

MONITORING WEATHER AND CLIMATE FROM SPACE



Alain Ratier

Director-General

International Ocean Colour Science Meeting, Darmstadt, 6 May 2013



EUMETSAT is an intergovernmental organisation with 26 Member and 5 Cooperating States

Member States



AUSTRIA



BELGIUM



CROATIA



CZECH REPUBLIC



DENMARK



FINLAND



FRANCE



GERMANY



GREECE



HUNGARY



IRELAND



ITALY



LATVIA



LUXEMBOURG



NETHERLANDS



NORWAY



POLAND



PORTUGAL



ROMANIA



SLOVAK REPUBLIC



SLOVENIA



SPAIN



SWEDEN



SWITZERLAND



TURKEY



UNITED KINGDOM

Cooperating States



BULGARIA



ESTONIA*



ICELAND



LITHUANIA*



SERBIA

* Full membership pending ratification

EUMETSAT's mission

- Establish, maintain, and exploit European systems of operational meteorological satellites, taking into account as far as possible WMO recommendations
- Further objective: contribute to the operational monitoring of climate and detection of climate change

EUMETSAT: what we deliver

- Exploit operational satellite systems to monitor weather, atmospheric composition, *ocean*, global land, climate
- Deliver cost efficient operational satellite data, product and support services to the worldwide user community, as agreed by our Member States
 - Around the clock, 365 days a year, over decades
 - In real time and off line
 - Including agreed support to Copernicus
- Encourage the maximum use of data/products

Current EUMETSAT satellites



METOP A-B

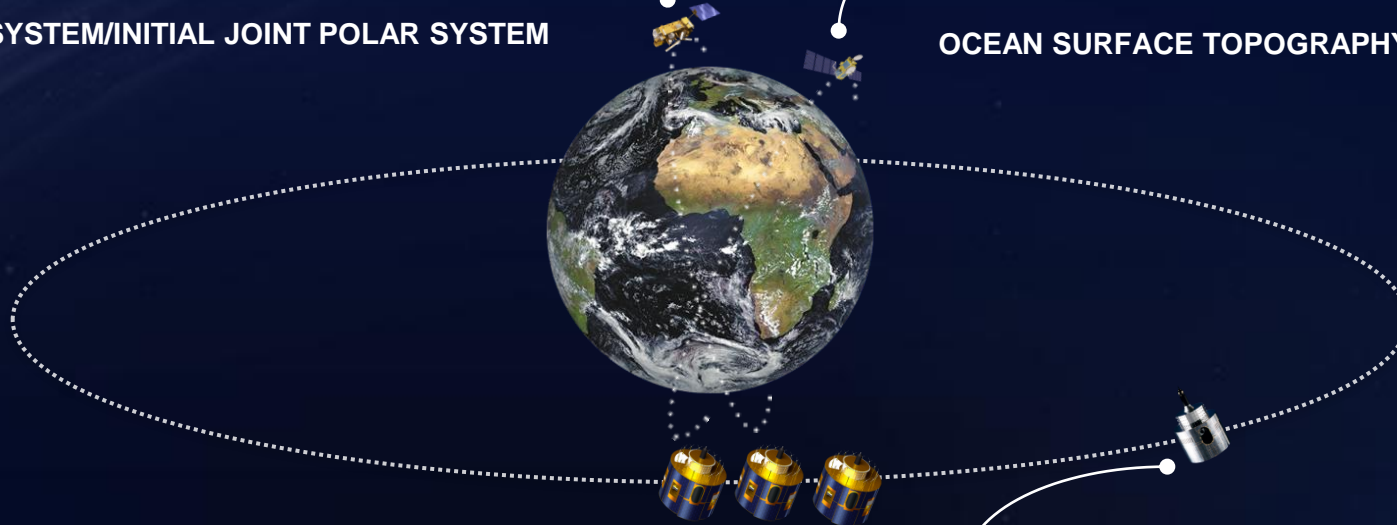
(LOW-EARTH, SUN – SYNCHRONOUS ORBIT)

EUMETSAT POLAR SYSTEM/INITIAL JOINT POLAR SYSTEM

JASON-2

(LOW-EARTH, 63° INCL. NON SYNCHRONOUS ORBIT)

OCEAN SURFACE TOPOGRAPHY MISSION



METEOSAT 8-9-10 (2nd GENERATION)

(GEOSTATIONARY ORBIT)

TWO-SATELLITE SYSTEM:

- METEOSAT-10: FULL DISK IMAGERY MISSION AT 0° (15 MN)
- METEOSAT-9: RAPID SCAN SERVICE OVER EUROPE AT 9.5°E (5 MN)
- METEOSAT- 8: BACK UP AT 3.5°E

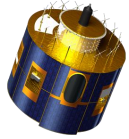
METEOSAT – 7 (1st GENERATION)

(GEOSTATIONARY ORBIT)

INDIAN OCEAN DATA COVERAGE MISSION AT 57°5 E
(UNTILL END 2016)

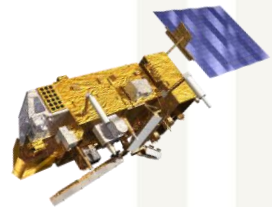
EUMETSAT Mission Planning: ocean monitoring

YEAR 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39



SEA SURFACE TEMPERATURE

INCOMING RADIATIVE FLUXES

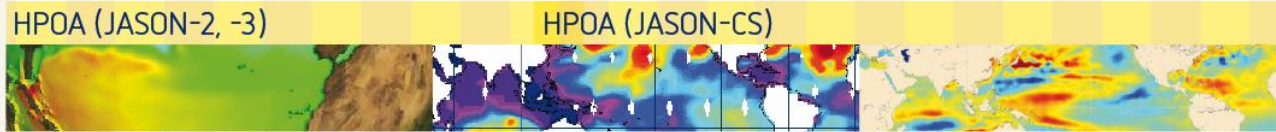
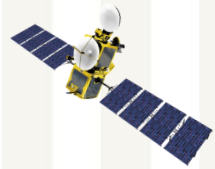


SEA SURFACE TEMPERATURE

SEA ICE

SEA SURFACE WIND

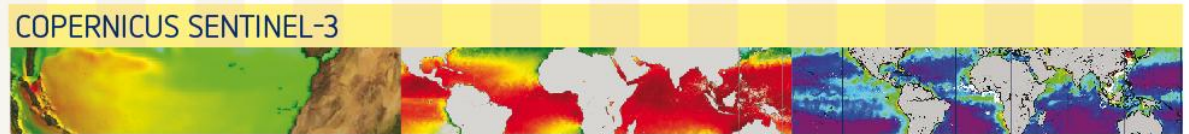
PRECIPITATION



SEA SURFACE TOPOGRAPHY

WAVE HEIGHT

MEAN SEA LEVEL



SEA SURFACE TOPOGRAPHY

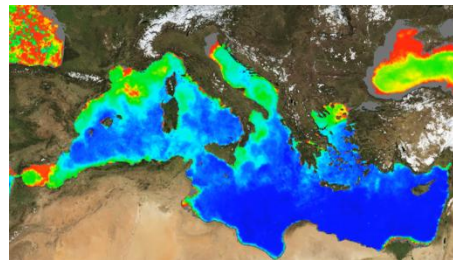
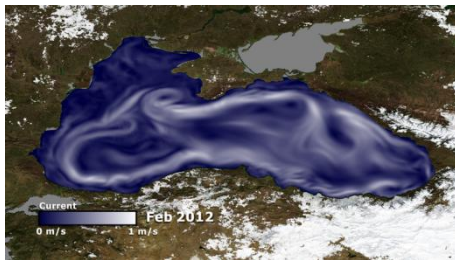
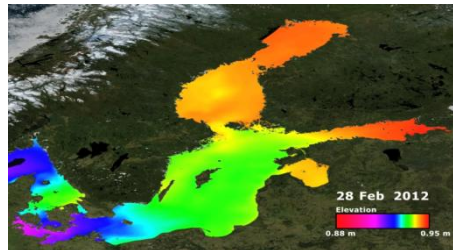
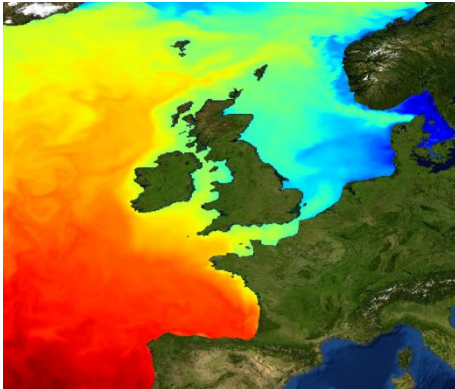
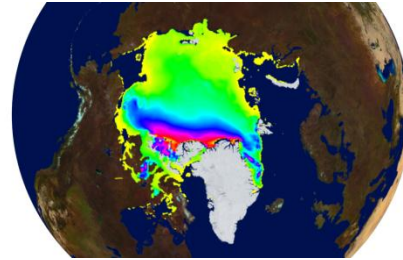
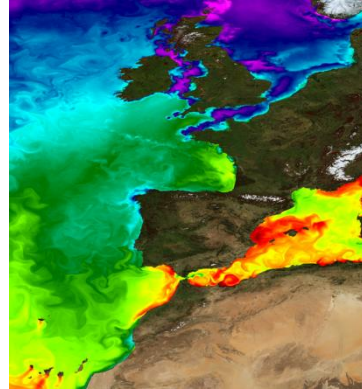
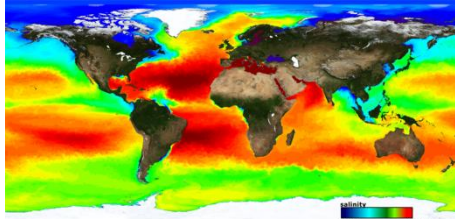
SEA SURFACE TEMPERATURE

OCEAN COLOUR

EUMETSAT and the Copernicus Marine service (1/2)

- Copernicus (formerly GMES, Global Monitoring for Environment and Security): joint EU/ESA initiative
- The Copernicus marine component:
 - Stimulates the development of operational oceanography in Europe
 - Creates new opportunities for the research community

Copernicus is a reality: MyOcean delivers

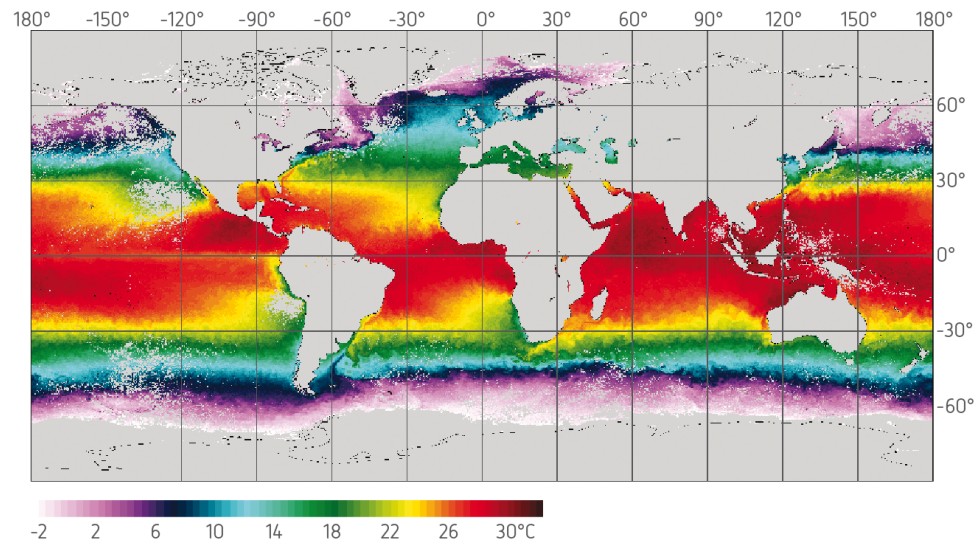
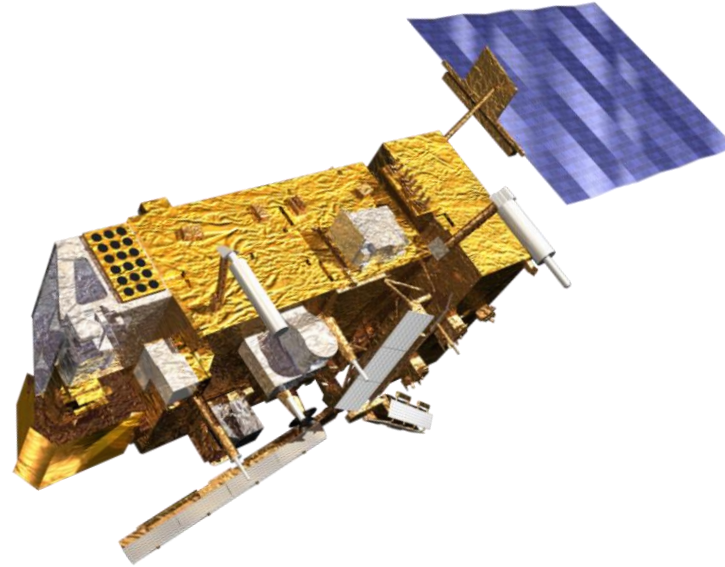
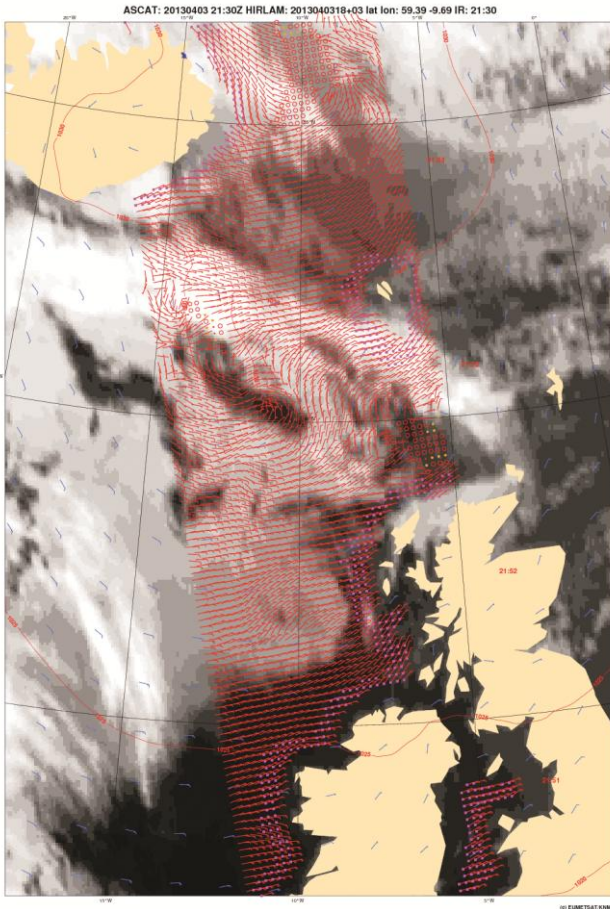


MYOCEAN SERVICE AREAS

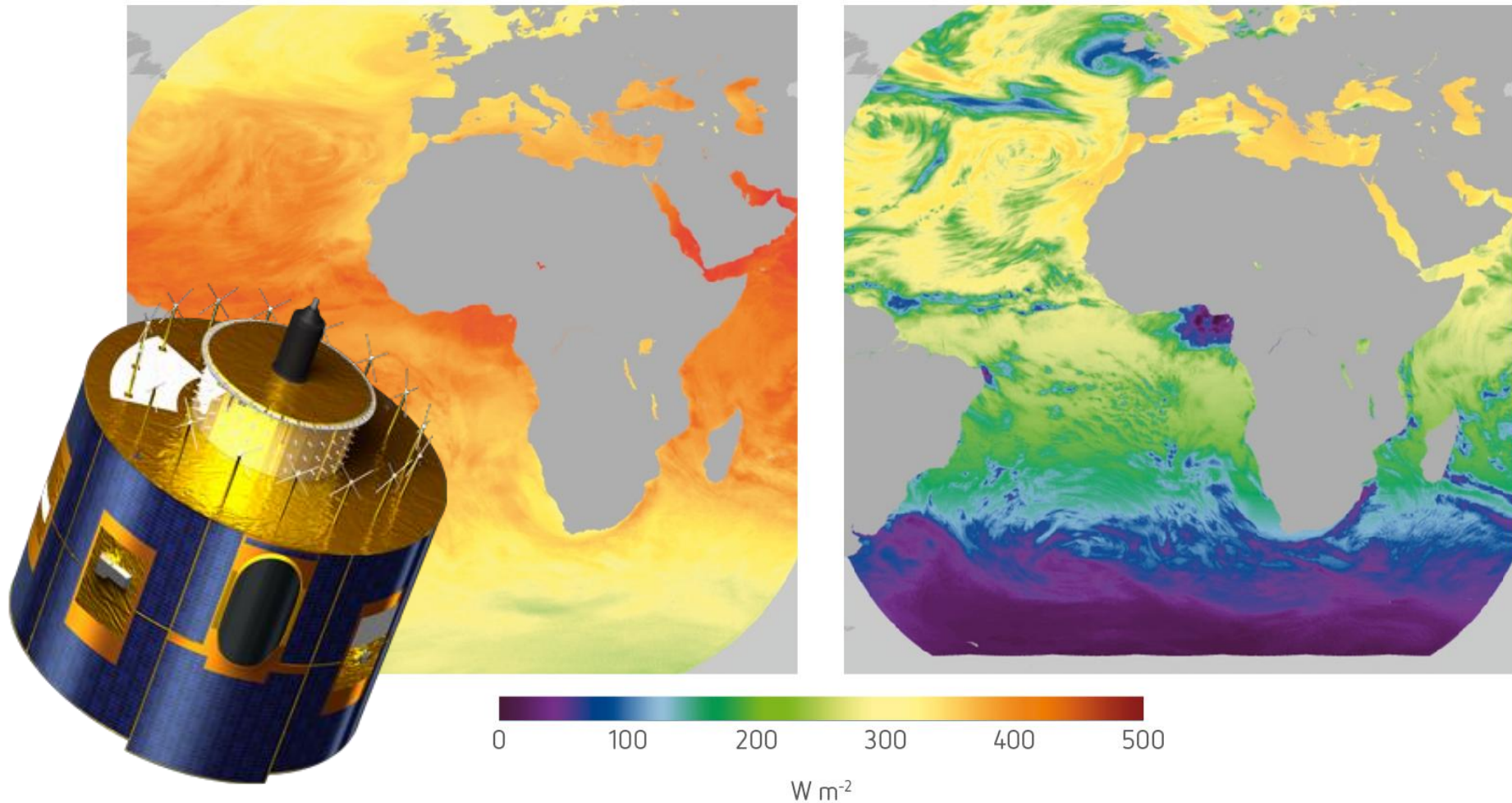
- 1 GLOBAL OCEAN
- 2 ARCTIC OCEAN
- 3 BALTIC SEA
- 4 ATLANTIC-EUROPEAN NORTH WEST SHELF-OCEAN
- 5 ATLANTIC-IBERIAN BISCAY IRISH-OCEAN
- 6 MEDITERRANEAN SEA
- 7 BLACK SEA



Metop satellites – global ocean observations



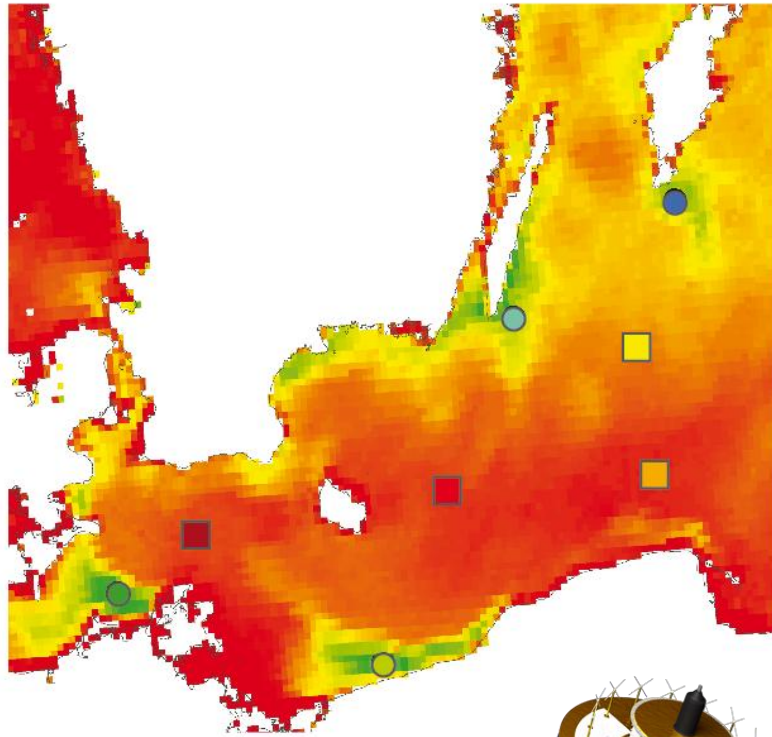
Geostationary orbit – Meteosat air-sea fluxes



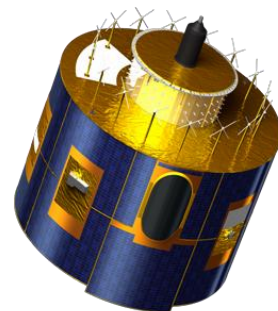
Incoming long wave (left) and solar (right) fluxes at the ocean surface (in W m^{-2}), integrated over 24 hours, as extracted from Meteosat imagery for 14 June 2012 (source: OSI SAF)

The potential of Meteosat for coastal oceanography

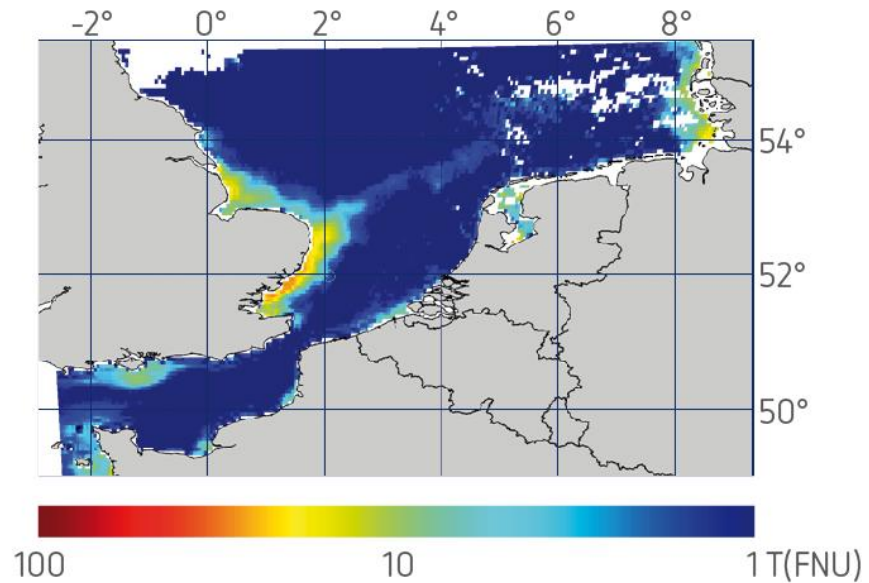
Meteosat infrared imagery and upwelling in the Baltic Sea



ISource: IOPAS)

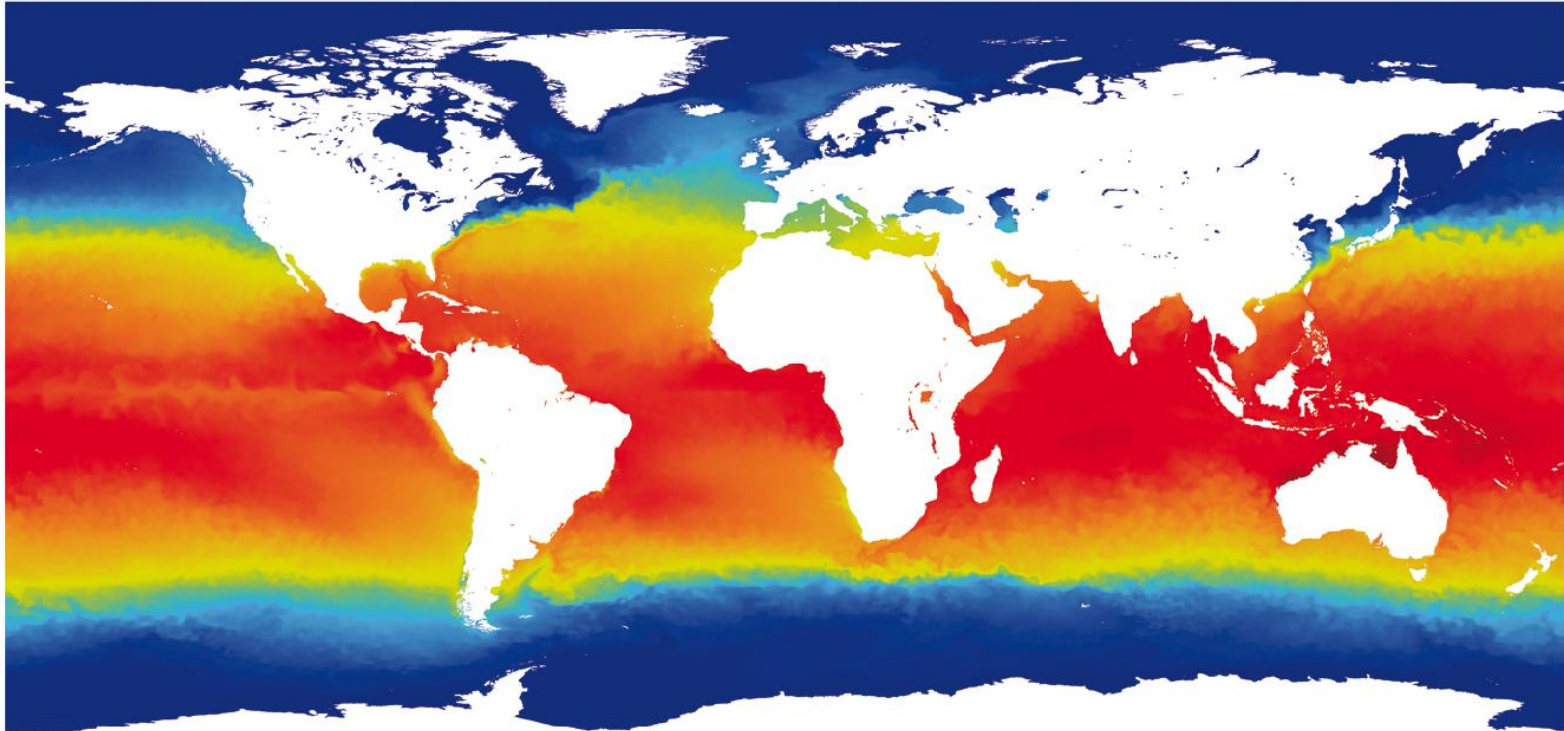


Meteosat visible imagery and detection of total suspended matter (TSM) in turbid waters



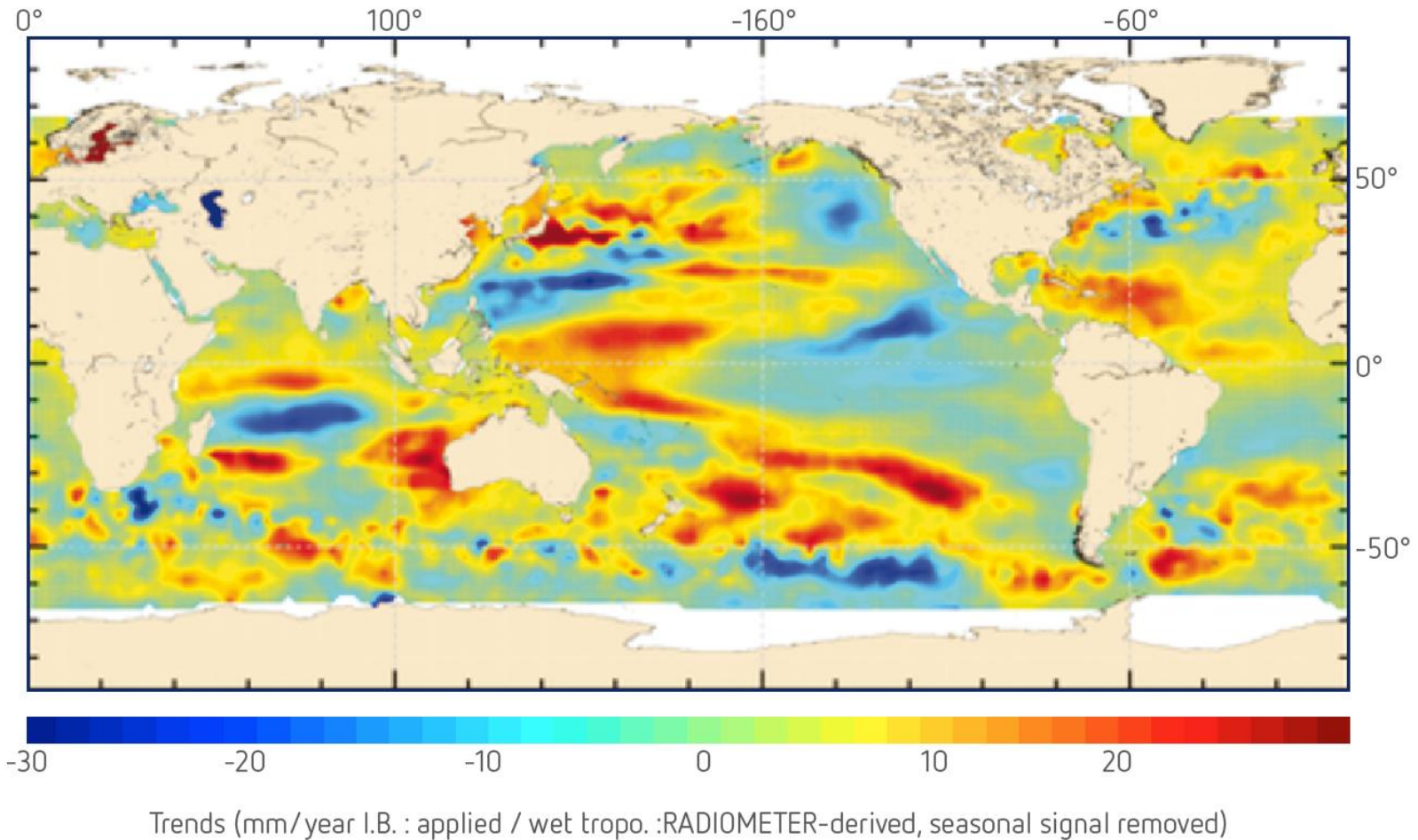
(source: G. Neukermans, RBINS/MUMM)

Combining Geostationary and LEO orbits



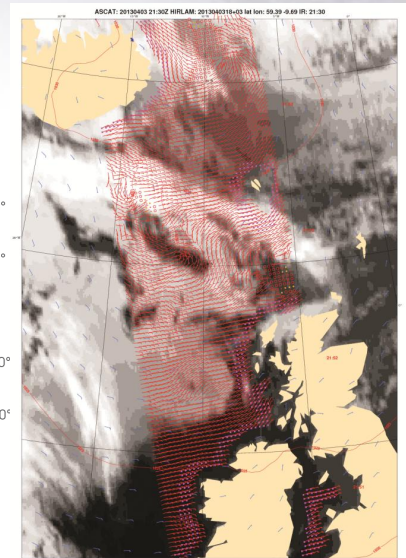
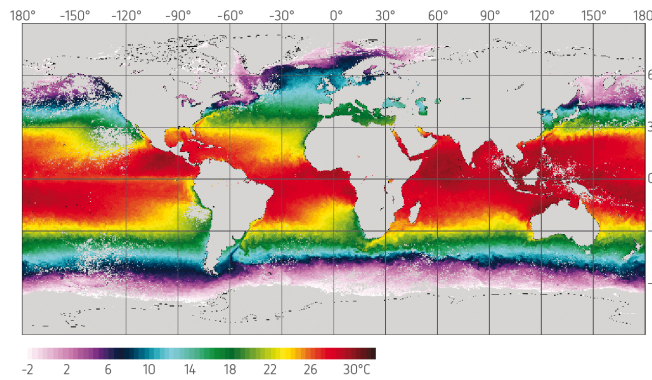
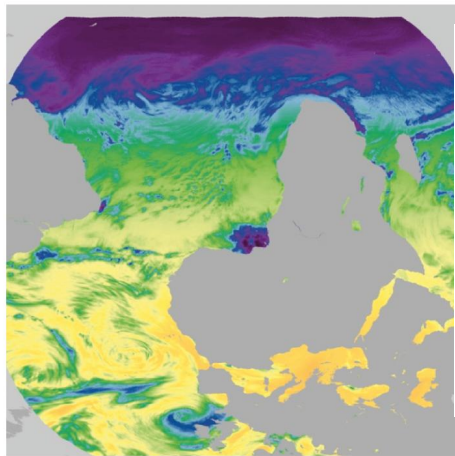
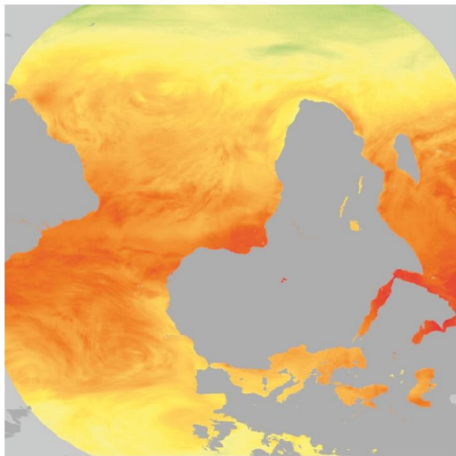
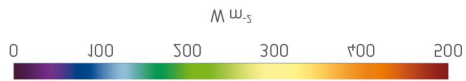
High resolution (~ 5km) global daily analysis of the sea surface temperature combining observations from Meteosat and polar orbiting satellites, as produced by the OSTIA project

Jason-2: reference for ocean circulation and sea level



Jason-2 sea level trends, July 2008-November 2012
(Source: CNES/LEGOS/CLS)

EUMETSAT network of Satellite Applications Facilities



Operational phase of Copernicus: 2014-2020

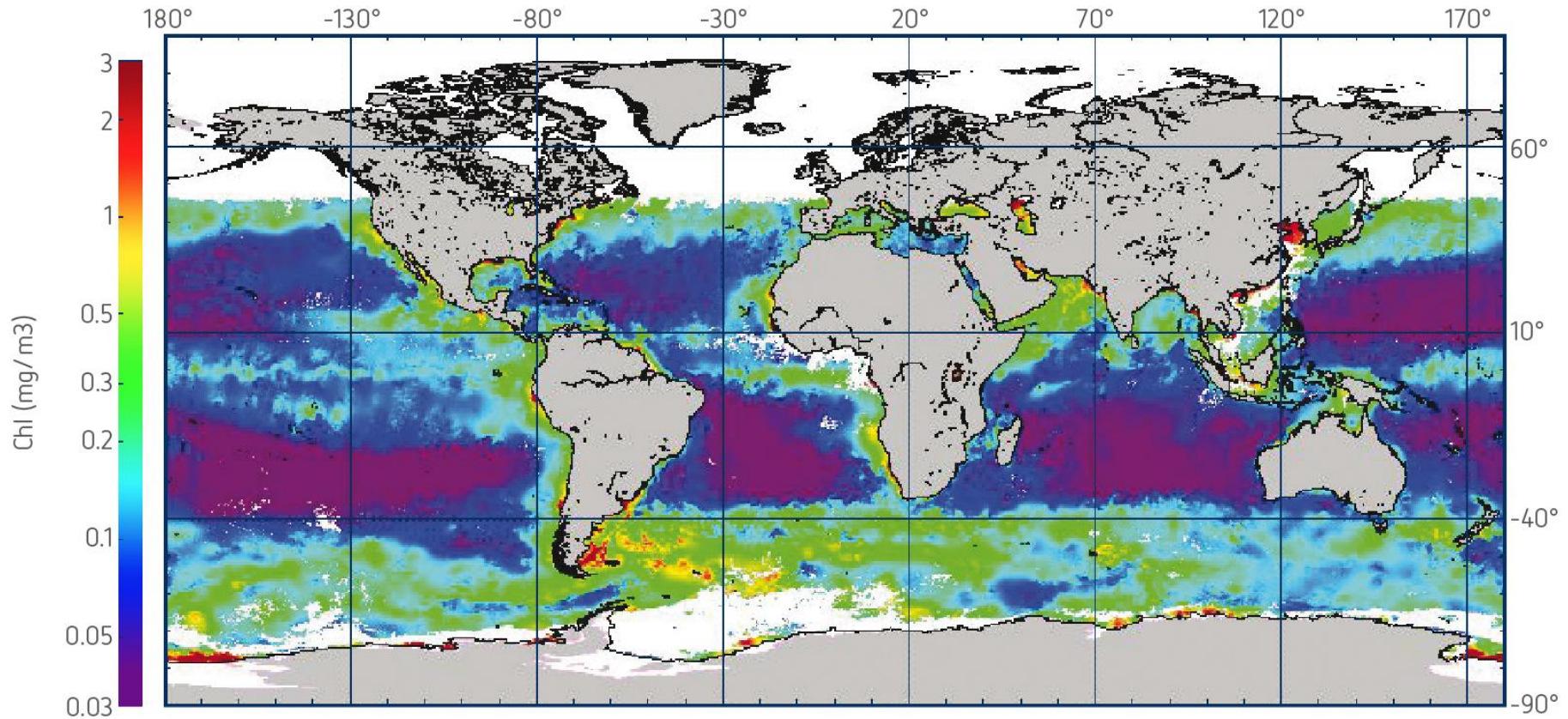
- Funded by the EC, will start in 2014
- EUMETSAT contributions:
 - Continue to deliver marine data, products and services from Metop, Meteosat and Jason-2 (with CNES/NOAA/NASA)
 - Operate Sentinel-3, deliver its marine mission (altimetry, SST, ocean colour) with ESA
 - Copernicus High Precision Ocean Altimetry: Jason-3 operations and Jason-CS

Copernicus Sentinel-3 – ocean monitoring from 2015



- Satellite operated by EUMETSAT, in cooperation with ESA
- EUMETSAT delivers Sentinel-3 marine mission and data/product services:
 - Sea Surface Temperature (SLSTR)
 - Ocean Colour (OLCI)
 - Ocean topography (SRAL/MWR/DORIS/GPS)

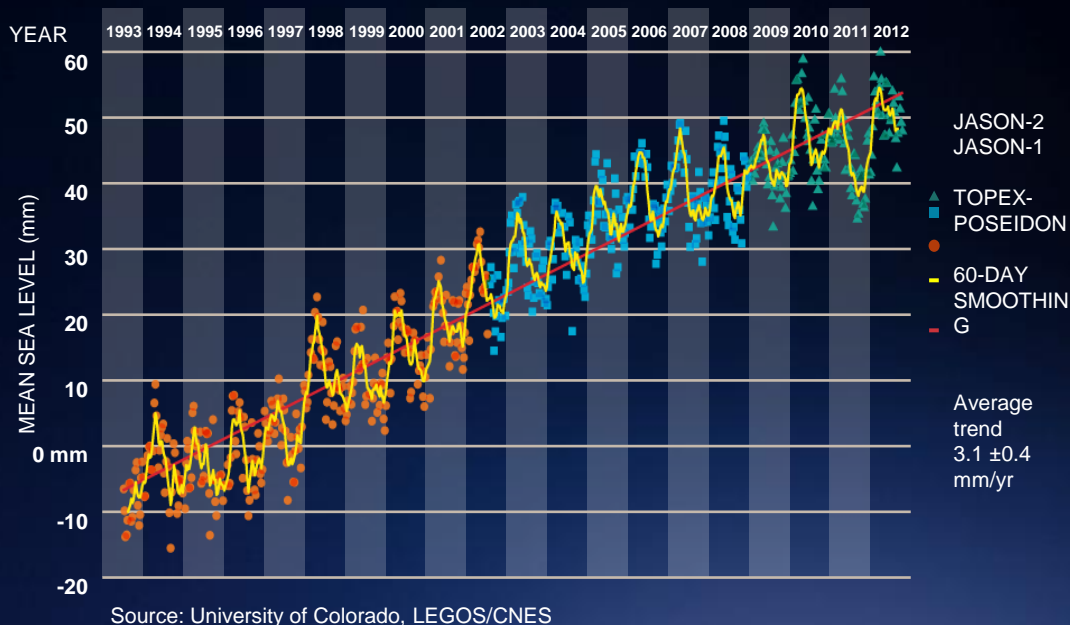
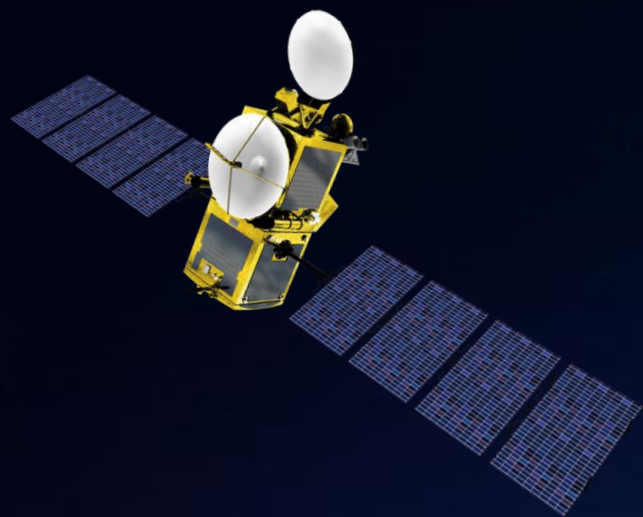
Copernicus Sentinel-3 – ocean monitoring from 2015



MERIS global chlorophyll-a concentration, December 2011.
(Source: ESA)

Oceanography: High Precision Ocean Altimetry (HPOA)

Monitoring mean sea level and operational oceanography

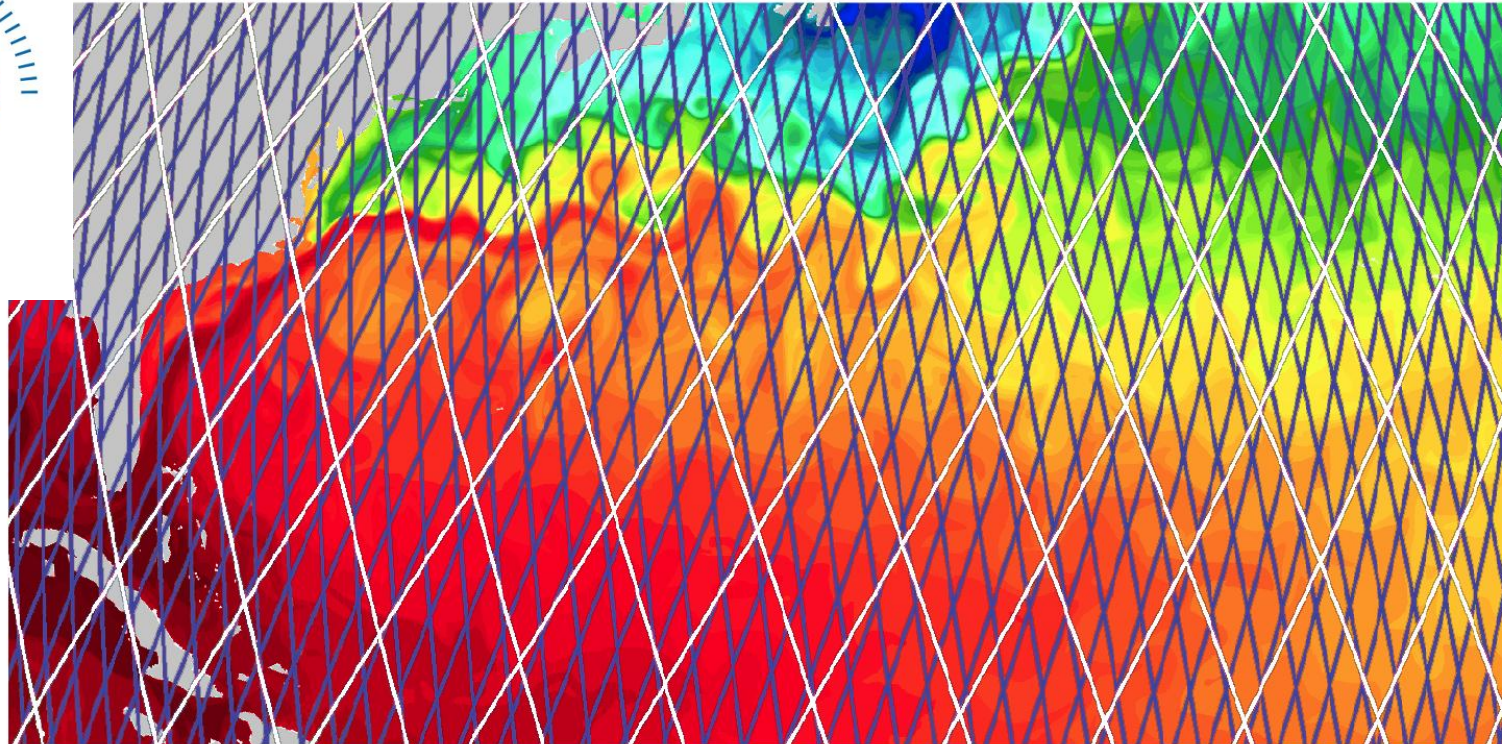


Reference for altimetry constellation, synergy with Sentinel 3

Jason-3: launch in March 2015, cooperation with NOAA/NASA/CNES

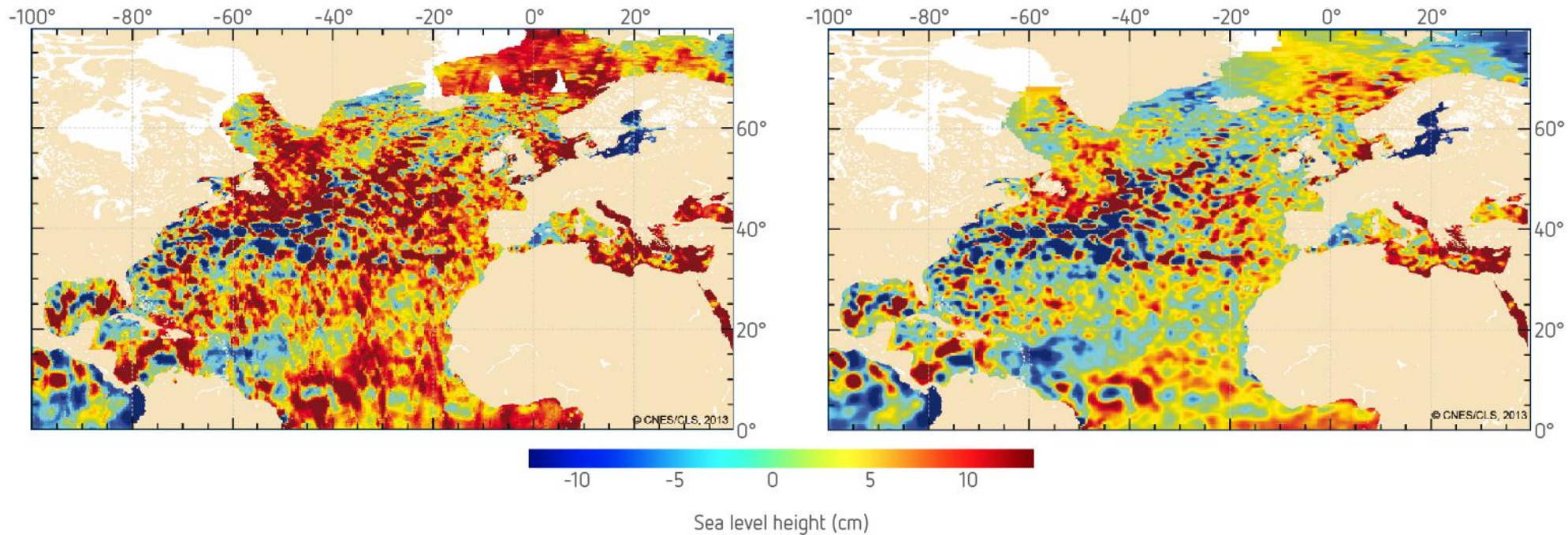
Jason-CS (Continuity of Service): planned with ESA, NOAA/NASA and EC

Jason-3/CS + Sentinel-3: an integrated Copernicus capability



Sentinel-3 (in blue) and Jason-3/-CS (white) orbital paths, superimposed on a MyOcean sea surface temperature image.

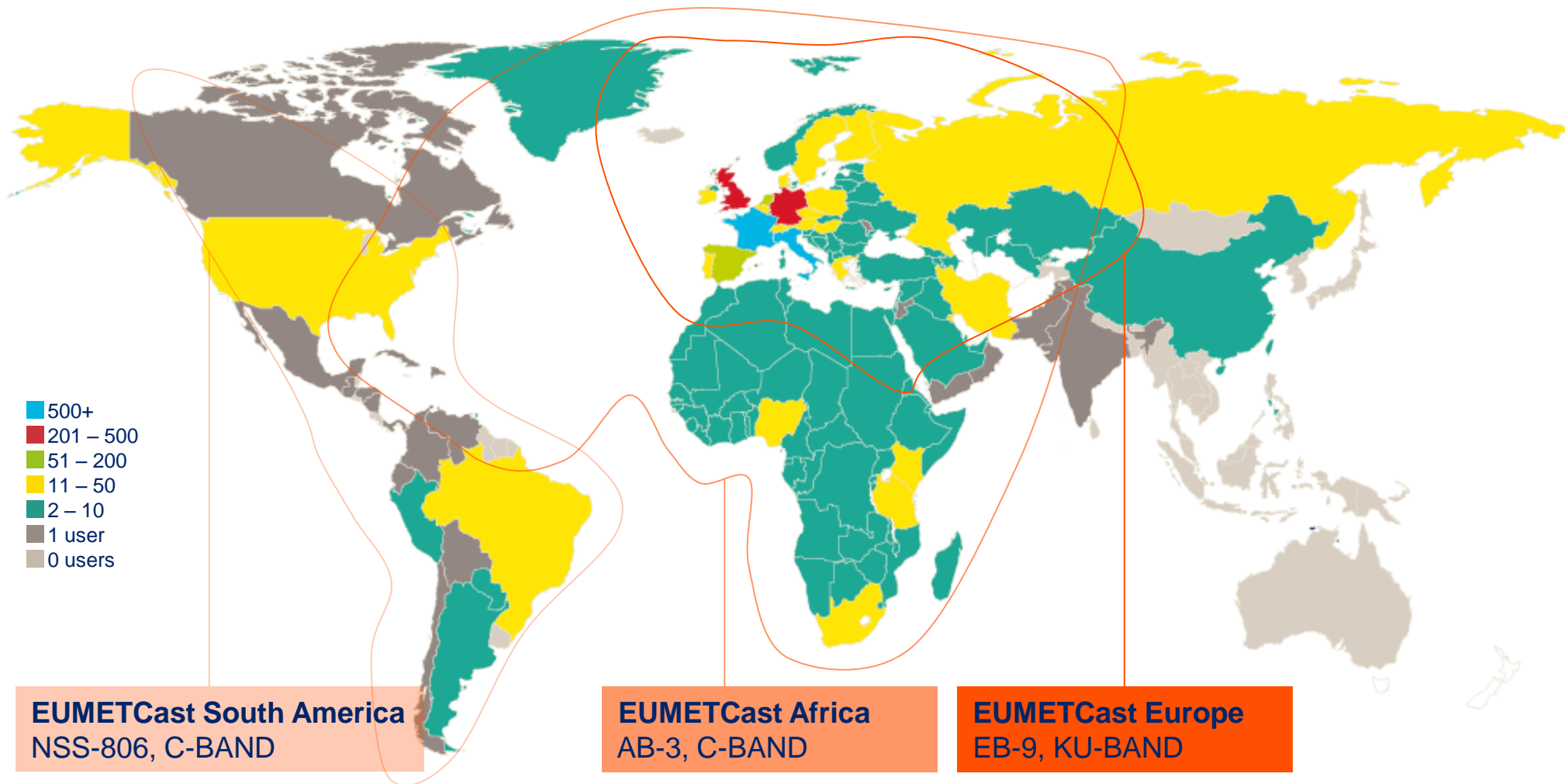
Jason-3/CS & Sentinel-3: Integrated Copernicus capability



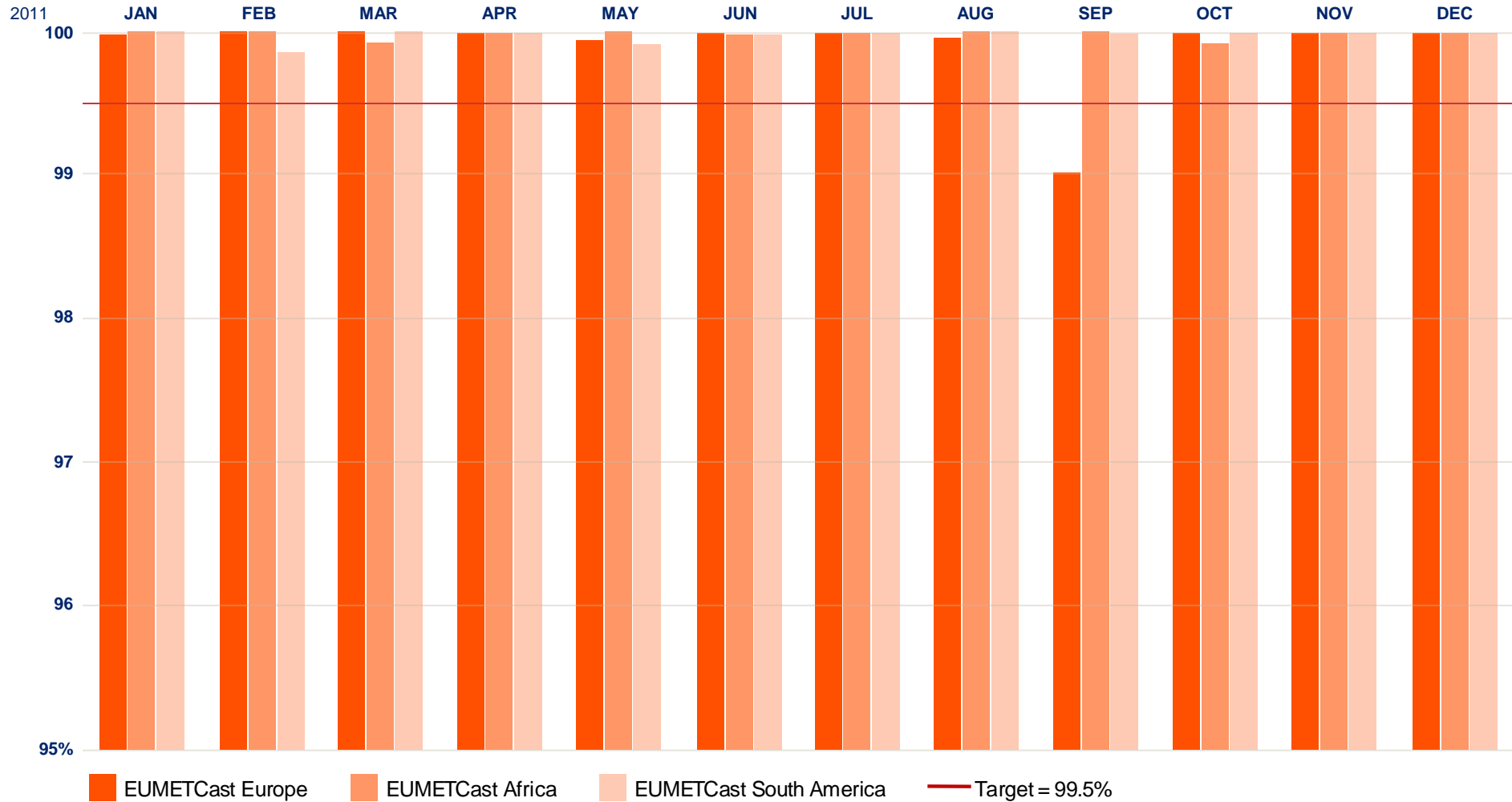
Sea surface anomalies using Cryosat and Jason-2 data, without (left) and with cross calibration (right)

(Source: CLS)

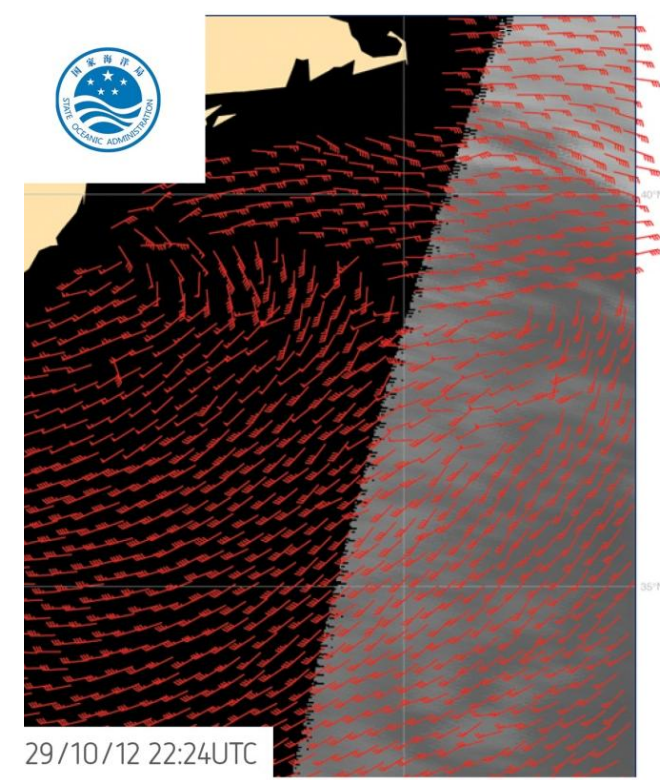
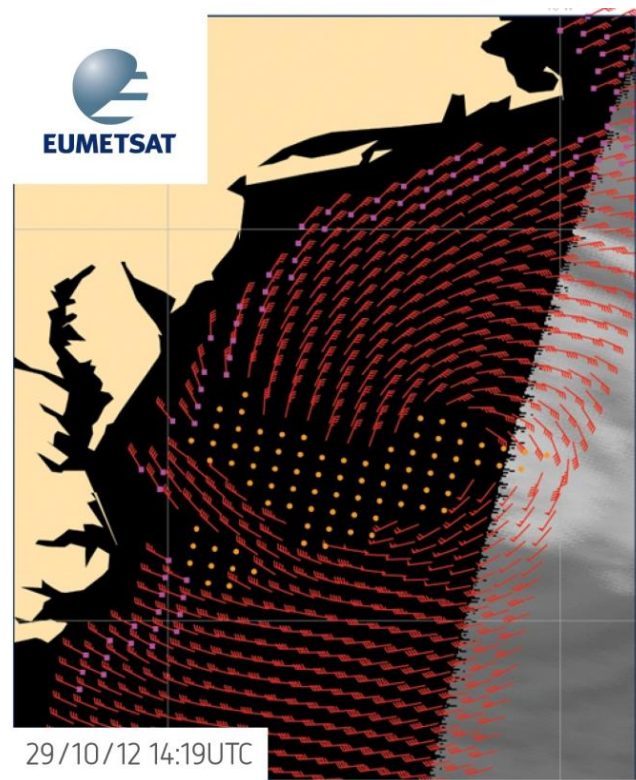
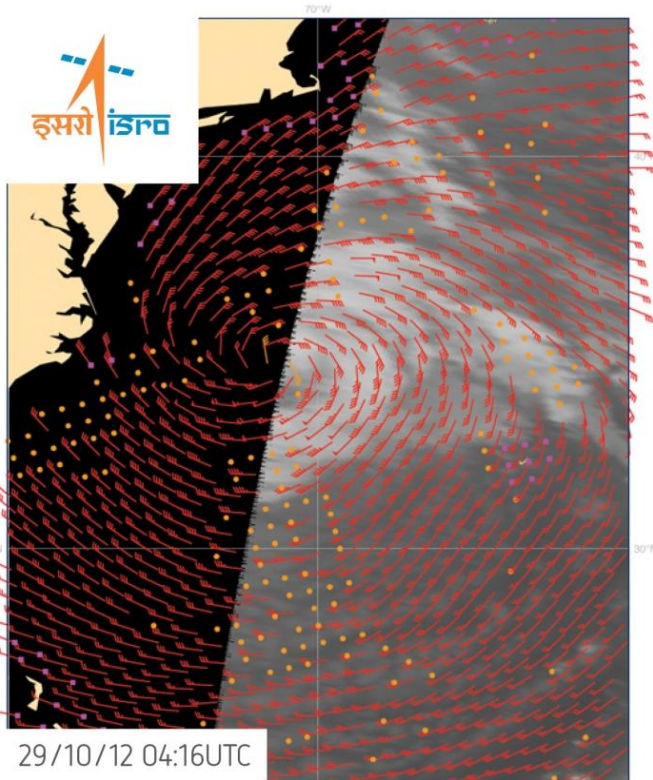
Delivering in real time to users of 3 continents



Meeting operational availability targets



Integrating EUMETSAT, Copernicus and Partner data into one real time data stream



Scatterometer derived wind products from Oceansat-2, Metop-A and HY-2 of Hurricane Sandy, 29 October 2012

Initial Joint Polar System shared with NOAA



Summary

- EUMETSAT delivers data services to the ocean community and will continue in the long run with two generations of Meteosat, Metop and Jason satellites
- EUMETSAT's role will expand in the Copernicus operations phase, in cooperation with ESA and the EC: Sentinel -3, Jason-3 and Jason-CS
 - First ocean colour data service with Sentinel-3
 - Sentinel 3/Jason-3 as an integrated altimeter capability
 - Integrated data stream available in real time to users of 3 continents
- The vision: deliver a real time integrated meteorological/ocean data stream to meteorological/ocean users

EUMETSAT support to the conference

The colours of the ocean colour conference....



Thanks to EUMETSAT team who are supporting the conference !

...available for you at the Secretariat desk in the lobby.