LET'S EMBRACE SPACE

China-EU research thematic event,
Shanghai World Expo,
2 July 2010

THE EUROPEAN SPACE AGENCY

Space technology for the benefit of mankind

Shanghai 2 July 2010

Chris de Cooker

Head of the International Relations Department

PURPOSE OF ESA

“To provide for and promote, for exclusively
)eration among
e research and
:e applications.”

Article 2 of
ESA Convention

18 MEMBER STATES

- **Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Norway, the Netherlands, Portugal, Spain, Sweden, Switzerland and the United Kingdom.**

- **Canada takes part in some projects under a cooperation agreement.**

- **Hungary, Romania, Poland, Estonia and Slovenia are European Cooperating States.**

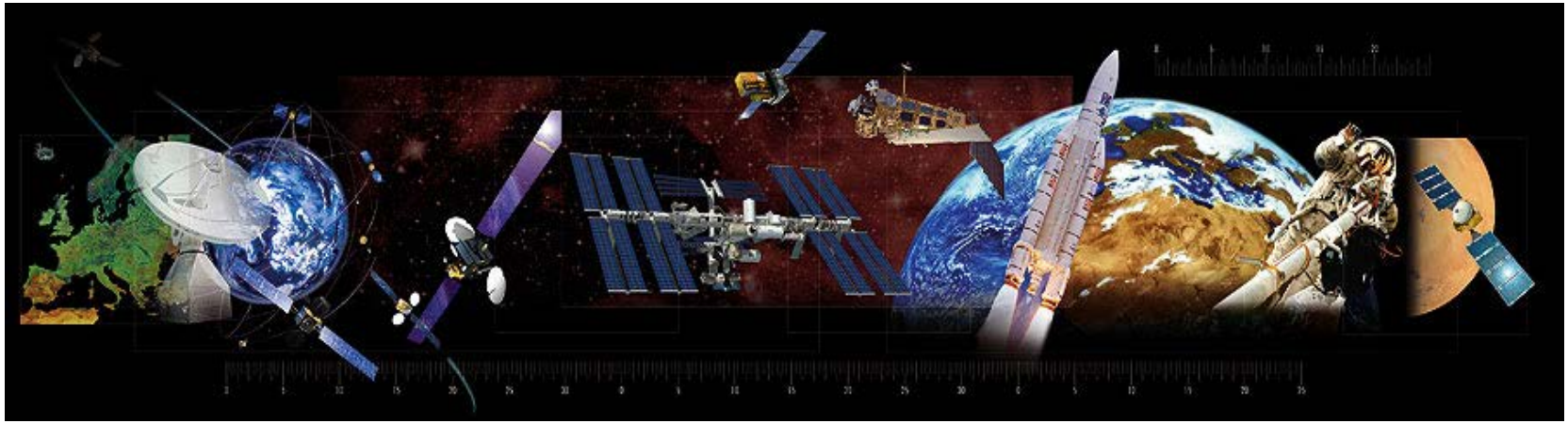
- **Latvia, Cyprusand Slovakia have signed Cooperation Agreements.**

European Space Agency

Activities

ESA is one of the few space agencies in the world covering all areas of space activities

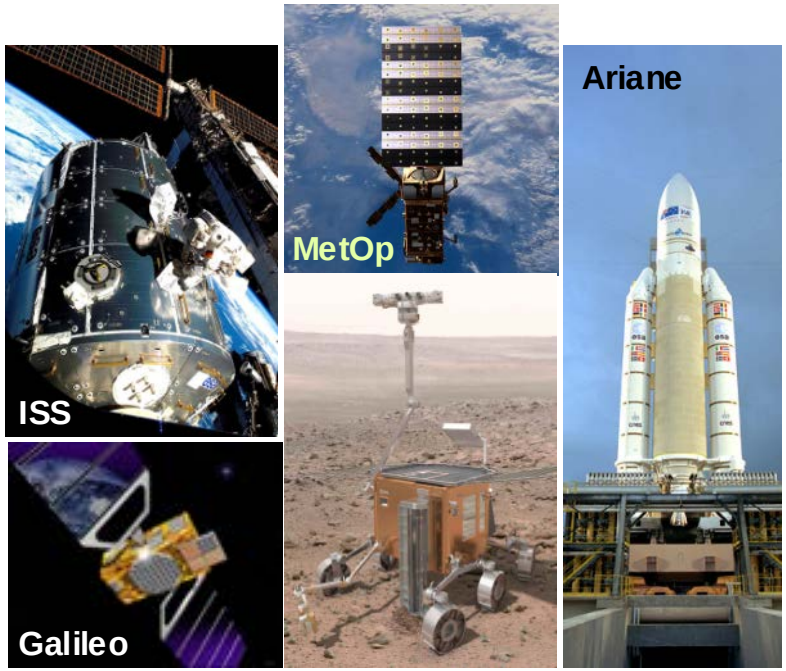
- **Space science**
- **Human spaceflight**
- **Exploration**
- **Earth observation**
- **Launchers**
- **Navigation**
- **Telecommunications**
- **Technology**
- **Operations**



ESA Programmes - Mandatory and Optional

All Member States participate (on a GNP basis) in activities related to Space Science and in a common set of programmes (**Mandatory** programmes).

In addition, Member States choose their level of participation in **Optional** programmes.



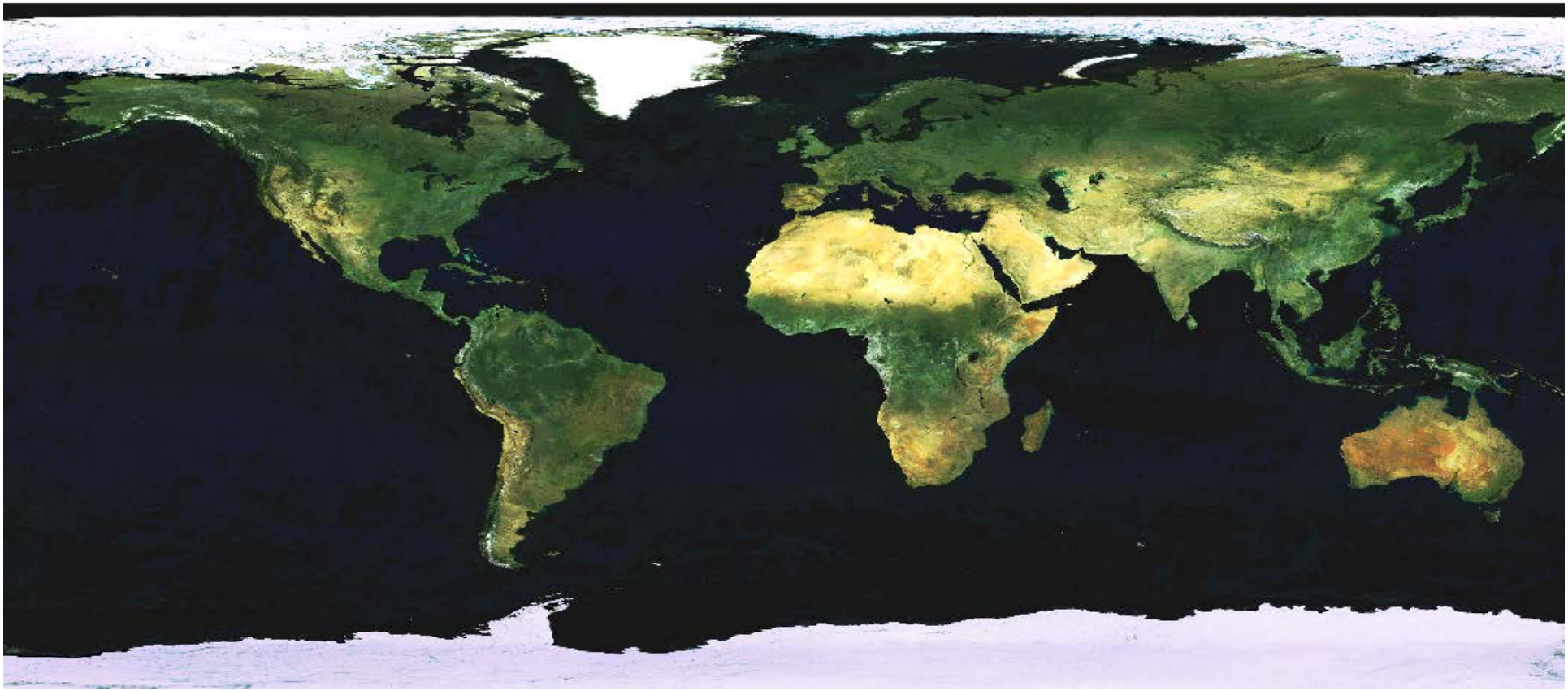
Mandatory

- General Budget: Future studies, technological research, education, common investments (facilities, laboratories, basic infrastructure)
- Science: Solar System science, astronomy and fundamental physics

Optional

- Human spaceflight
- Telecommunications
- Earth observation
- Launchers
- Navigation
- Robotic exploration

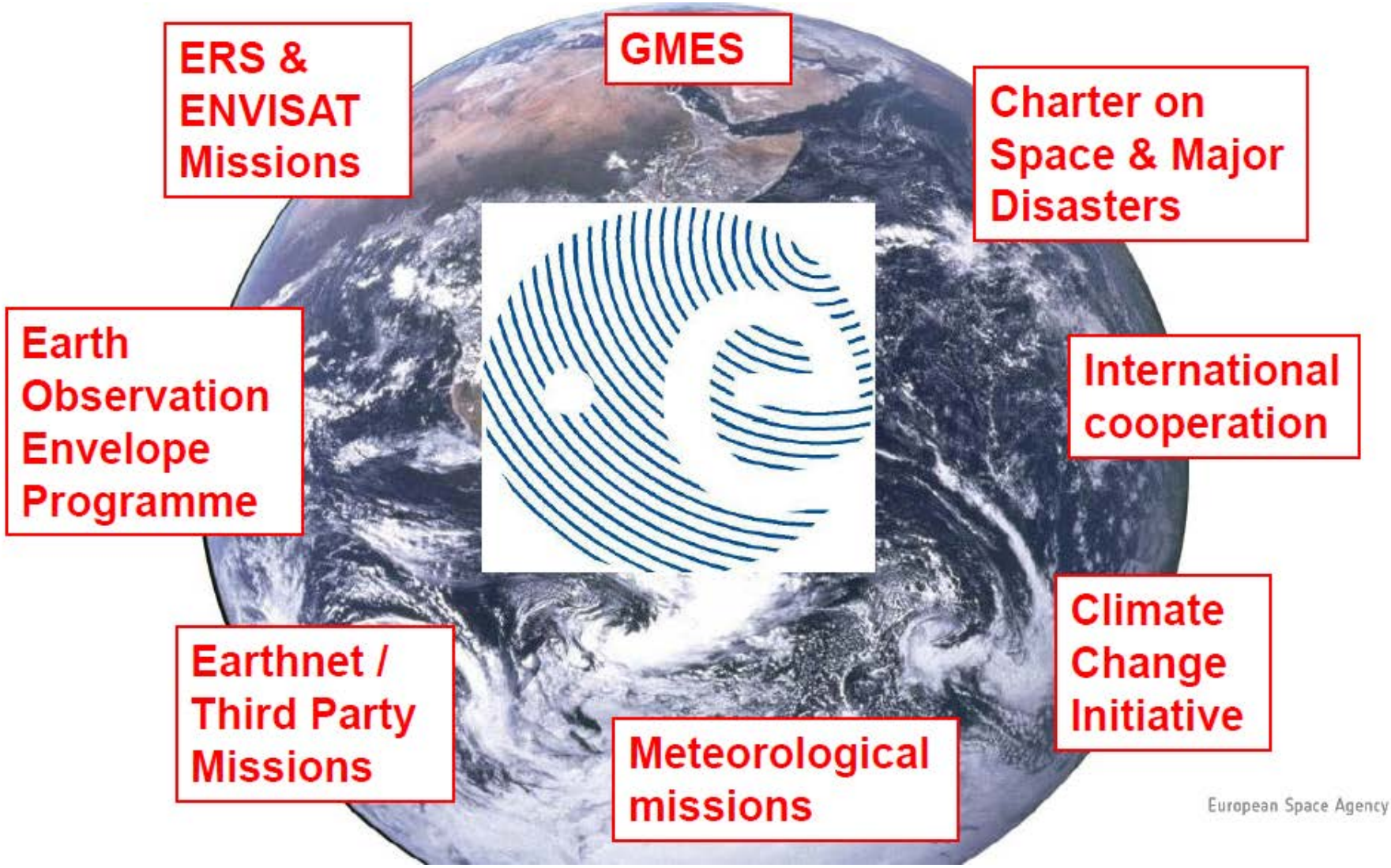
Earth Observation



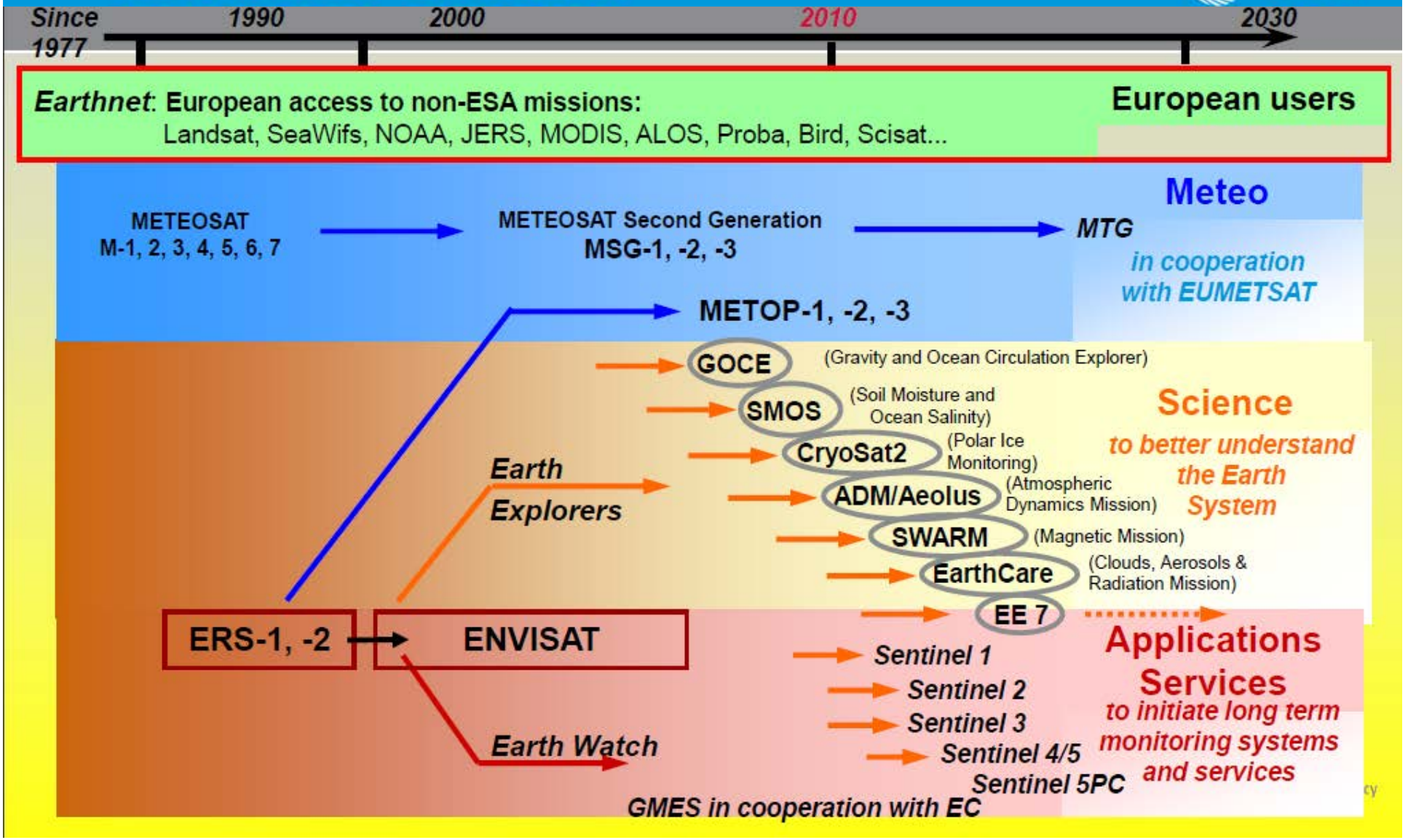
Highest resolution global cover satellite map - spatial resolution 300m

European Space Agency

ESA Earth Observation programme



EO Mission *evolution*



ESA's Earth Explorers

GMES dedicated missions : Sentinels

Sentinel 1 – SAR imaging
All weather, day/night applications, interferometry

2012, 2014+

Sentinel 2 – Multispectral imaging
Land applications: urban, forest, agriculture,..
Continuity of Landsat, SPOT

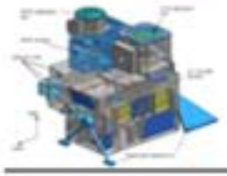
2013, 2014+

Sentinel 3 – Ocean and global land monitoring
Wide-swath ocean colour, vegetation, sea/land surface temperature, altimetry

2013, 2014+

Sentinel 4 – Geostationary atmospheric
Atmospheric composition monitoring, trans-boundary pollution

2018+



Sentinel 5 and Precursor – Low-orbit atmospheric
Atmospheric composition monitoring

2014, 2020

Satellites for emergency relief

The International Charter on Space and Major Disasters

- > Data acquisition in case of natural or human-made disasters

- > Data delivery to civil protection agencies, emergency & rescue services

Examples of activations :

- **Bam earthquake 2003**
- **Darfur crisis 2004**
- **Tsunami catastrophe 2004/2005**
- **Hurricane Katrina 2005**
- **Sichuan earthquake 2008**
- **Haiti earthquake 2010**

What is the Charter:

The Charter is an **International agreement** among Space Agencies **implemented in 2000** to support relief efforts in the event of emergencies caused by major disasters (natural/man-made).

- a **virtual constellation of satellites**, coordinated to ensure immediate access to EO data to support disaster-response (with maps) to organisations dealing with major disasters
- only focusing on the **immediate disaster-response** not the other parts of the 'disaster management cycle' (prevention, reconstruction, etc)

The Charter is a simple mechanism with two key functions:

- to **task relevant satellites** in response to an emergency

(Fast data turn-around – priority acquisition – archive retrieval)

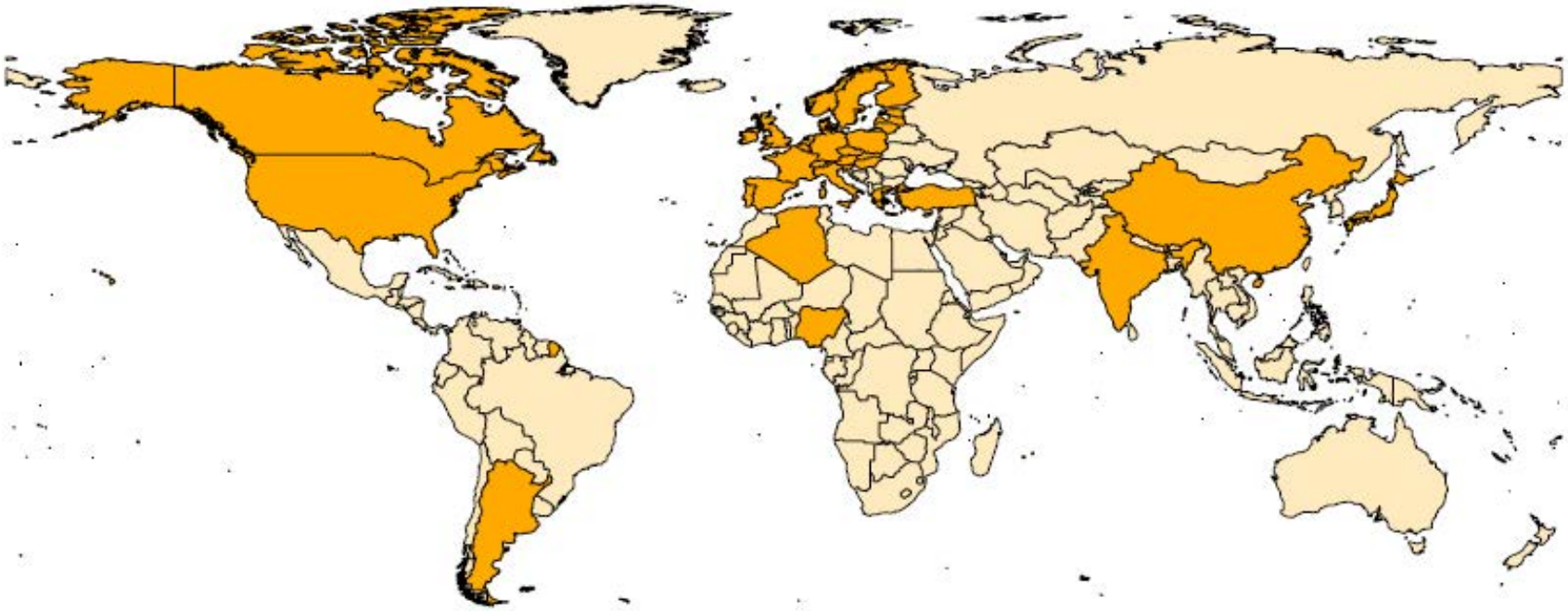
- to supply **EO data at no cost** *

(No paper work – emergency act – best effort)

** Each Member Agency commits resources to support the provisions of the Charter and thus is helping to mitigate the effects of disasters on human life and property*

Background and Membership

- UNISPACE III Conference, Vienna, July 1999
- European and French space agencies **(ESA, CNES)** initiated the International Charter for "Space and Major Disasters“
- Canadian Space Agency (**CSA**) joined Oct. 2000
- Other space agencies joined:
  - **2001 National Oceanic and Atmospheric Administration (NOAA)**
  - **2001 Indian Space Research Organization (ISRO)**
  - **2003 Argentine Space Agency (CONAE)**
  - **2005 Japan Aerospace Exploration Agency (JAXA)**
  - **2005 US Geological Survey (USGS)**
  - **2005 British National Space Centre BNSC/DMCii(including Algeria, Nigeria, Turkey Space Centres)**
  - **2007 China National Space Administration (CNSA)**



Legend

- Charter Authorized Users
- Other countries

The Charter membership is composed of organisations that combine 36 countries with 42 Aus.

ESA – China cooperation

- Framework Cooperation Agreement, signed November 2005.
- Science : from Cluster (1993) to Double Star (2003 + 2004); Cosmic Vision;
- Operations : Chang'E-1 and Chang'E-2.
- Earth Observation : Dragon 1 (2004-2008), Dragon 2 (2008-). (http://dragon2.esa.int)

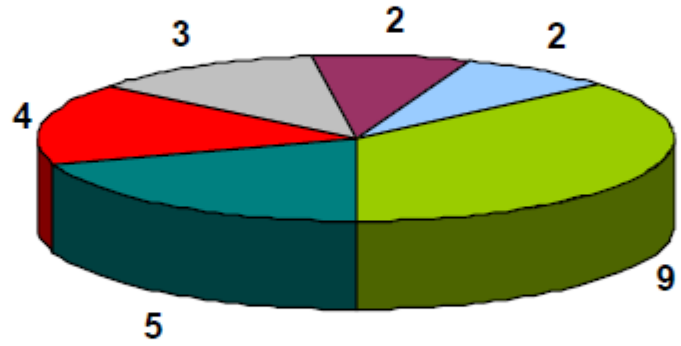
Dragon 2

Objectives

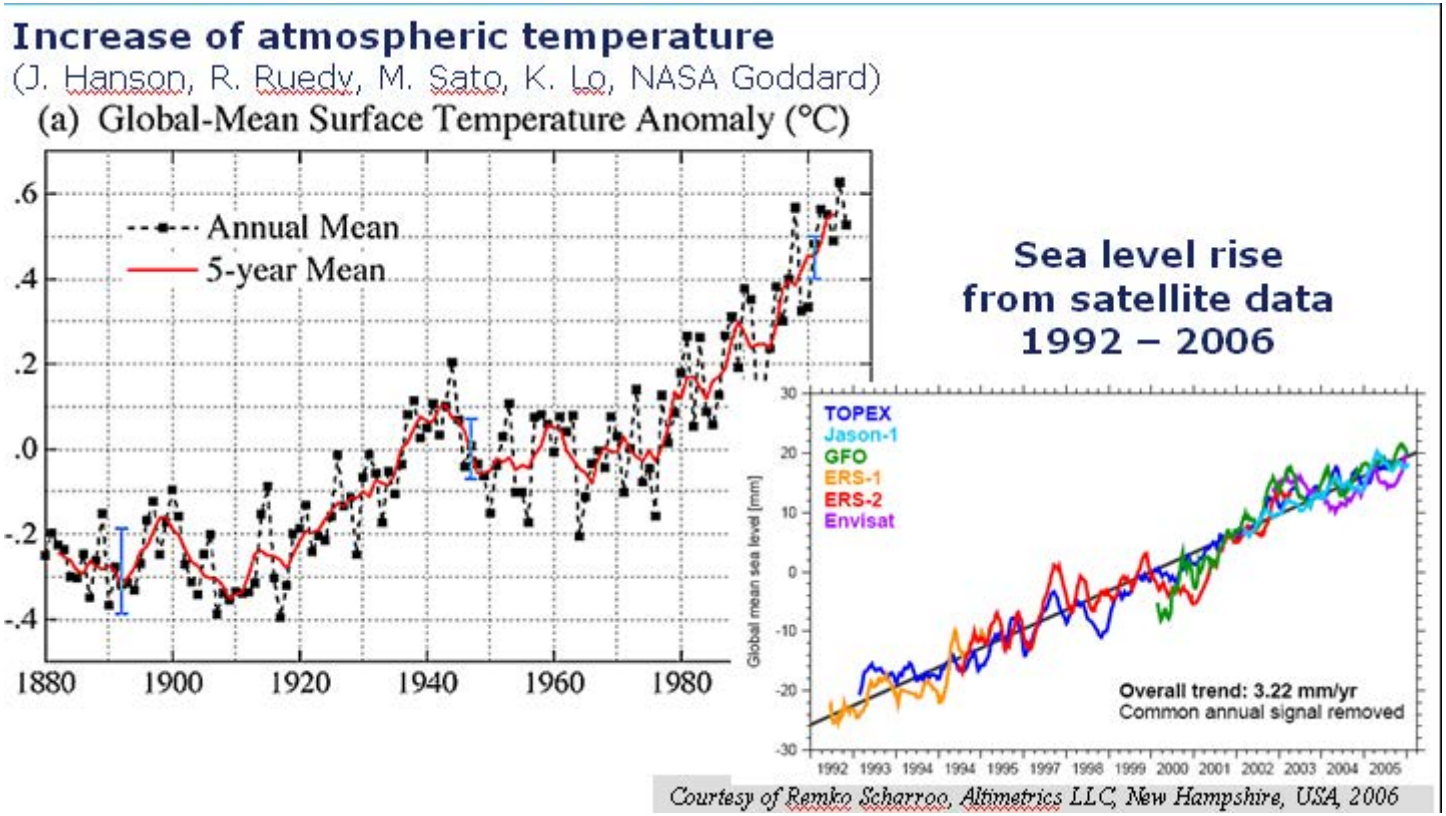
- Promote the exploitation of ESA, TPM and Chinese EO data
  - *for science and application development*
- Stimulate scientific exchange
  - *by the formation of joint Sino-European teams*
- Publish co-authored results
  - *at the mid term stage & end of the programme*
- Provide training to European and Chinese scientists
  - *for exploiting ESA, TPM and Chinese EO data in land, ocean and atmospheric applications*

Thematics for Dragon 2 projects

25 joint project teams investigating land, ocean and atmospheric applications



Global climate change – evidence from satellite data



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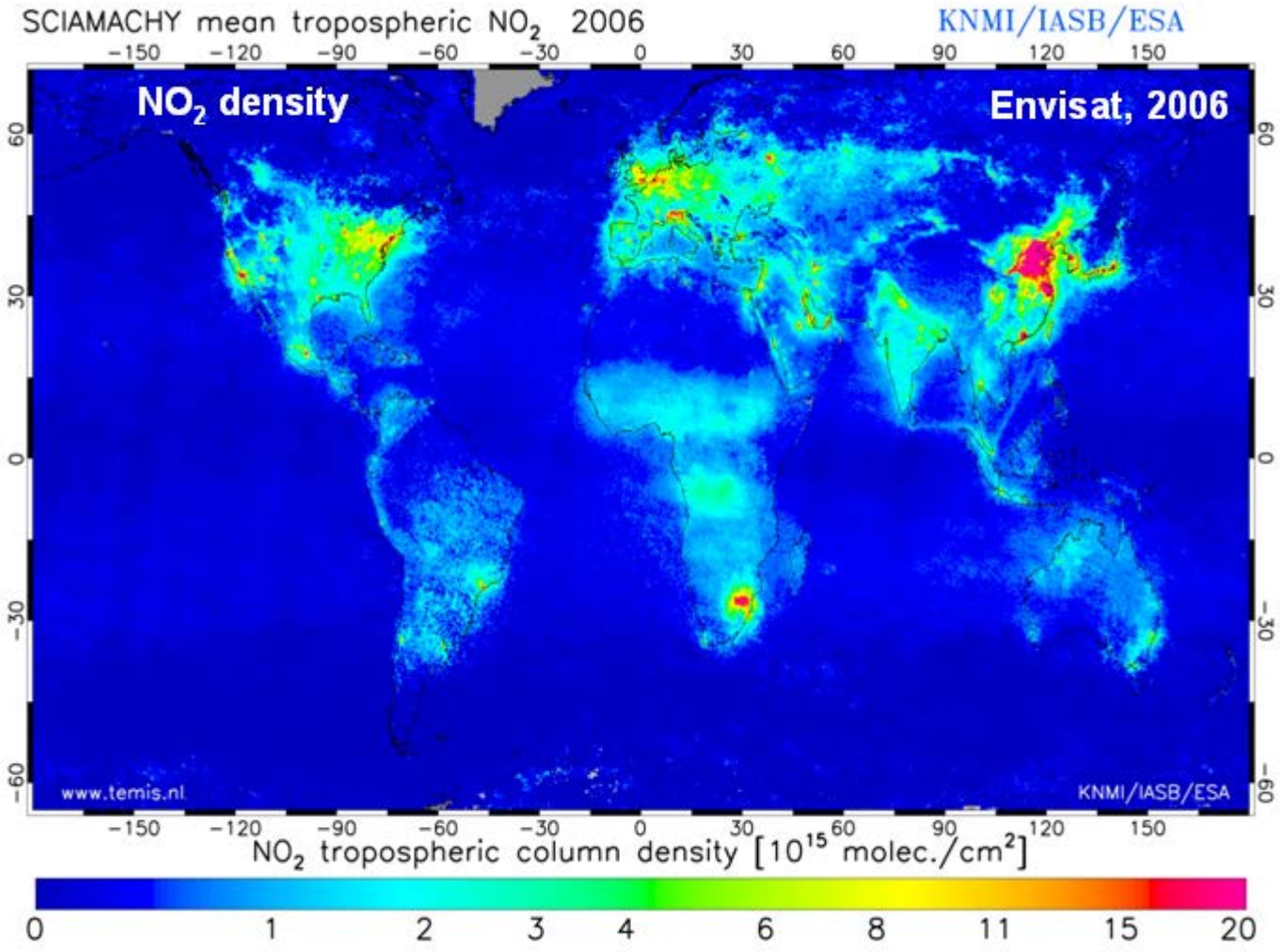
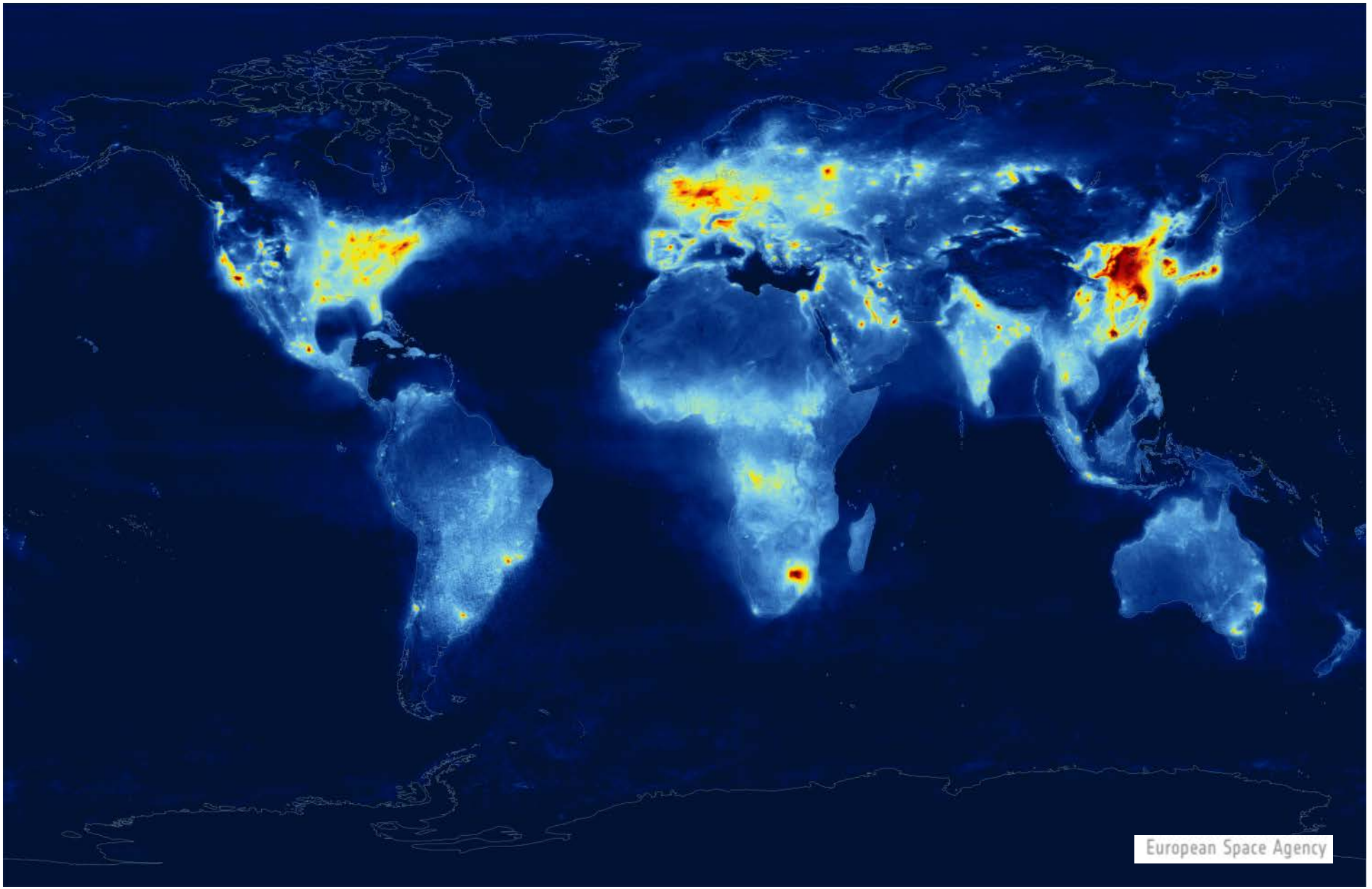


Air quality

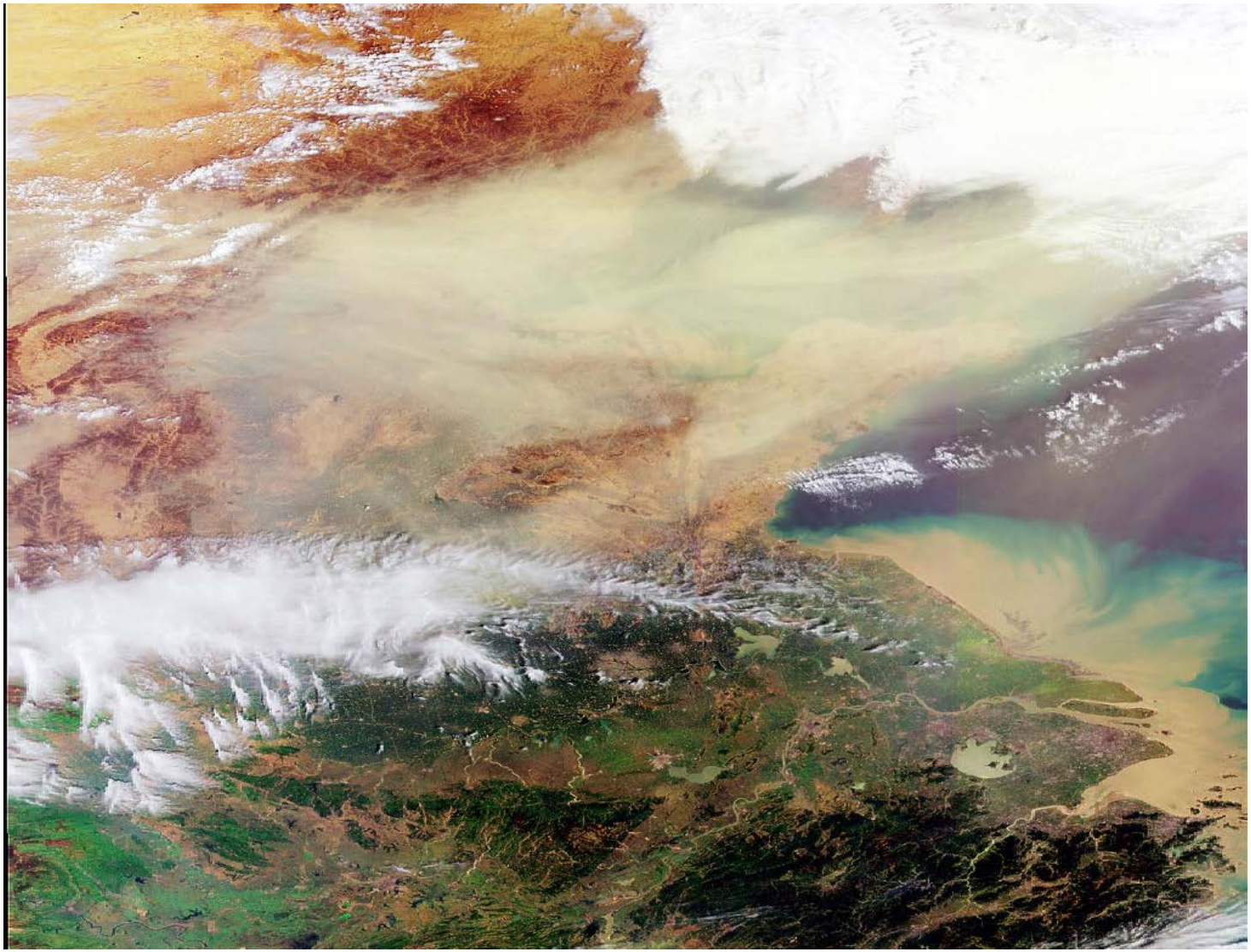
Air composition and quality are changing constantly, because of natural and manmade events, such as :

- Sand and dust storms
- Lightning
- Fires
- Biological activity
- Climate change
- Urbanisation
- Industrialisation, etc.

Global AQ Records

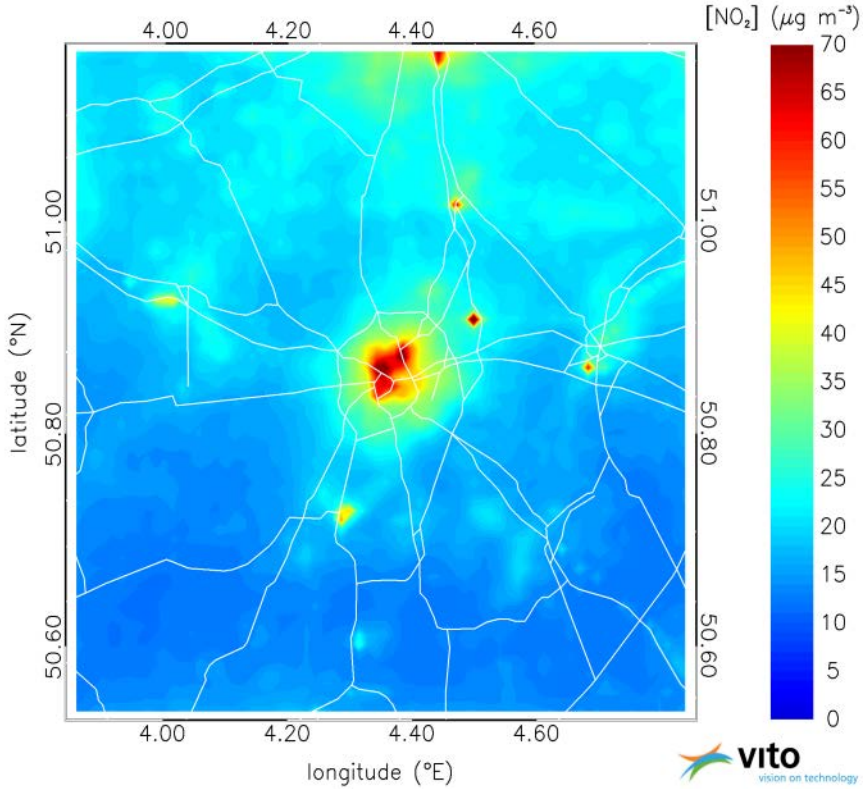


Sandstorm over Beijing April 2006

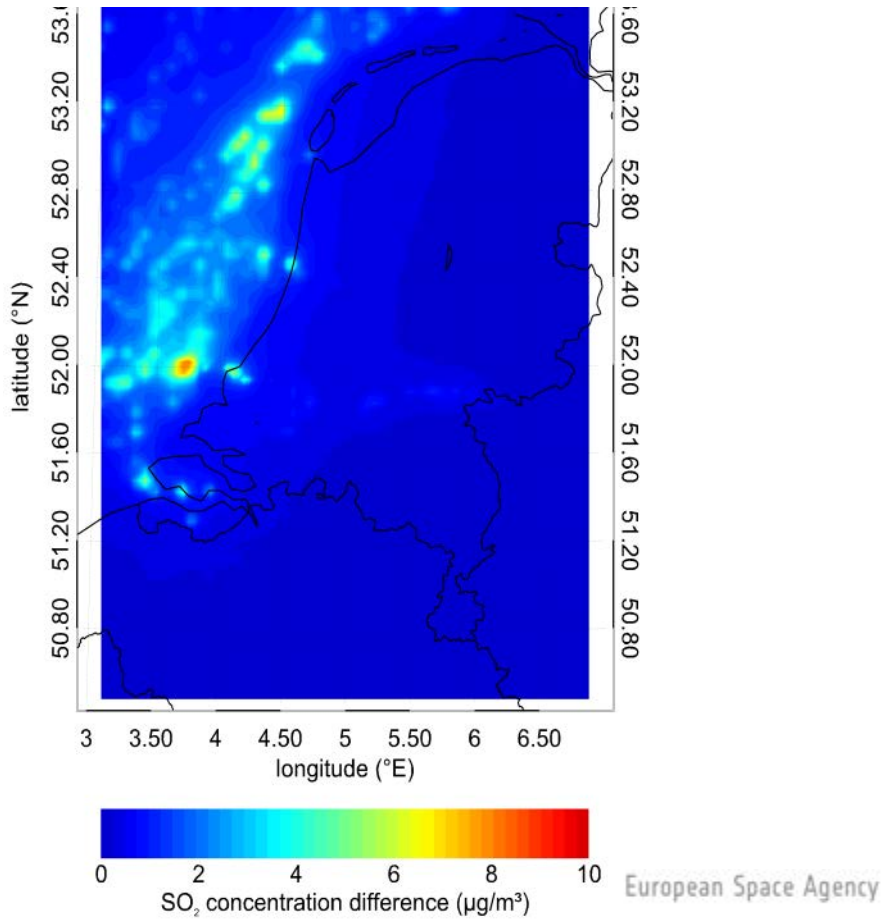


Urban AQ indicators / scenario tool

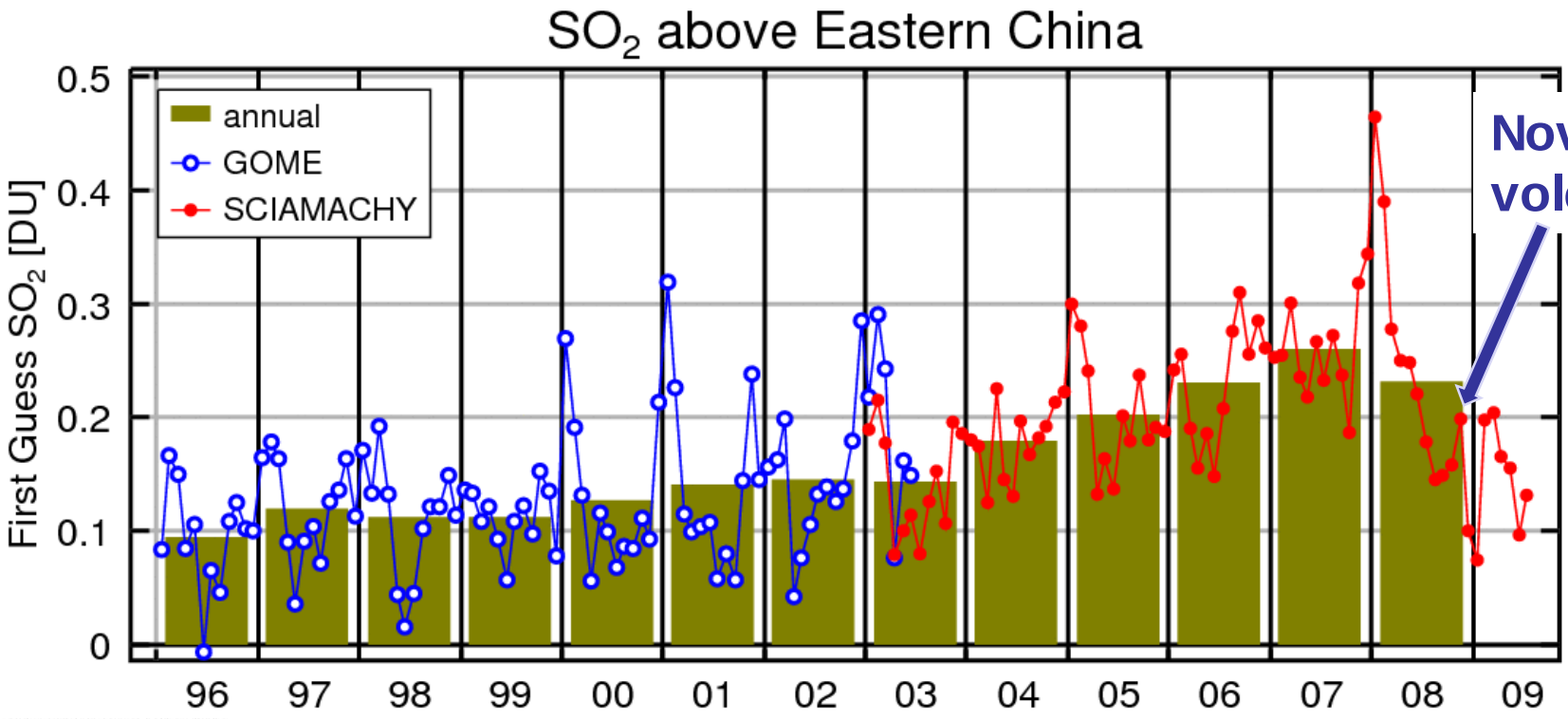
- Brussels, NO_2 annual mean

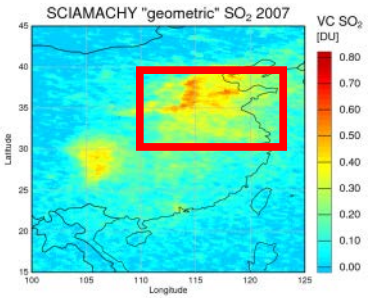


- impact of reduced sulphur content in ship fuel



Changes in SO_2 columns East Central China





- SO_2 columns show upward trend since 1996
- Accelerating increase from 2001
- Sharp decrease in 2008 / 2009

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Thank you !

For further information :

www.esa.int