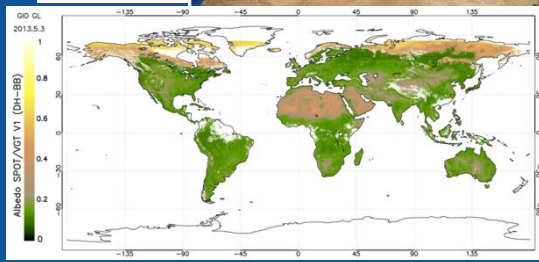
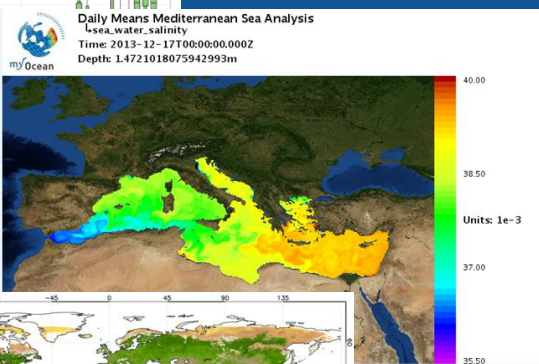
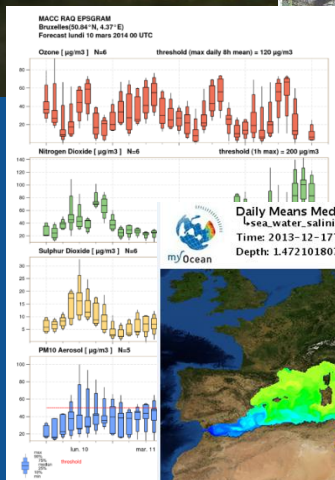


The state of Copernicus and the role of EO research

Peter Breger, Michael Rohn, Bernard Pinty

DG Enterprise and Industry
European Commission

With thanks and acknowledgements to
P. Brasseur et al (MyOcean team)
V-H. Peuch et al (MACCII team)



Copernicus – Objectives

Monitor the environment



Protect people and
assets



Increase general knowledge
on the state of the Planet



Improve environmental
policy effectiveness



Facilitate
adaptation to
climate change

Foster downstream applications
in a number of fields



Help managing emergency
and security related
situations



Copernicus comprises...

a service component ensuring access to information

a space component ensuring sustainable space borne observations for the service areas

an in-situ component ensuring observations through airborne, seaborne and ground-based installations for the service areas



Builds on observations ...



... Driven by user needs

USERS

Policy makers & Public & Private, commercial

What is their need?



Farming



Ice monitoring



Air quality



Flood



Surveillance



Climate Change

Examples provided



Land



Marine



Atmosphere



Emergency



Security



Climate

Information services

Space
Infrastructure

&

in-situ
Infrastructure

Sustainable information

OBSERVATION

Builds on observations ...

... Driven by user needs

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**REGULATION (EU) No 377/2014 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL
of 3 April 2014
establishing the Copernicus Programme and repealing Regulation (EU) No 911/2010
(Text with EEA relevance)**

THE EUROPEAN PARLIAMENT AND THE COUNCIL OF THE EUROPEAN UNION,

Adopted budget appropriations 2014-2020

Space component	3.394 million €
Service & In-situ component	897 million €

**in-situ
Infrastructure**

OBSERVATION

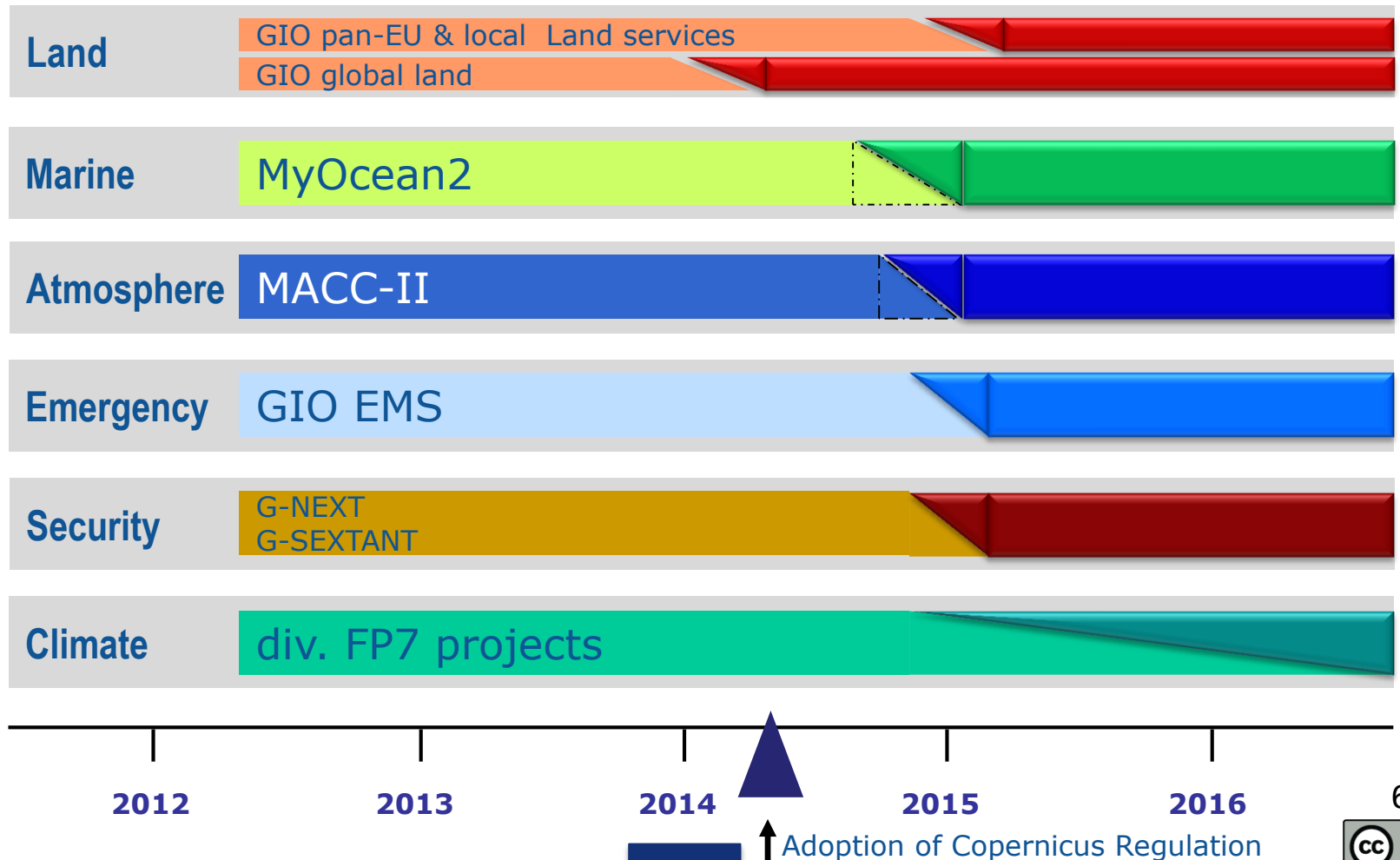
What is their need?

Examples provided

Information services

Sustainable information

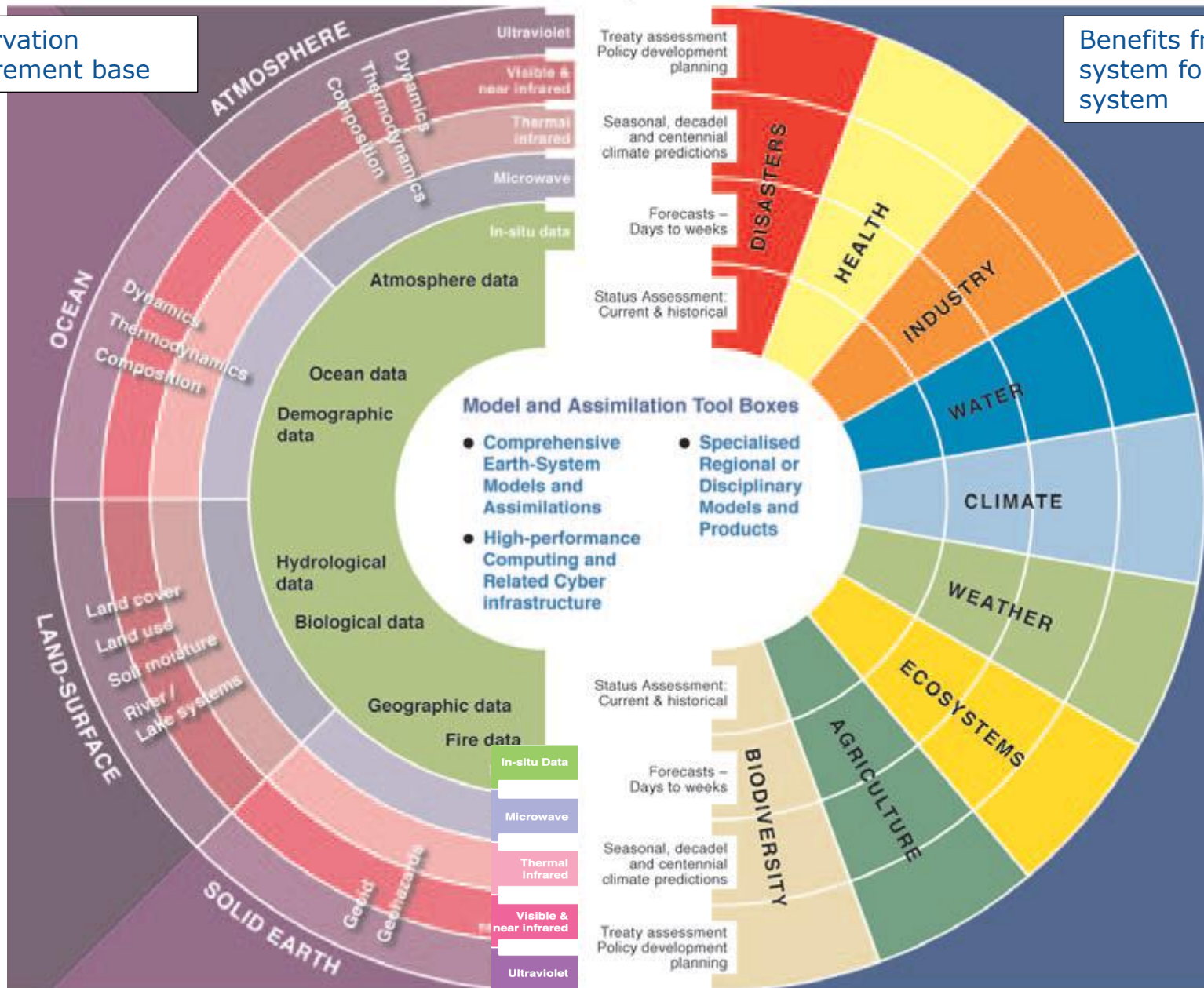
Service Deployment



The transformation of observations into predictive and current-status information

Observation
requirement base

Benefits from earth-
system forecasting
system



The transformation of observations into predictive and decision support information

Observation requirement base

Copernicus Atmosphere

Copernicus Marine

Copernicus Land

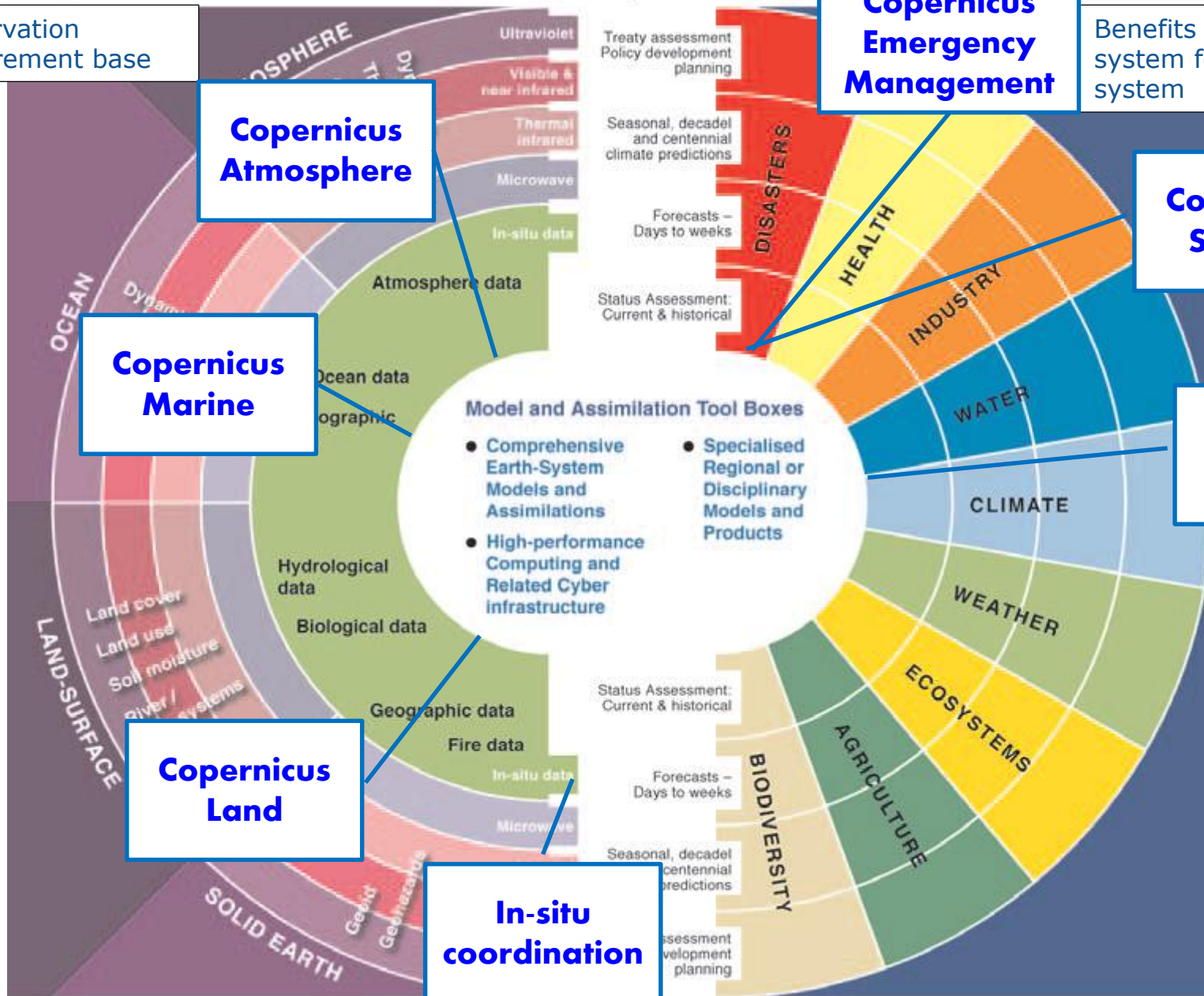
In-situ coordination

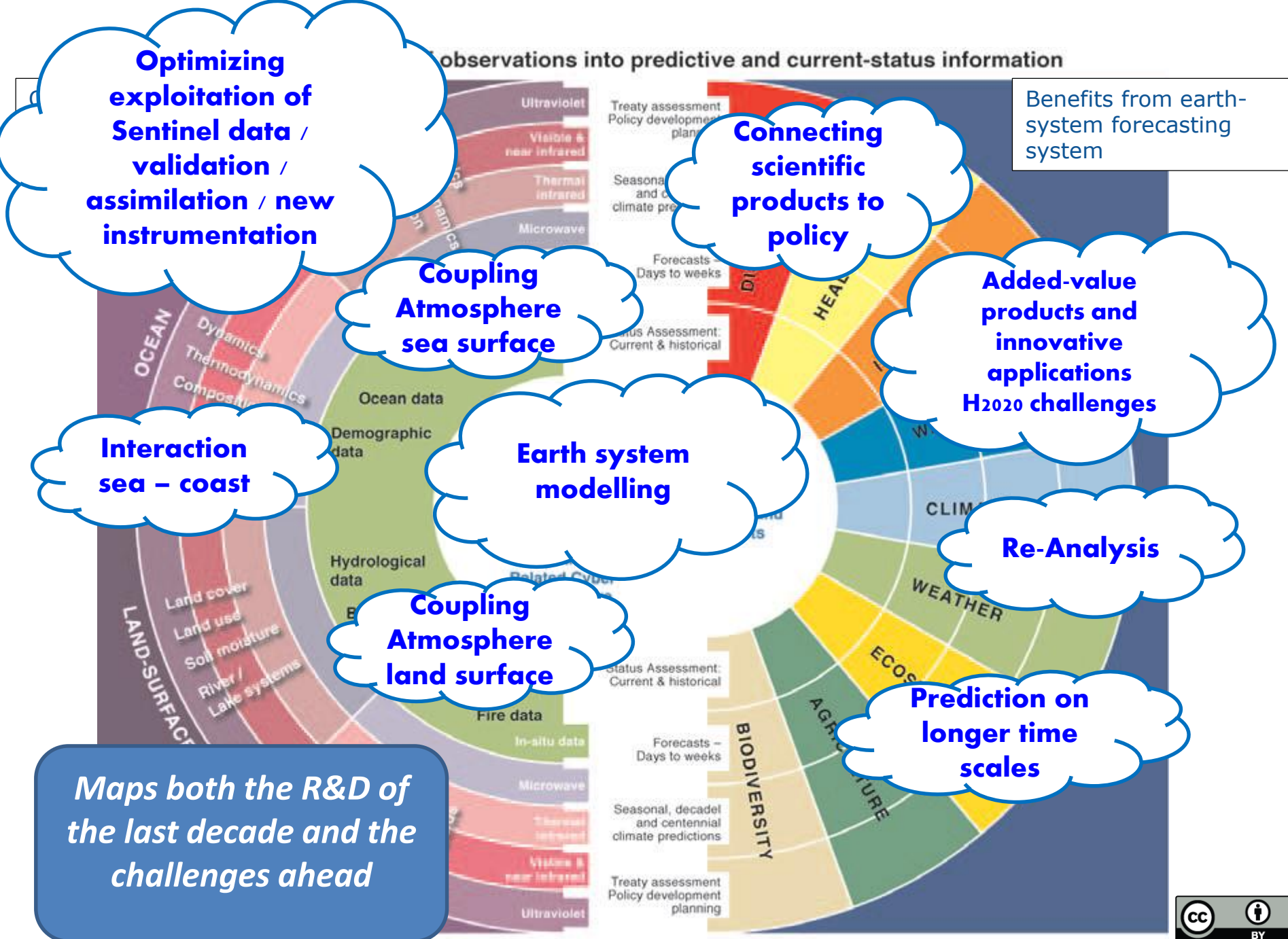
Copernicus Emergency Management

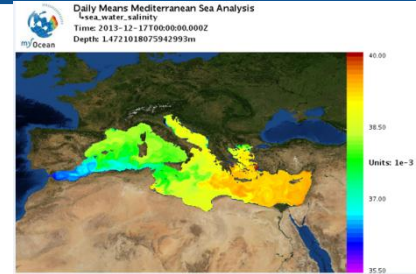
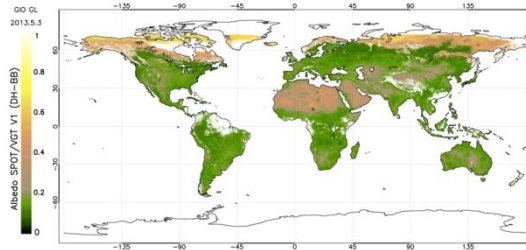
Benefits from earth-system forecasting system

Copernicus Security

Copernicus Climate Change





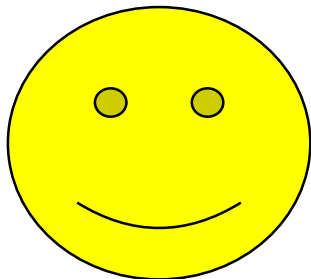


What benefits does Copernicus bring to Geoscience community?

- **Access to unprecedented range of Space data**
- **Geo-information products from Copernicus services**
- **Coherent assimilations, models and tool-boxes**
- **Aiming at a sustained provision**


Delegated Act in force on Full, Open and Free Data Access

Business, citizens and environment are to benefit from free access to EU satellite data and service information



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EN

Official Journal of the European Union

L 309/1

II

(Non-legislative acts)

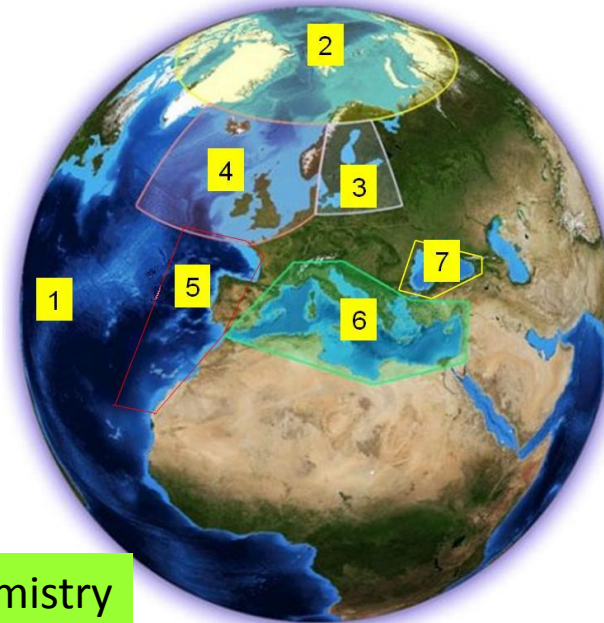
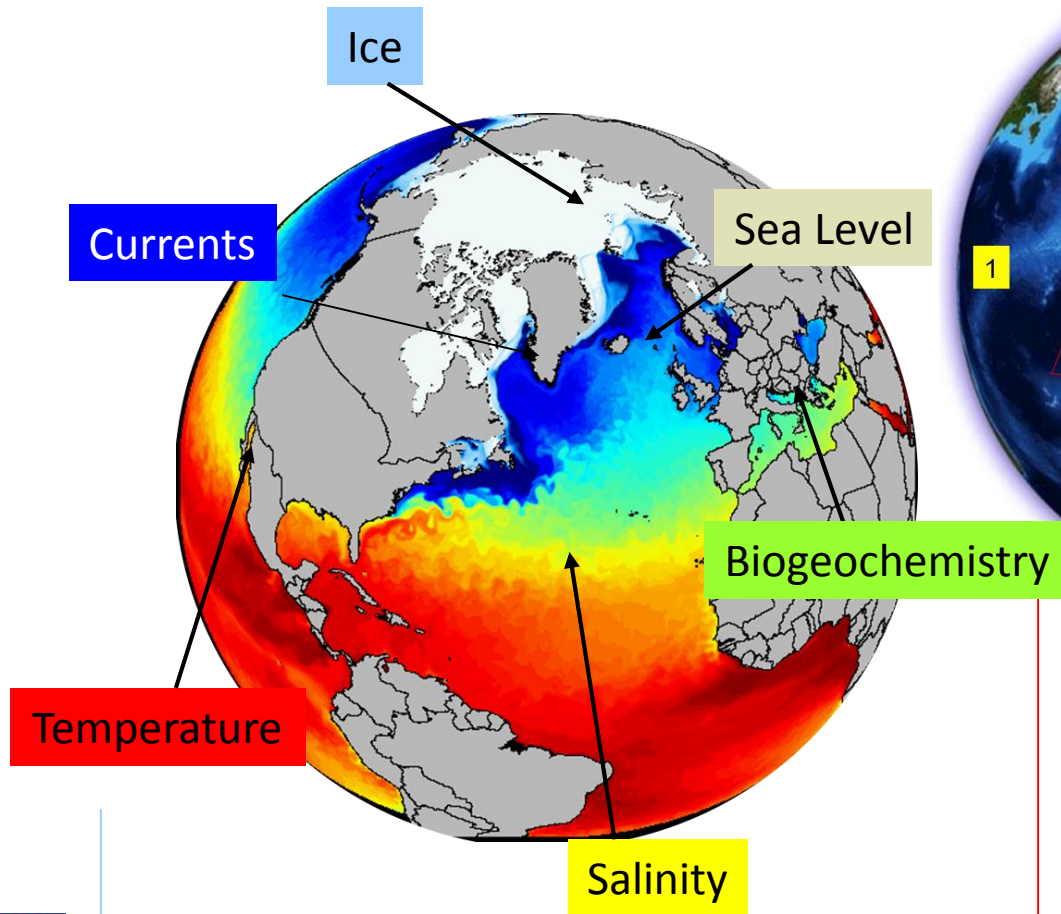
REGULATIONS

COMMISSION DELEGATED REGULATION (EU) No 1159/2013
of 12 July 2013
supplementing Regulation (EU) No 911/2010 of the European Parliament and of the Council on the European Earth monitoring programme (GMES) by establishing registration and licensing conditions for GMES users and defining criteria for restricting access to GMES dedicated data and GMES service information
(Text with EEA relevance)

Science Community is called upon to make good use of the available data, acting as value multipliers

Ocean State Monitoring

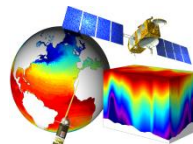
www.myocean.eu



- 1. Global
- 2. Arctic
- 3. Baltic
- 4. NWS
- 5. IBI
- 6. Med Sea
- 7. Black Sea

- Global and Regional
- Real time and Reanalyses
- Satellite & In Situ obs. and Models

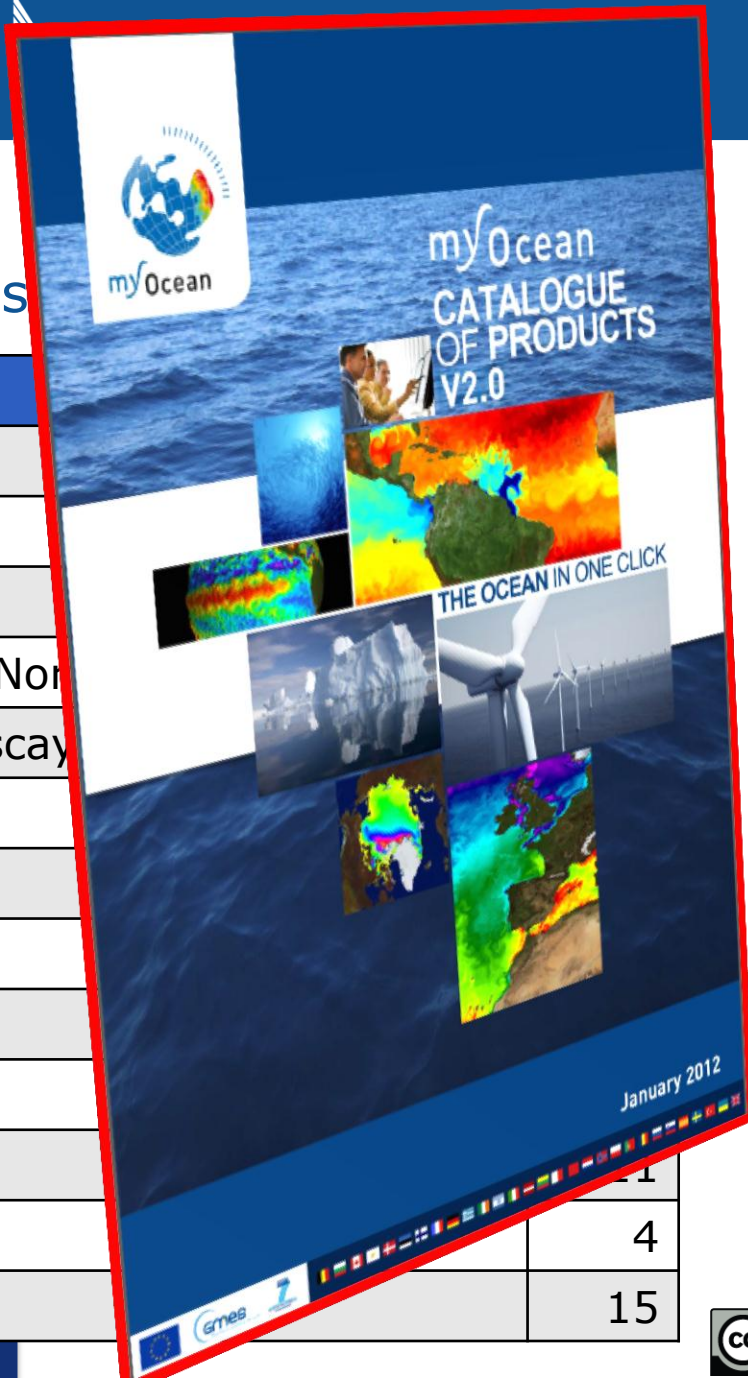
A 3D and consistent estimation of the ocean



Initial data products -

111 products, grouped into (details

Product group	
Analysis and Forecast: Global Ocean	
Analysis and Forecast: Arctic Ocean	
Analysis and Forecast: Baltic Sea	
Analysis and Forecast: Atlantic-European North	
Analysis and Forecast: Atlantic-Iberian Biscay	
Analysis and Forecast: Mediterranean Sea	
Analysis and Forecast: Black Sea	
Observation: Sea Level	
Observation: Ocean Colour	
Observation: Sea Surface Temperature	
Sea Ice	
Wind	
In-Situ	



The Atmosphere service - A decade of evolution

Pre-GEMS, GEMS studies : IFS and CTMs separate

GEMS : 2005-2009
MACC : 2009-2011
MACC-II : 2011-2014



GEMS-MACC-MACC-II (start) production : IFS and CTMs coupled



MACC-II (end) production : IFS with online CTMs chemistry





European

Product gateway

HOME NEWS ABOUT THE PROJECT SERVICES DATA PRODUCTS DOCUMENTS EVENTS CONTACT US

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Today's forecasts
 Reactive Gases
 Aerosols
 European Air Quality
 UV Index

mac Monitoring Atmospheric Composition and Climate - is the current pre-operational atmospheric service of the European GMES programme. MACC provides data records on atmospheric composition for recent years, data for monitoring present conditions and forecasts of the distribution of key constituents for a few days ahead. MACC combines state-of-the-art atmospheric modelling with Earth observation data to provide information services covering European Air Quality, Global Atmospheric Composition, Climate, and UV and Solar Energy.

Services by theme

European Air Quality
 Global Atmospheric Composition
 Climate
 UV, Solar Energy, Stratospheric Ozone

Services by user

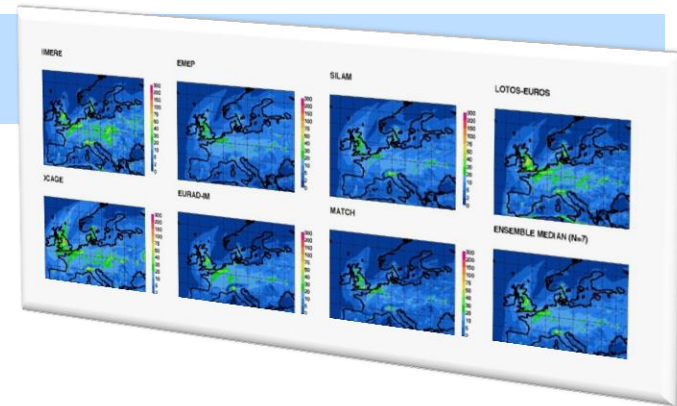
Health
 Environment
 Science Community
 Citizen
 Meteorology

Potential users of MACC are invited to complete the questionnaire at this link

MACC is a Collaborative Project (2009-2011) funded by the European Union under the 7th Framework Programme. It is coordinated by the European Centre for Medium-Range Weather Forecasts and operated by a 45-member consortium.

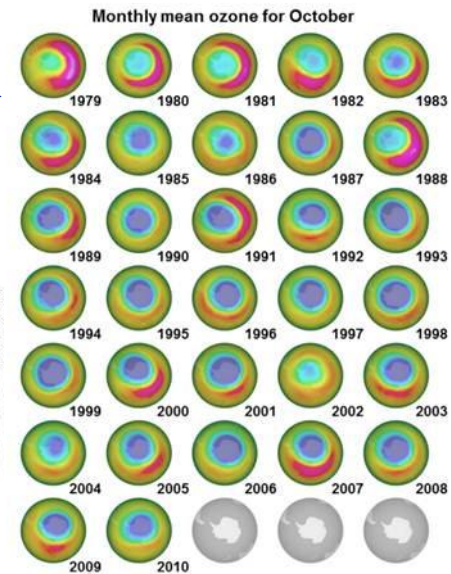
**Air Quality
forecast**

**and
(Re-)Analysis**



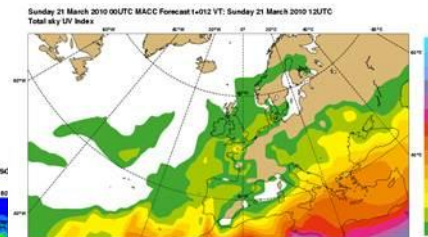
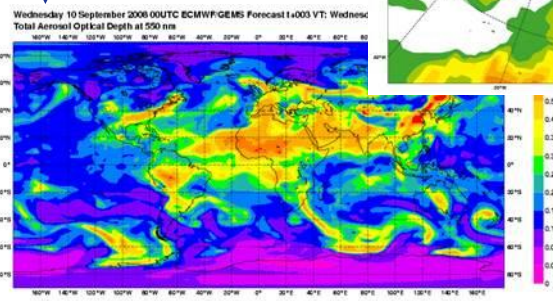
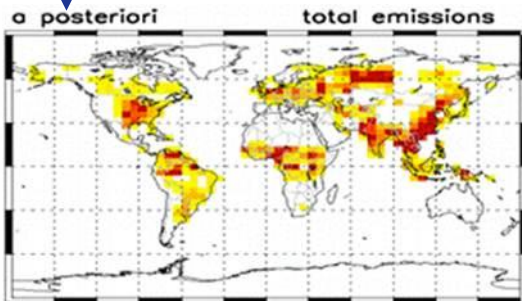
**Stratospheric
Ozone**

UV Information



Emissions

**Global
Forecasts**



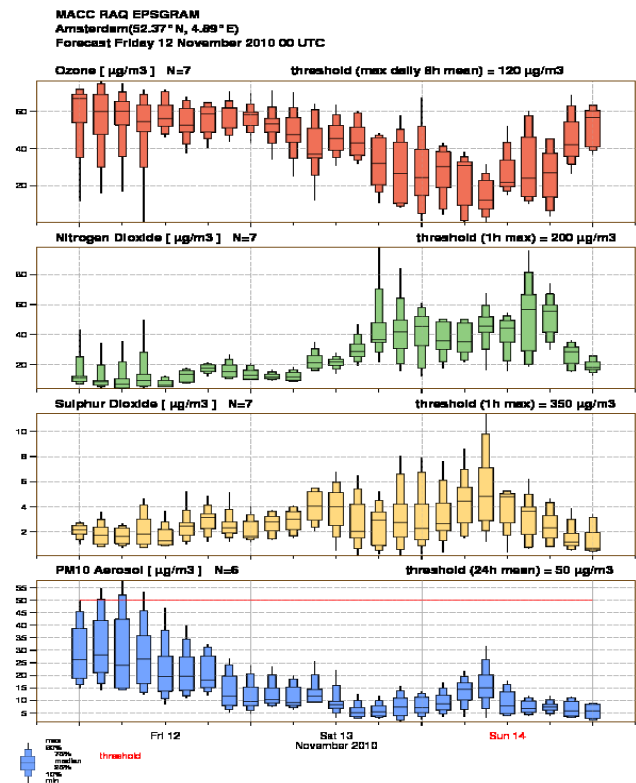
Initial data products - Atmosphere

244 products, grouped into (details in separate list):

Product group	N
EU regional AQ NRT analysis and forecast	103
EU regional AQ reanalysis	45
Global NRT analysis and forecast	29
Global reanalysis	19
Global stratospheric analysis and reanalysis	11
Greenhouse gases (CO ₂ , CH ₄ & N ₂ O)	10
Fire emissions	2
AQ policy specific	4
Solar radiation	2
Satellite retrievals	12
Prototype products	7

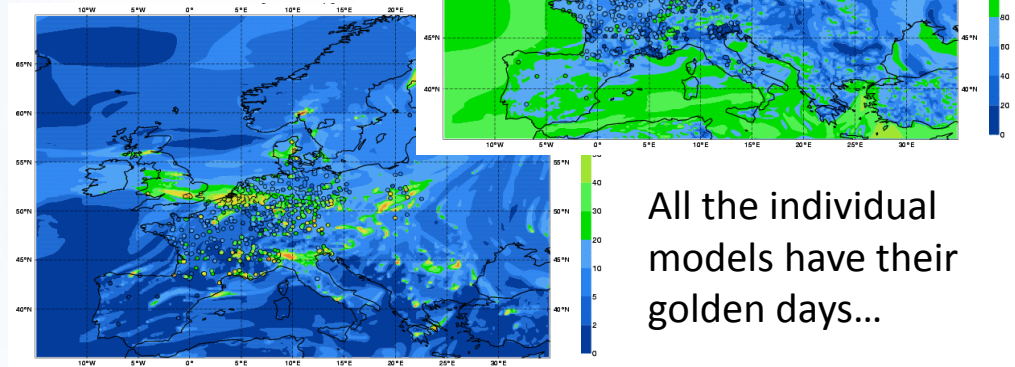
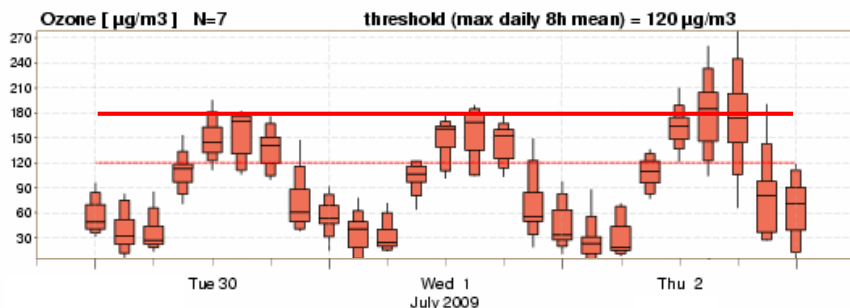
Ensemble forecasting for Air Quality

An ensemble of models provides additional useful products...



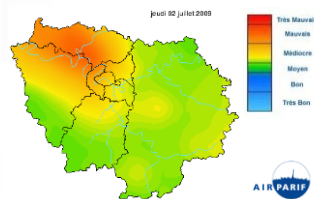
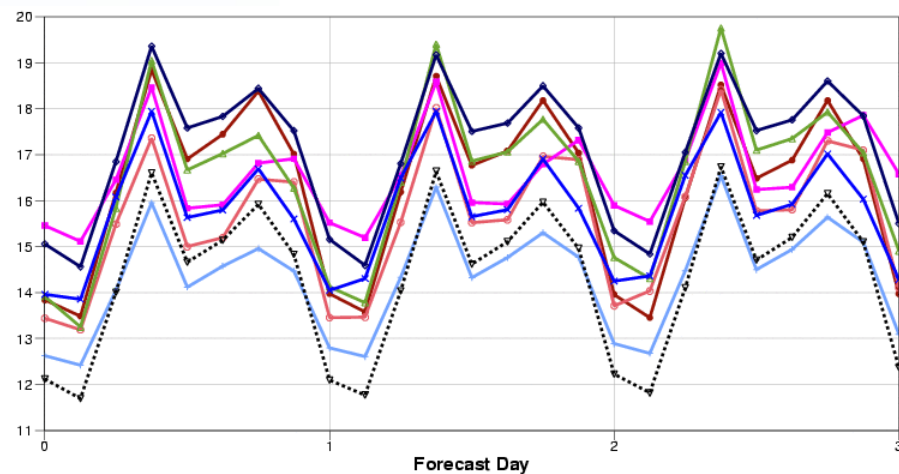
GMES RAQ EPSGRAM
Paris (48.86° N, 2.35° E)
Forecast Tuesday 30 June 2009 00 UTC

...specially when situation is complex



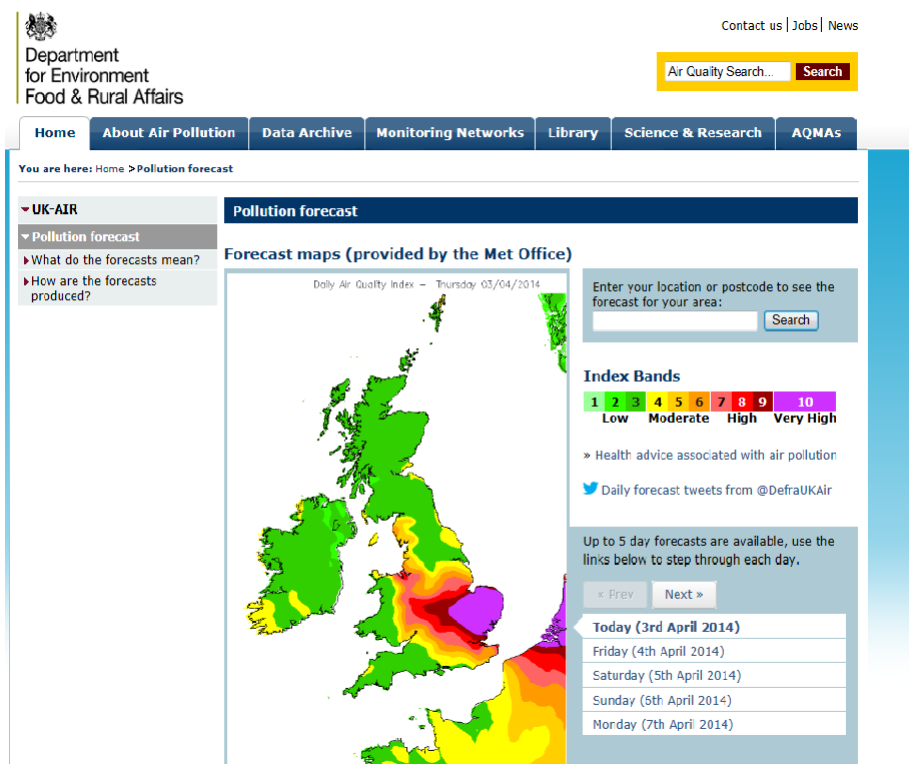
All the individual models have their golden days...

... but the median of the ensemble has always among the best skill scores (here PM10 RMSE for ASO 2010).



Air Quality in London, UK – 3. April 2014

- *Strong influence of inflow of Sahara dust*

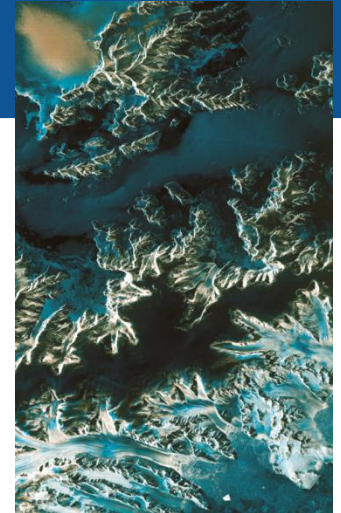


DEFRA/UK Met Prognose for 3. April 2014



BBC, 02.04.2014: " ... The air was hazy as Oxford University's rowing crew took part in a training session ahead of the Boat Race ... "

- ***As of 1 April 2014 national forecast is done (UK Met) for DEFRA (Department for Environment Food & Rural Affairs)***
- ***Usage of Copernicus/MACC Boundary conditions***



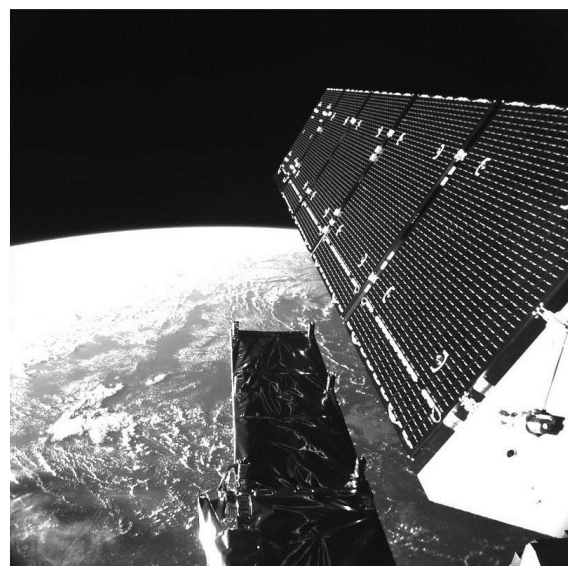
Your creativity is asked for...

EO in Horizon 2020 « SPACE »

- **Foster uptake of space based EO data in commercial applications, and supporting market introduction of downstream services activities**
- **To address capability gaps identified by service operators for service evolution**
- **To maintain the lead in European EO capabilities, research into remote sensing technologies and instruments, and space systems**

<http://ec.europa.eu/research/participants/portal>

Thank you for your attention!



DG Enterprise and Industry

peter.breger@ec.europa.eu

<http://copernicus.eu>