- GMES is a European space flagship programme
- GMES provides the necessary data for operational monitoring of the environment and for civil security

### Sentinel-1A – launched 3 April 2014



Sentinel-2A



Sentinel-3A



## GMES SERVICES

- The Sentinels provide the basis for offering GMES Services to European users
  - Land Monitoring
  - Marine Services
  - Atmosphere
  - Emergency Response
  - Civil Security
  - Climate Change
- ESA and the EU invested 100 M€ each in the preparation of a wide user basis
  - **330+ organizations** are ready to use Sentinel data from services

