Monitoring the Earth environment:

the ENVISAT mission

European Space Agency
Agence spatiale européenne

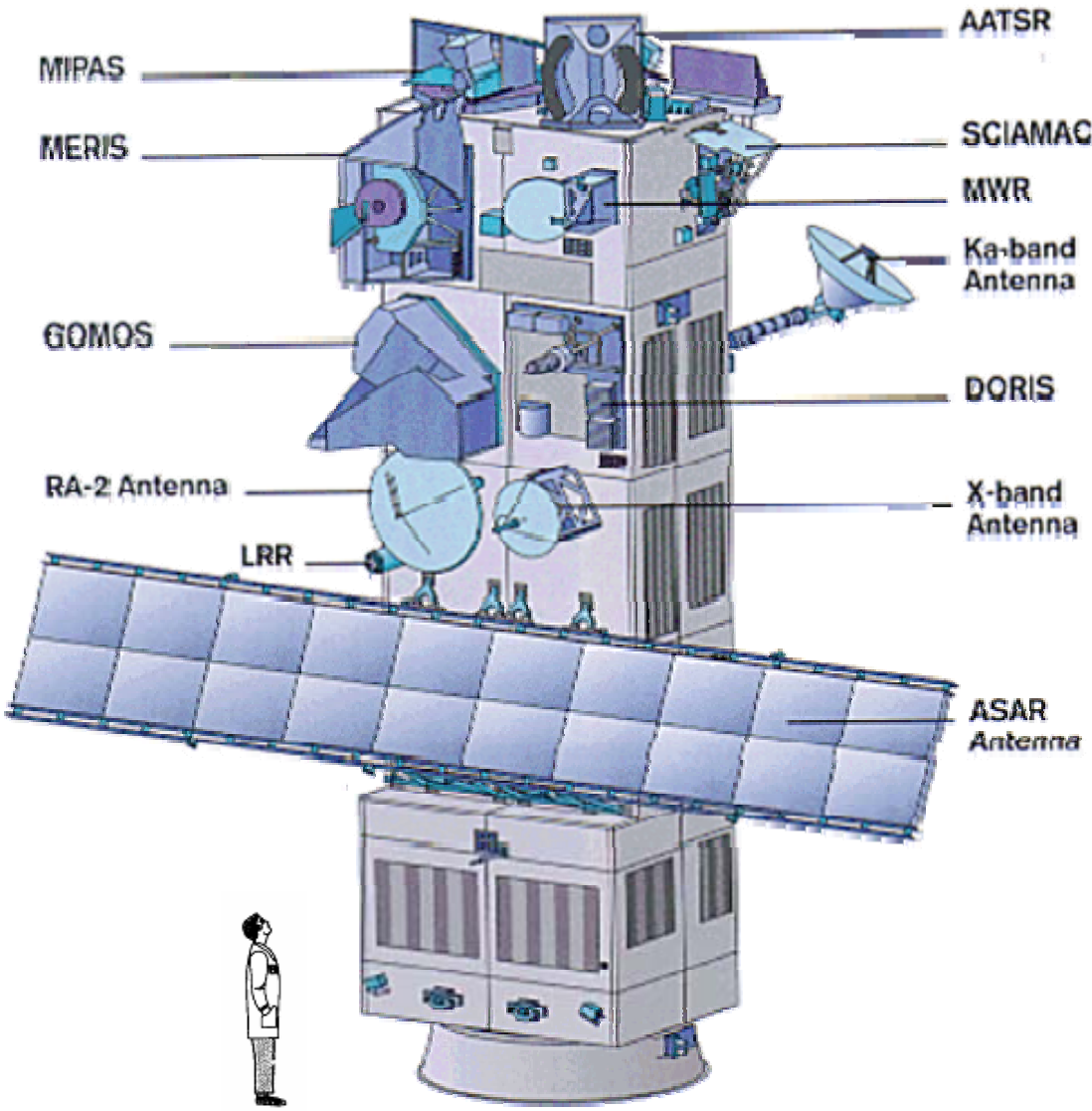
The Living Planet

ENVISAT mission

Some numbers :

- Largest European satellite & largest worldwide EO satellite:
  - unique combination of 10 instruments ,
  - all instruments working nominally,
  - however recent anomalies with MIPAS instrument led to the suspension of the instrument operations in March 04
- Satellite OK with long-term operations capabilities:
  - 75 % of fuel available
- 77 different types of data products
- 140 Gigabytes of data products generated per day

ENVISAT: the most powerful tool for monitoring the state of our planet



- ***Dimensions***

  Launch configuration:
  - length 10.5 m
  - envelope diameter 4.6 m

  In-Orbit configuration:
  - **26m x 10m x 5m**

- ***Mass***

  Total satellite **8140 Kg**
  Payload 2050 Kg

- ***Power***

  Solar array power*:*
  6.5 kW (EOL)
  Average power demand*:*

	Sun (watts)	Eclipse (watts)
Payload	1700	1750
Satellite	3275	2870

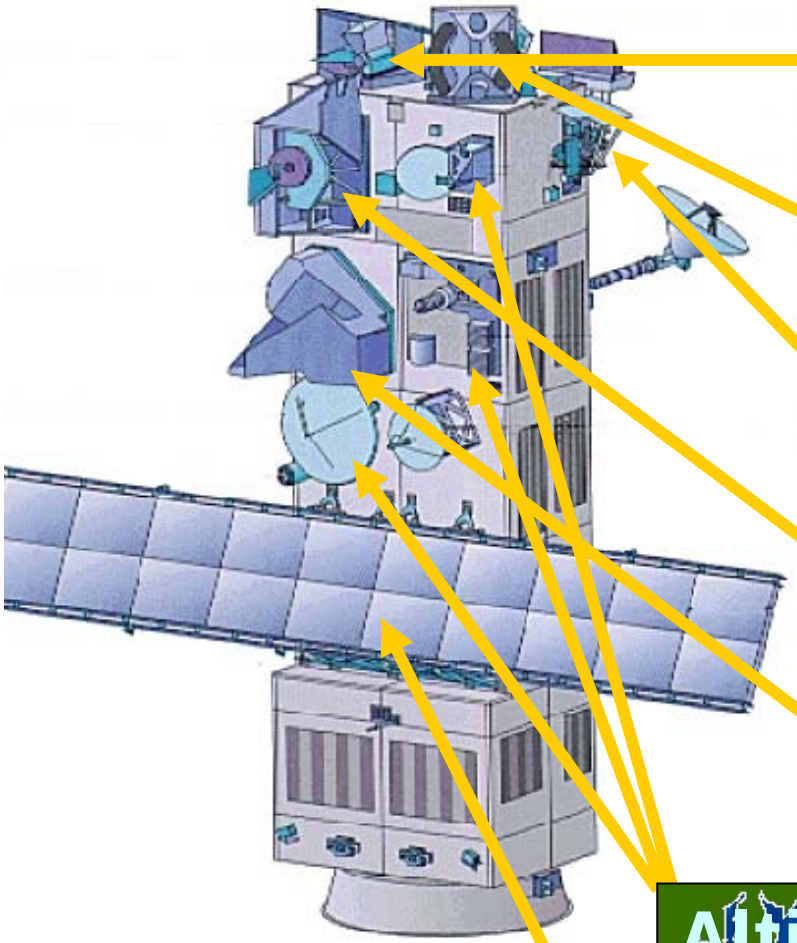
- ***Orbit***

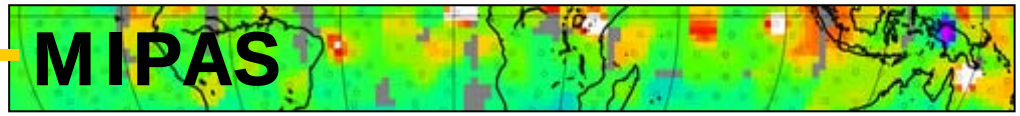
  800 km as ERS, sun synchronous 10:00, i.e. 30 minutes before ERS-2

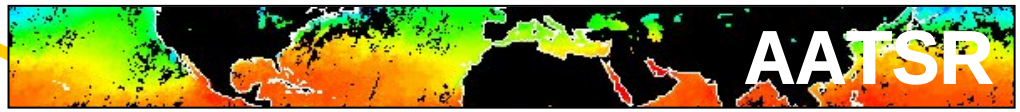
European Space Agency
Agence spatiale européenne

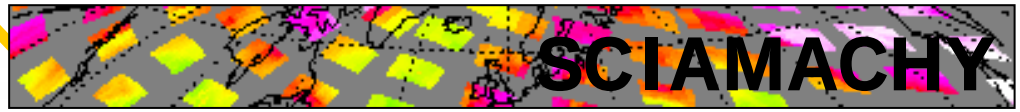
the Living Planet

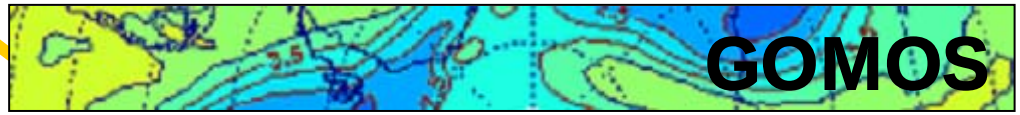
ENVISAT: the most powerful tool for monitoring the state of our planet

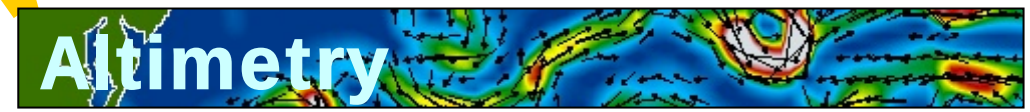


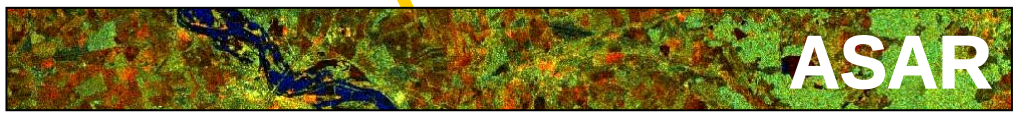






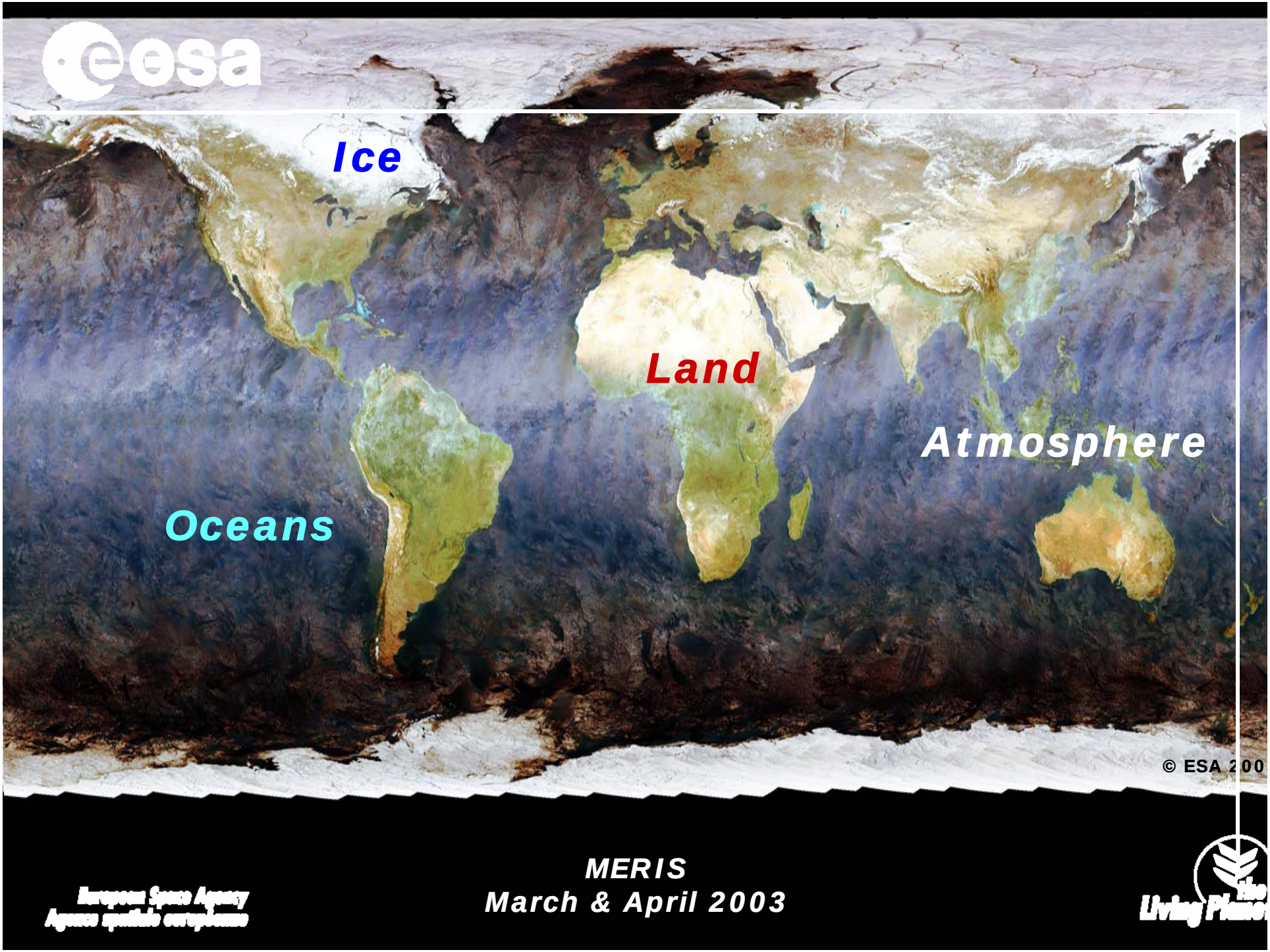


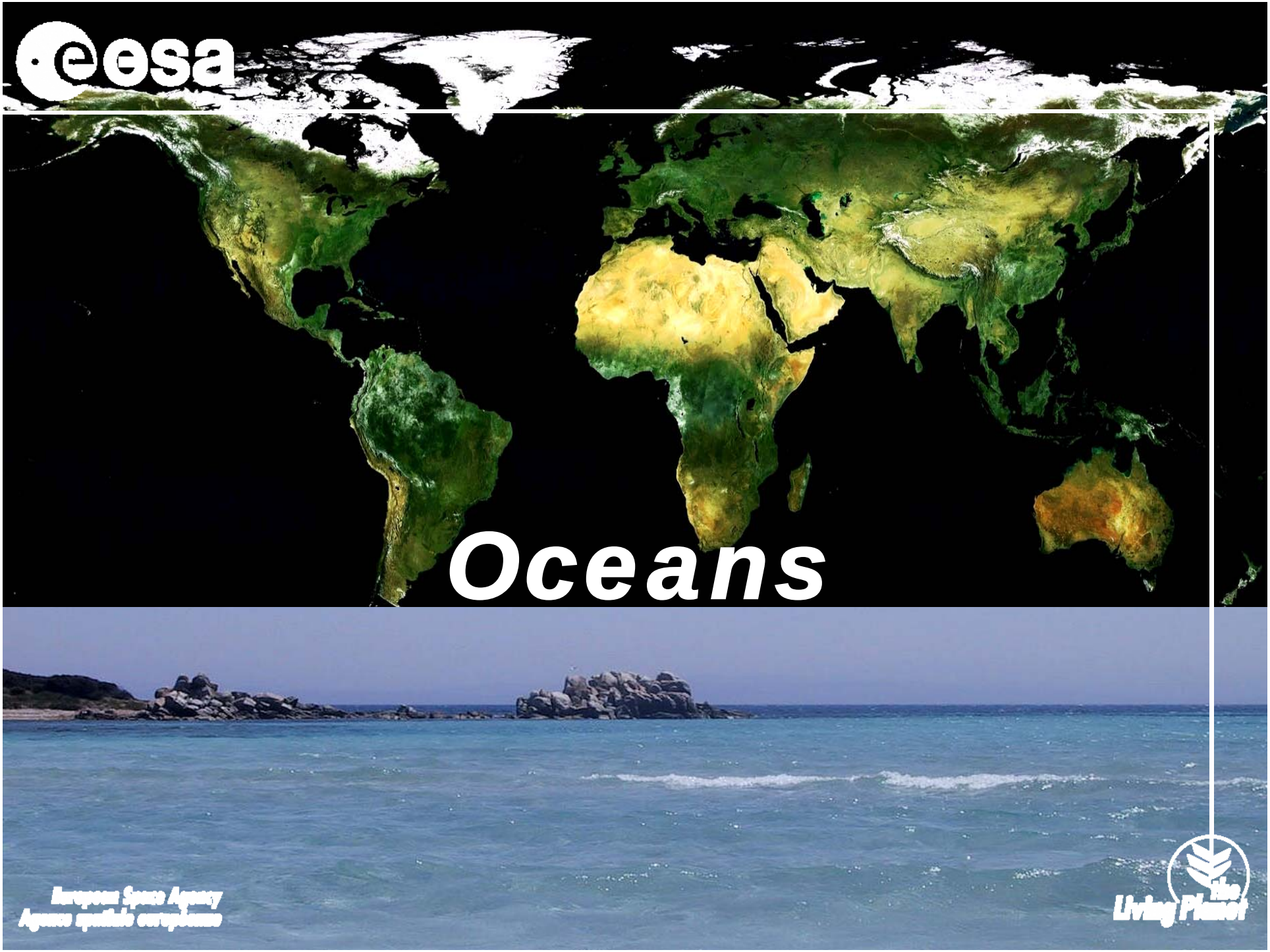


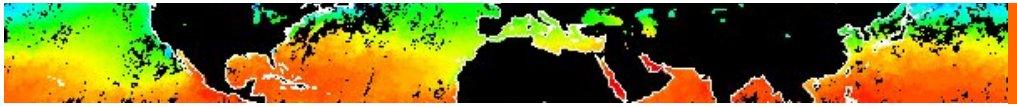


European Space Agency
Agence spatiale européenne

the Living Planet


Ice
Land
Atmosphere
Oceans
© ESA 200
MERIS
March & April 2003
European Space Agency
Agence spatiale européenne
the Living Planet

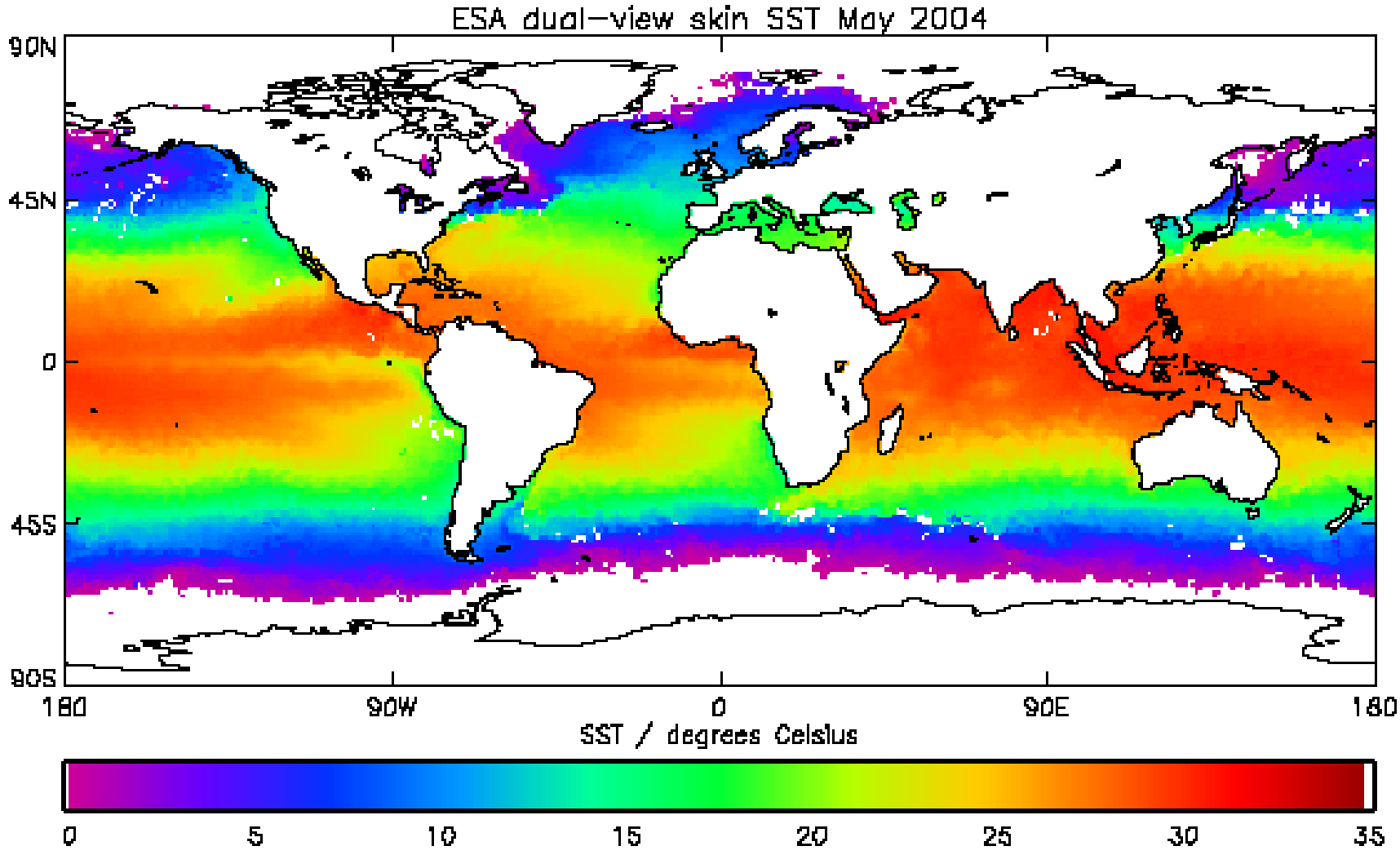

esa
Oceans
European Space Agency
Agence spatiale européenne
The Living Planet



AATSR

ENVISAT
CARING FOR THE EARTH

Sea Surface Temperature (12 months – June 2003 to May 2004)



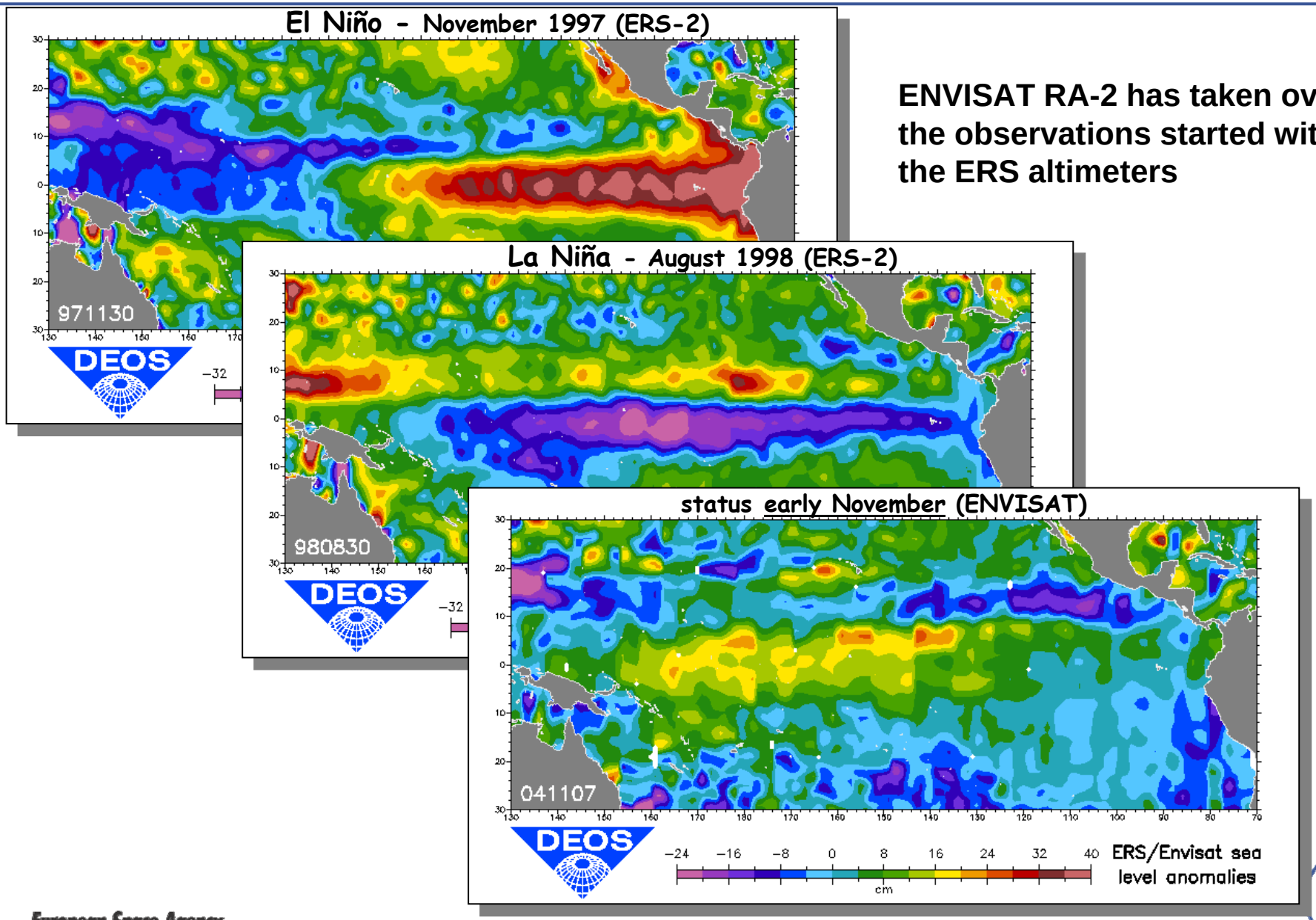
Courtesy of UK Met Office

Agence spatiale européenne

the Living Planet

Altimetry

ENVISAT
CARING FOR THE EARTH



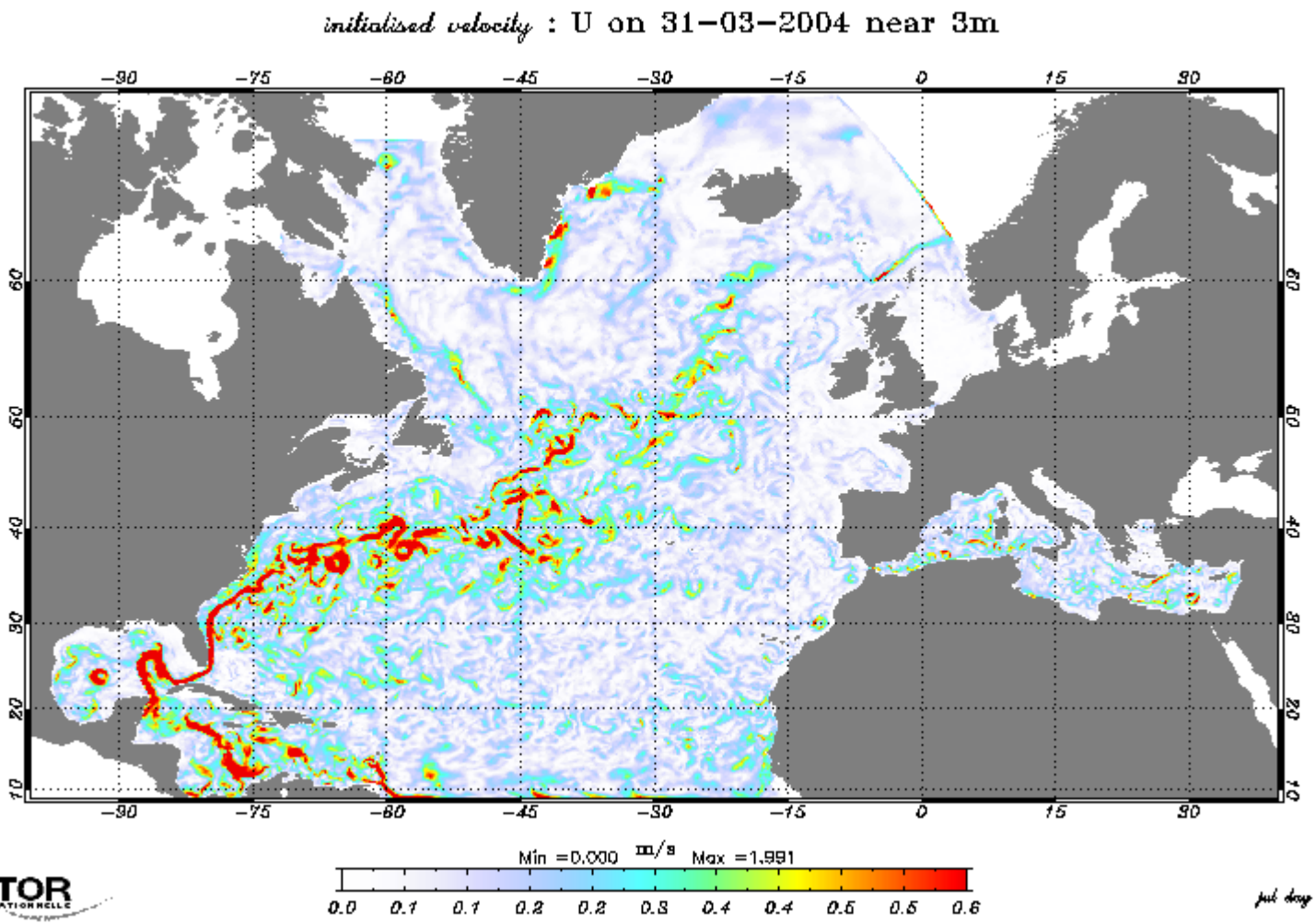
ENVISAT RA-2 has taken over the observations started with the ERS altimeters

European Space Agency
Agence spatiale européenne

the Living Planet

ENVISAT
CARING FOR THE EARTH

ENVISAT RA-2 observing the Gulf Stream current velocity



MERCATOR
OCEANOGRAPHIC OPERATION HELLC

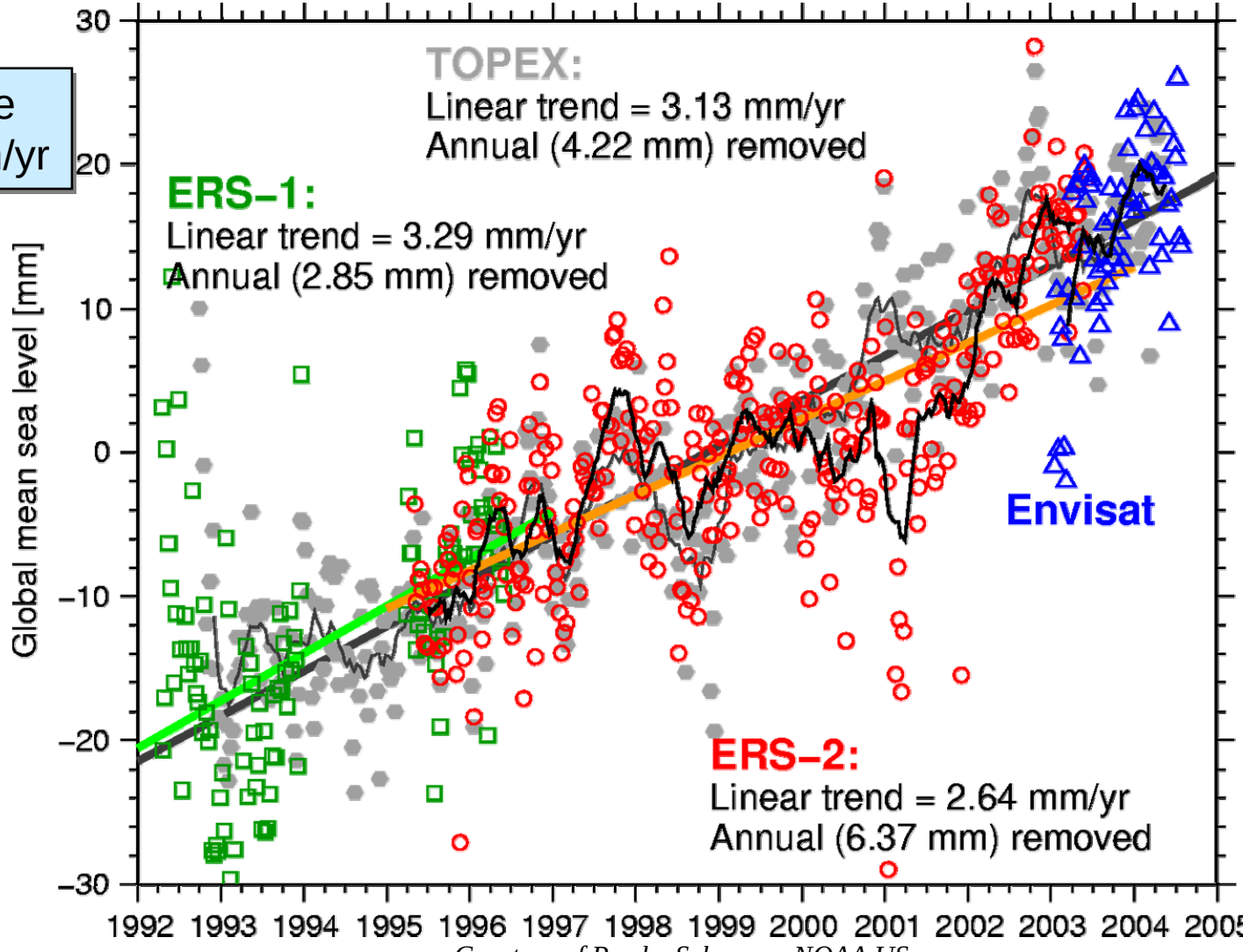
European Space Agency
Agence spatiale européenne

the Living Planet

ENVISAT
CARING FOR THE EARTH

The ENVISAT altimeter provides continuity to the measurements initiated with the altimeters in the early 1990

Sea level rise
Trend: + 3 mm/yr

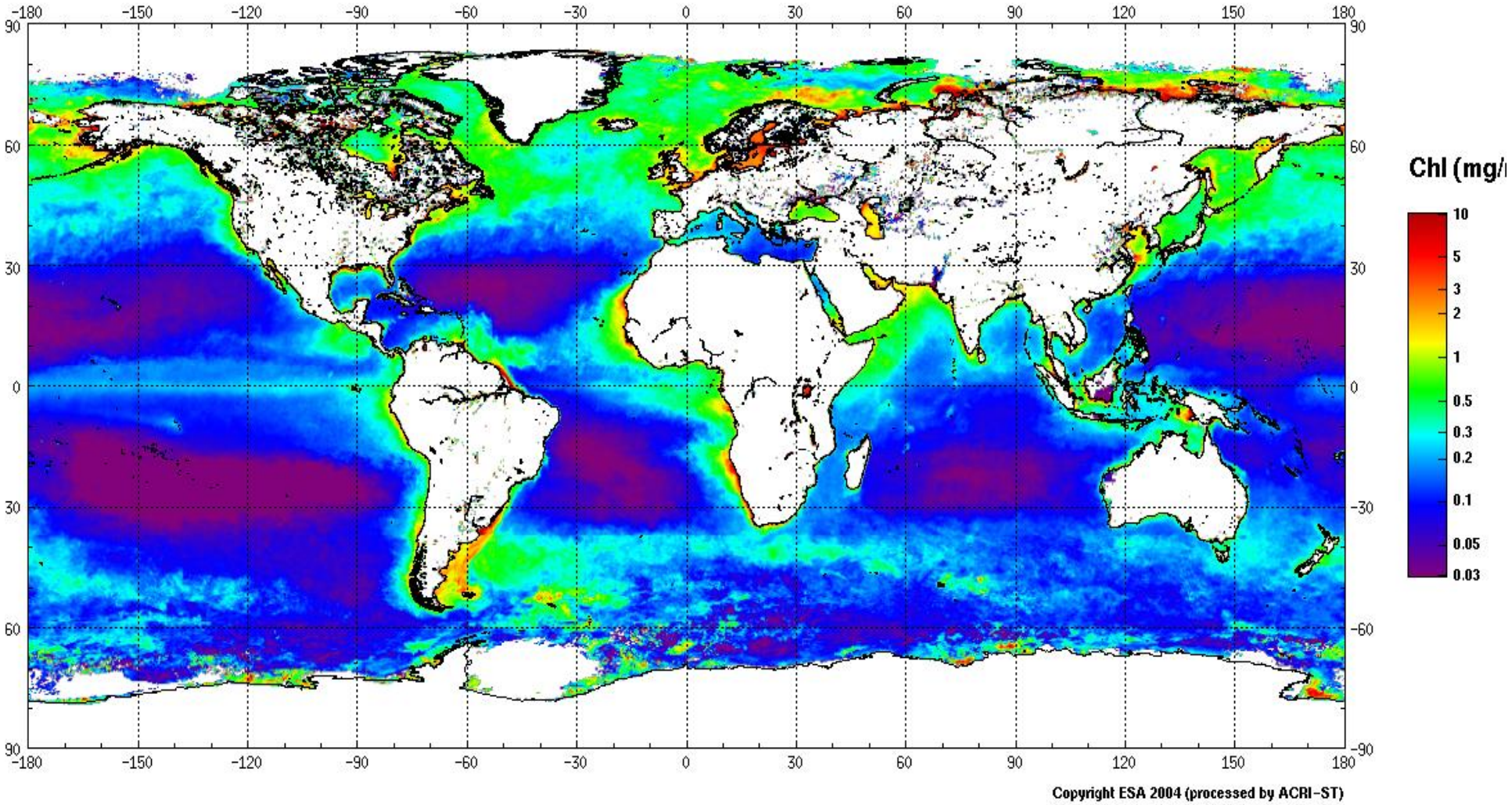


Courtesy of Remko Scharroo, NOAA,US

MERIS

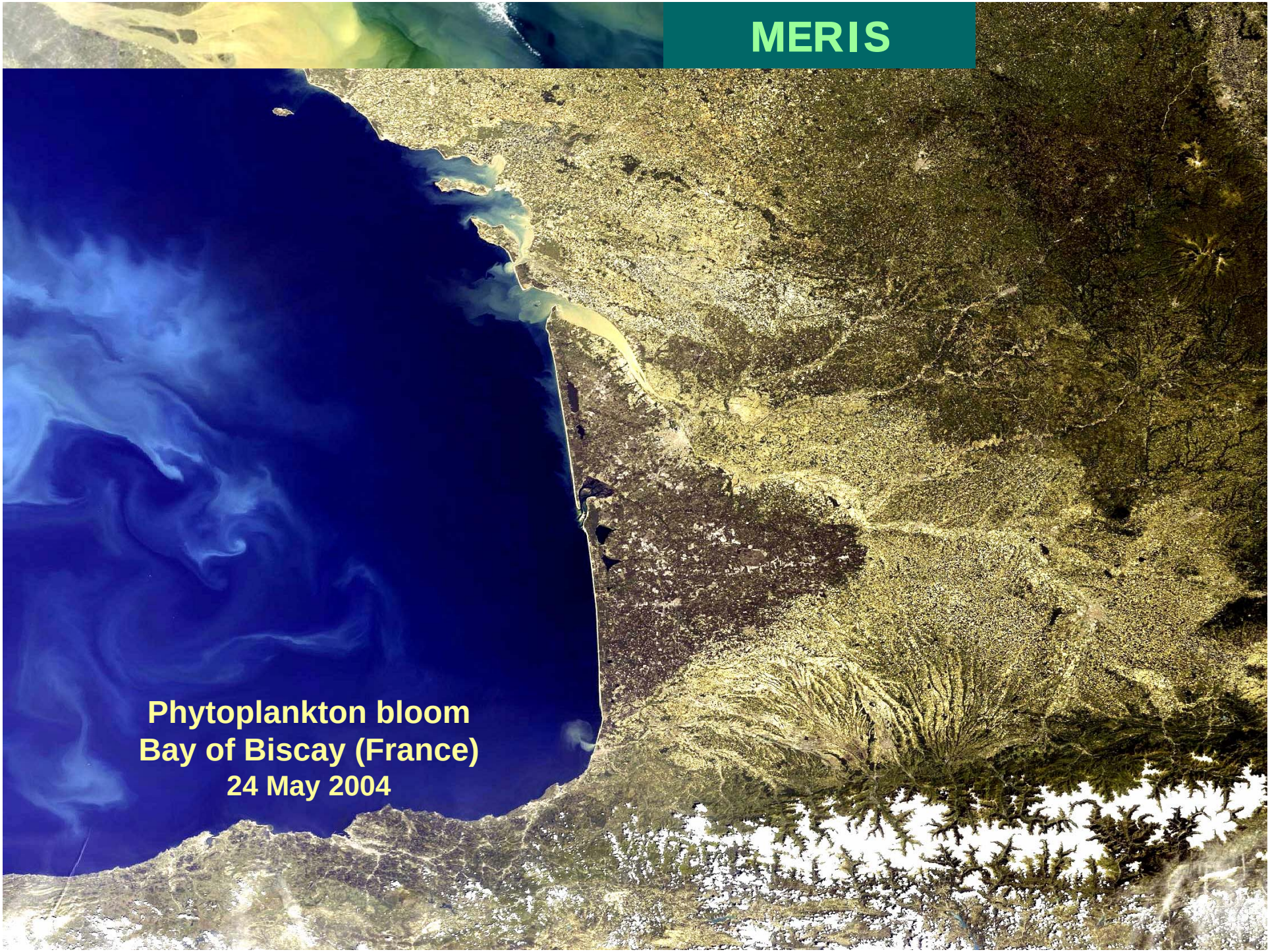
ENVISAT
CARING FOR THE EARTH

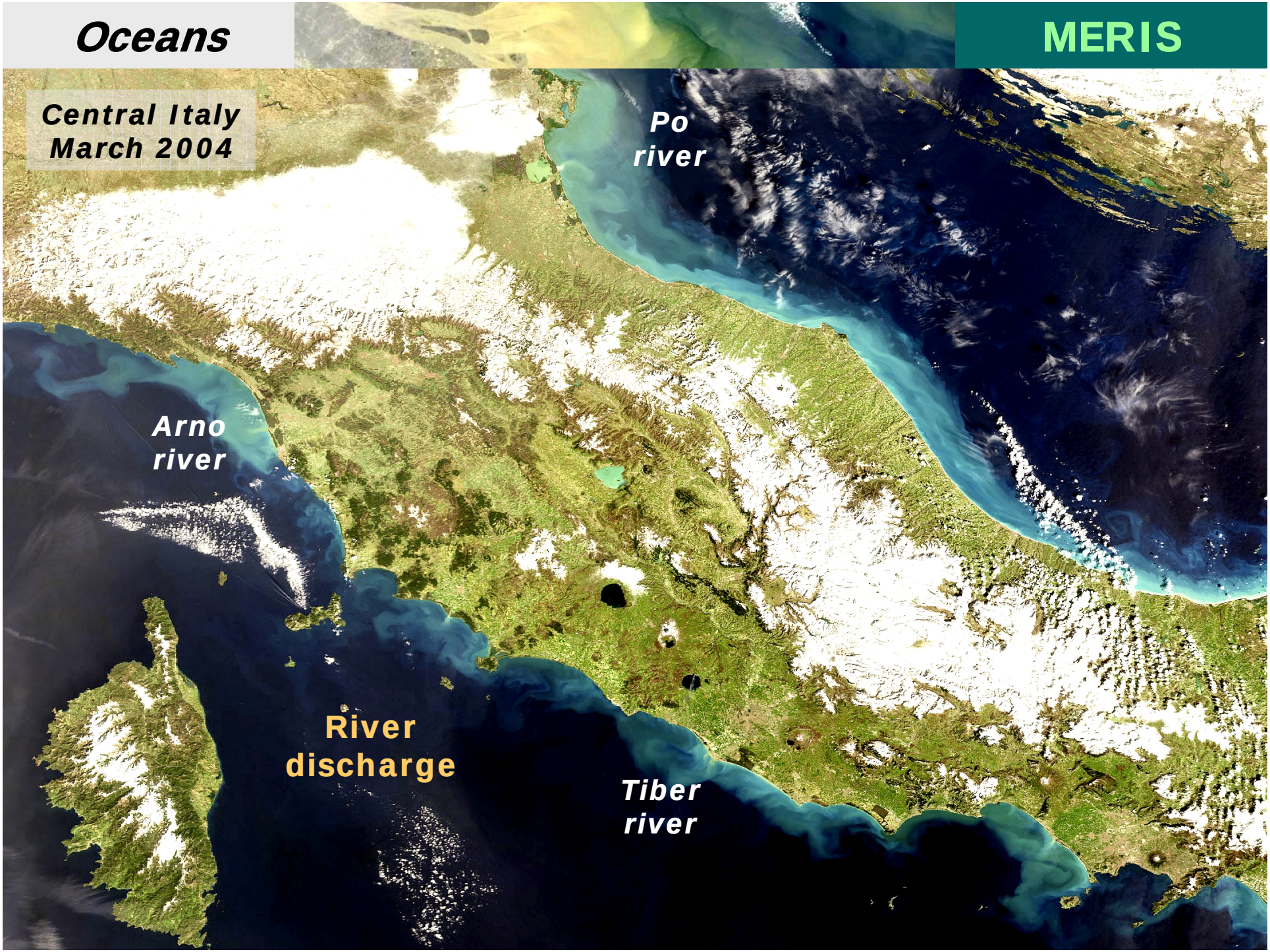
ENVISAT – MERIS
Chlorophyll-a – Global coverage – Annual average – 2003

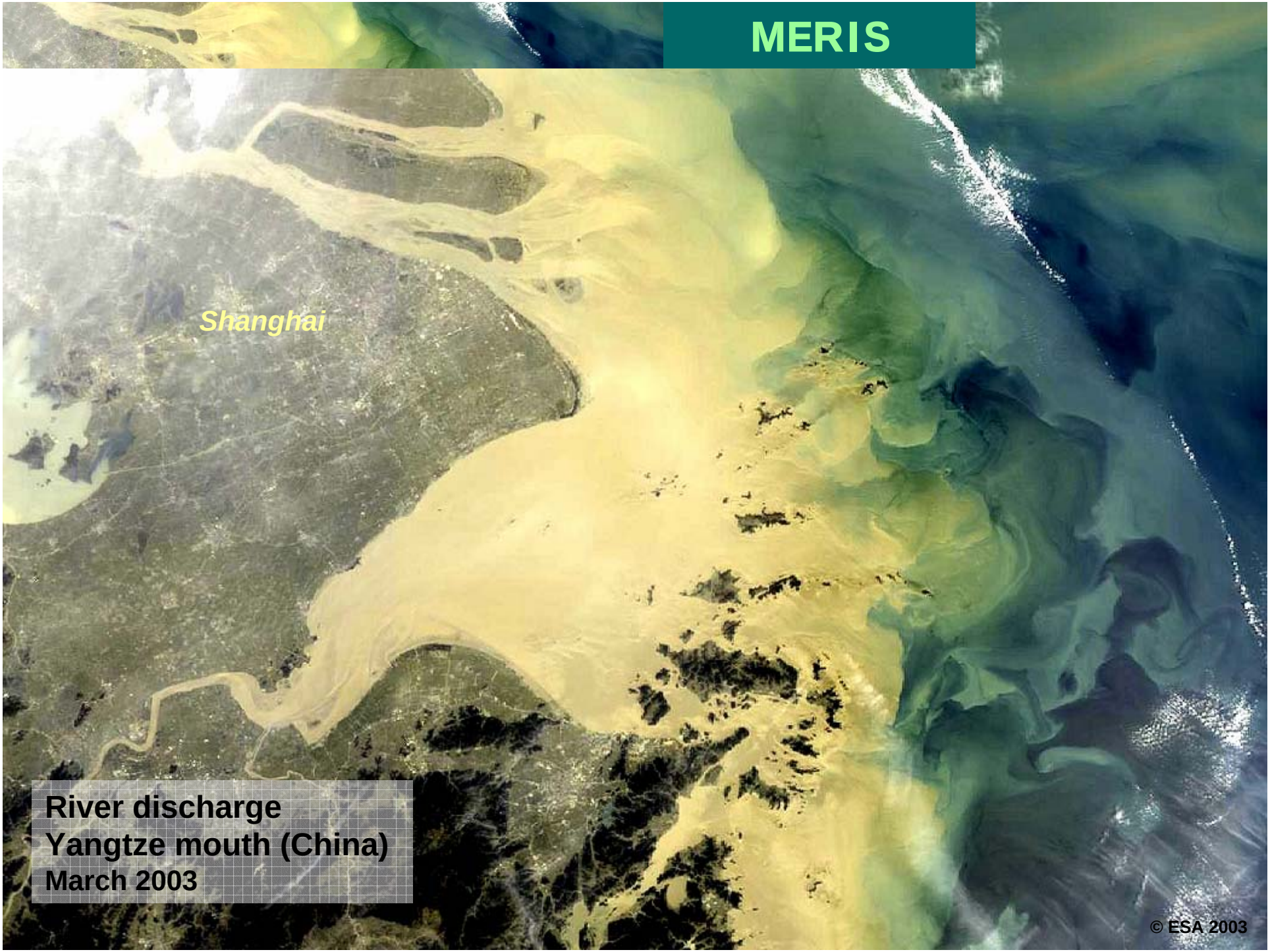


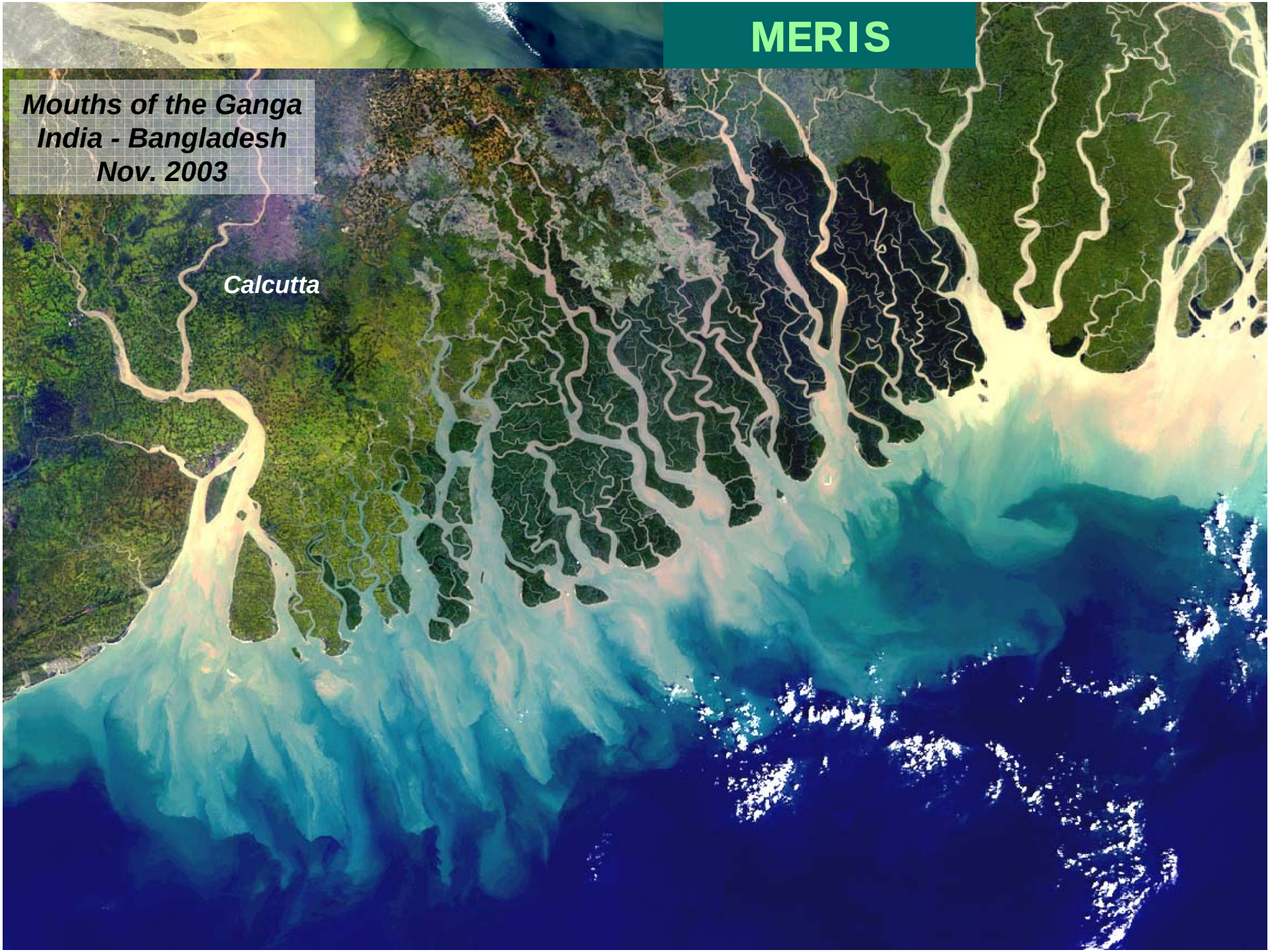
European Space Agency
Agence spatiale européenne

the Living Planet

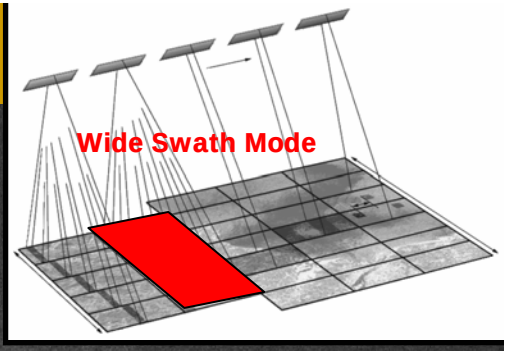

MERIS
Phytoplankton bloom
Bay of Biscay (France)
24 May 2004


Oceans
MERIS
Central Italy
March 2004
Po
river
Arno
river
River
discharge
Tiber
river


MERIS
Shanghai
River discharge
Yangtze mouth (China)
March 2003
© ESA 2003


MERIS
Mouths of the Ganga
India - Bangladesh
Nov. 2003
Calcutta

ASAR



Dover strait and North Sea

Ship detection

Dover

Calais

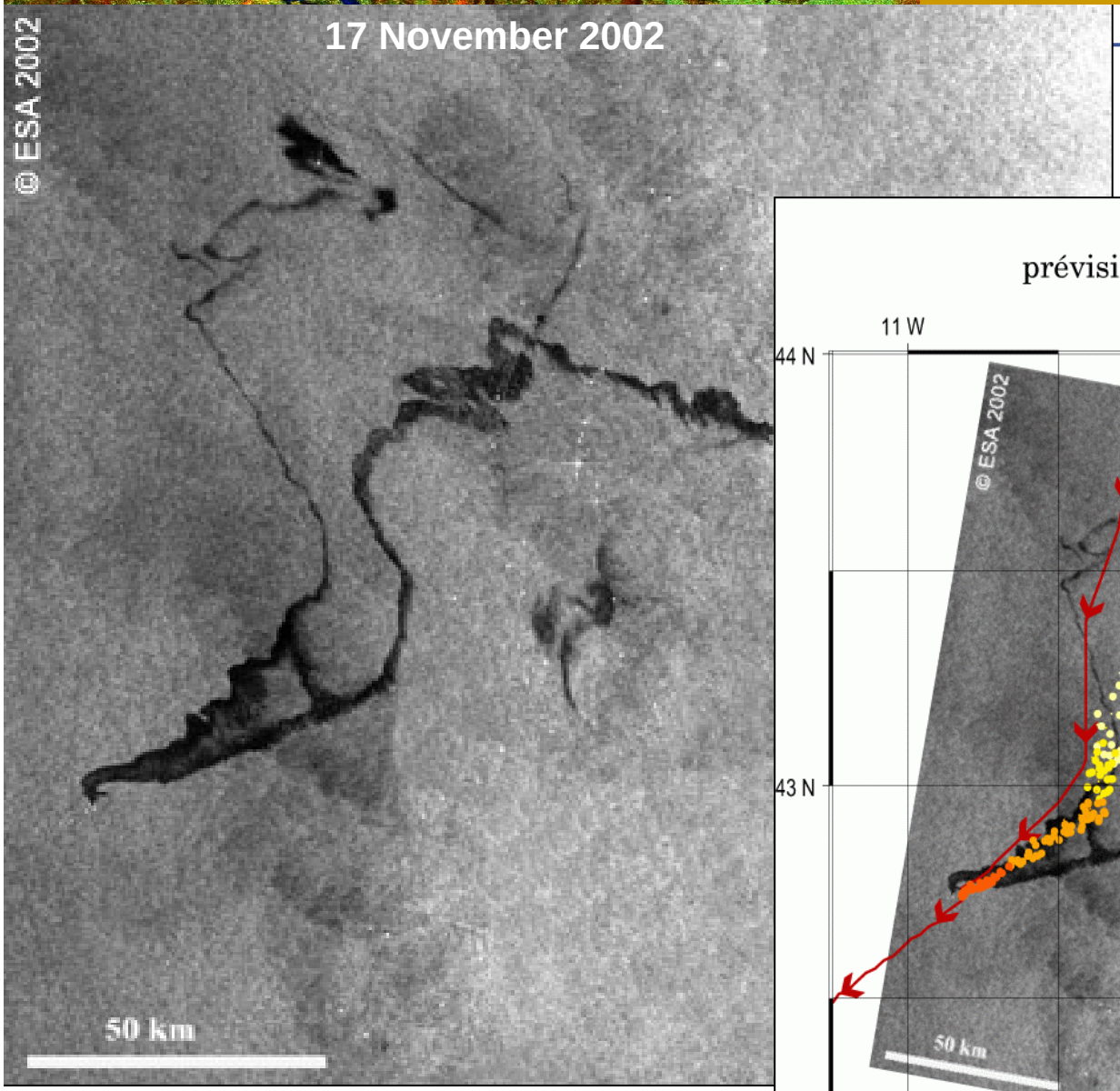
Ostend

22 November 2003

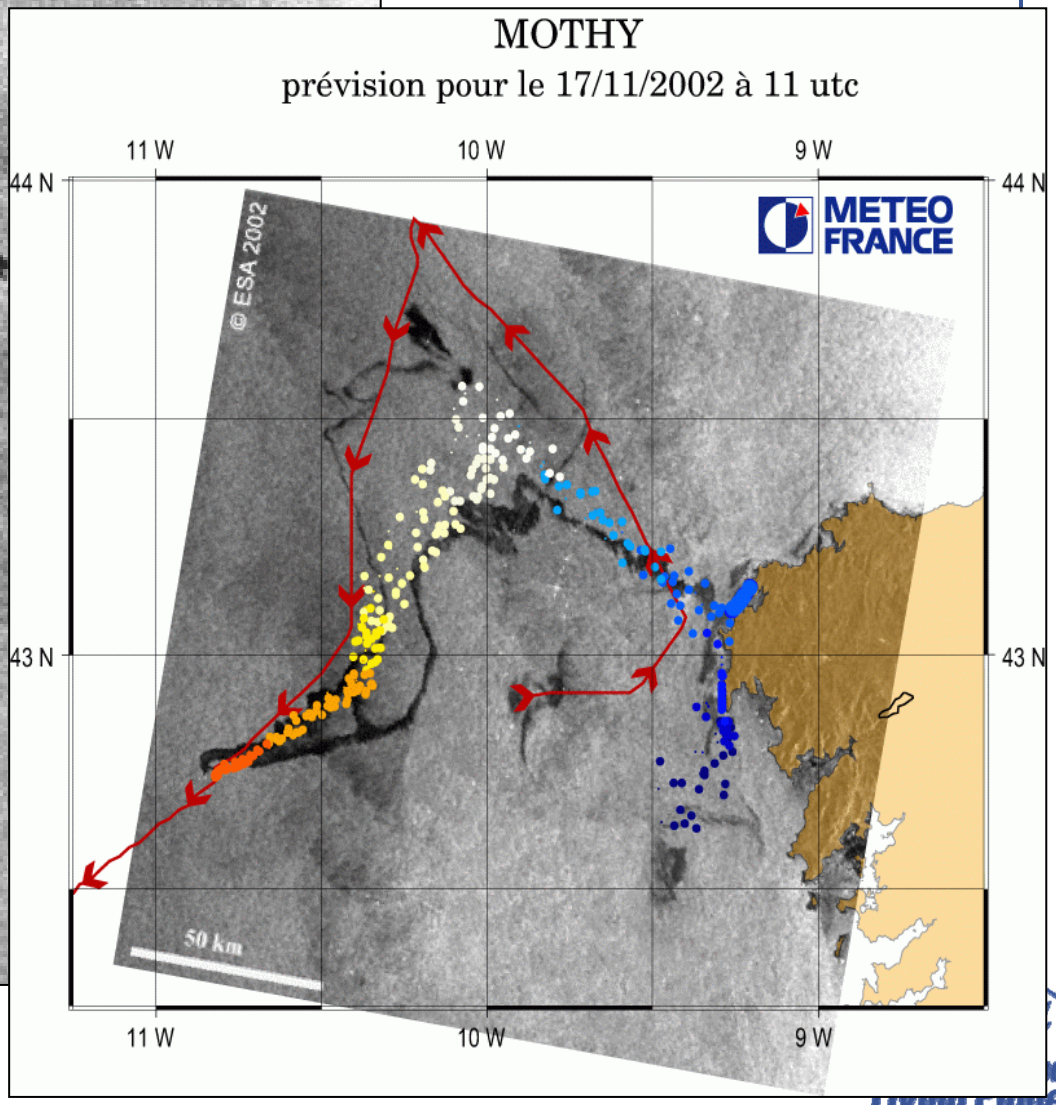
ASAR

ENVISAT
CARING FOR THE EARTH

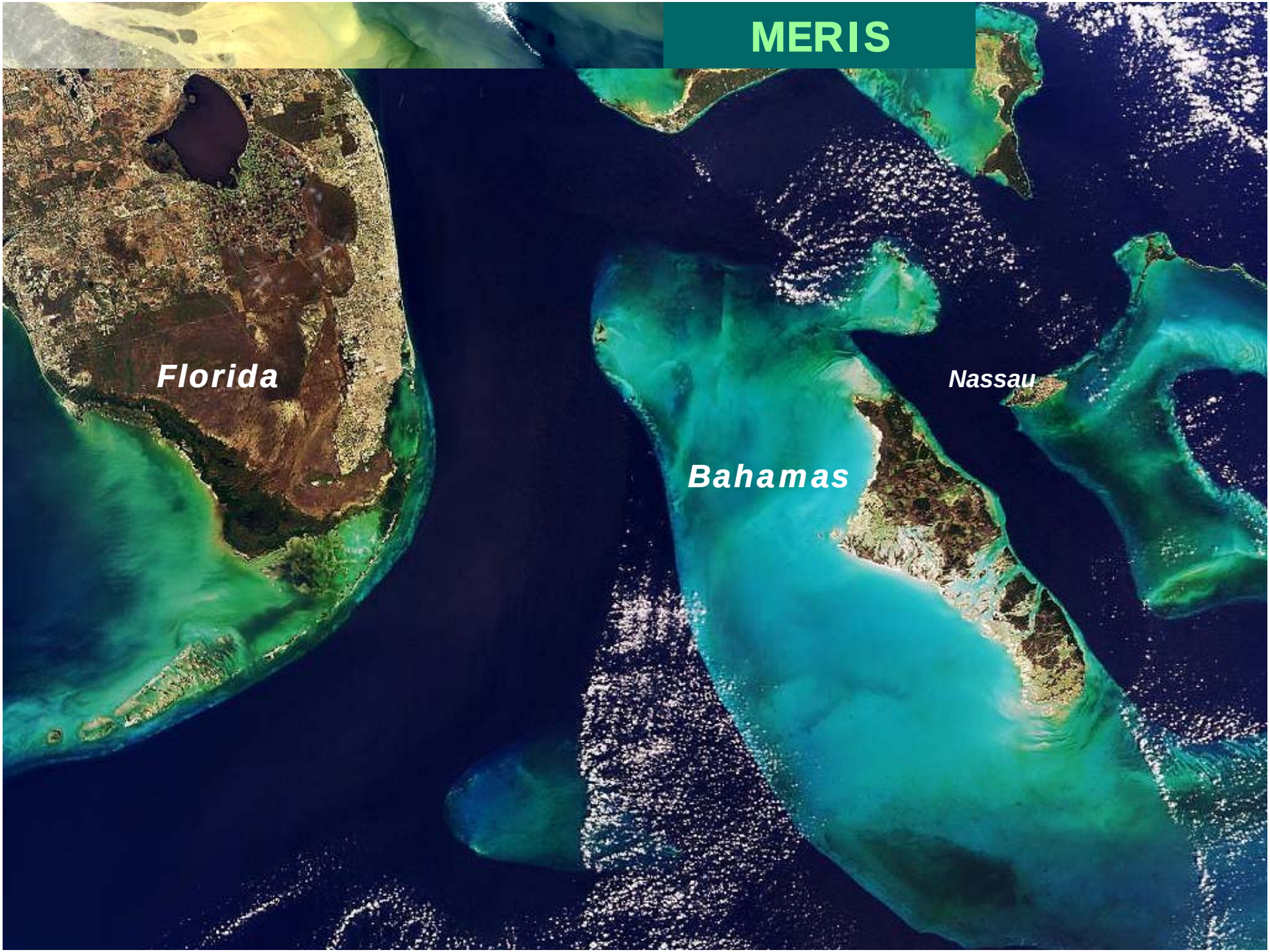
17 November 2002

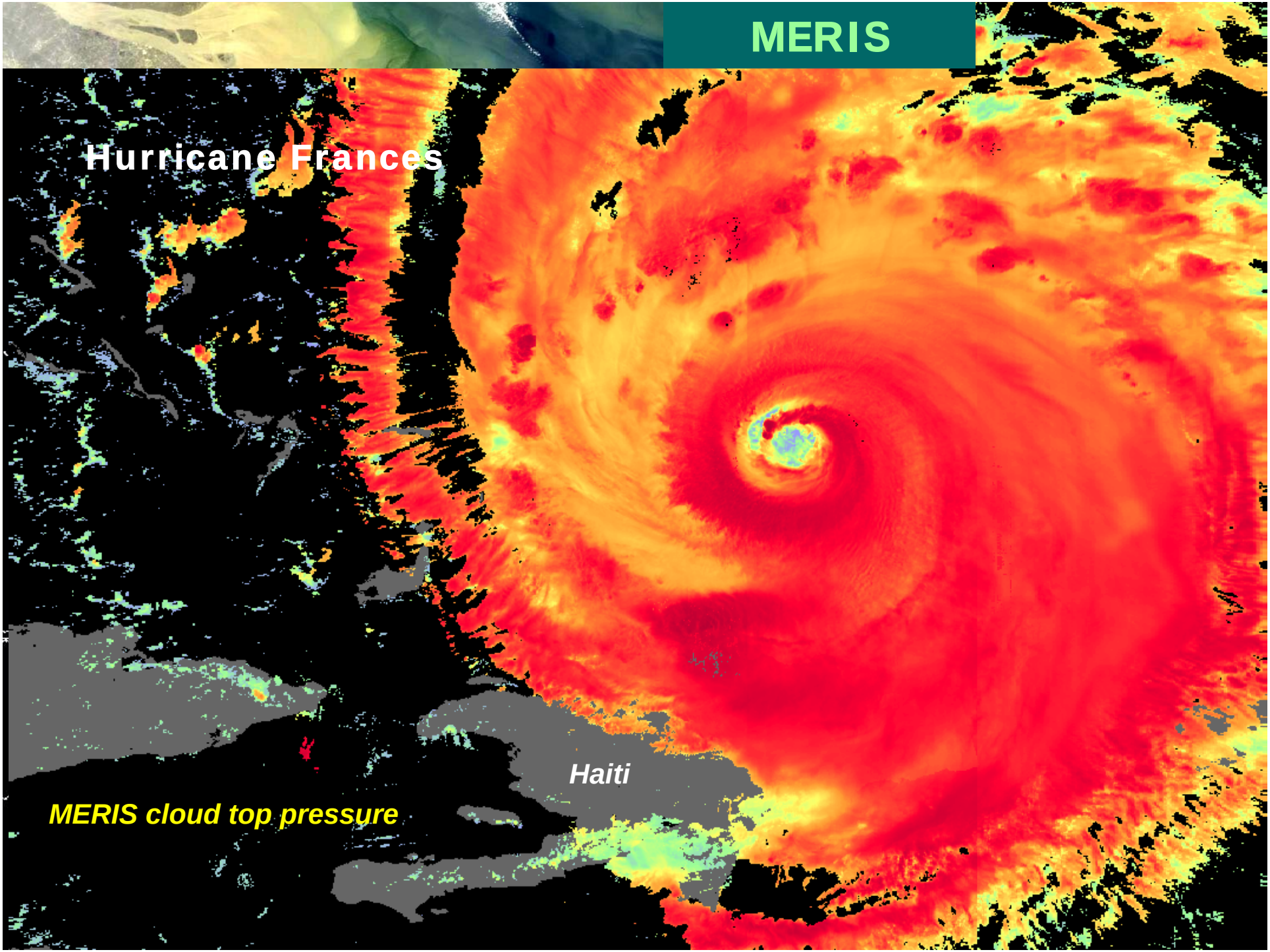


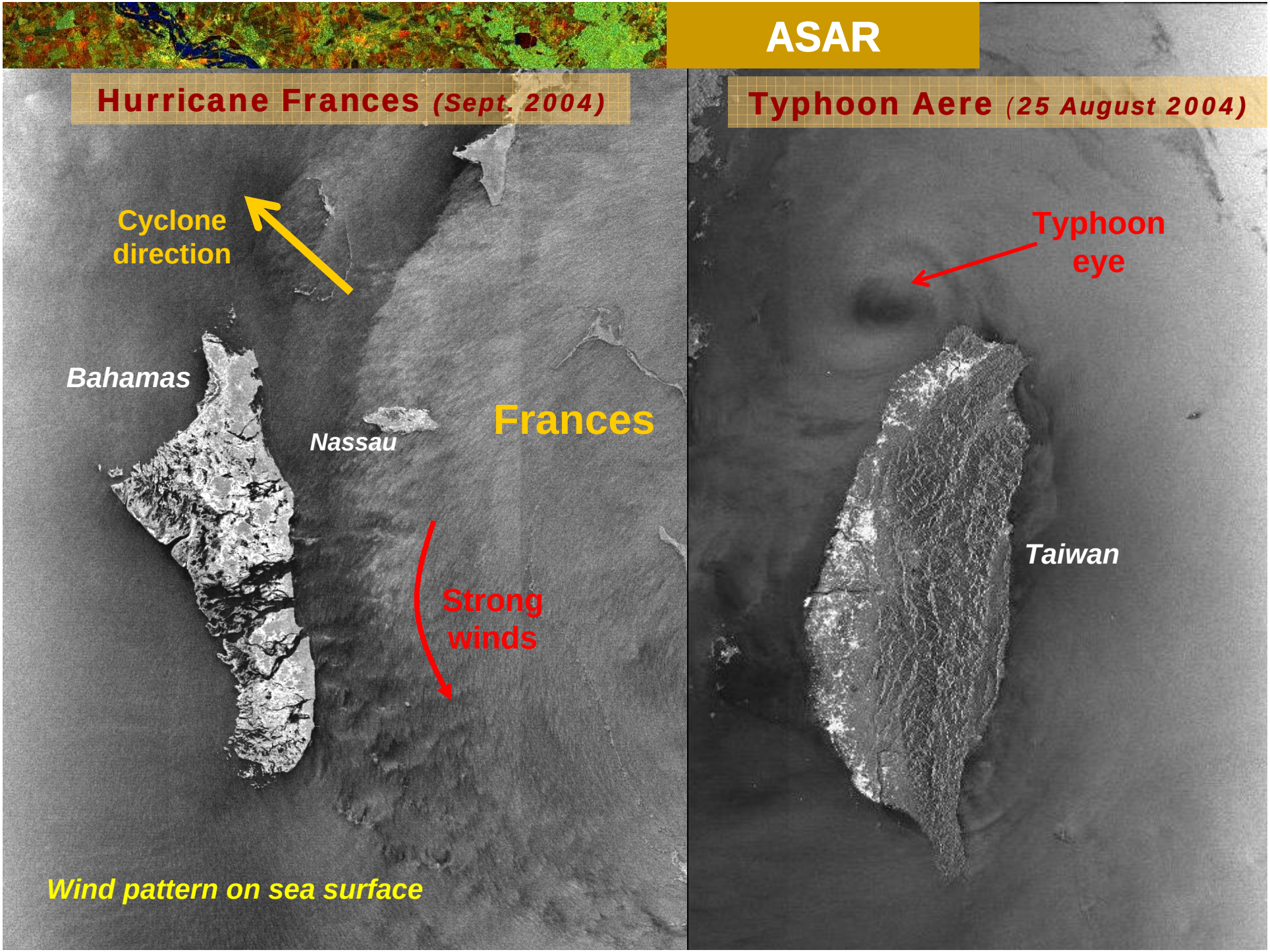
Oil slick



European Space Agency
Agence spatiale européenne


MERIS
Florida
Nassau
Bahamas

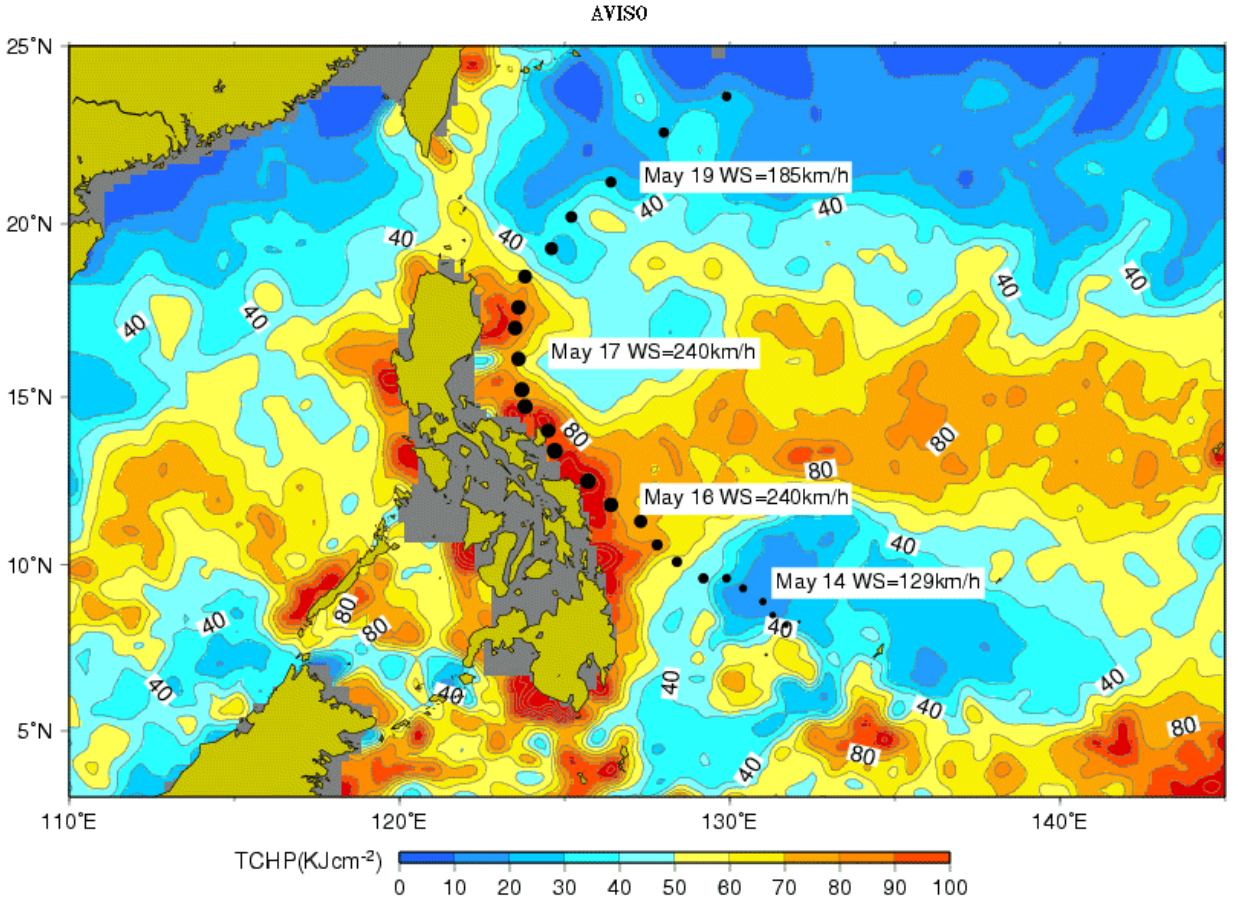

MERIS
Hurricane Frances
Haiti
MERIS cloud top pressure


ASAR
Hurricane Frances (Sept. 2004)
Typhoon Aere (25 August 2004)
Cyclone direction
Typhoon eye
Bahamas
Nassau
Frances
Taiwan
Strong winds
Wind pattern on sea surface

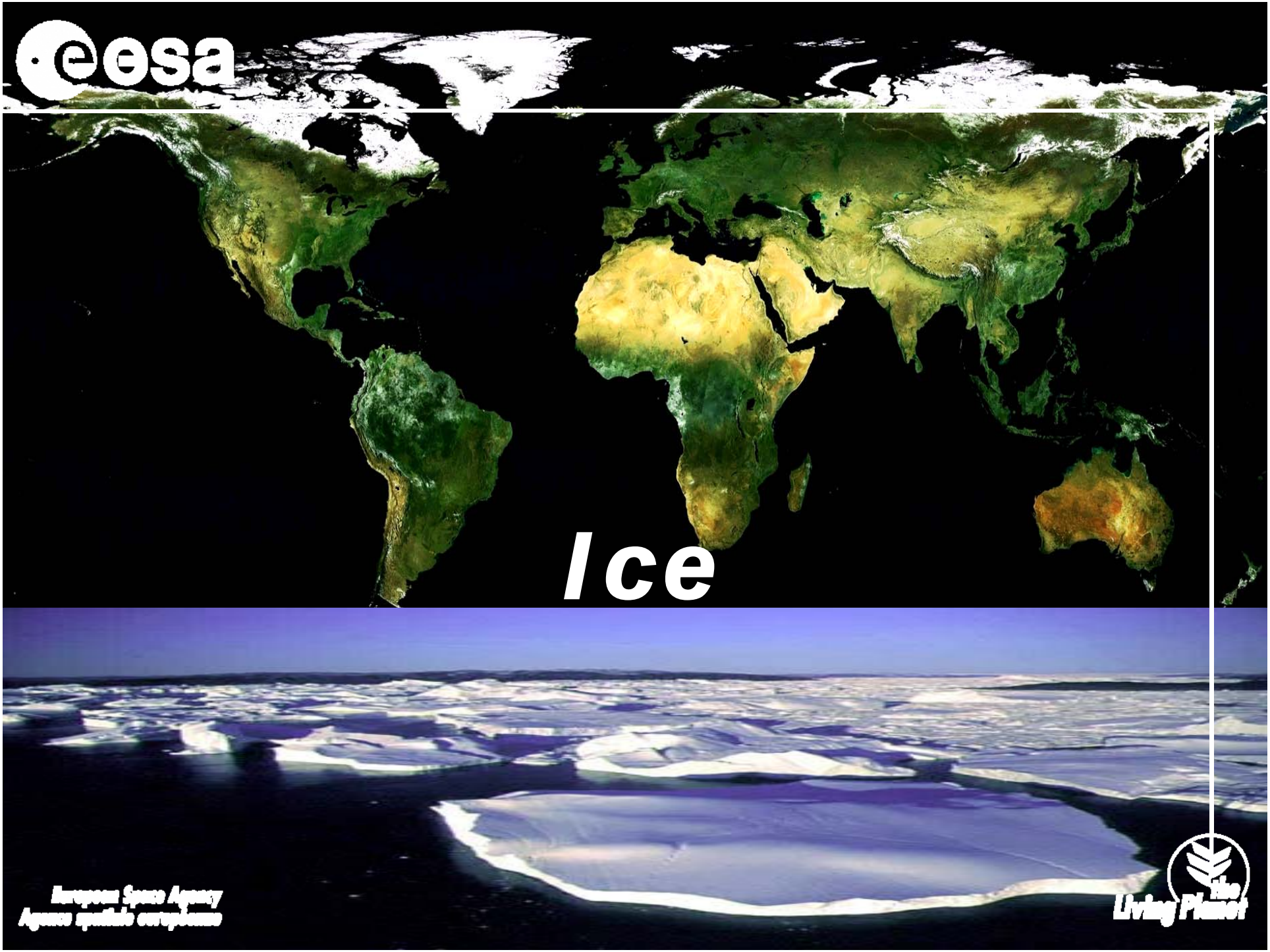
MERIS
Altimetry

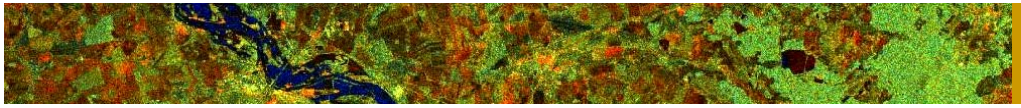
ENVISAT
CARING FOR THE EARTH

Typhoon Nida – 17 May 2004



the Living Planet

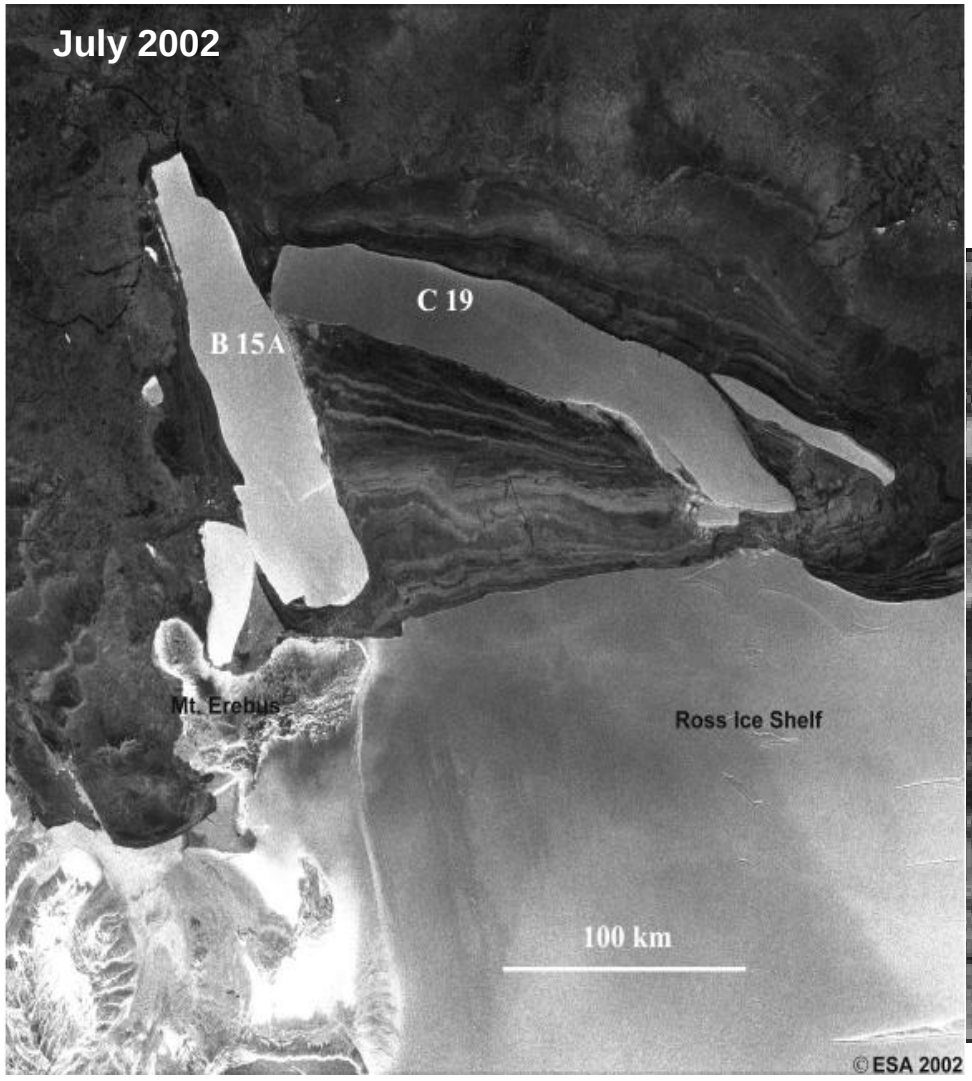

esa
Ice
European Space Agency
Agence spatiale européenne
The Living Planet

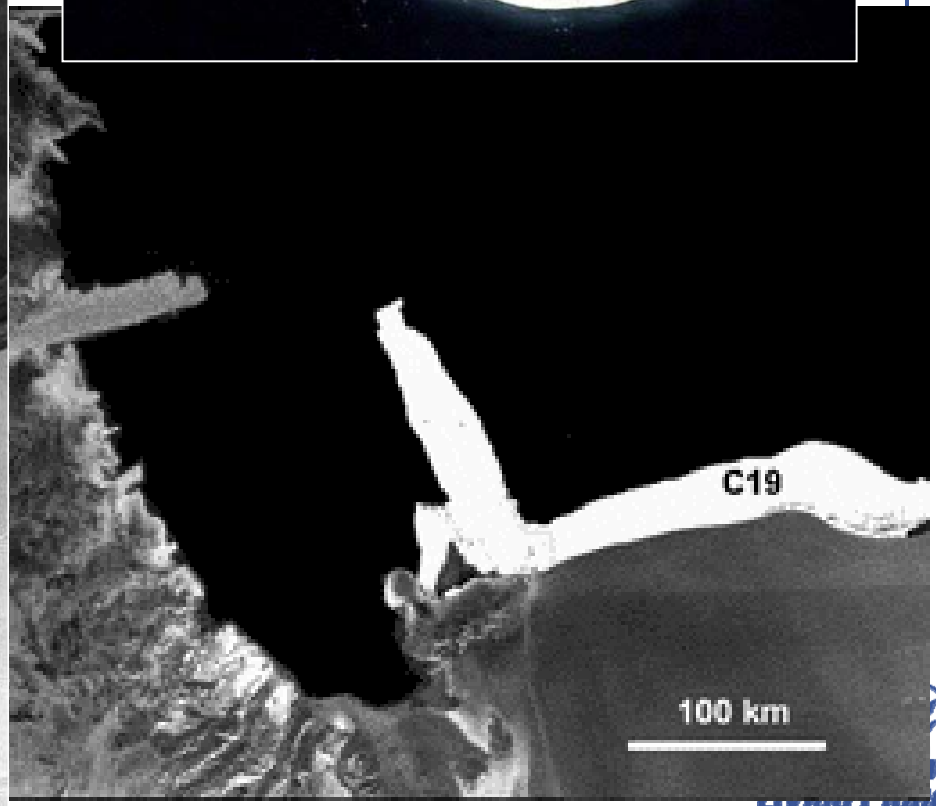


ASAR

ENVISAT
CARING FOR THE EARTH

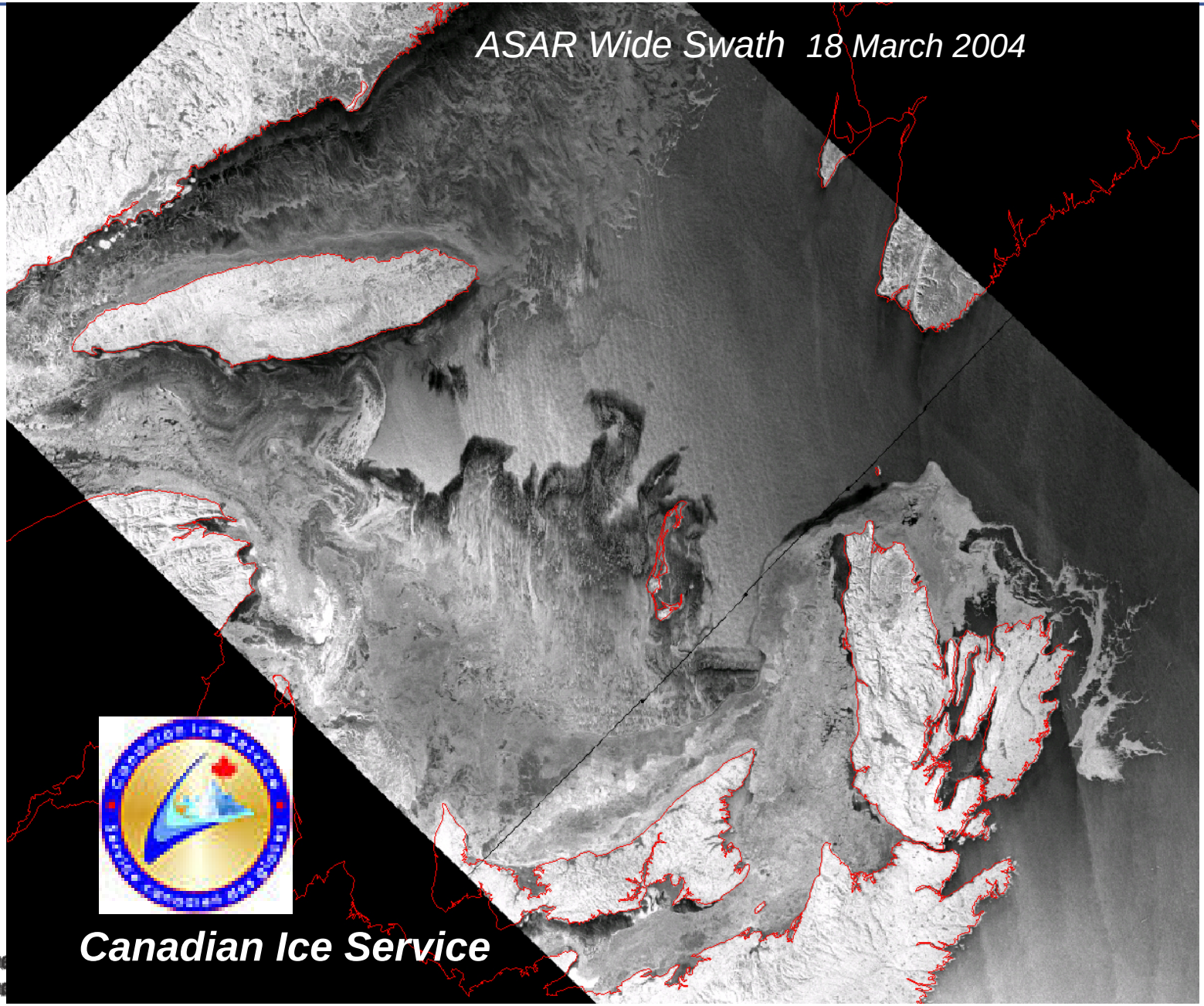
C-19 iceberg monitoring in Antarctica
(from May to October 2002)





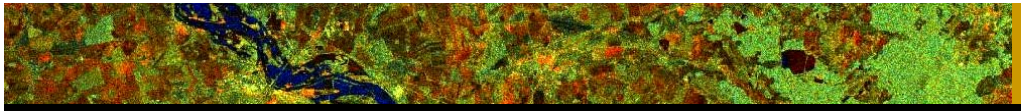
ASAR

ENVISAT
CARING FOR THE EARTH



Europe
Agence spa

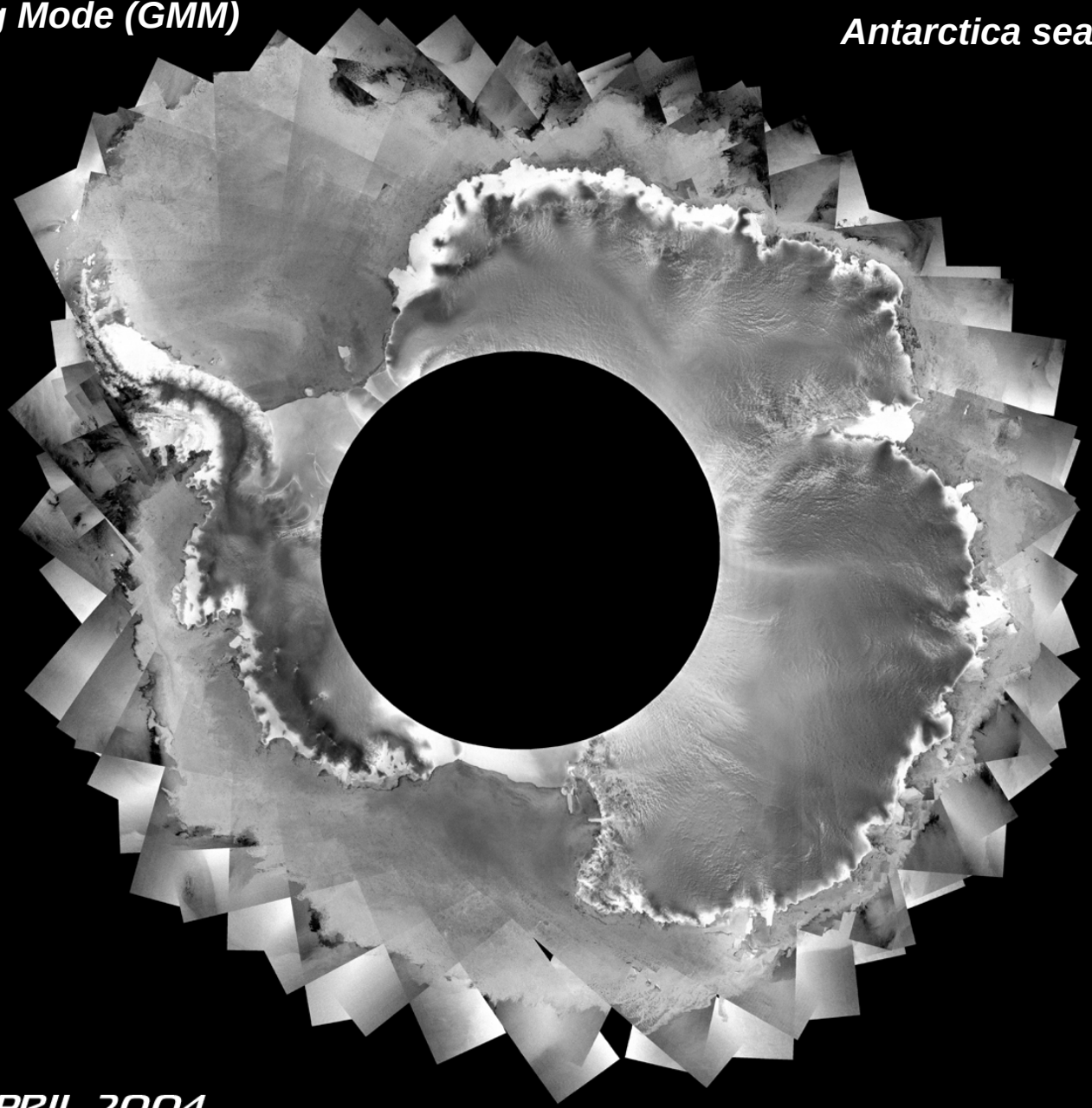
the Living Planet



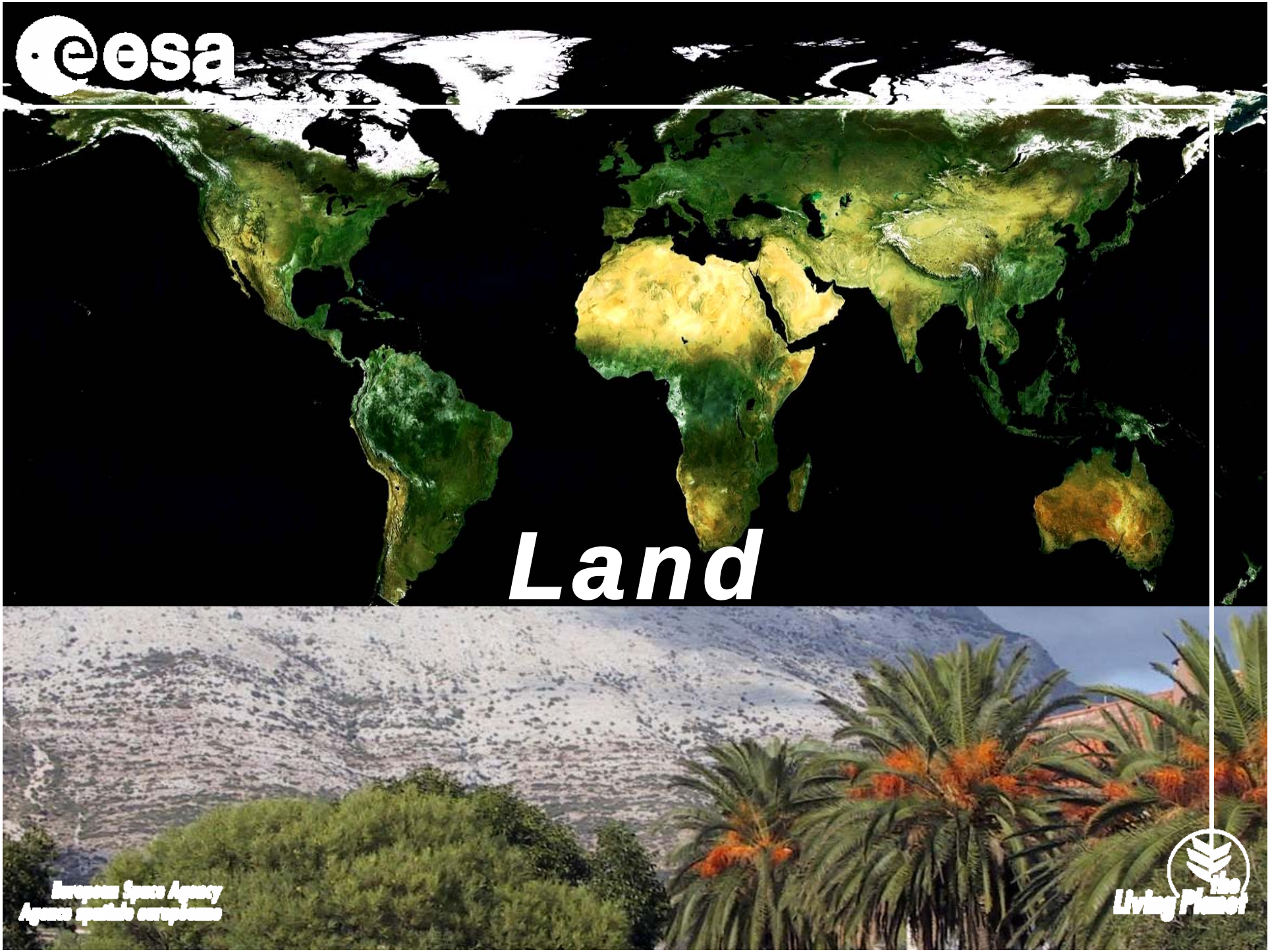
ASAR

Global Monitoring Mode (GMM)

Antarctica sea ice extent

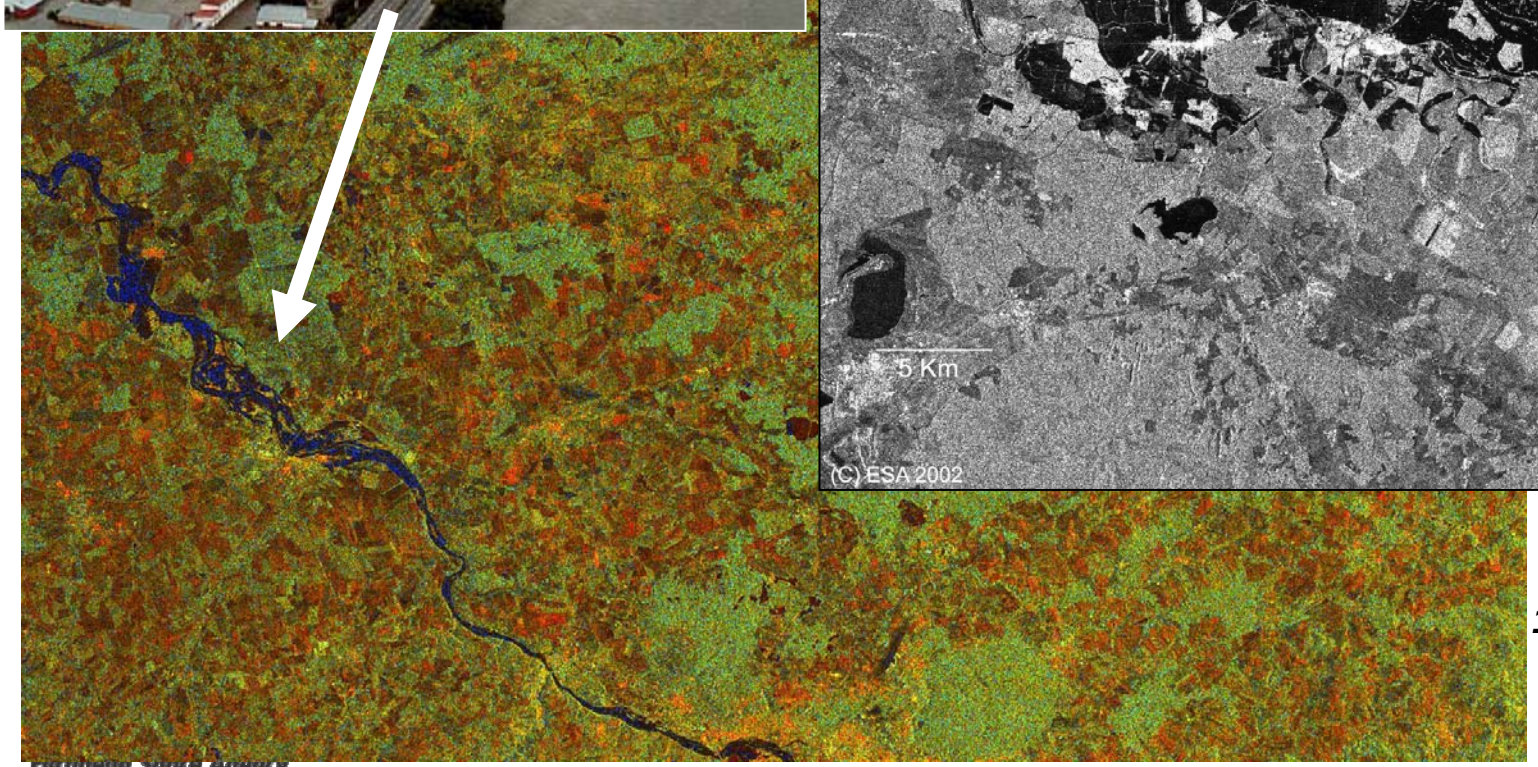


APRIL 2004


esa
Land
European Space Agency
Agence spatiale européenne
The Living Planet

ENVISAT
CARING FOR THE EARTH

Elbe flood (Germany - Summer 2002)



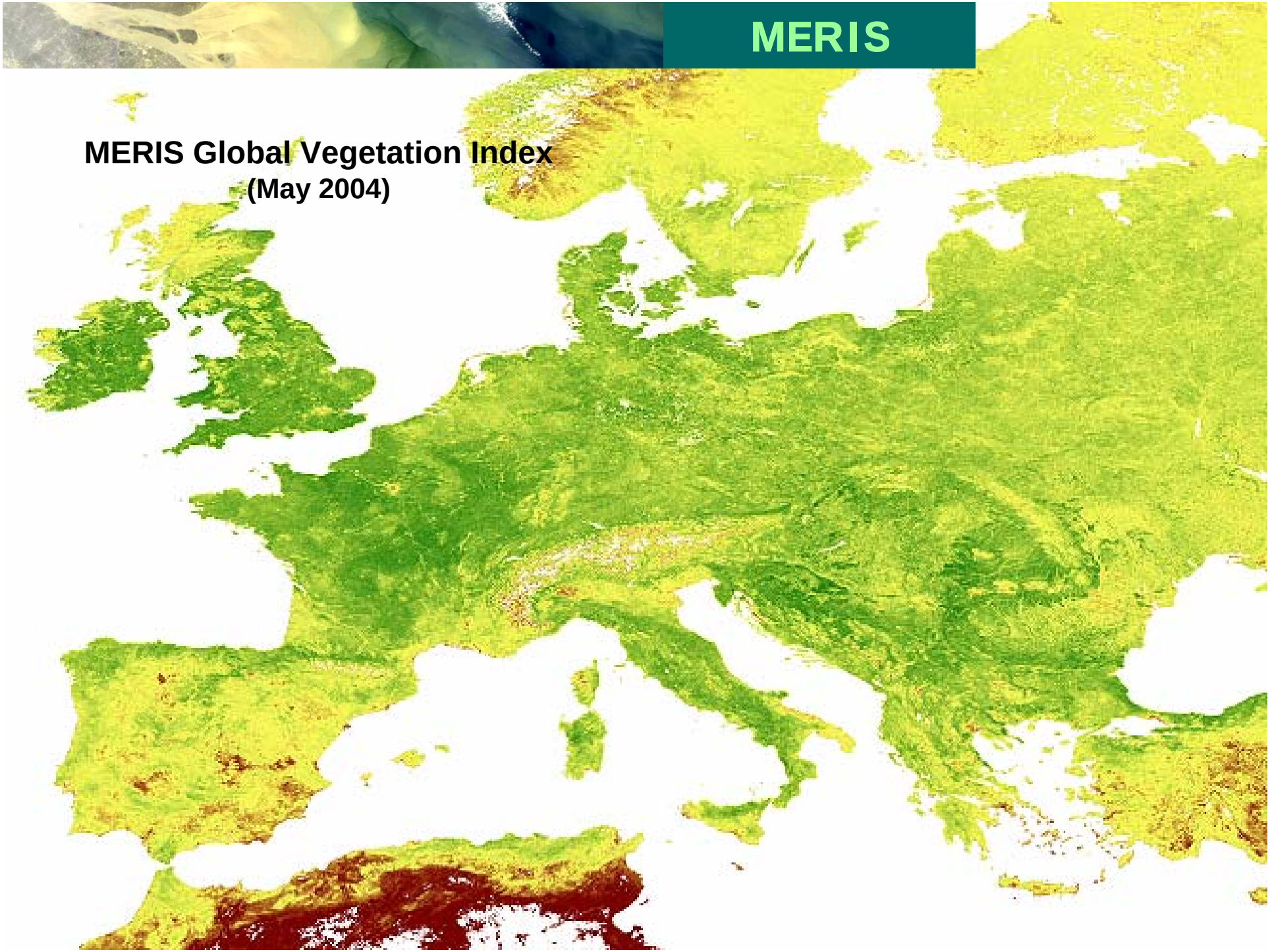
19 August 2002

European Space Agency
Agence spatiale européenne

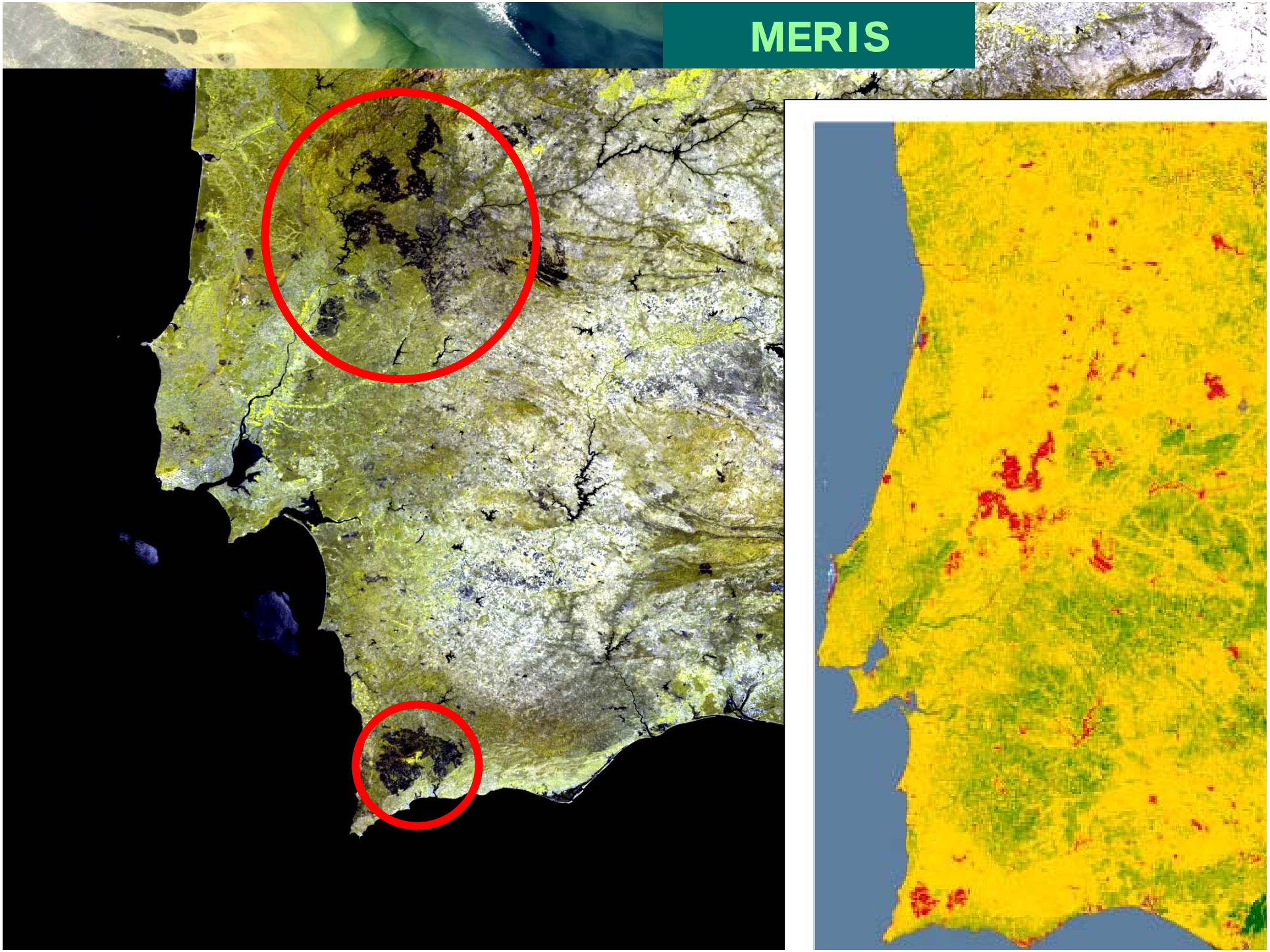
the Living Planet

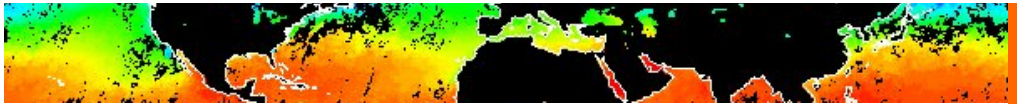
MERIS

MERIS Global Vegetation Index
(May 2004)



MERIS





AATSR

ENVISAT
CARING FOR THE EARTH

AATSR Fire Atlas - year 2003

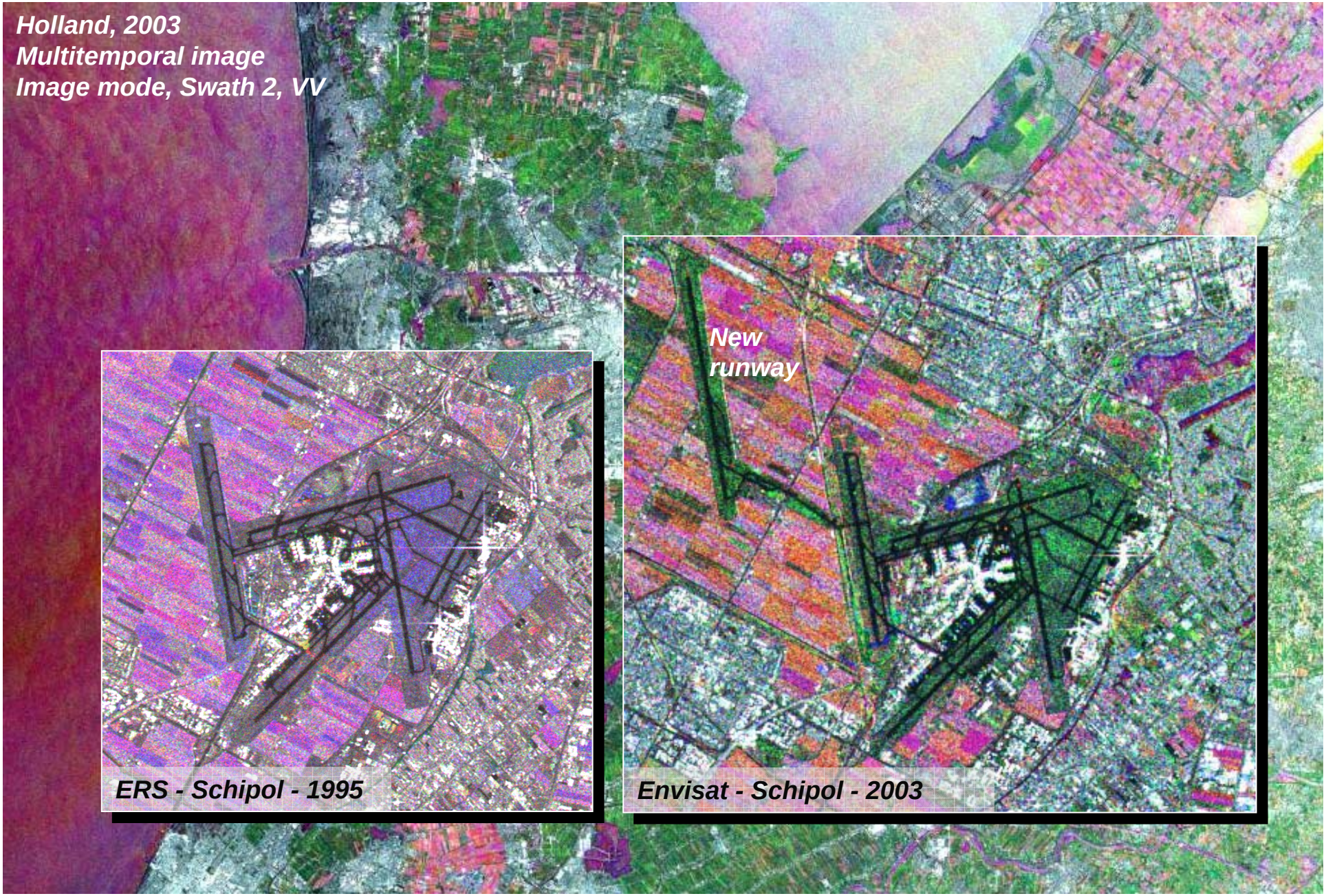
ATSR Hot spots Display / Algo = 3.7 saturation / January 2003

European Space Agency
Agence spatiale européenne

the Living Planet

ASAR

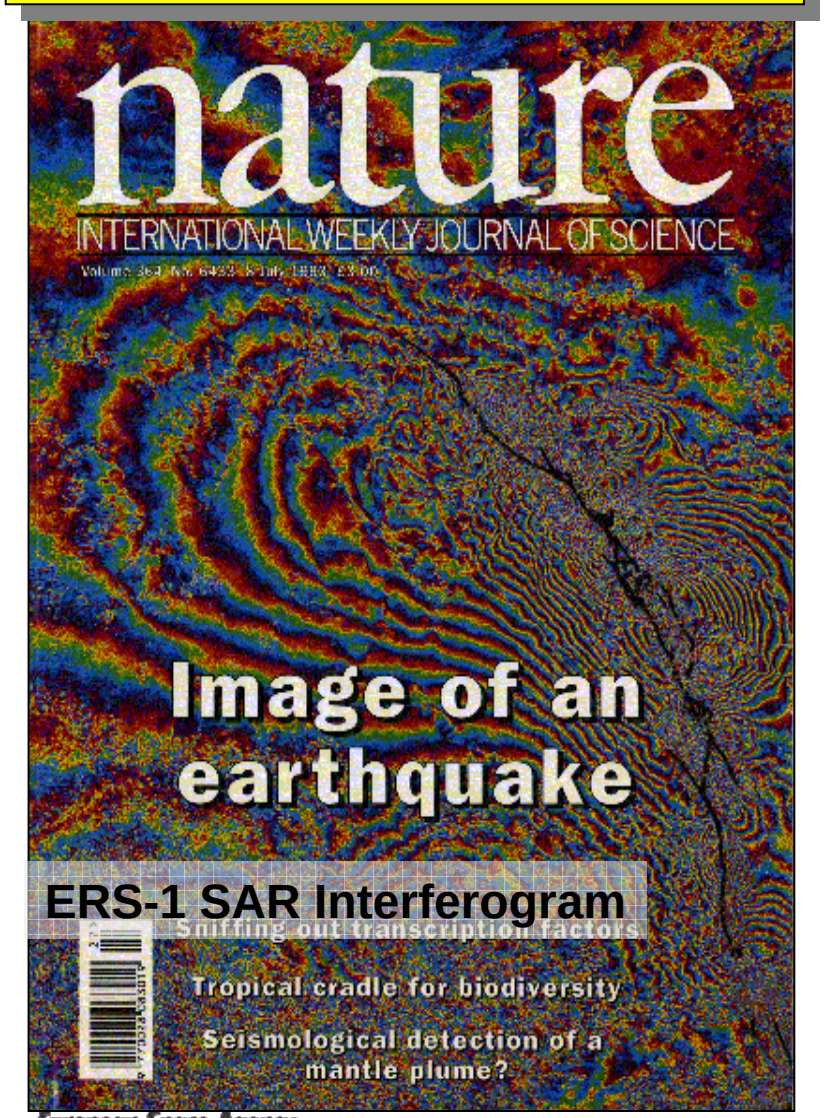
ENVISAT
CARING FOR THE EARTH



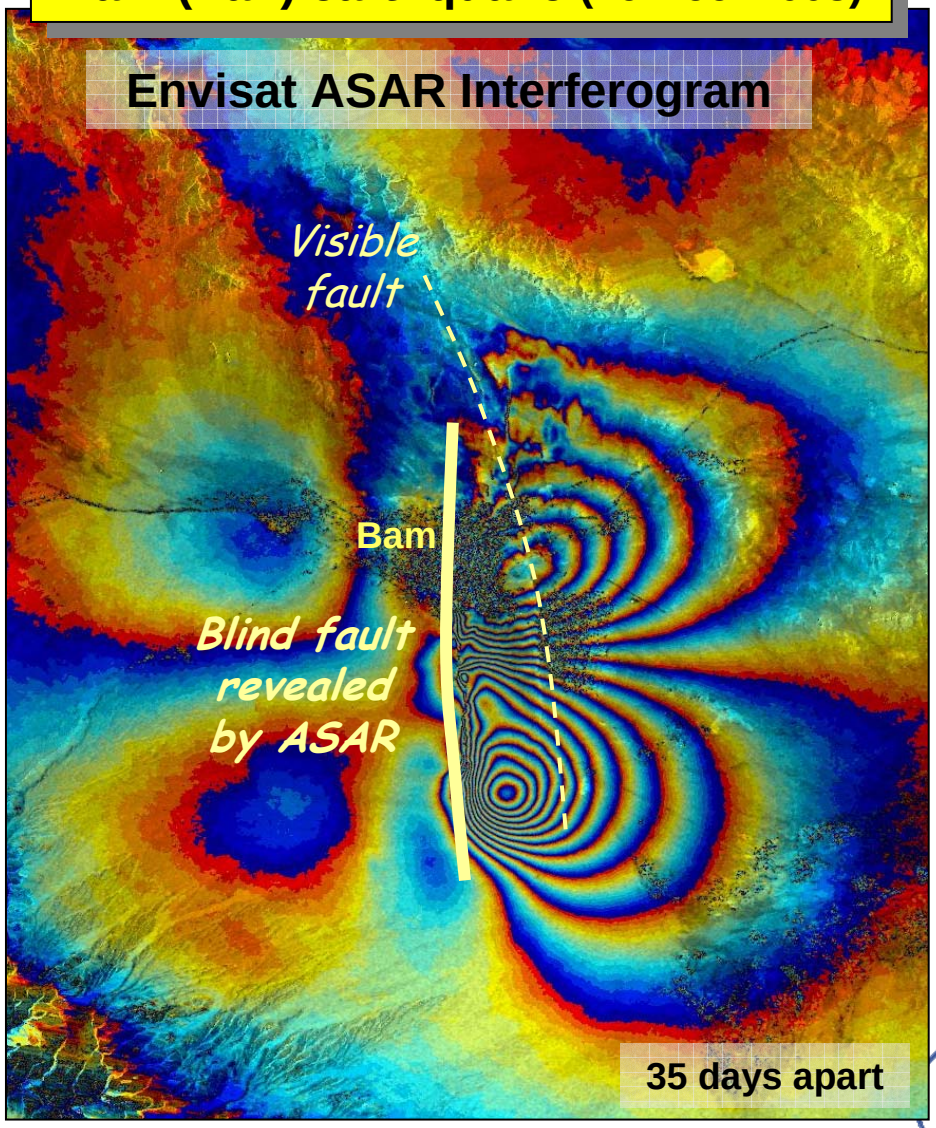
ASAR

ASAR Interferometry

Landers (USA) earthquake (1993)



Bam (Iran) earthquake (26 Dec. 2003)



ENVISAT
CARING FOR THE EARTH

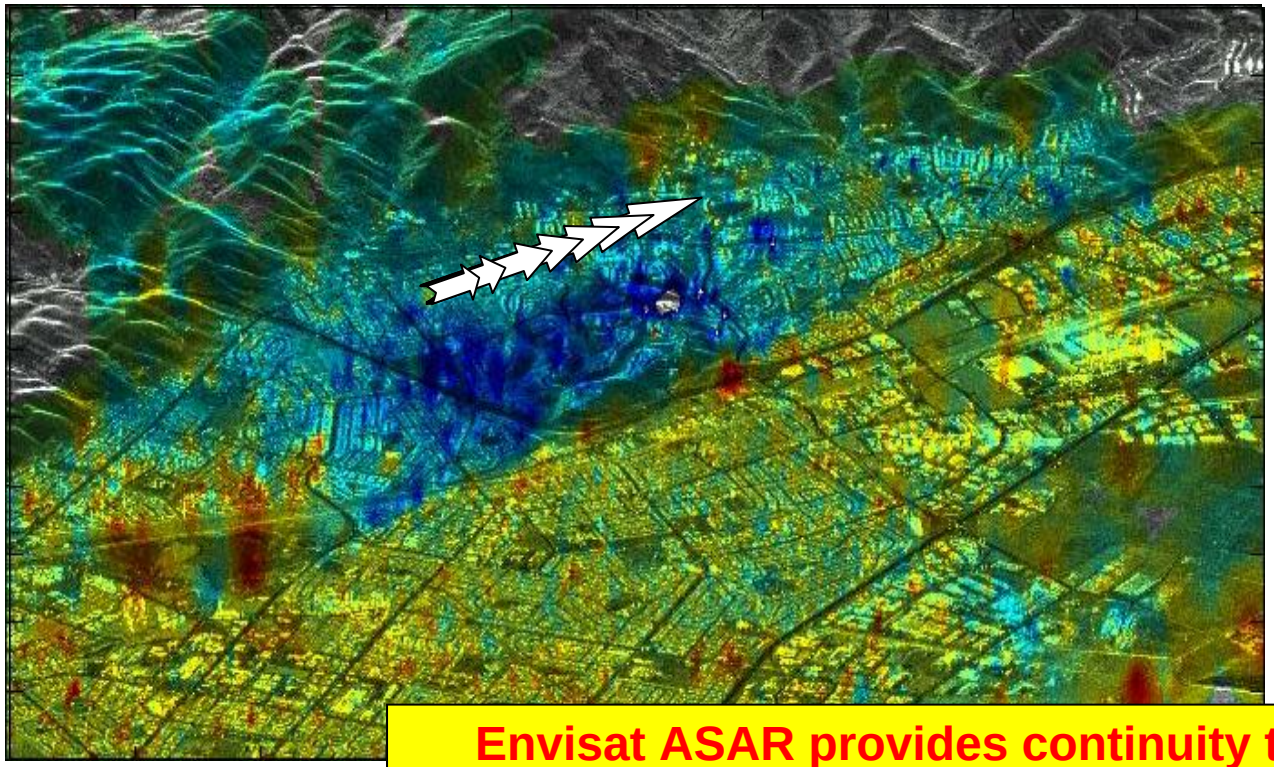
European Space Agency
Agence spatiale européenne

the Living Planet

13 years of ERS SAR archive:

Preseismic motion of the Hayward fault (California)

1992 1993 1995 1996 1997 1998 1999 2000



Envisat ASAR provides continuity to ERS SAR interferometry measurements initiated in 1991

ASAR

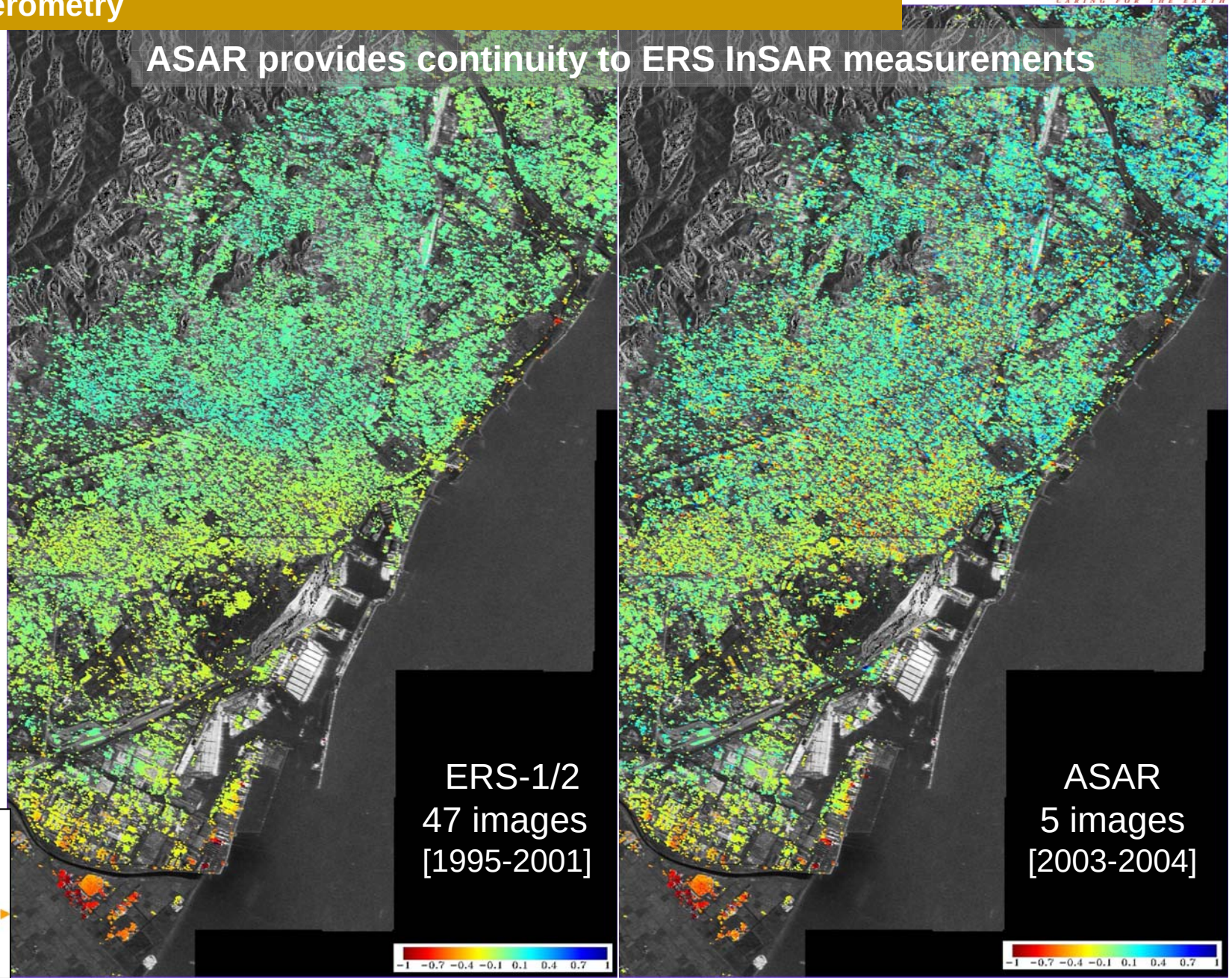
ASAR Interferometry

ENVISAT
CARING FOR THE EARTH

ASAR provides continuity to ERS InSAR measurements

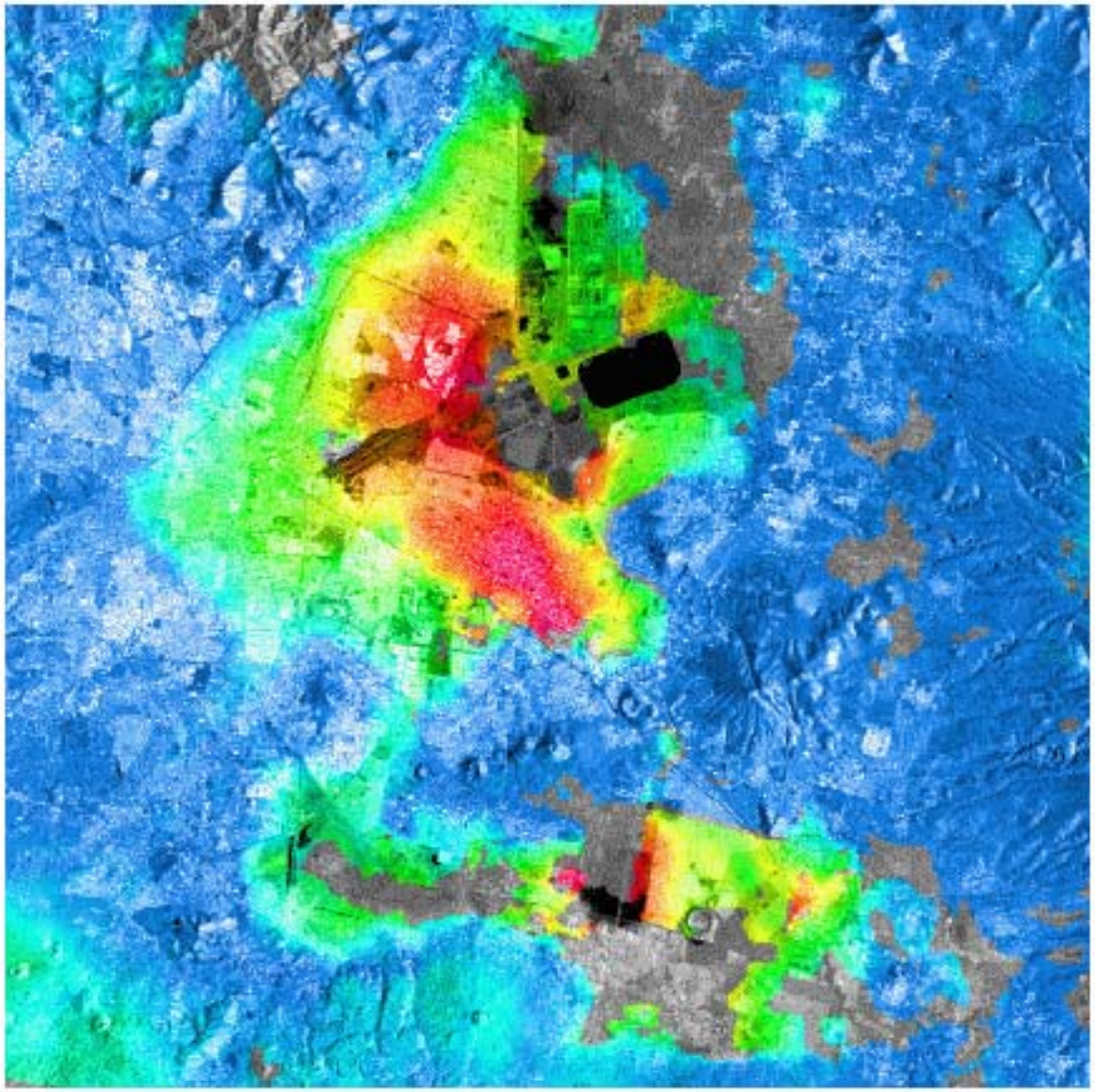
Barcelona (Spain)

Stable points network technique



ALTAMIRA INFORMATION

ASAR Interferometry



European Space Agency
Agence spatiale européenne

ASAR InSAR to monitor subsidence

Mexico City:
Subsidence rate between
20 June and 29 August 2003

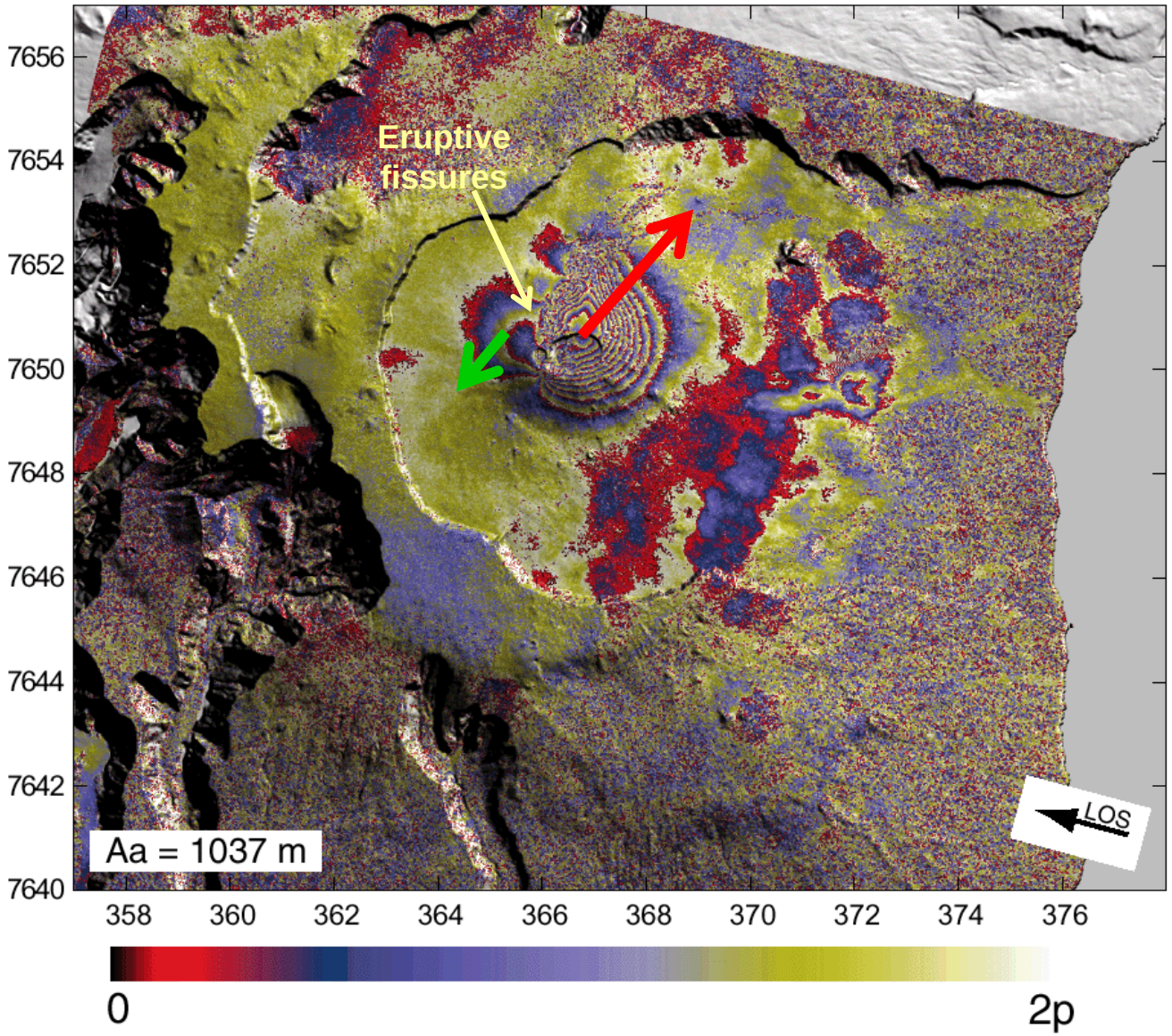
T. Strozzi, GAMMA RS

ENVISAT
CARING FOR THE EARTH

the Living Planet

“Piton de la Fournaise” volcano (Reunion island) – August 2003 eruption

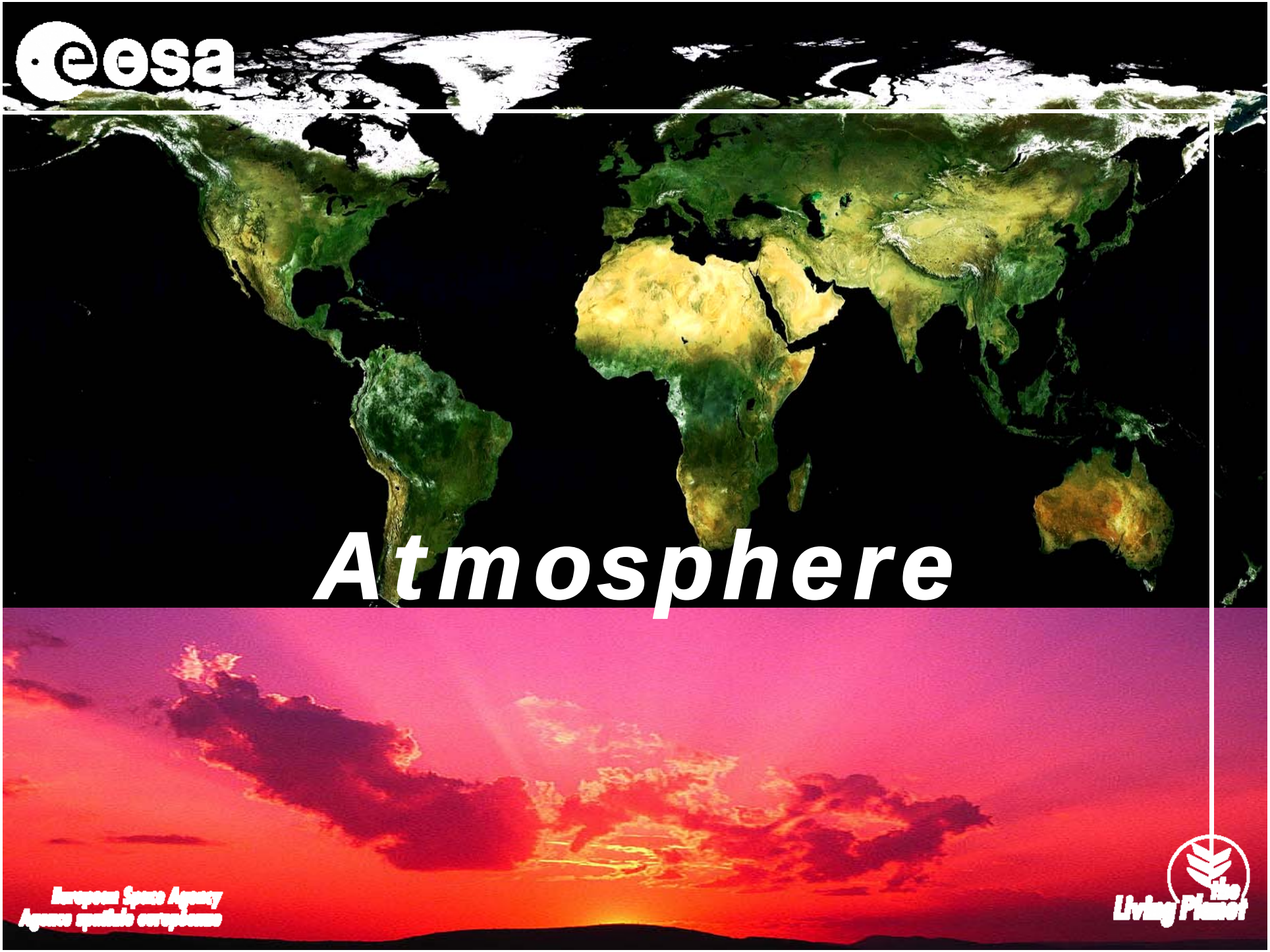
Descending, Swath 6, Track 277, Frame 4046, 27/07/2003 - 31/08/2003



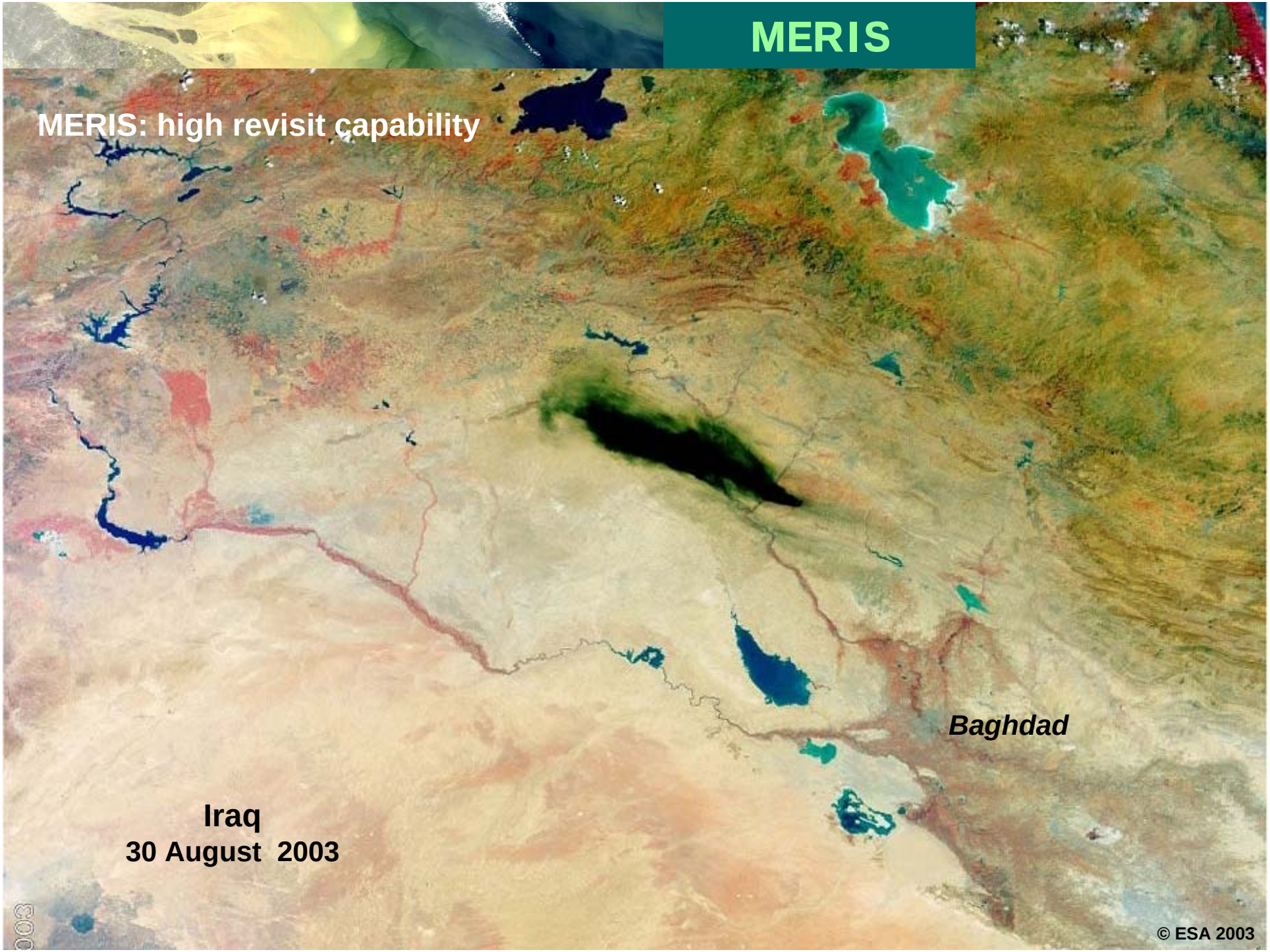
30 cm displacement toward satellite

7 cm displacement away from satellite

Courtesy:
- *Institut de Recherche pour le Développement (IRD), Clermont-Ferrand, France*
- *Université Blaise Pascal, Clermont-Ferrand, France*
- *Institut de Physique du Globe de Paris, Paris, France*
- *Université de la Réunion, Saint-Denis, France*


eesa
Atmosphere
European Space Agency
Agence spatiale européenne
The Living Planet

MERIS

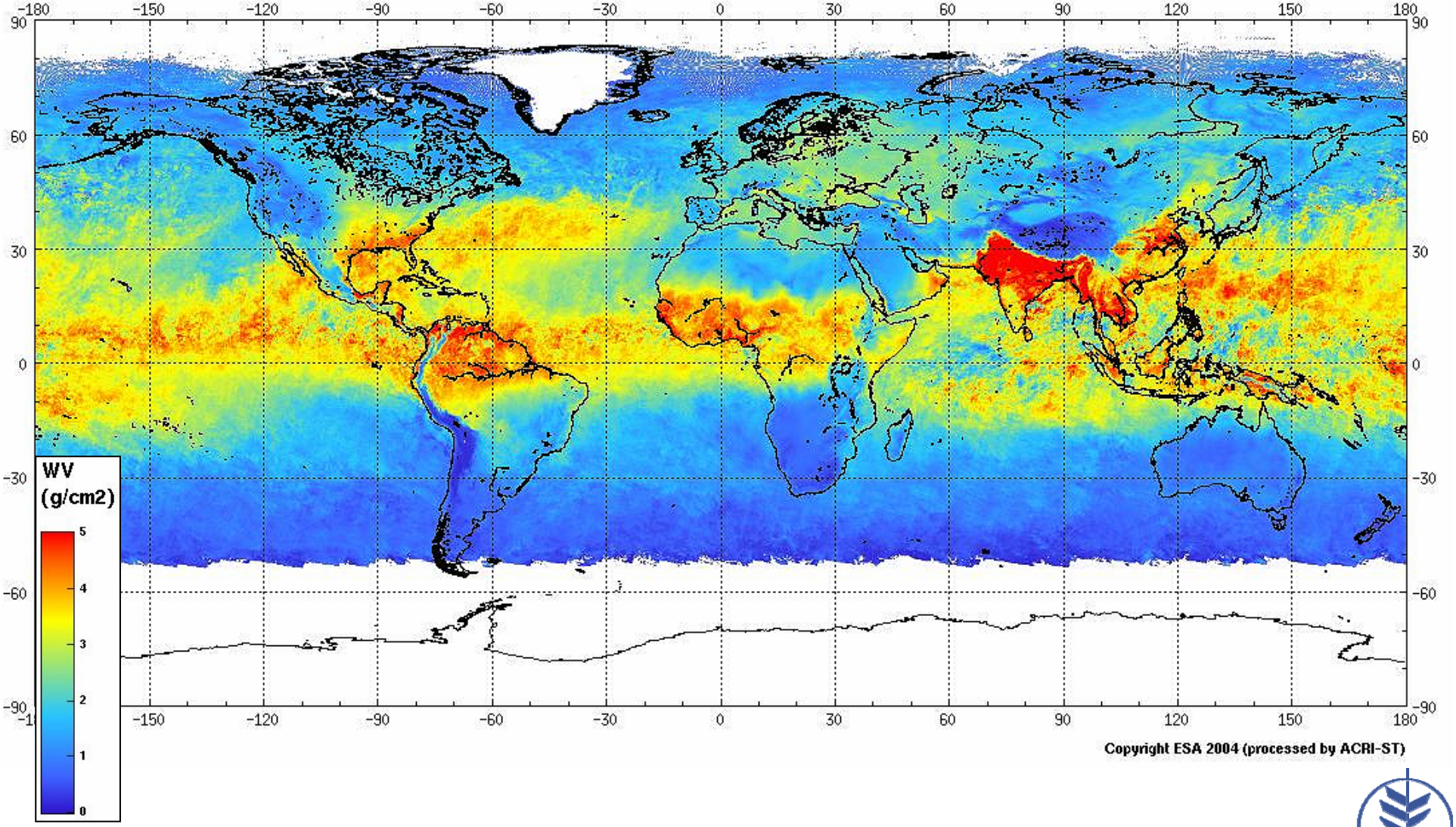

MERIS: high revisit capability
Baghdad
Iraq
30 August 2003
© ESA 2003

MERIS

ENVISAT
CARING FOR THE EARTH

ENVISAT - MERIS

Total column water vapor, clear sky - Global coverage - Monthly average - July 2003

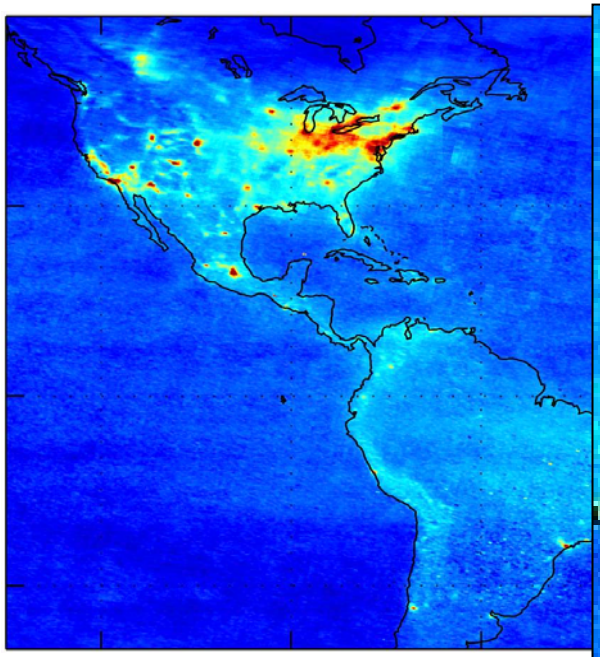


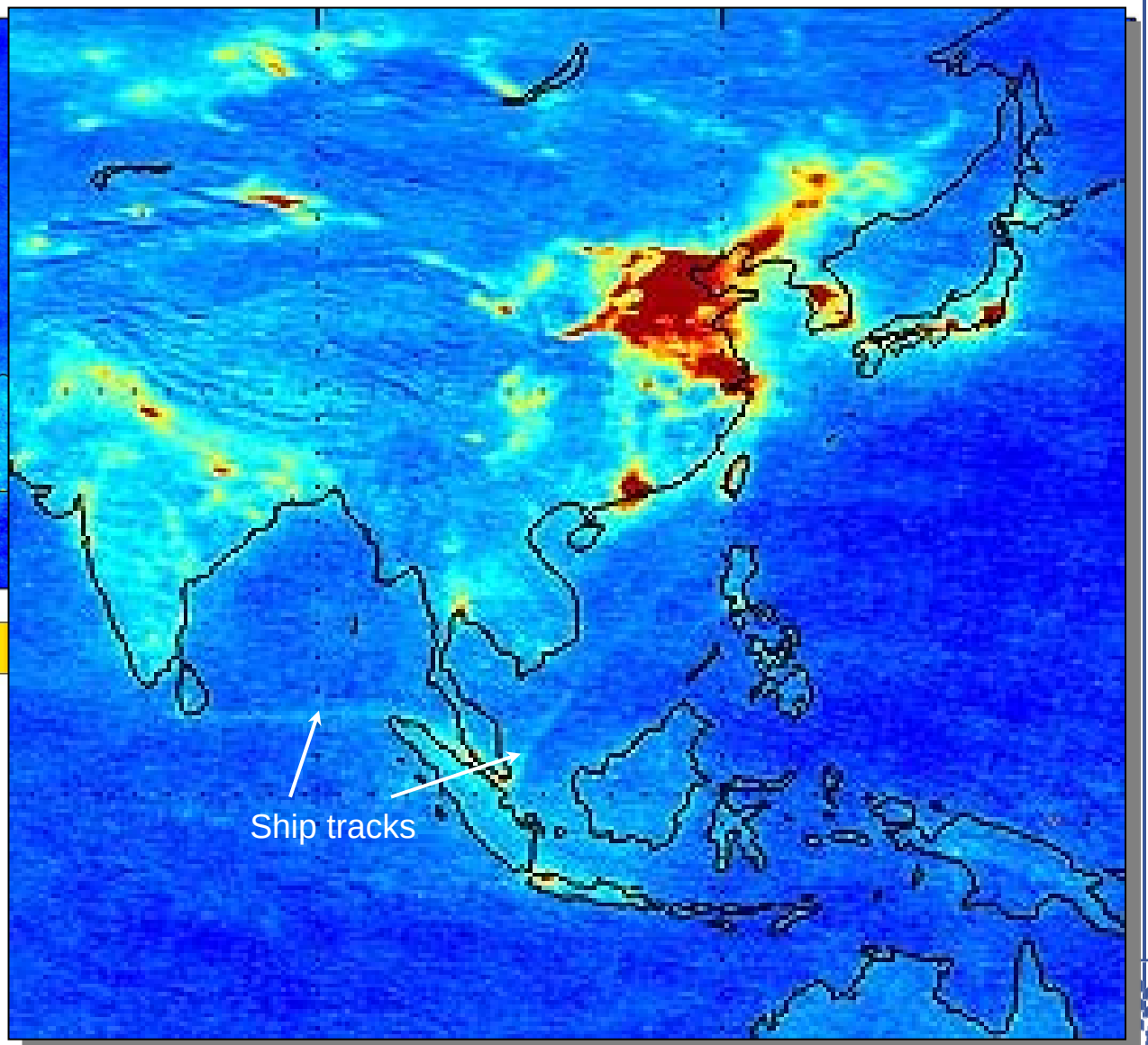
European Space Agency
Agence spatiale européenne

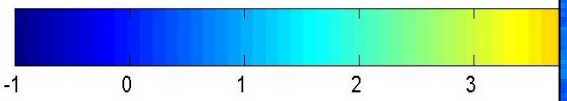
the Living Planet

ENVISAT
CARING FOR THE EARTH

NO_2 concentration







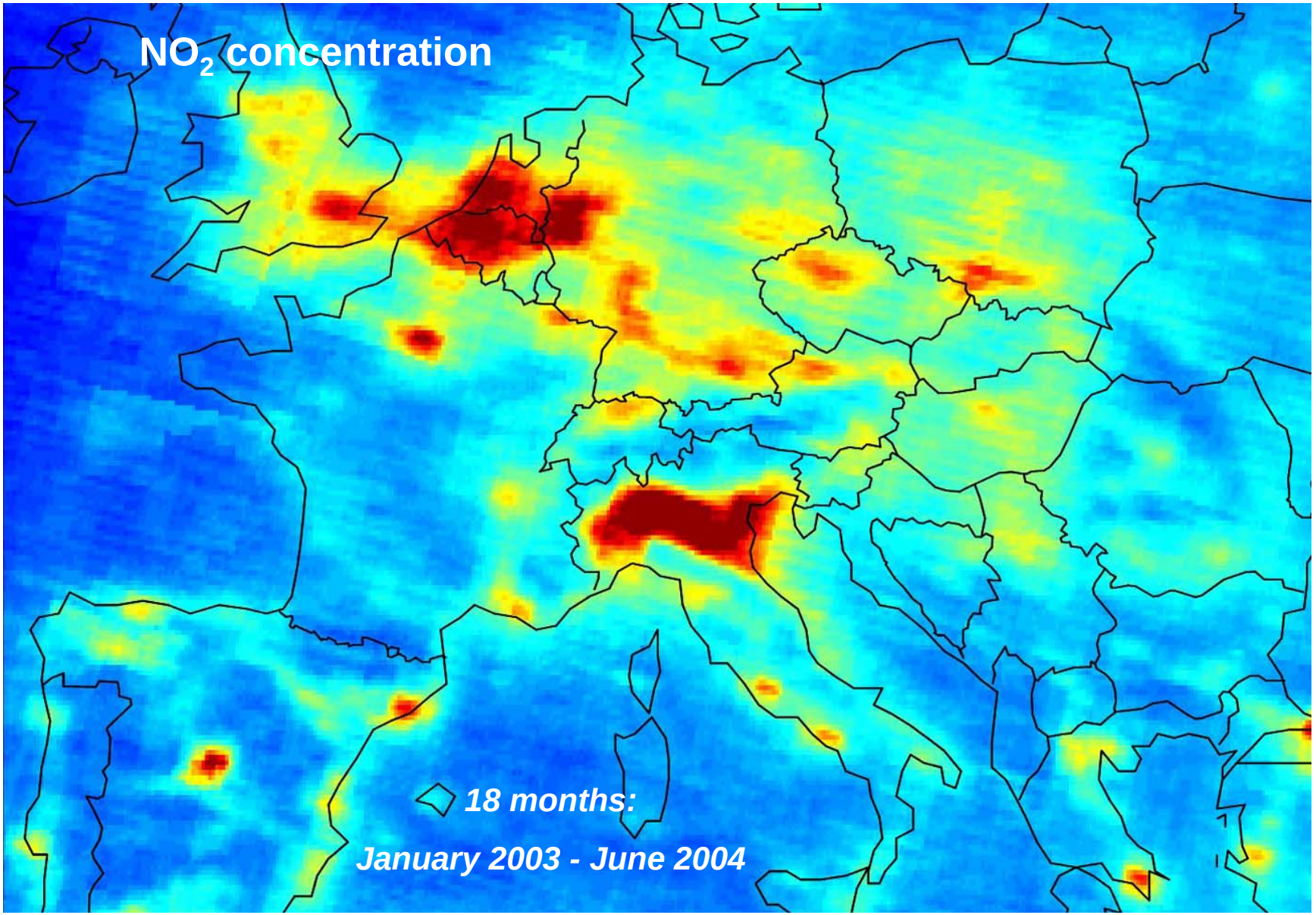
1e15 molec/cm^2

18 months:

January 2003 - June 2004

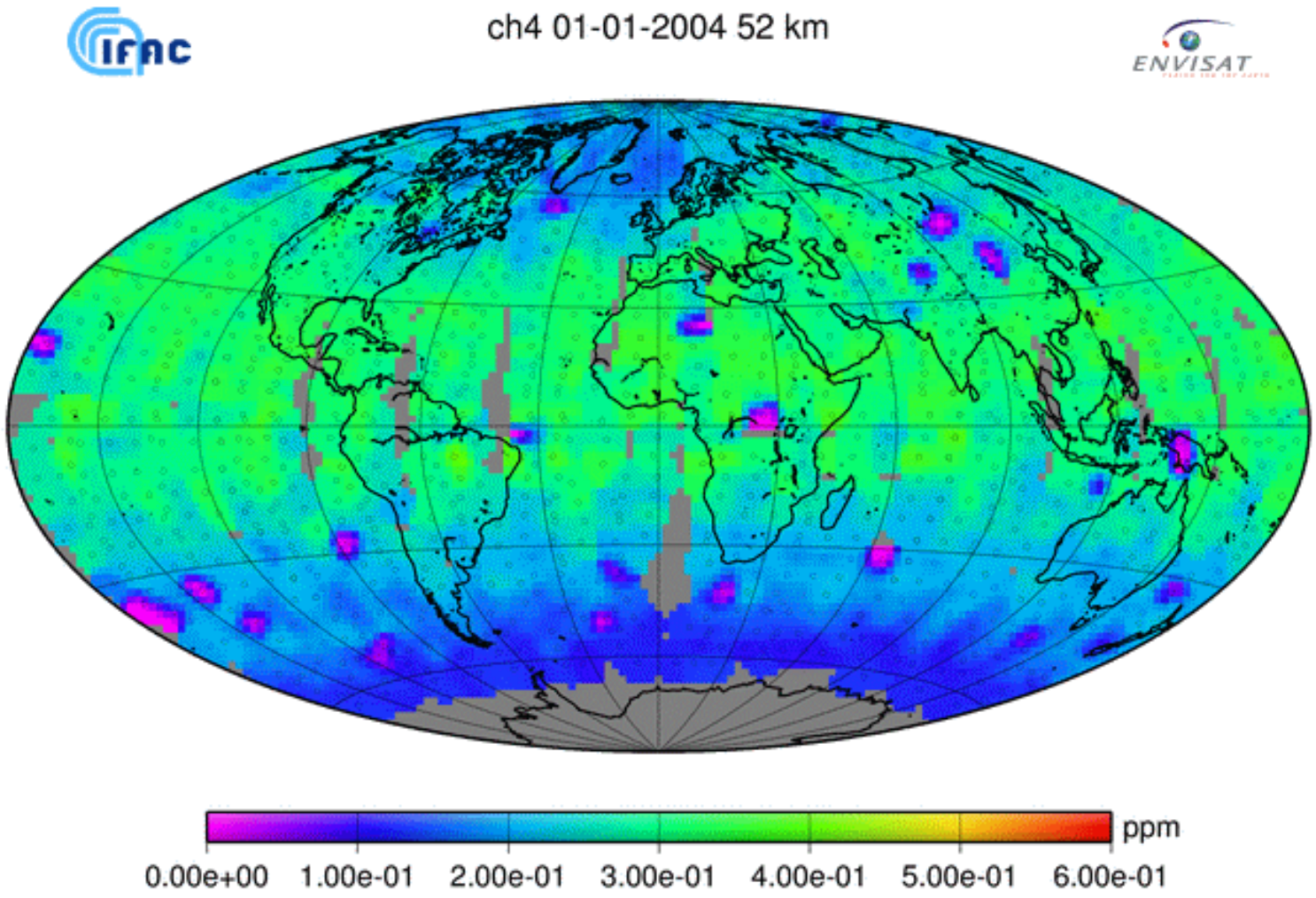
European Space Agency
Agence spatiale européenne

the Living Planet

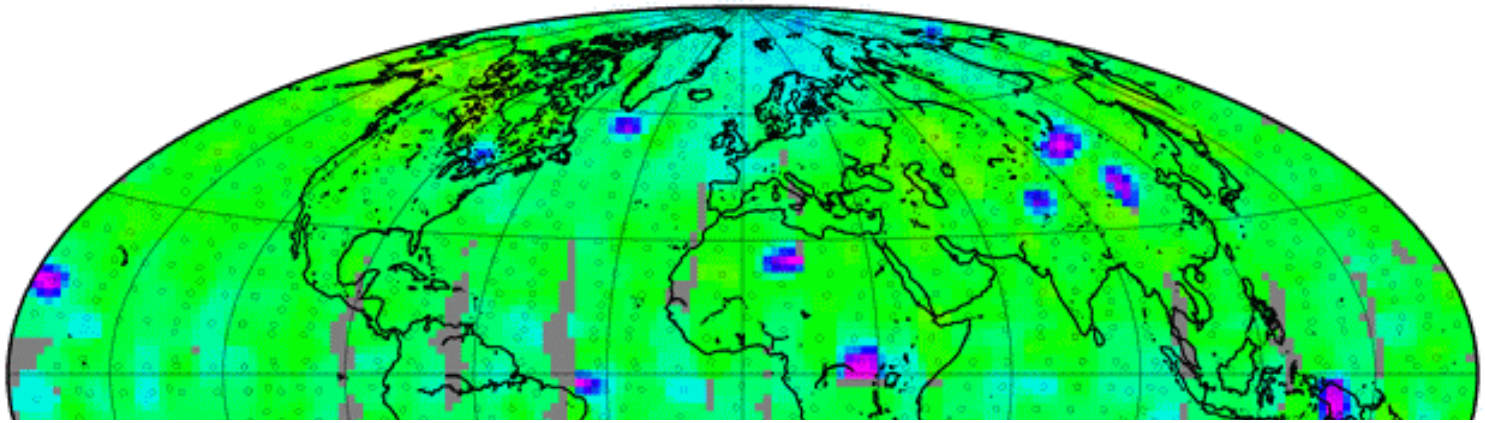


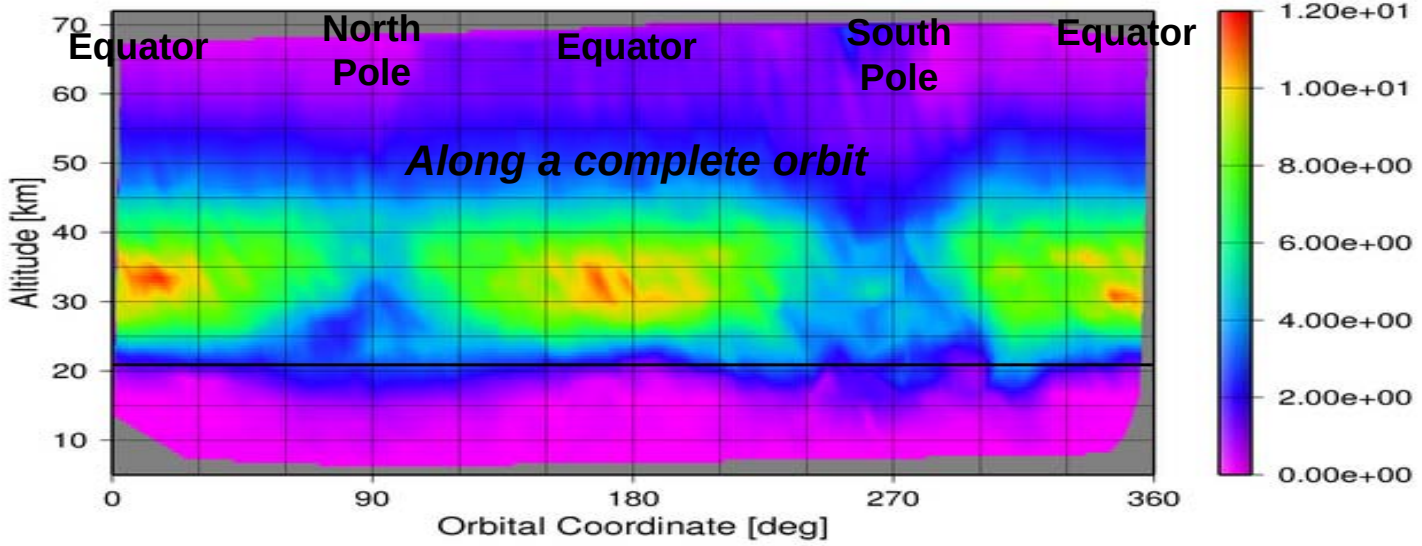
Courtesy of Steffen Beirle, Univ. Heidelberg, D

Mapping the 3D profile of different trace gases: Methane (CH4)



Mapping the 3D profile of different trace gases: Ozone (O3)





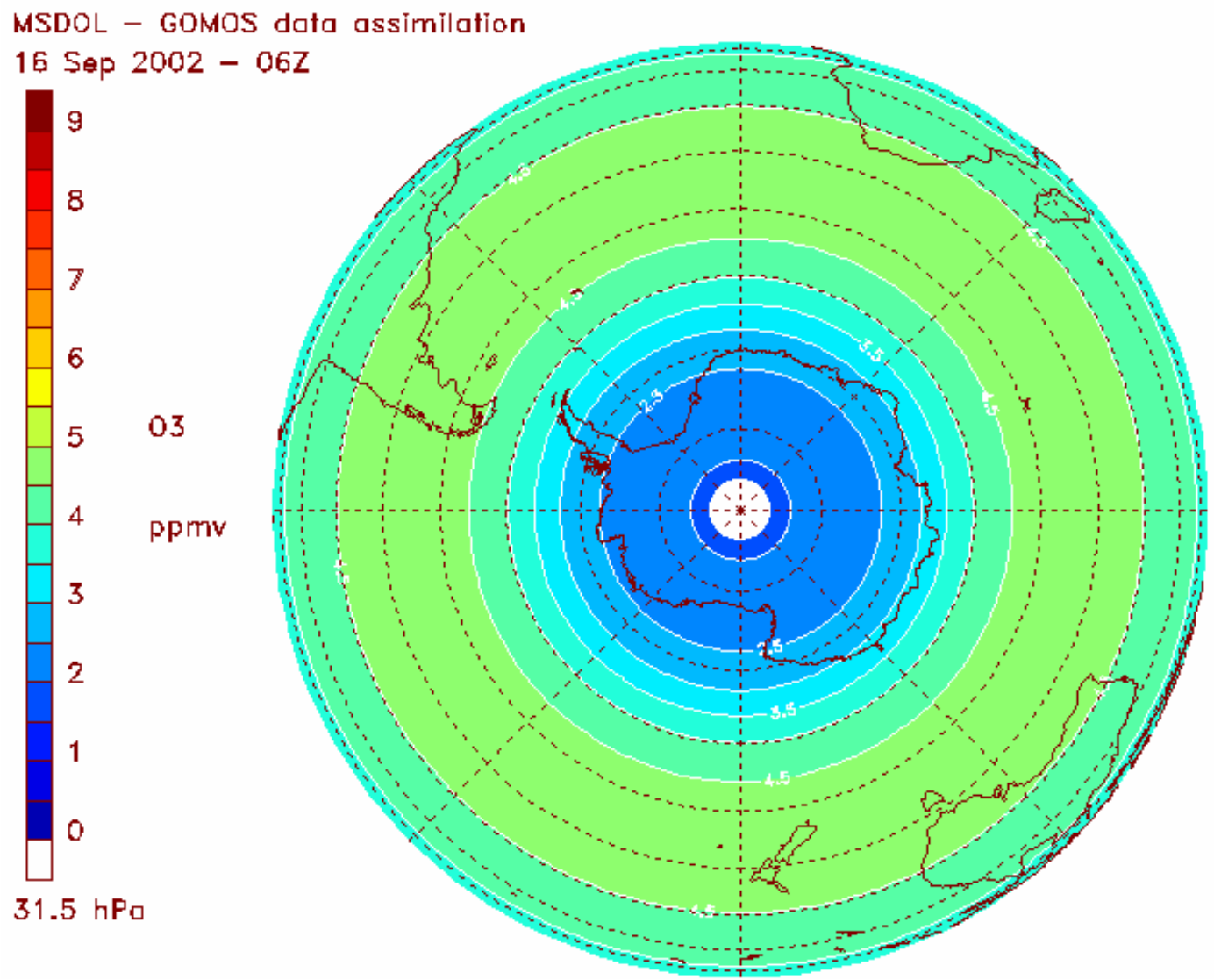
GOMOS

ENVISAT
CARING FOR THE EARTH

Antarctic ozone hole break-up

September 2002

<u>GOMOS</u> assimilated ozone field



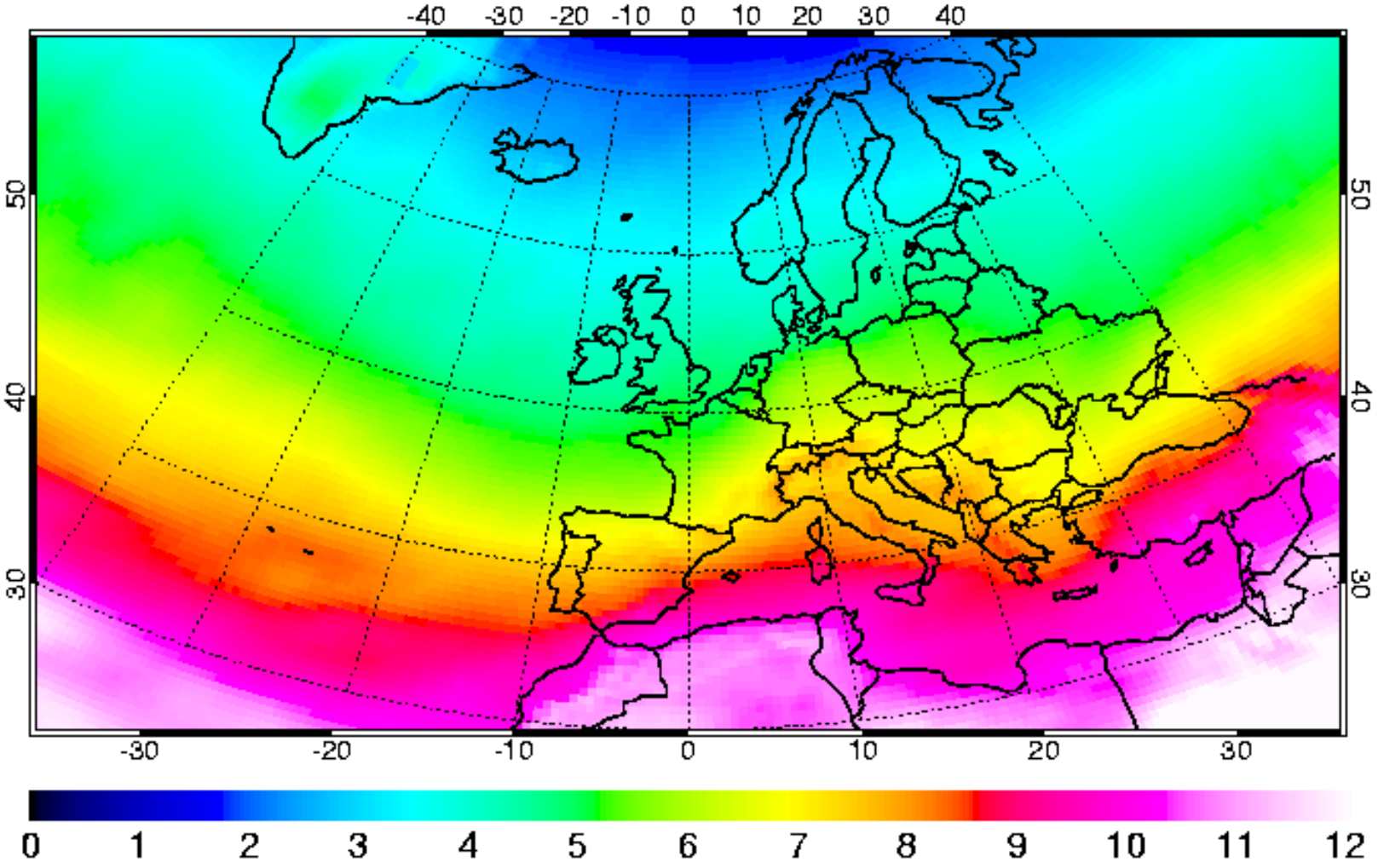
ACRI ST

European Space Agency
Agence spatiale européenne

the Living Planet

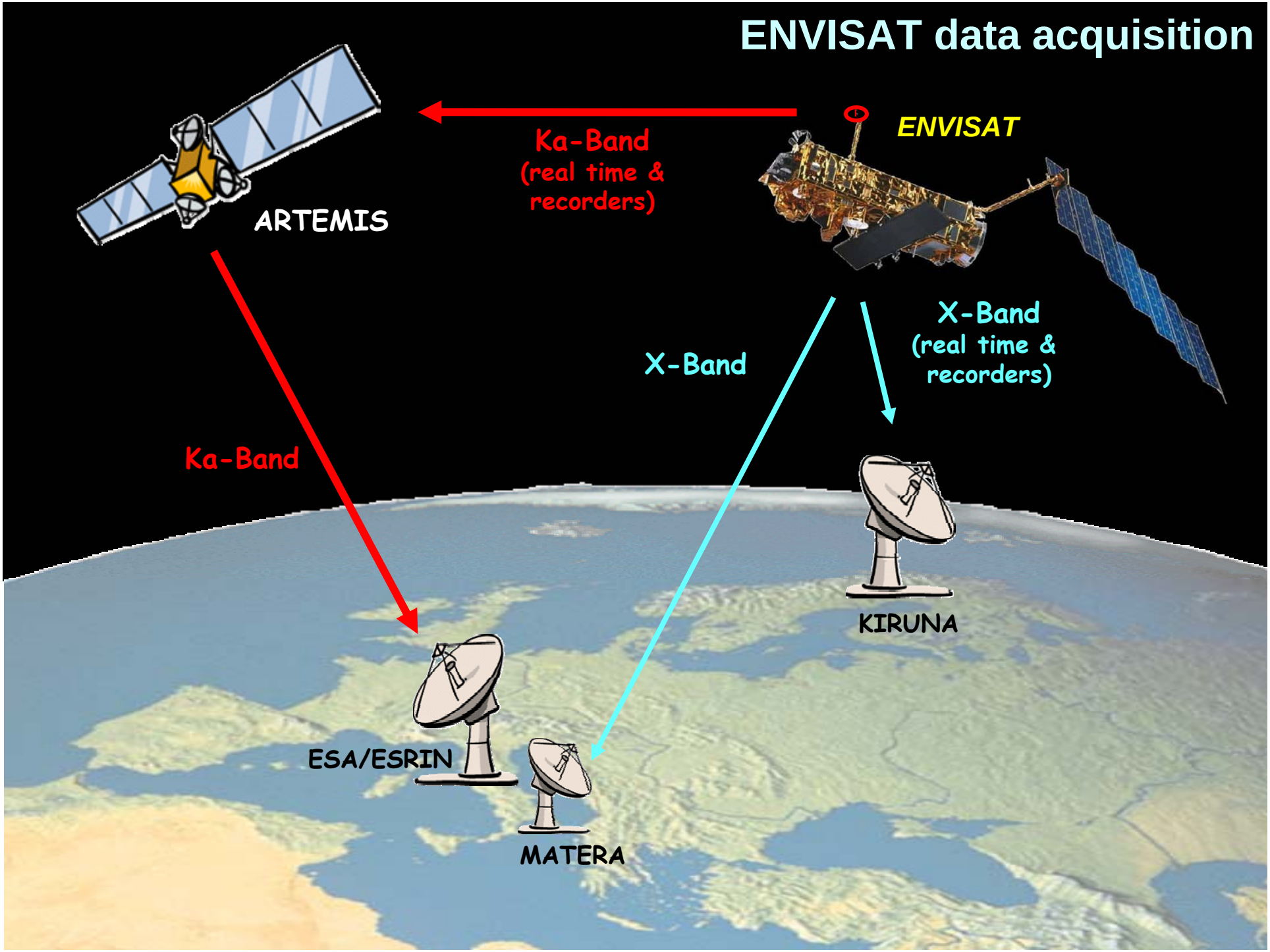
Erythemal UV index
SCIAMACHY - KNMI/ESA

local solar noon
19 August 2004



http://www.temis.nl

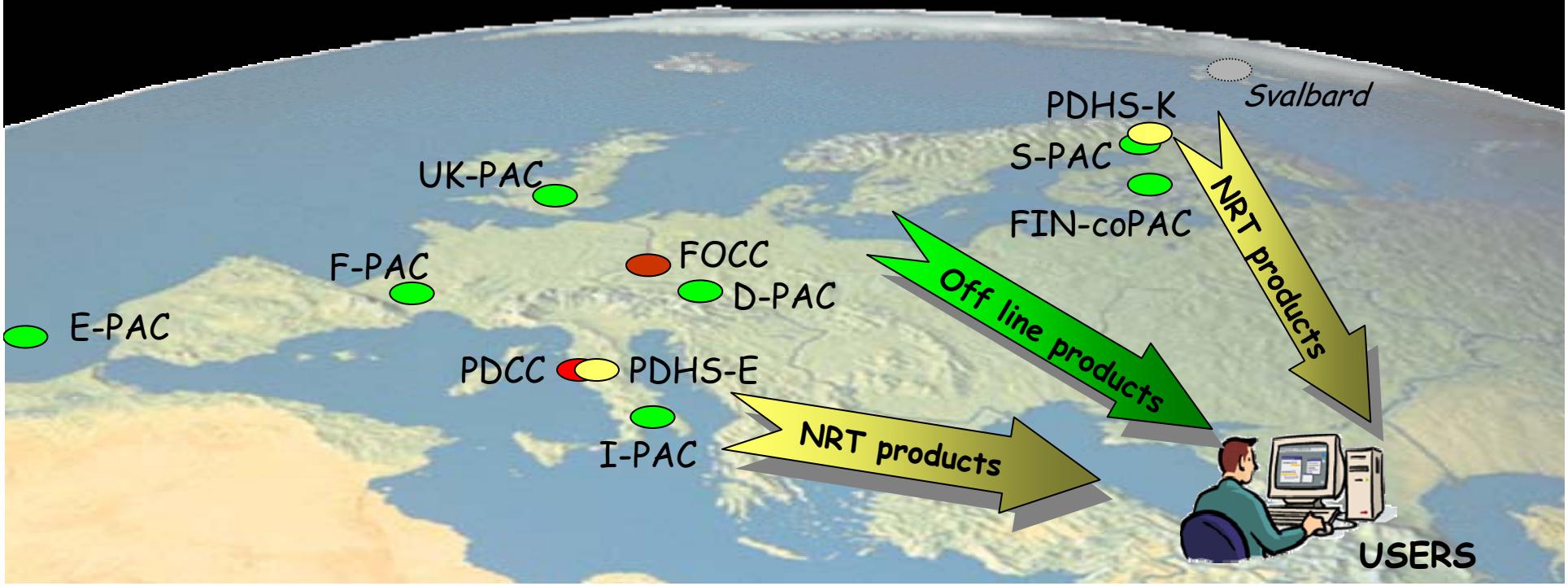
Envisat ground segment and data exploitation

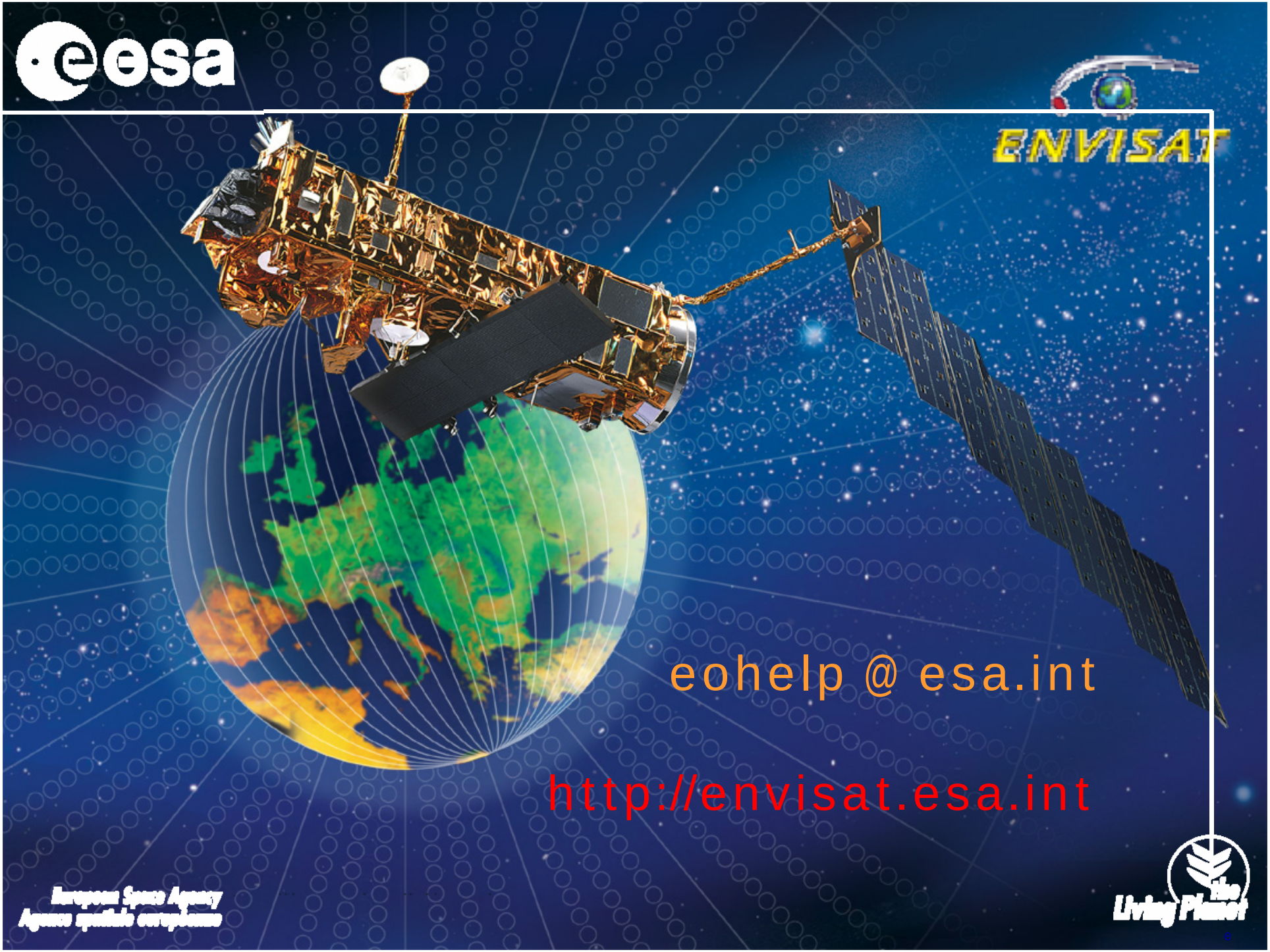

ENVISAT data acquisition
ARTEMIS
Ka-Band
(real time &
recorders)
ENVISAT
X-Band
(real time &
recorders)
X-Band
Ka-Band
KIRUNA
ESA/ESRIN
MATERA

A decentralized ground segment

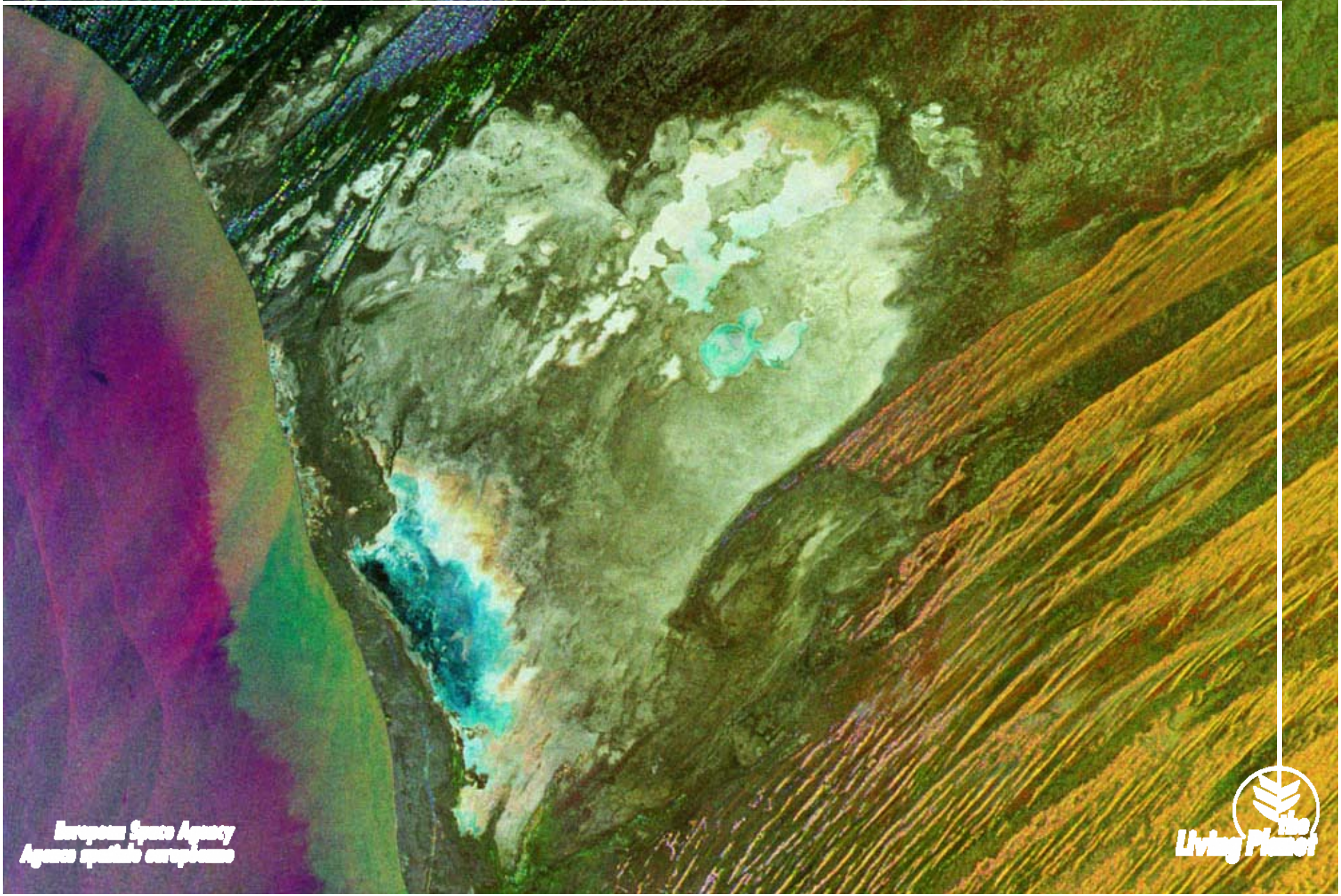
ENVISAT : a European ground segment

- **Flight Operations Control Centre (FOCC) at ESA/ESOC**
- **Payload Data Control Centre (PDCC) at ESA/ESRIN**
- **NRT Processing Stations (PDHS) at ESRIN and Kiruna**
- **Off-Line Processing and Archiving Centres (PAC) in 7 European countries**




esa
ENVISAT
eohelp @ esa.int
http://envisat.esa.int
European Space Agency
Agence spatiale européenne
The Living Planet

ASAR


European Space Agency
Agence spatiale européenne
The Living Planet