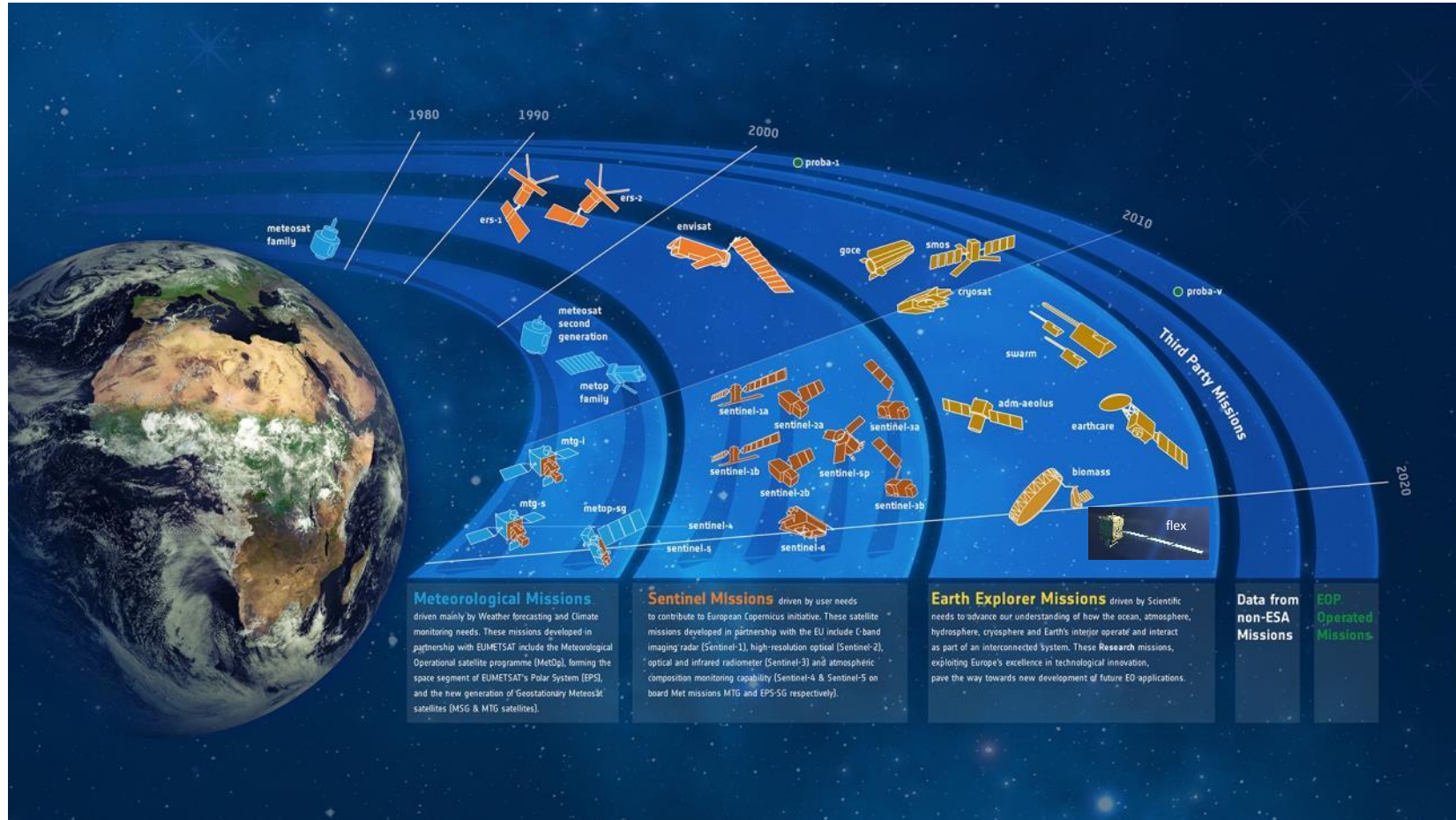


# Status report on the current and future satellite systems by the European Space Agency (ESA)

Presented to CGMS-44, Plenary session, agenda item D2

## Overview - Planning of ESA satellite systems



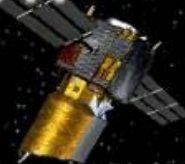
ESA'S EARTH EXPLORER SATELLITES – HIGH-END SCIENCE RESEARCH MISSIONS

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

**SMOS**  
2 Nov. 2009



**ADM-AEOLUS**  
2017



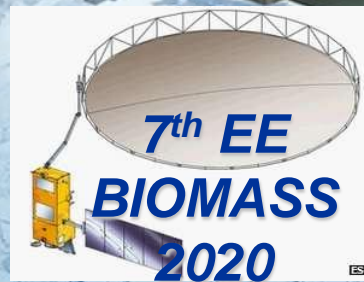
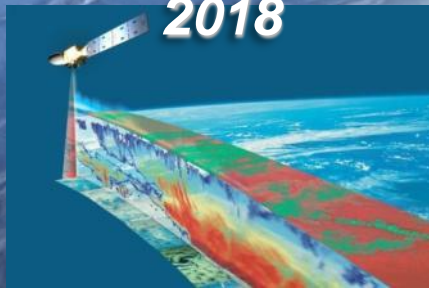
**CryoSat-2**  
8 April 2010



**SWARM**  
22 November 2013



**EARTH  
CARE**  
2018



**7th EE  
BIOMASS**  
2020

**8th EE  
FLEX**  
2022

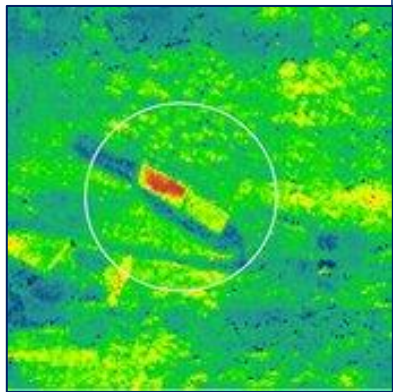
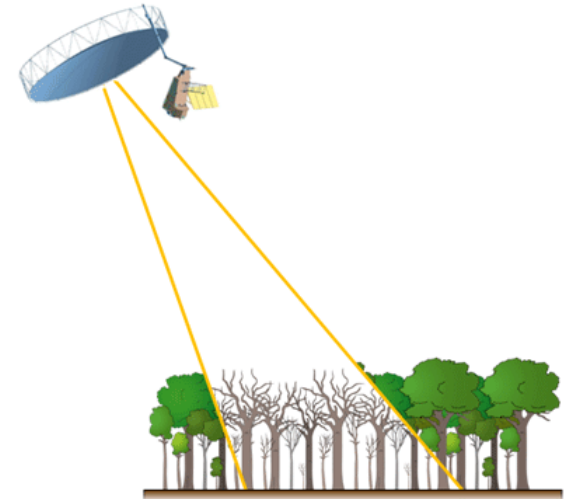




## FUTURE EARTH EXPLORER SATELLITES

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**.

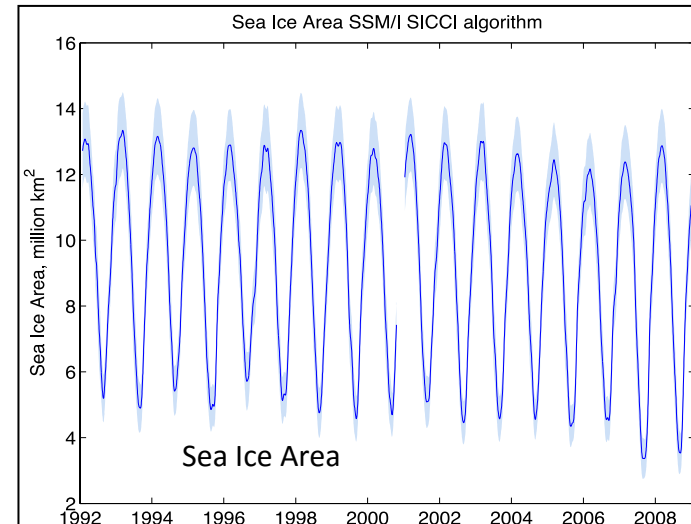
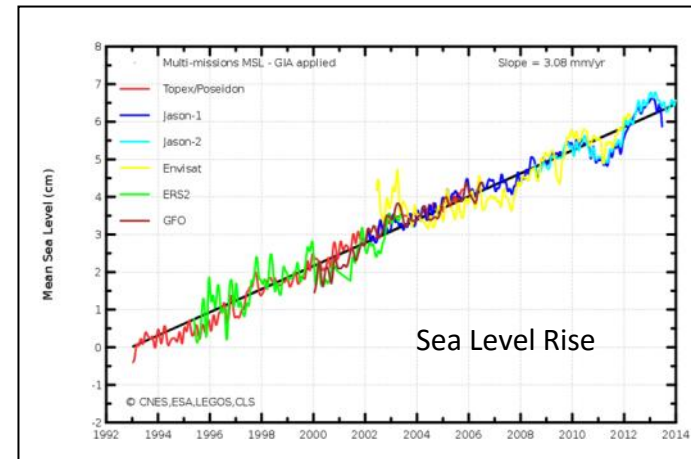


FLEX will be the 8<sup>th</sup> Earth Explorer:

- **FLEX** will provide **global maps of vegetation fluorescence to quantify photosynthetic activity** to improve our understanding of the way carbon moves between plants and the atmosphere and how photosynthesis affects the carbon and water cycles.

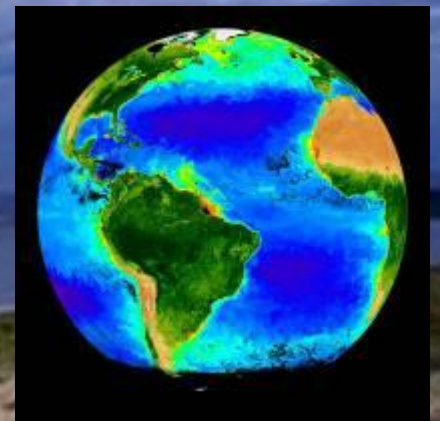
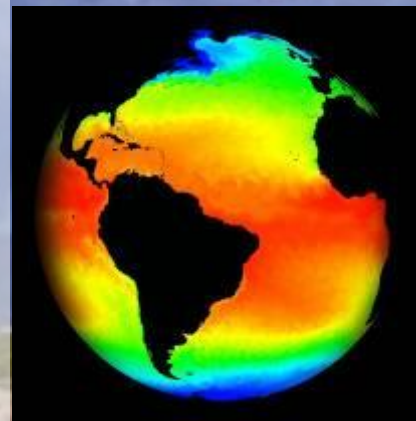
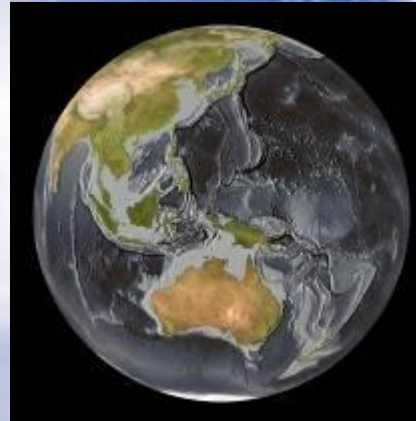
## THE ESA CLIMATE CHANGE INITIATIVE

- The ESA Climate Change Initiative launched in 2009 aims to address the GCOS Essential Climate Variable (ECV) requirements for satellite datasets and derived products.
- The CCI complements existing efforts in Europe (e.g. led by EUMETSAT through the CM SAF) and internationally which focus on datasets characterizing meteorological aspects of the climate system.



## ESSENTIAL CLIMATE VARIABLES UNDER THE ESA CCI

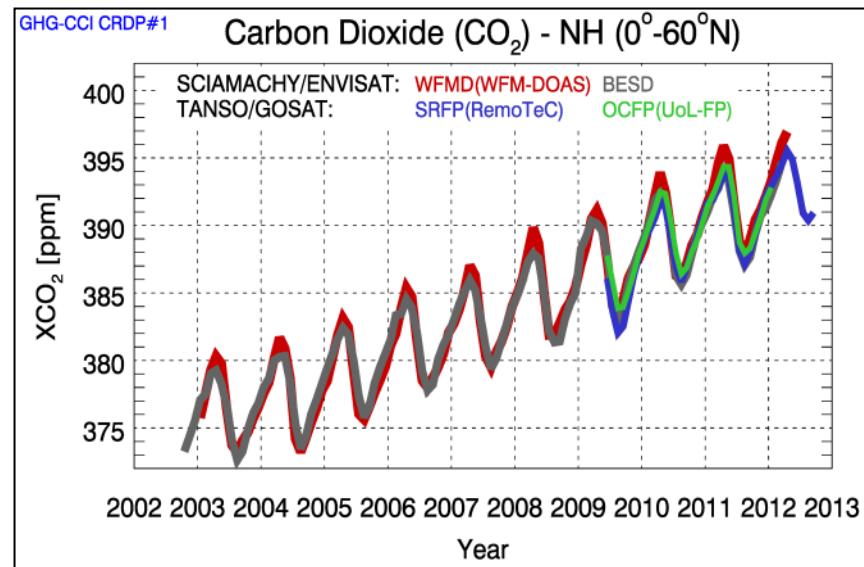
- Cloud Properties
- Carbon Dioxide, Methane & others GHGs
- Ozone
- Aerosol properties
- Sea Surface Temperature
- Sea Level
- Sea Ice
- Ocean Colour
- Glaciers
- Ice sheets – Greenland and Antarctica
- Land cover
- Fire disturbance
- Soil moisture



## THE ESA CLIMATE CHANGE INITIATIVE: PLANS FOR THE FUTURE

- ESA plans to extend the CCI activities for the period 2018-2026 to:
  - Cover new ECVs;
  - Continue R&D activities and the set of ECVs already part of CCI
  - Study multiple ECV topics (such as Fluxes, Cycles ...etc...); and,
  - Re-enforce outreach activities (data access and user tool box, visualization and post docs research grants).

Northern Hemisphere CO<sub>2</sub> concentration from different retrieval algorithms applied to SCIAMACHY and TANSO data.





## METEOROLOGICAL MISSIONS

- Cooperation model:
  - **ESA** develops the new European meteorological missions and procures recurrent satellites
  - **EUMETSAT** is responsible for the overall system (launch services, ground segment, satellite operation)
- Currently Meteosat Second Generation (MSG) in GEO and MetOp in LEO
  - MSG-3 and Metop-B launched in 2012, MSG-4 launched in July 2015, Metop-C in 2017
- MeteoSat 3<sup>rd</sup> Generation (MTG) and Metop 2<sup>nd</sup> Generation (Post-EPS) under development



MSG-4 SEVIRI First Image  
4 August 2015



## COPERNICUS SPACE COMPONENT – UPCOMING LAUNCHES

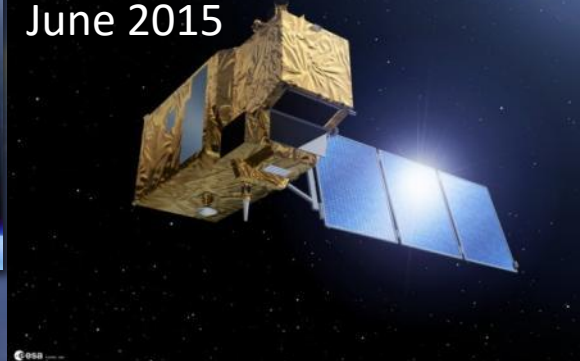
- COPERNICUS is a European space flagship programme
- COPERNICUS provides the necessary data for operational monitoring of the environment and for civil security

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

**Sentinel-1B – launched 25 April 2016**



**Sentinel-2A – launched 23 June 2015**



**Sentinel-3A – launched 16 February 2016**



Sentinel-5Precursor due for launch in October 2016

Sentinel-6 (aka Jason-CS) approved in September 2015

## COPERNICUS SERVICES

- The Sentinels provide the basis for offering COPERNICUS Services to European users
  - Land Monitoring
  - Marine Environment Monitoring
  - Atmosphere Monitoring
  - Emergency Management
  - Security
  - Climate Change
- Hundreds of users have already started to use Sentinel data, taking advantage of the free and open data policy

