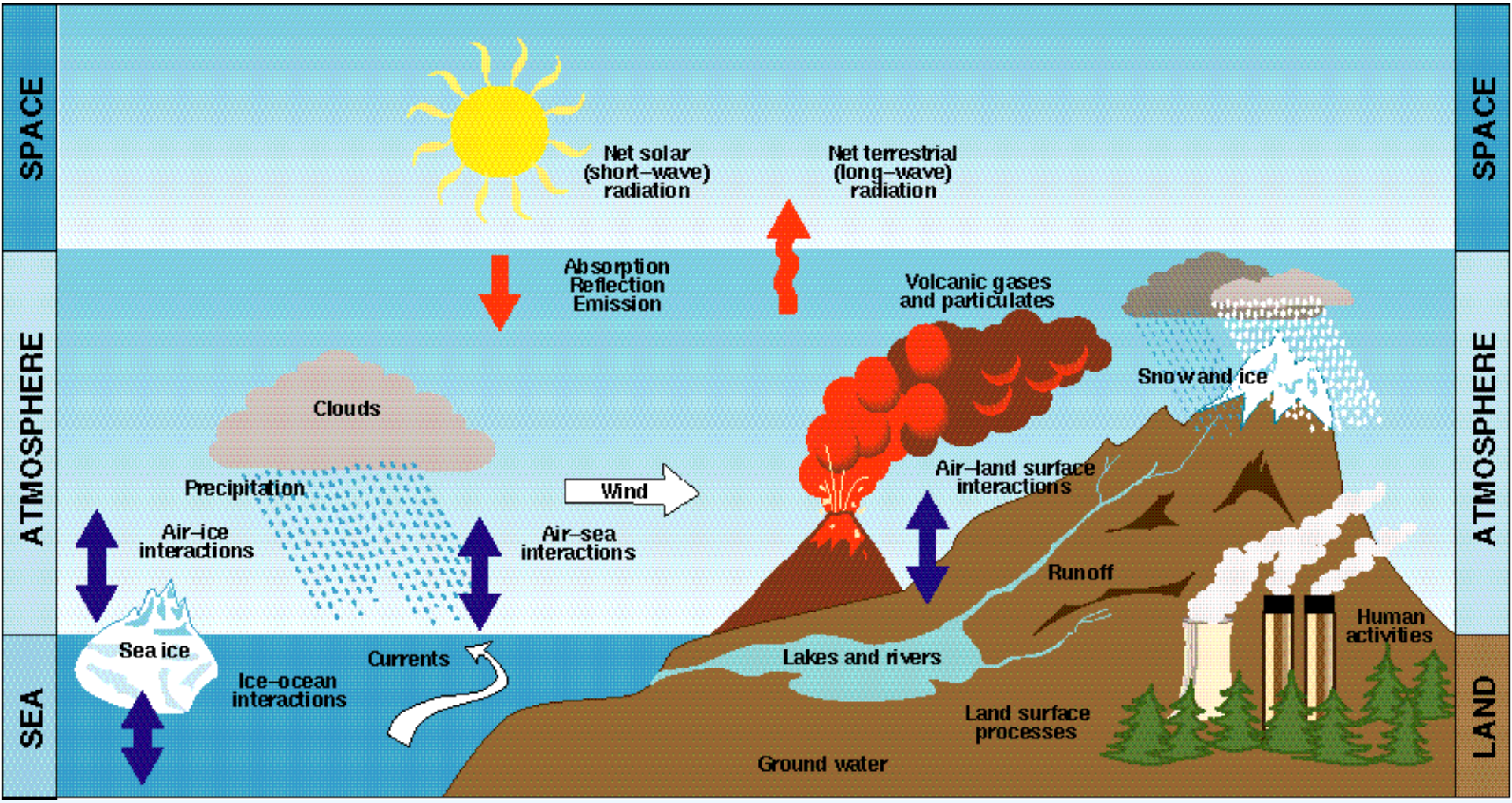
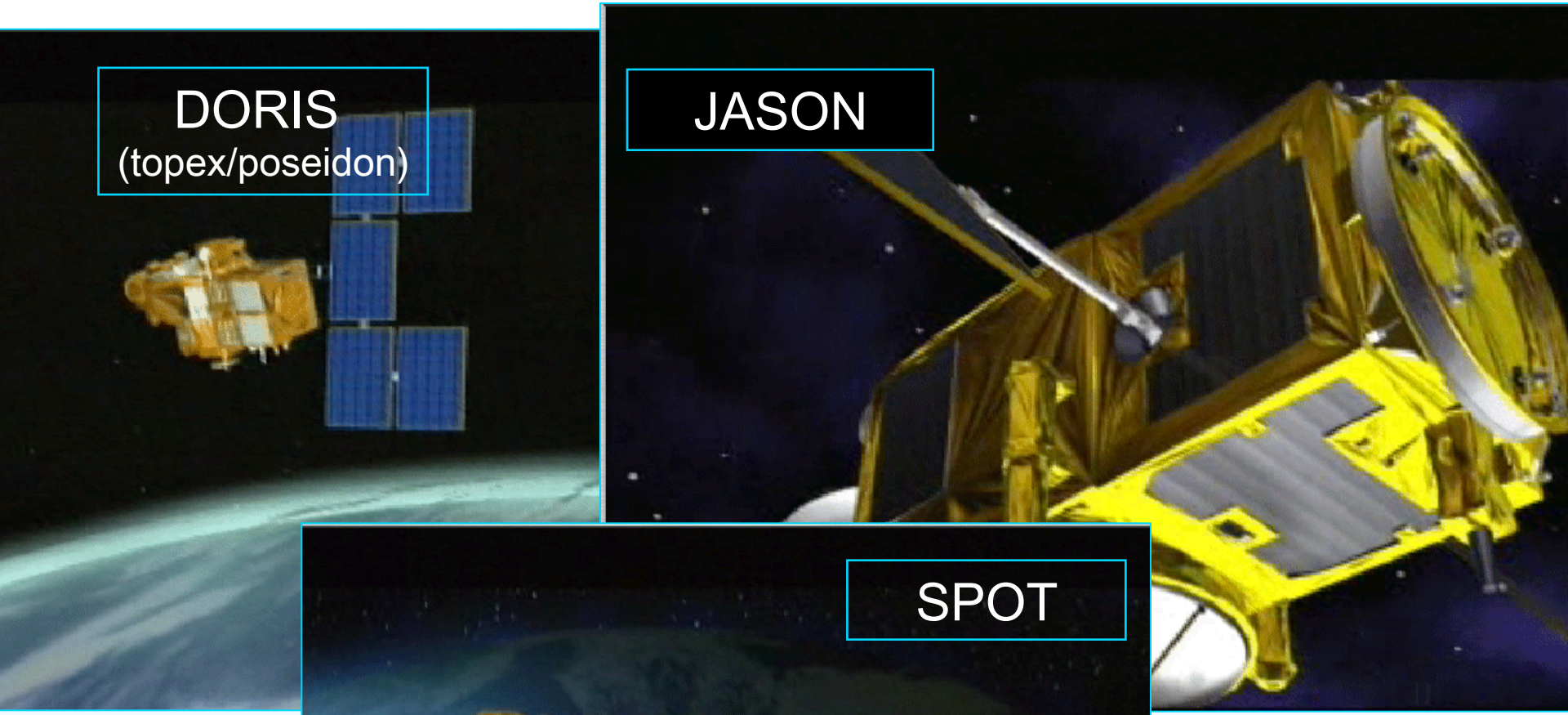
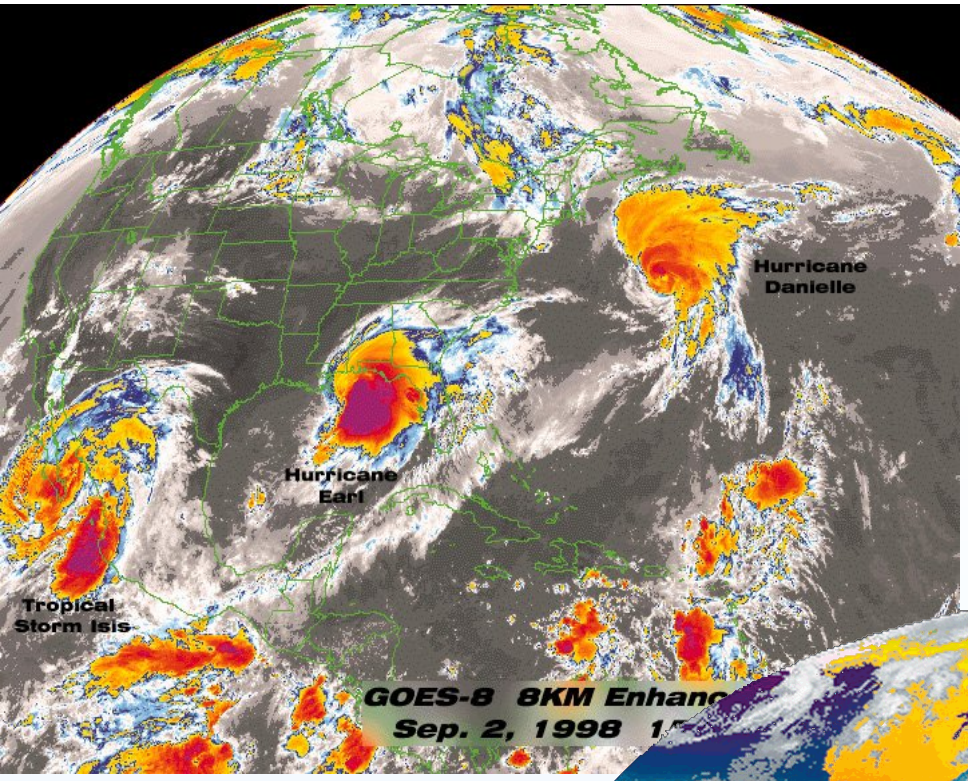
Fisica della Terra

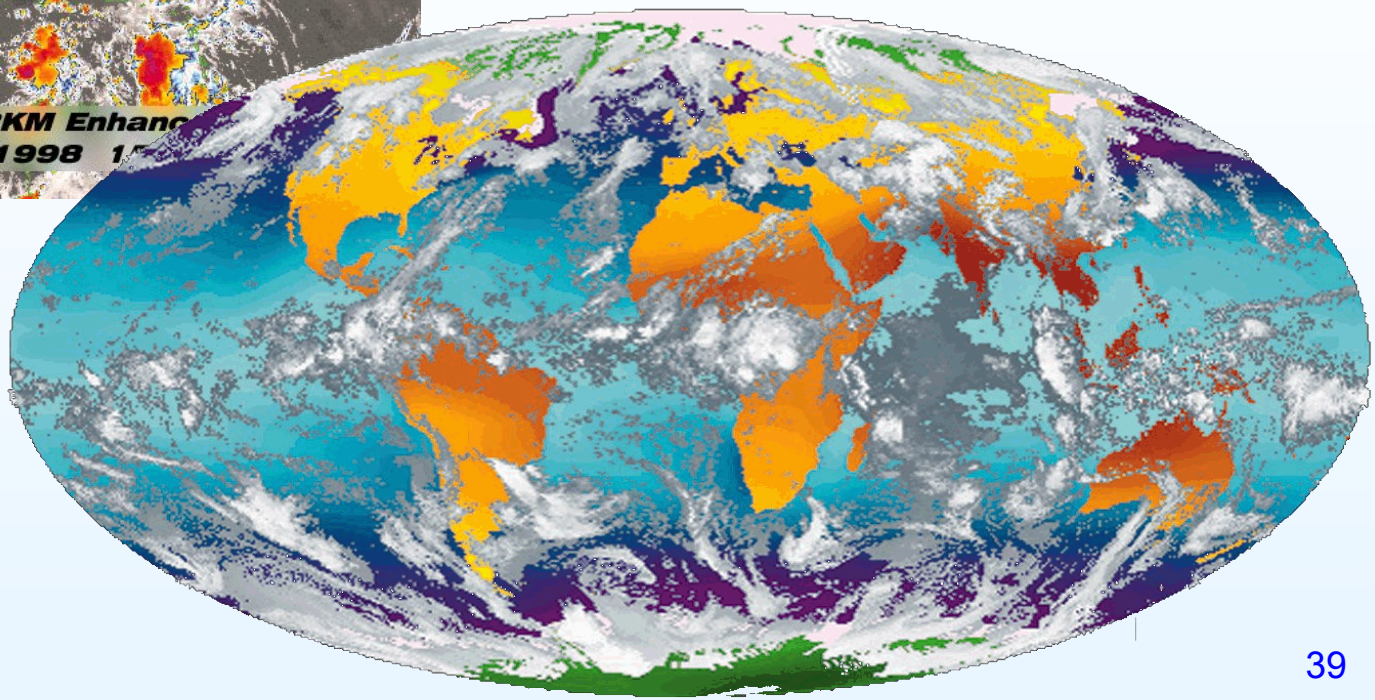


Osservazioni della Terra

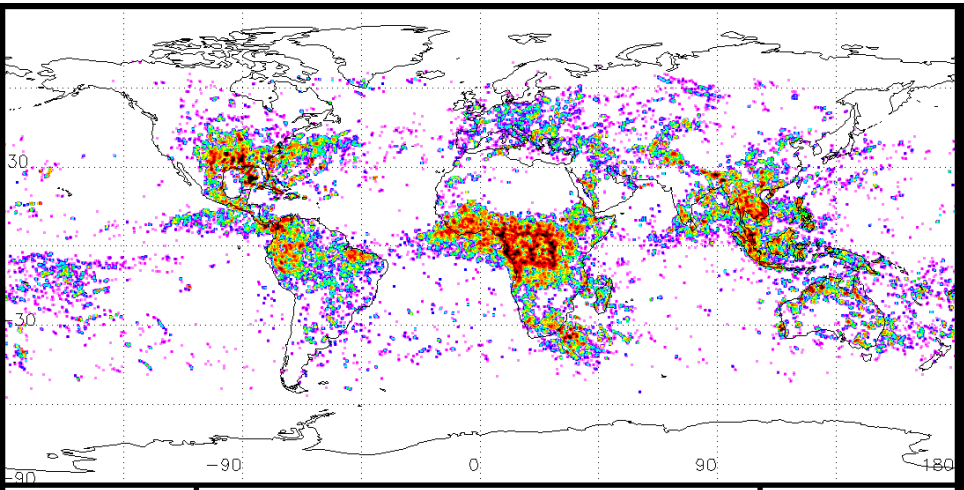


Metereologia





Metereologia



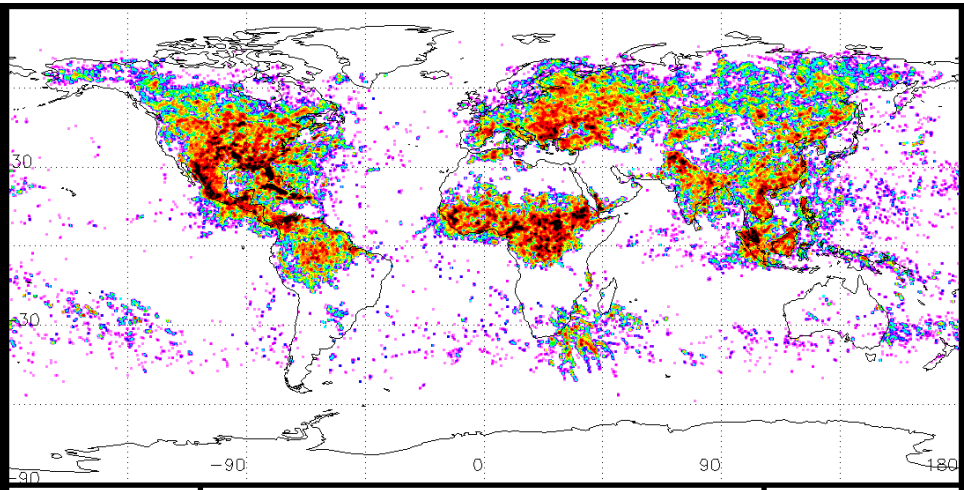
Orbits	710
Areas	27718
Flashes	151705
Groups	771976
Events	1619345
(Created : 02/15/100)	

1 2 3 4 5 >5 >10 >15 >25 >50 >100 >150

Flash scale

1999 March, April, May

OPTICAL TRANSIENT DETECTOR NASA / MSFC



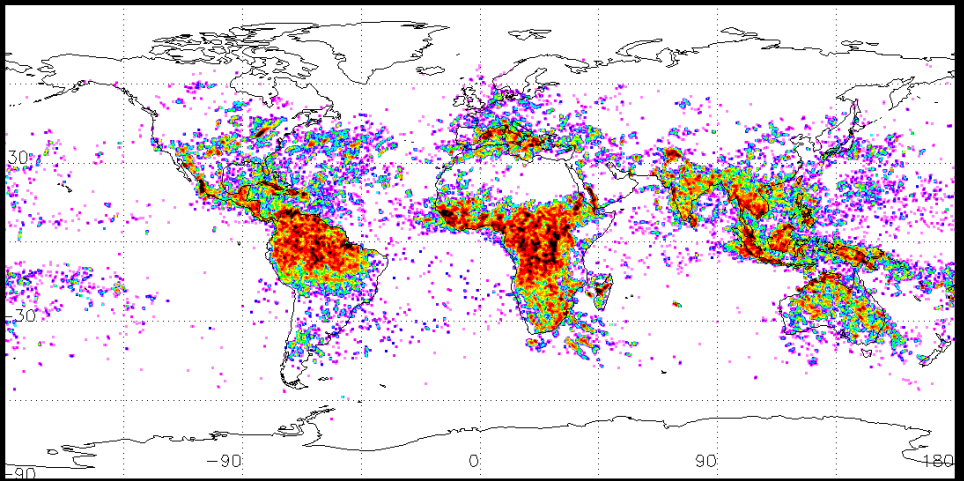
Orbits	759
Areas	54285
Flashes	324088
Groups	1500391
Events	3073364
(Created : 02/15/100)	

1 2 3 4 5 >5 >10 >15 >25 >50 >100 >150

Flash scale

1999 June, July, August

OPTICAL TRANSIENT DETECTOR NASA / MSFC



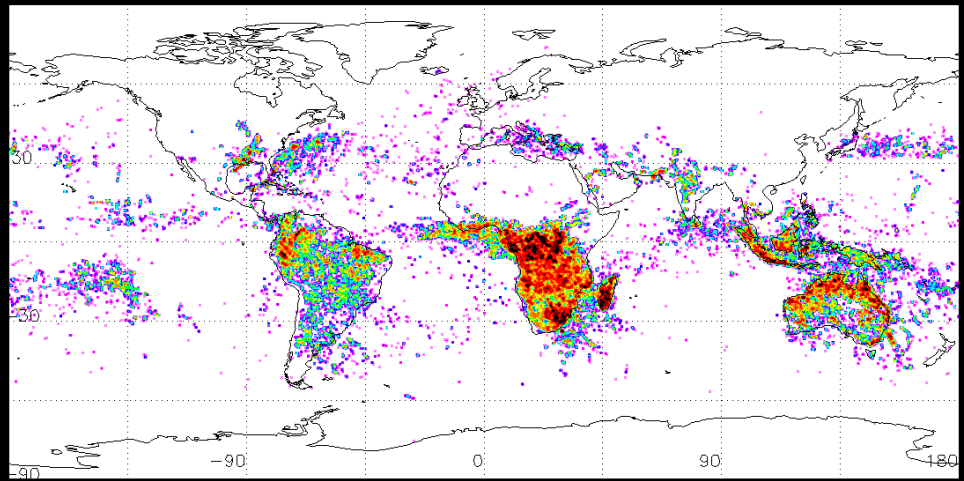
Orbits	904
Areas	43568
Flashes	229678
Groups	1164369
Events	2454938
(Created : 02/15/100)	

1 2 3 4 5 >5 >10 >15 >25 >50 >100 >150

Flash scale

1999 September, October, November

OPTICAL TRANSIENT DETECTOR NASA / MSFC



Orbits	799
Areas	27117
Flashes	137810
Groups	683597
Events	1463457
(Created : 02/14/100)	

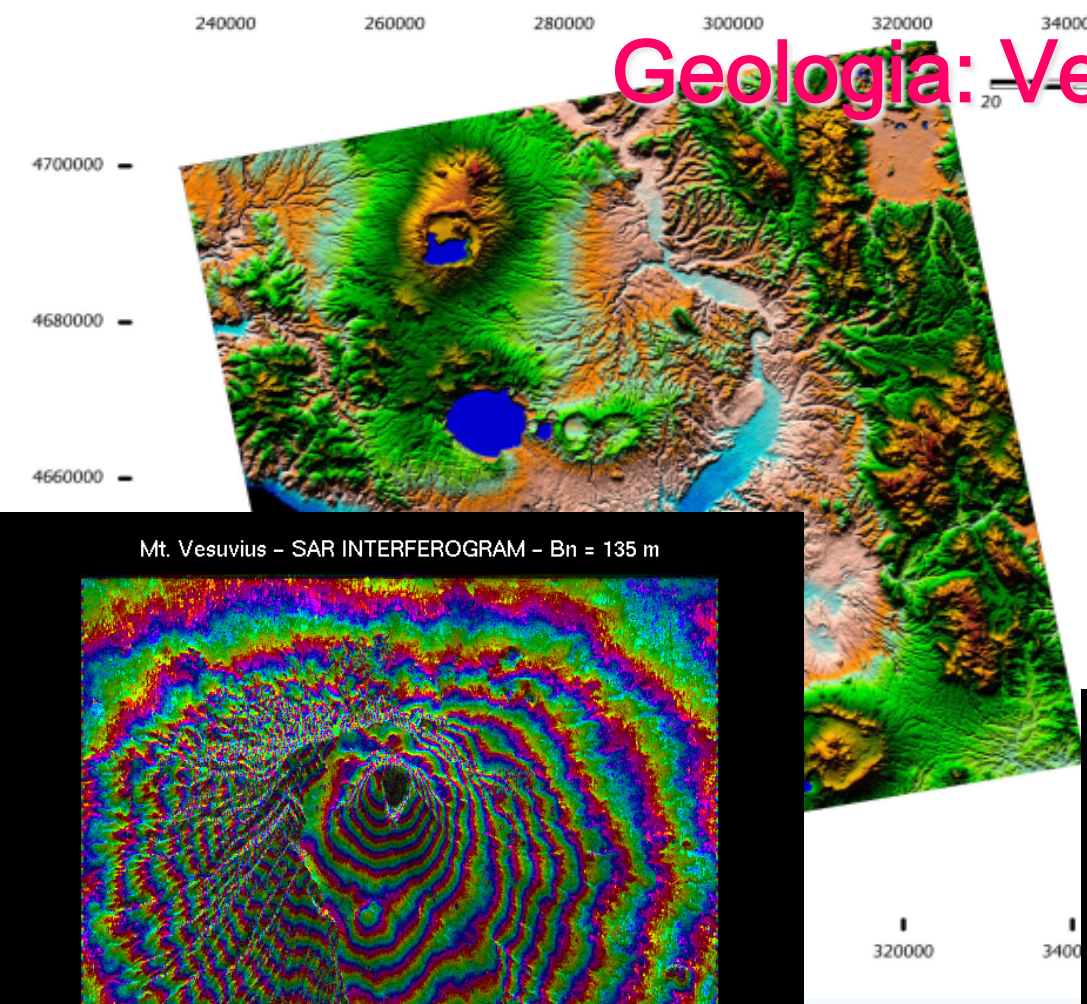
1 2 3 4 5 >5 >10 >15 >25 >50 >100 >150

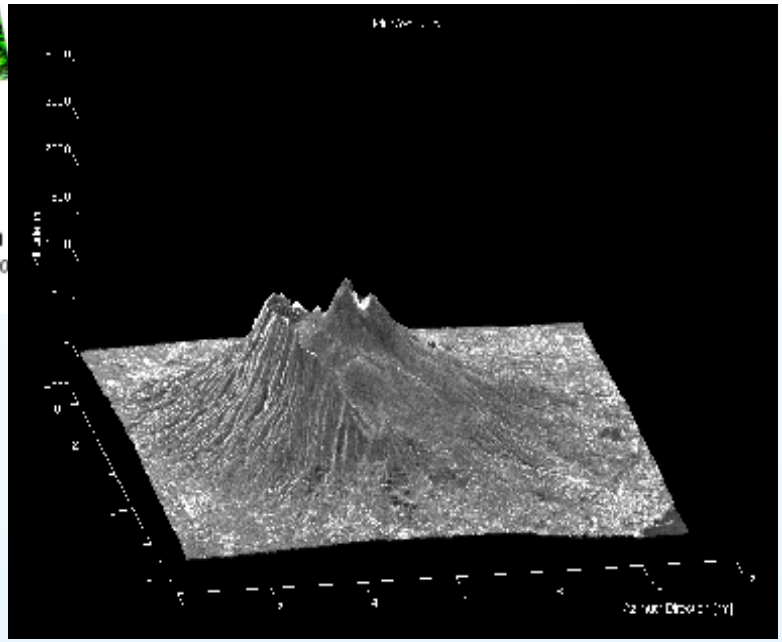
Flash scale

1998 December, 1999 January, 1999 February

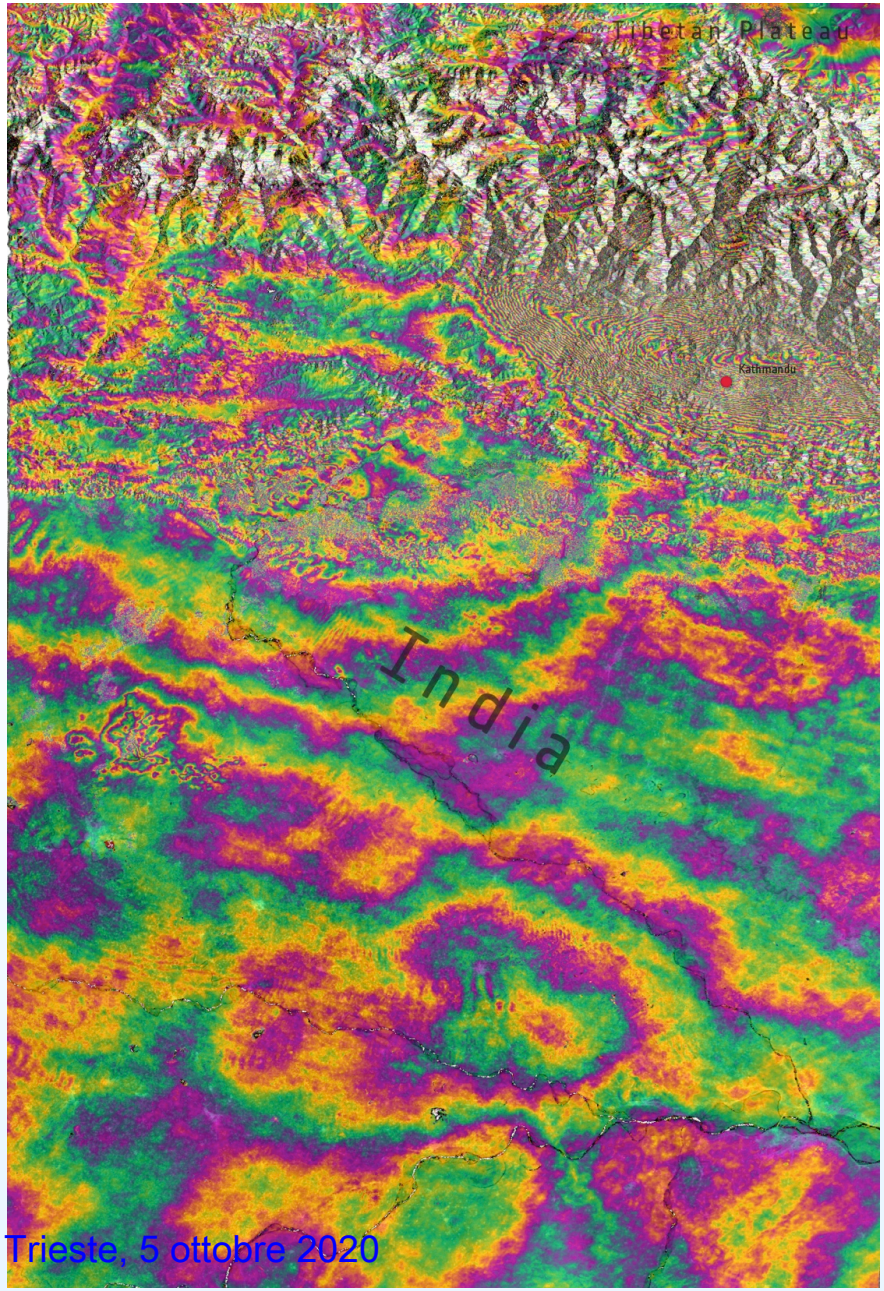
OPTICAL TRANSIENT DETECTOR NASA / MSFC

Geologia: Vesuvio



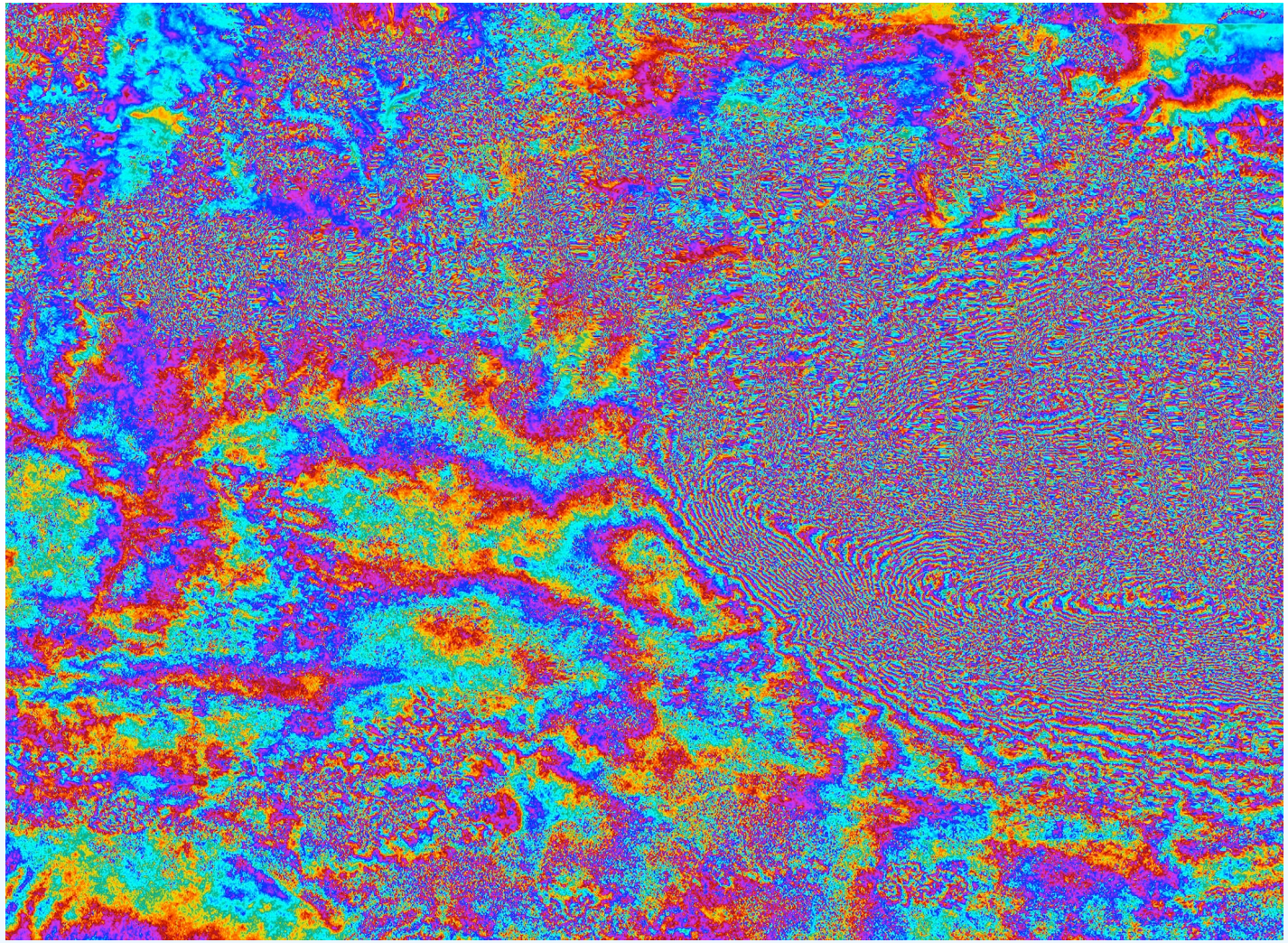


Sentinel 1 2015 - Nepal earthquake



- Combining two Sentinel-1A radar scans from 17 and 29 April 2015, this interferogram shows changes on the ground that occurred during the 25 April earthquake that struck Nepal. An overall area of 120x100 km has moved – half of that uplifted and the other half, north of Kathmandu subsided. Vertical accuracy is a few cm

Sentinel 1 2015 - Nepal earthquake

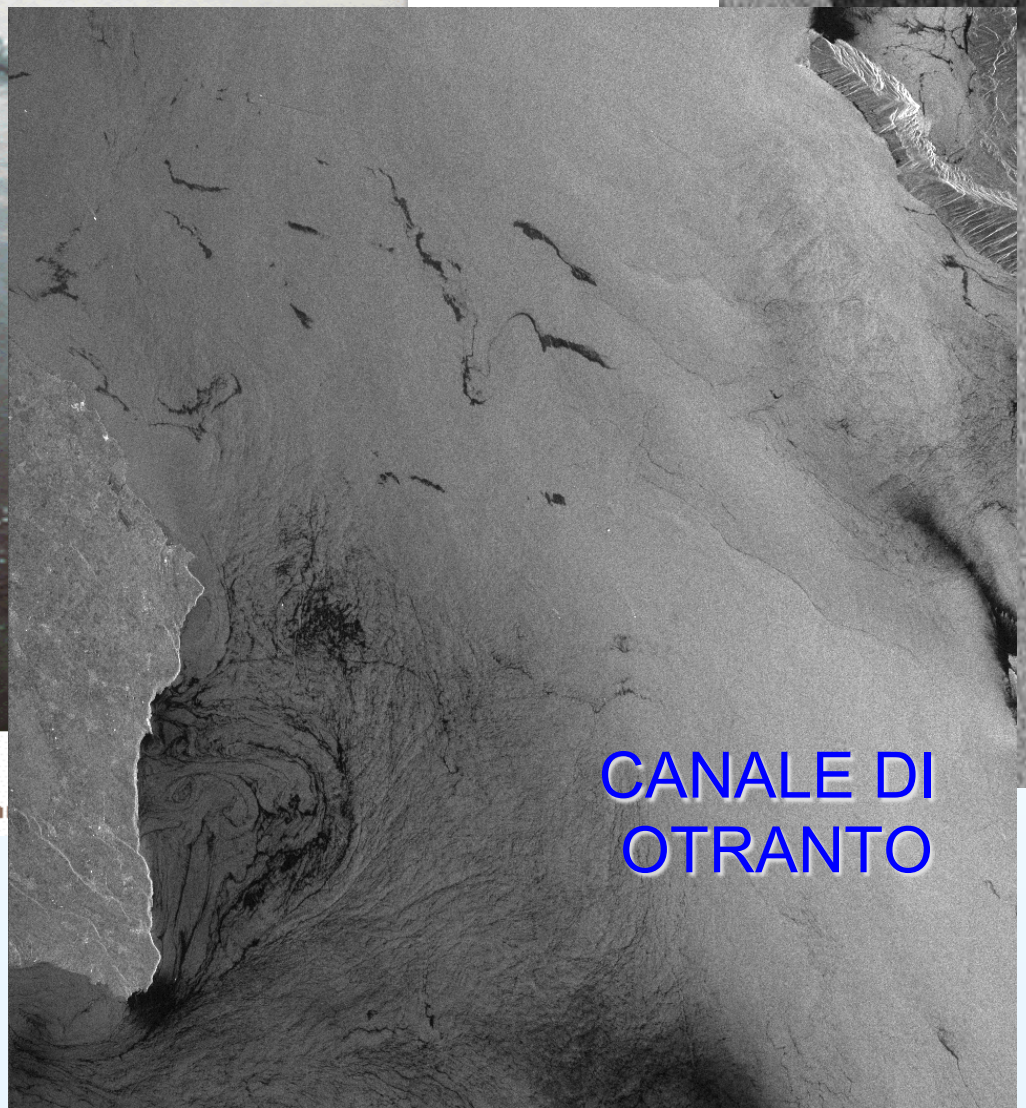


Interferogram over Kathmandu generated from two Sentinel-1A scans on 17 and 29 April 2015 – before and after the 25 April earthquake.

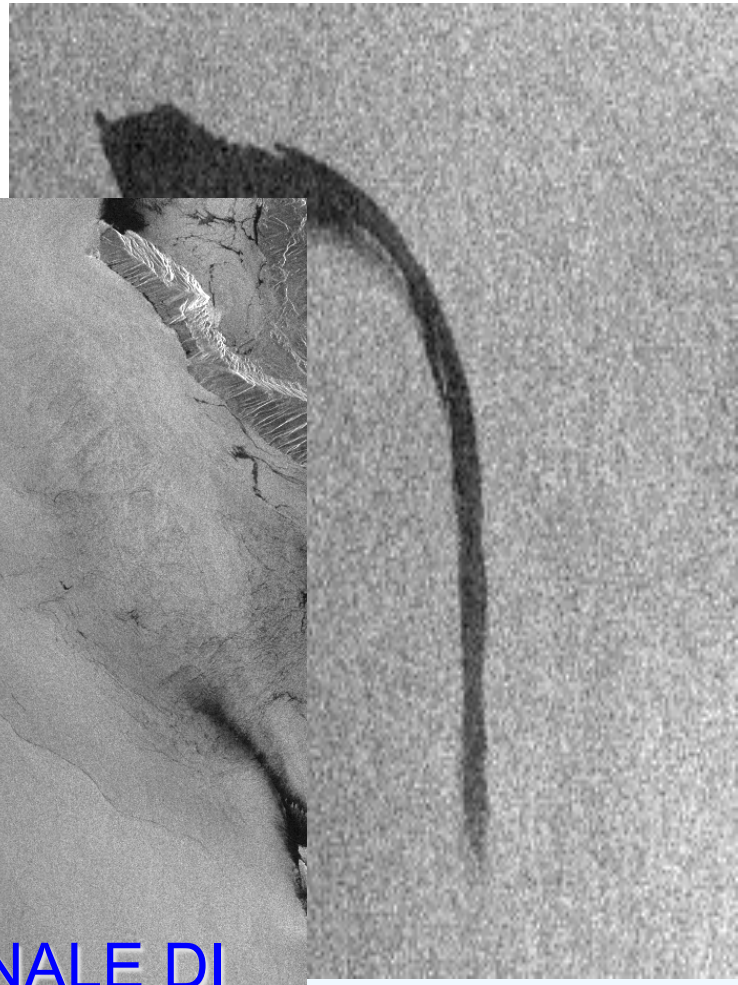
Each ‘fringe’ of colour represents about 3 cm of deformation. The large amount of fringes indicates a large deformation pattern with ground motions of 1 m or more

Ambiente: Inquinamento

Thames Water Authority dump sewage in the North Sea. Copyright Greenpeace / Morga



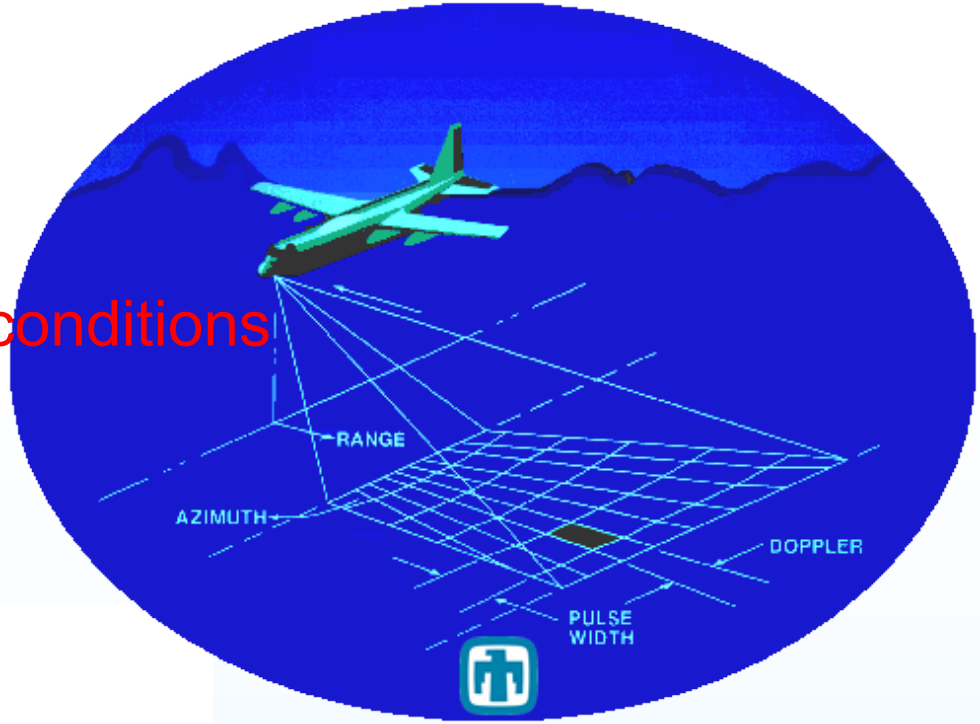
CANALE DI OTRANTO

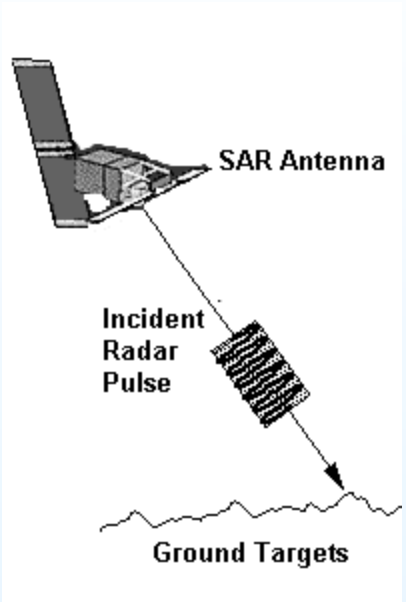


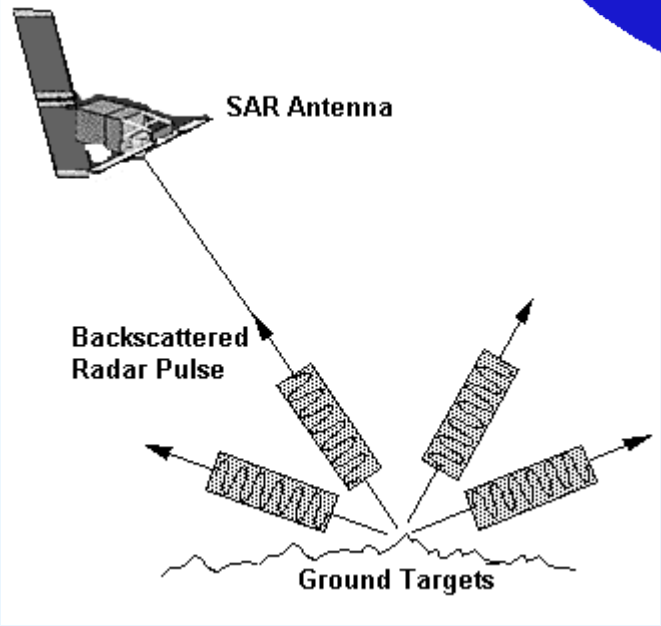
Synthetic Aperture Radar - SAR

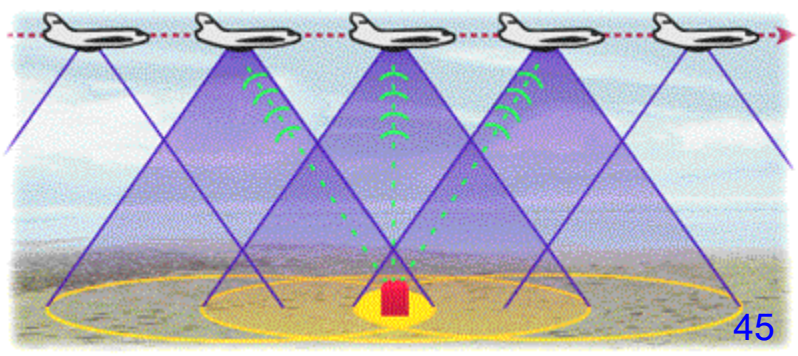
Radio Signals

- Long range propagation characteristics
- Reduced effect of weather conditions
- Unique response of terrain





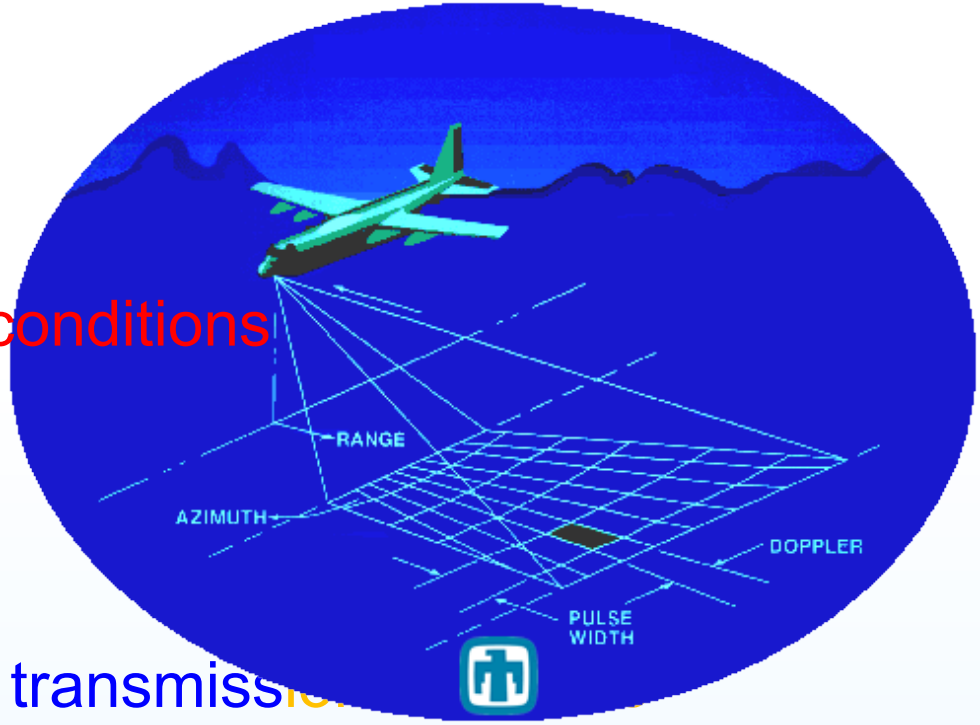




Synthetic Aperture Radar - SAR

Radio Signals

- Long range propagation characteristics
- Reduced effect of weather conditions
- Unique response of terrain



2-dim image

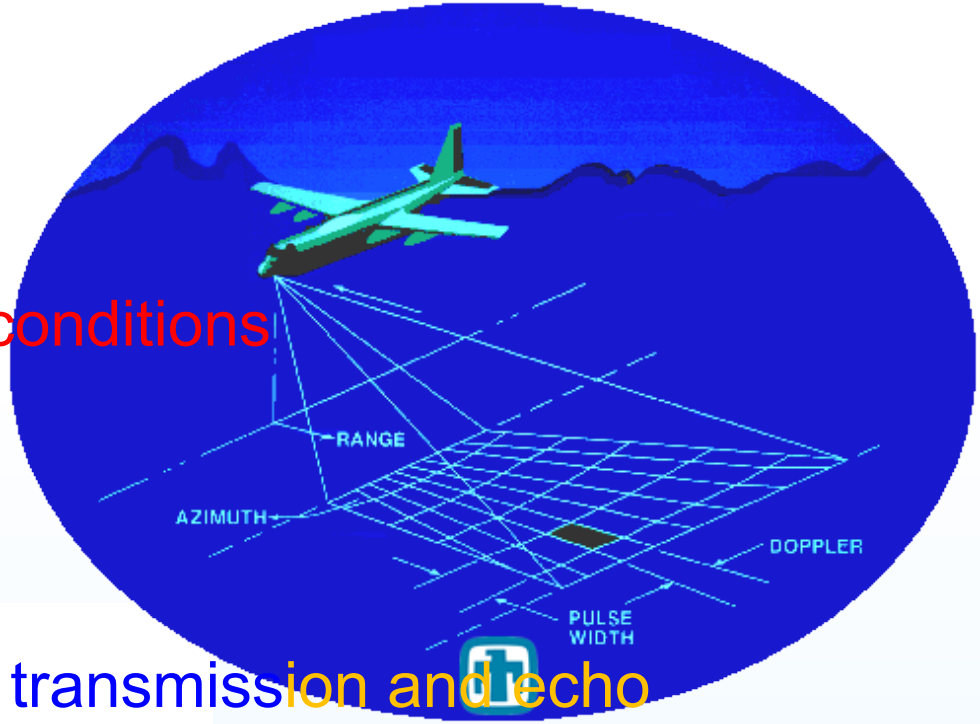
- Range: time between signal transmiss
  (resolution ∝ signal width)
- Azimuth: doppler shift processing (resolution ∝ beam dimension ∝ 1/antenna length)
  - Resolution ~ λR/d
  - R~50 km, λ~0.03 m, resolution~1 m ⇒ d~1.5 km!

⇒ Synthetic Aperture !!!

Synthetic Aperture Radar - SAR

Radio Signals

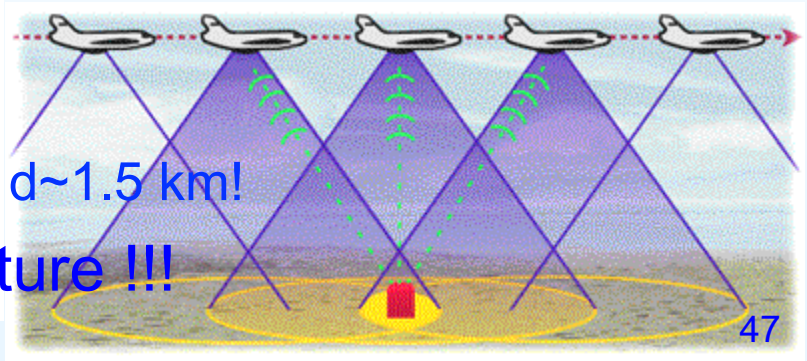
- Long range propagation characteristics
- Reduced effect of weather conditions
- Unique response of terrain



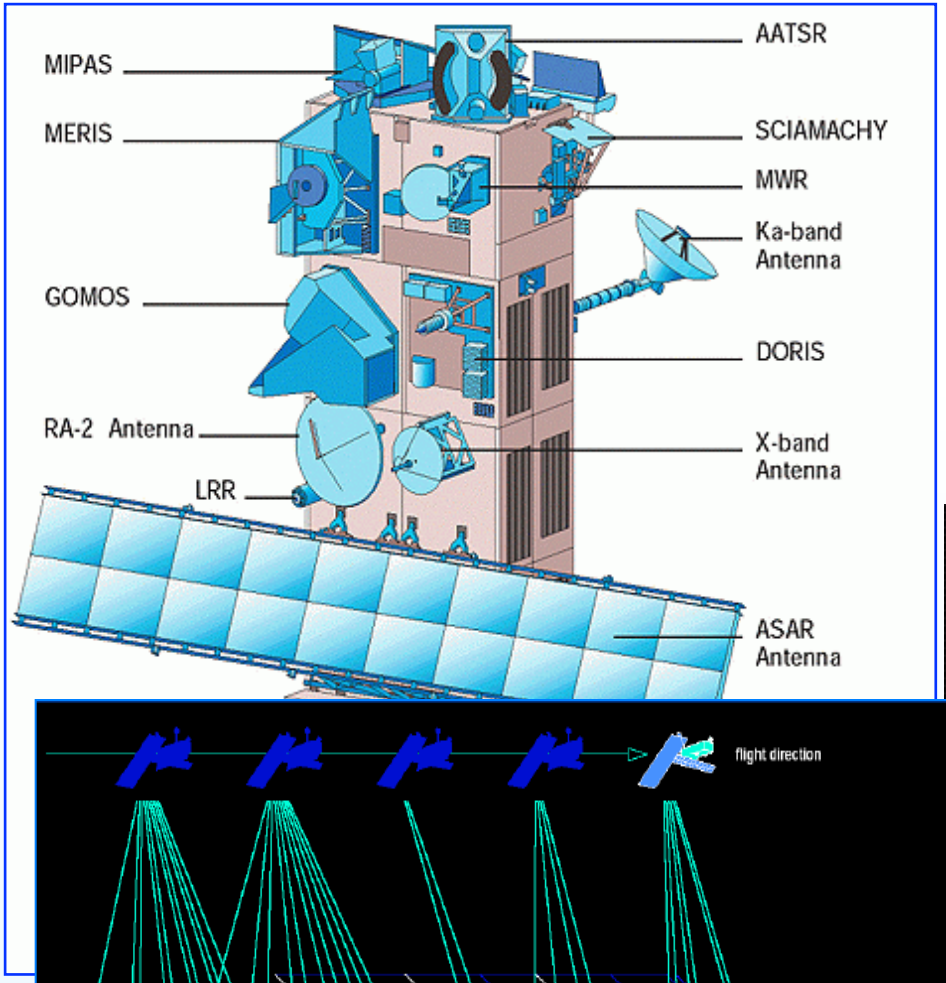
2-dim image

- Range: time between signal transmission and echo (resolution ∝ signal width)
- Azimuth: doppler shift processing (resolution ∝ beam dimension ∝ 1/antenna length)
  - Resolution ~ λR/d
  - R~50 km, λ~0.03 m, resolution~1 m ⇒ d~1.5 km!

⇒ Synthetic Aperture !!!

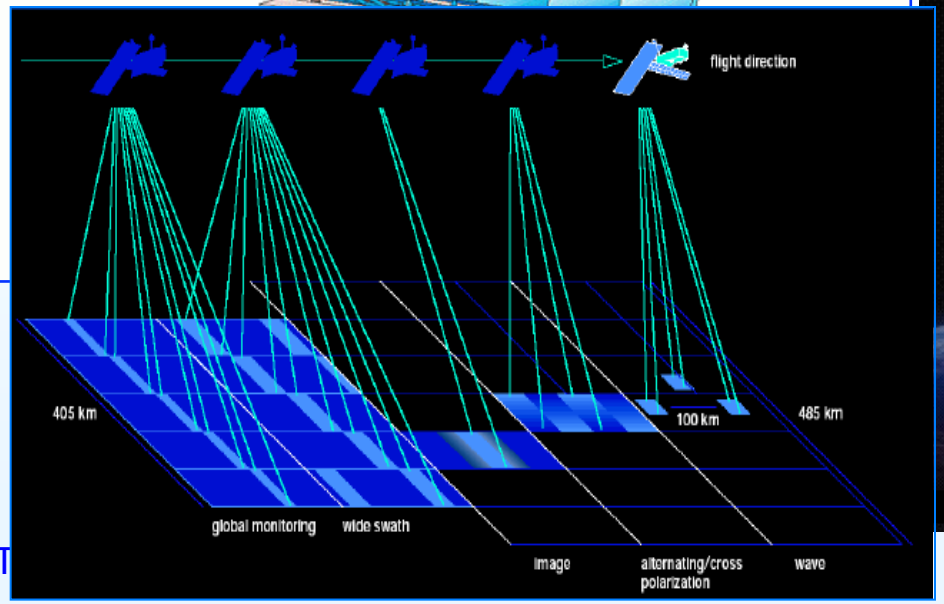


Strumenti di Envisat

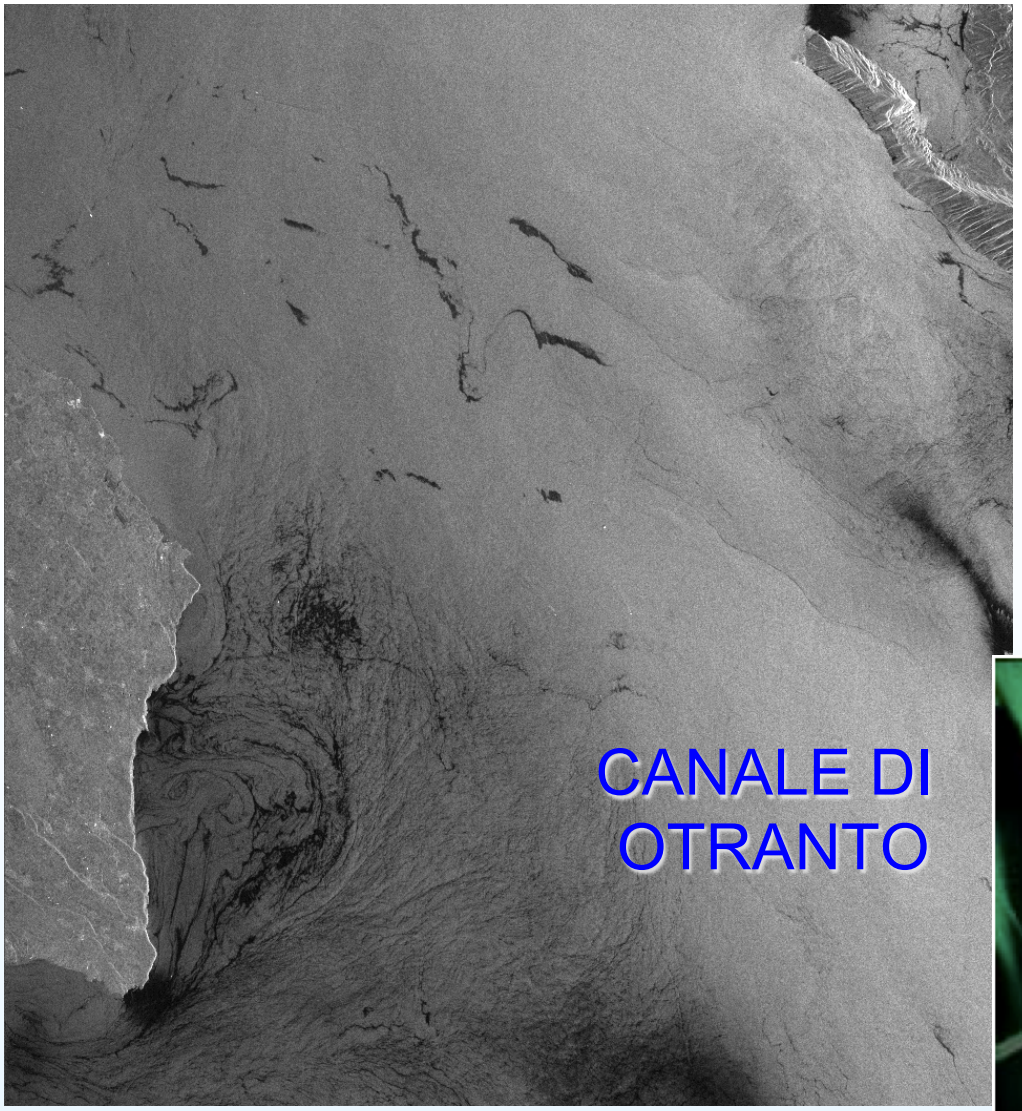


ASAR: Advanced Synthetic Aperture Radar

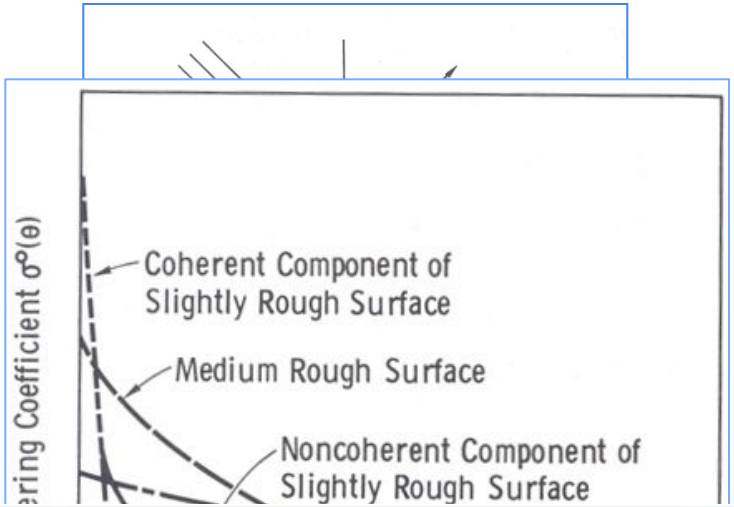
Immagini radar ad alta risoluzione dell'ambiente terrestre in qualsiasi condizione ambientale e di illuminazione



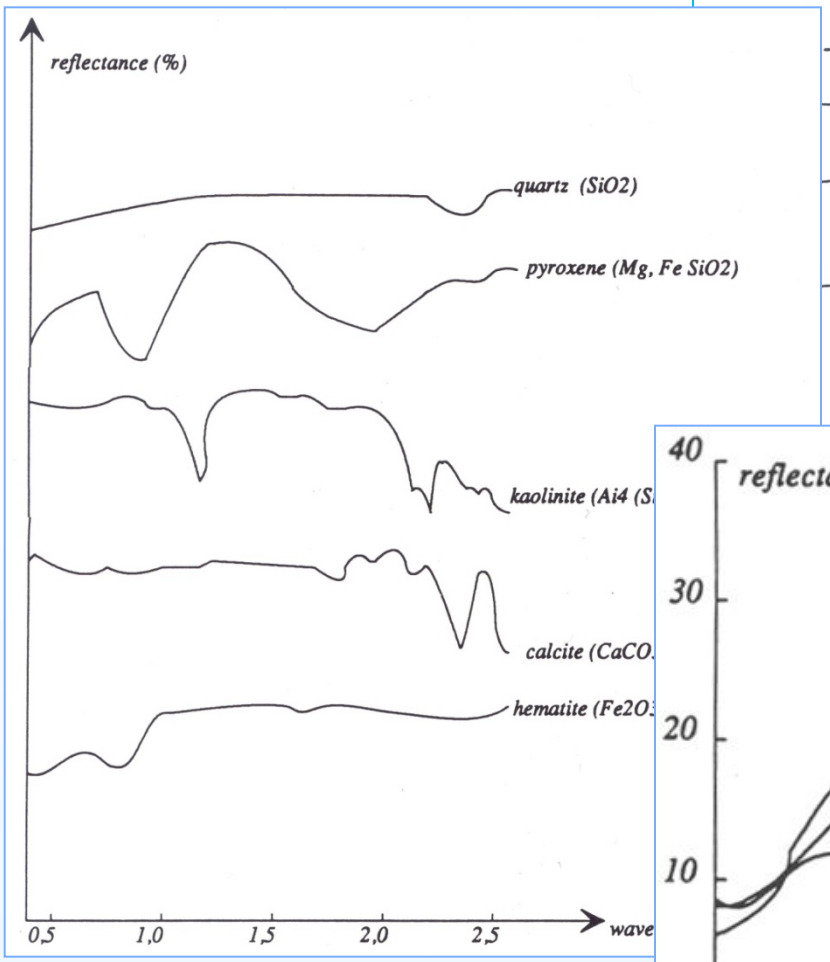
Imaging Radar: light reflectance, back-scattering

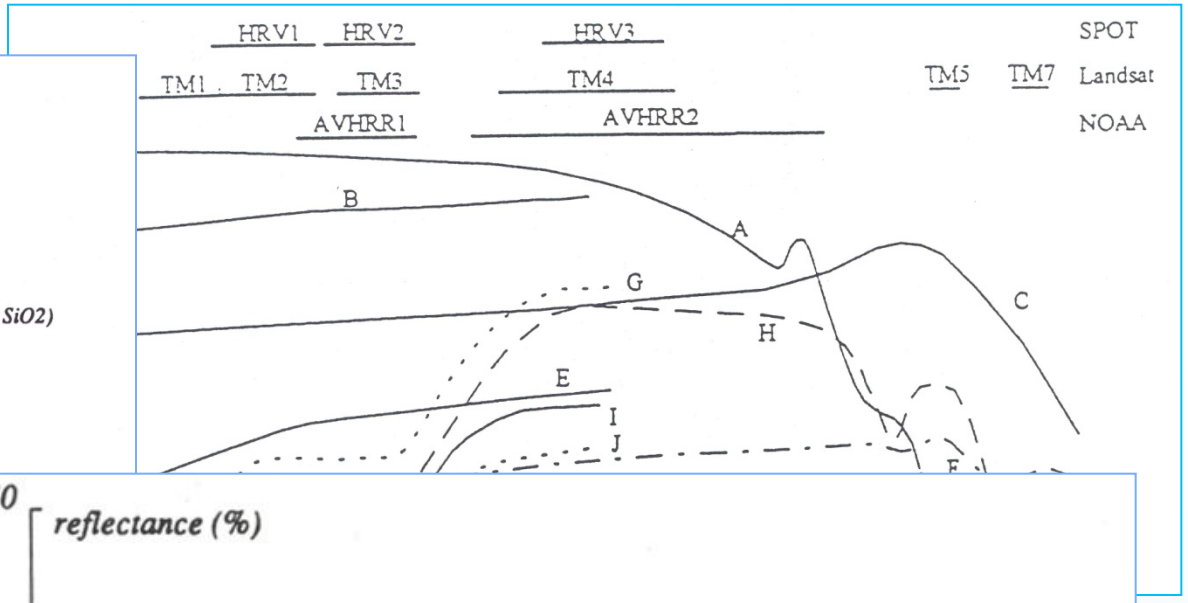


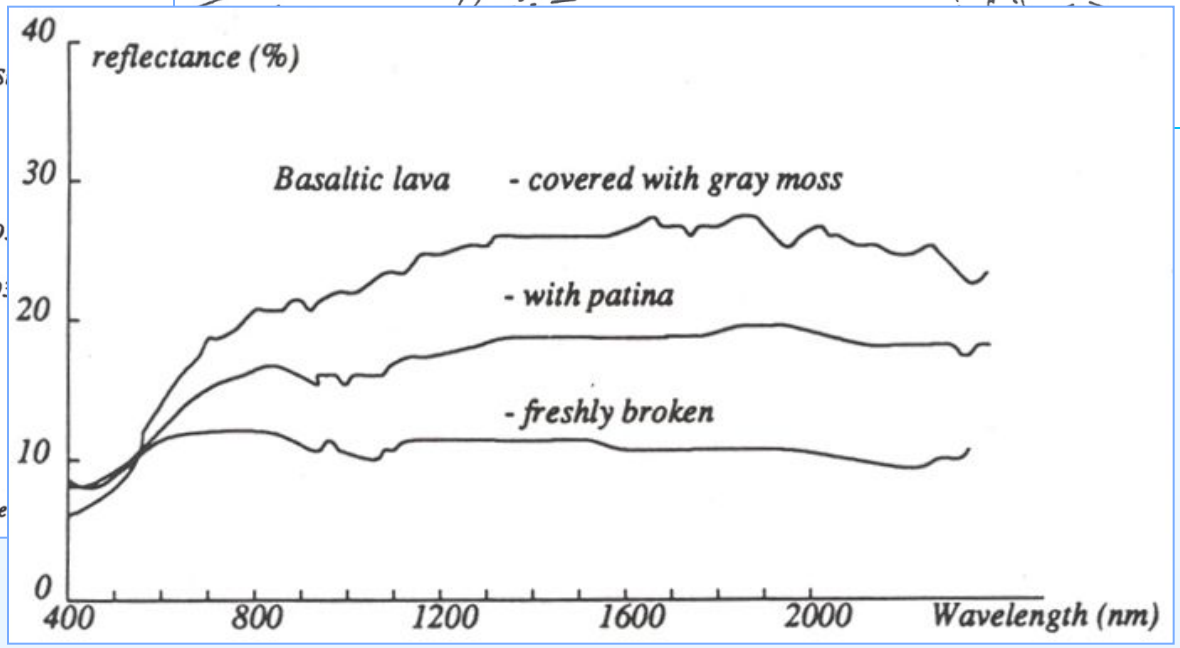
Surface rugosity is the second primary driver in radar signature



Geologia: struttura del suolo



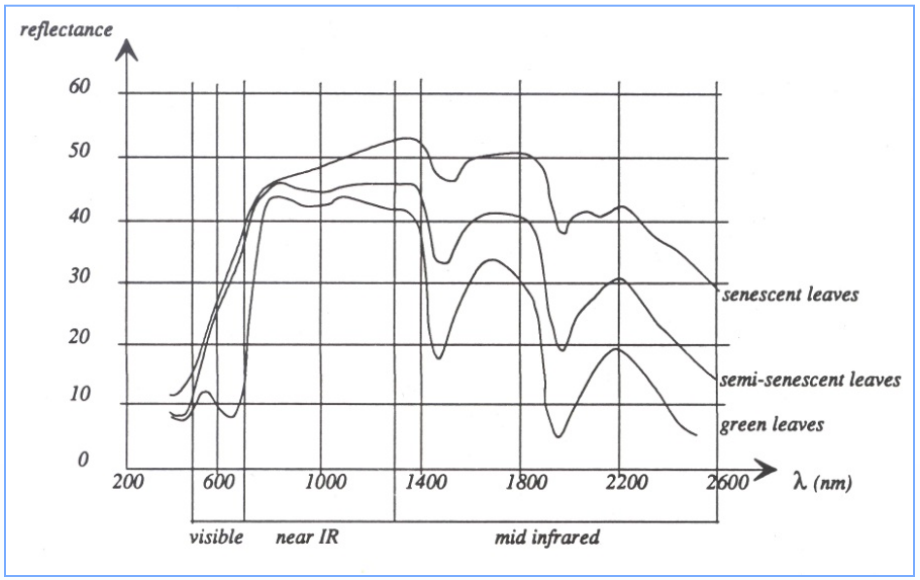


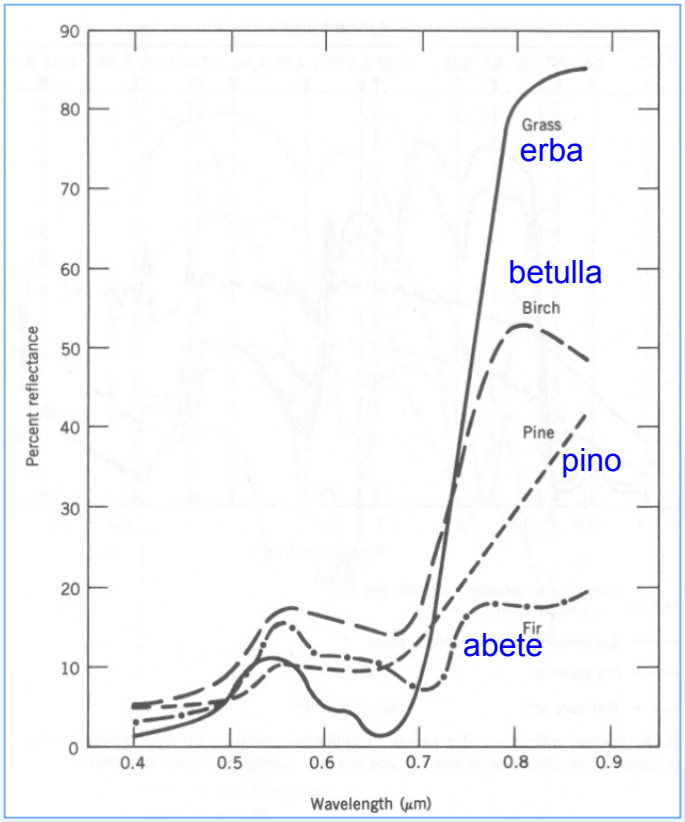


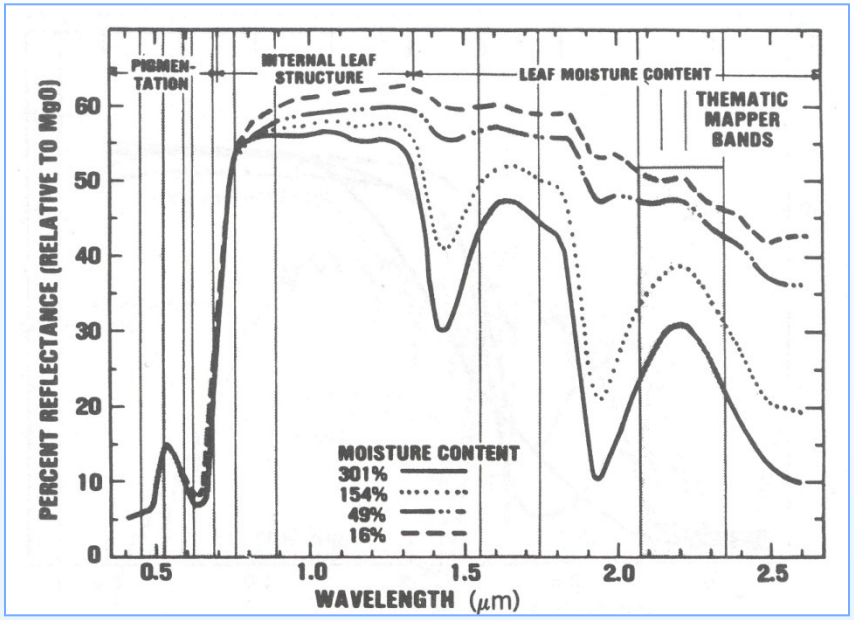
Biologia: vegetazione

Vegetation spectral signatures vary with

- leaf state
- canopy species
- leaf moisture content
- phenological stage



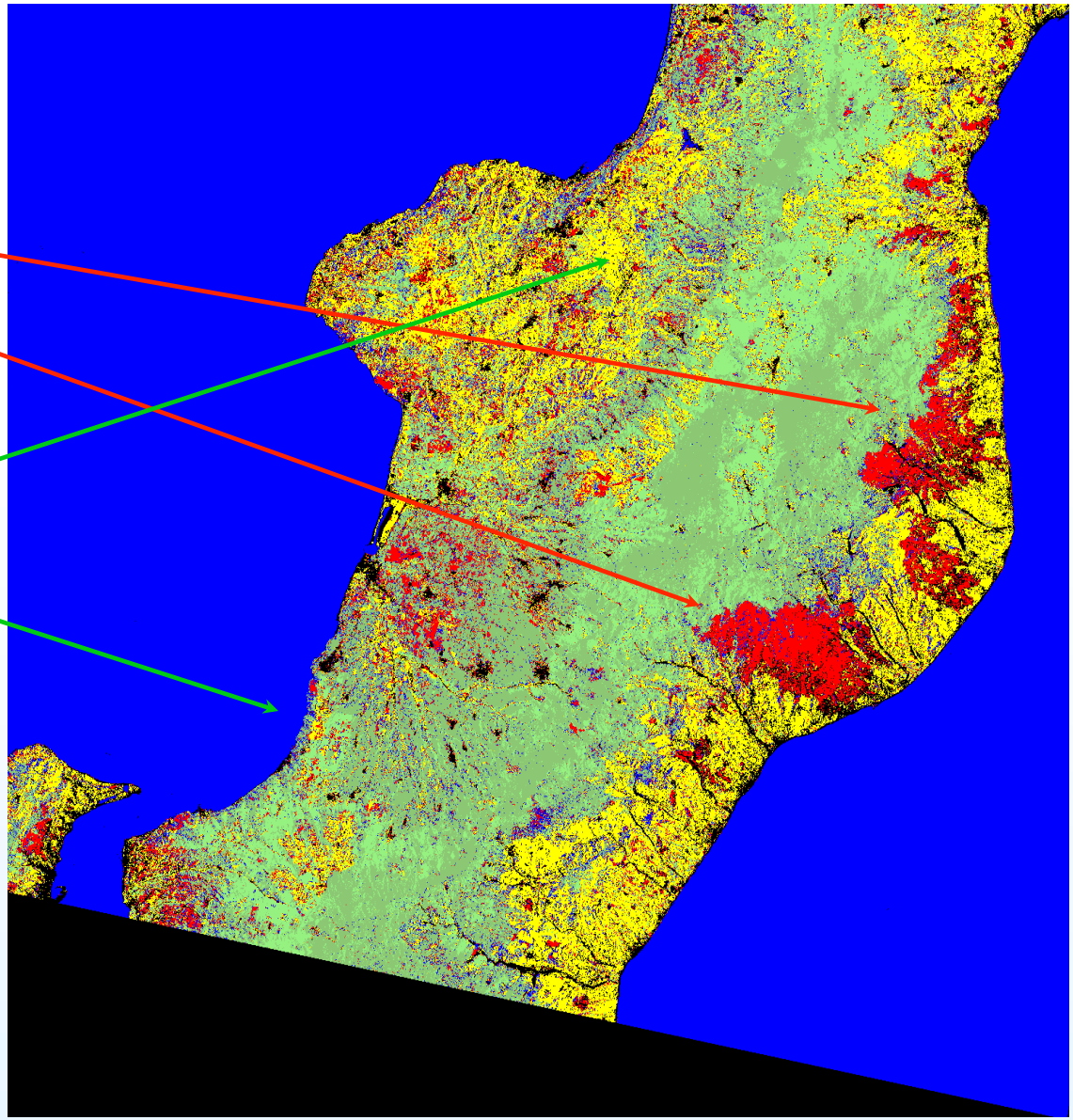




Ambiente: Controllo Incendi

incendi

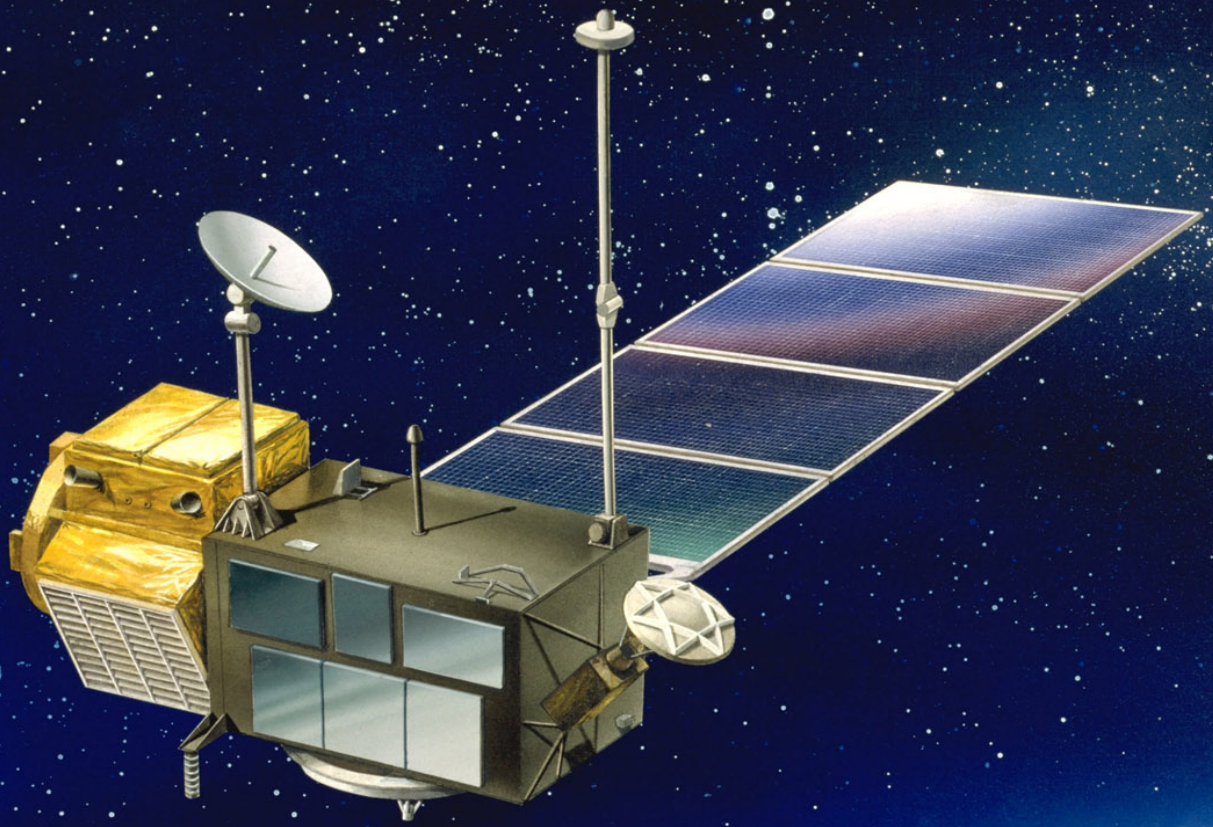
zone calde



Osservazioni Della Terra

Trieste, 5 ottobre 2020

TOPEX-POSEIDON: Studio degli Oceani



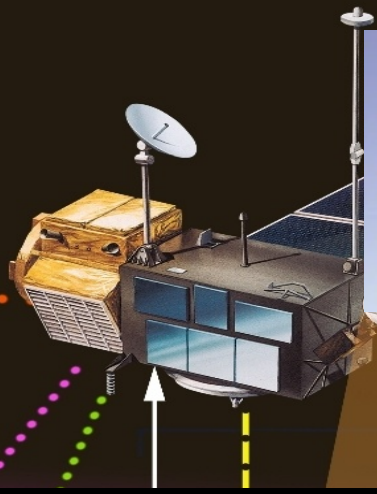
cnes
CENTRE NATIONAL D'ETUDES SPATIALES

DORIS

The DORIS system uses a ground network of 50 orbitography beacons around the globe, which send signals at two frequencies to a receiver on the satellite. The relative motion of the satellite generates a shift in the signal's frequency (called the Doppler shift) that is measured to derive the satellite's velocity. These data are then assimilated in orbit determination models to keep permanent track of the satellite's precise position (to within three centimetres) on its orbit. (Instrument supplied by CNES)

LRA

The Laser Retroreflector Array (LRA) provides a target for laser tracking measurements from the ground. By analysing the round-trip time of the laser beam, we can locate where the satellite is on its orbit. (Instrument supplied by NASA).



POSEIDON-1 altimeter on TOPEX/POSEIDON, it is a compact, low-power, low-mass

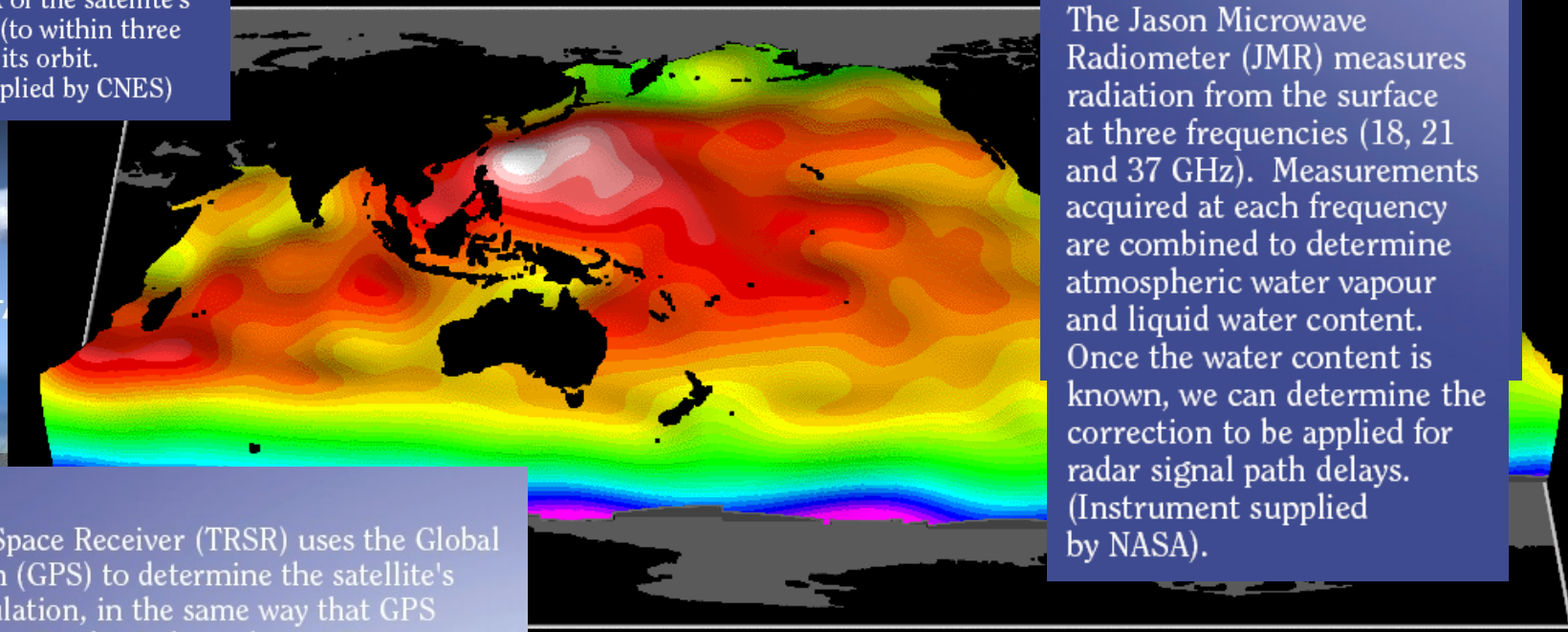
JMR

The Jason Microwave Radiometer (JMR) measures radiation from the surface at three frequencies (18, 21 and 37 GHz). Measurements acquired at each frequency are combined to determine atmospheric water vapour and liquid water content. Once the water content is known, we can determine the correction to be applied for radar signal path delays. (Instrument supplied by NASA).

LASER ST

TRSR

The Turbo Rogue Space Receiver (TRSR) uses the Global Positioning System (GPS) to determine the satellite's position by triangulation, in the same way that GPS fixes are obtained on Earth. At least three GPS satellites determine the mobile's exact position at a given instant. Positional data are then integrated into an orbit determination model to track the satellite's trajectory continuously.

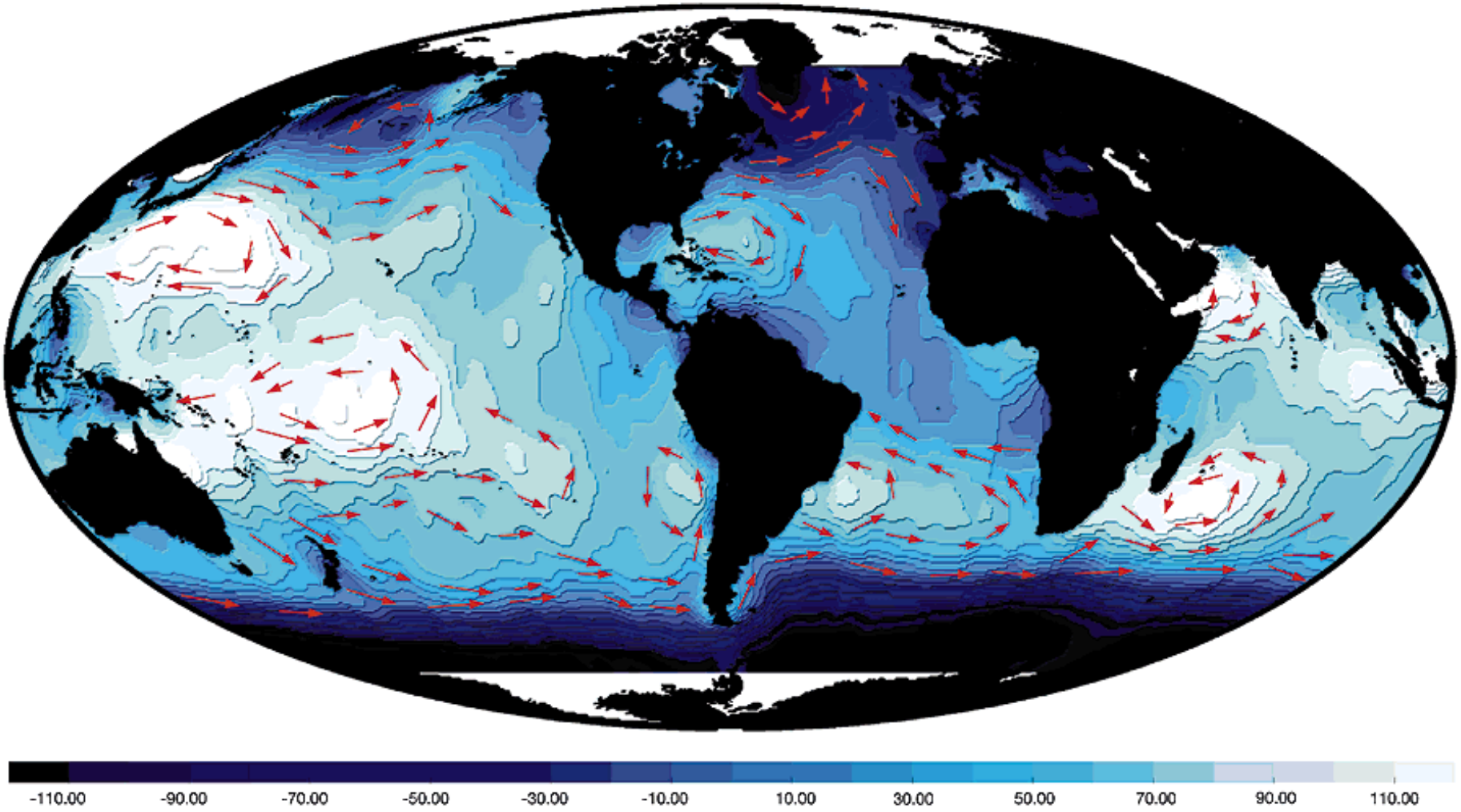


-80 -40 0 40 80

No Valid Data

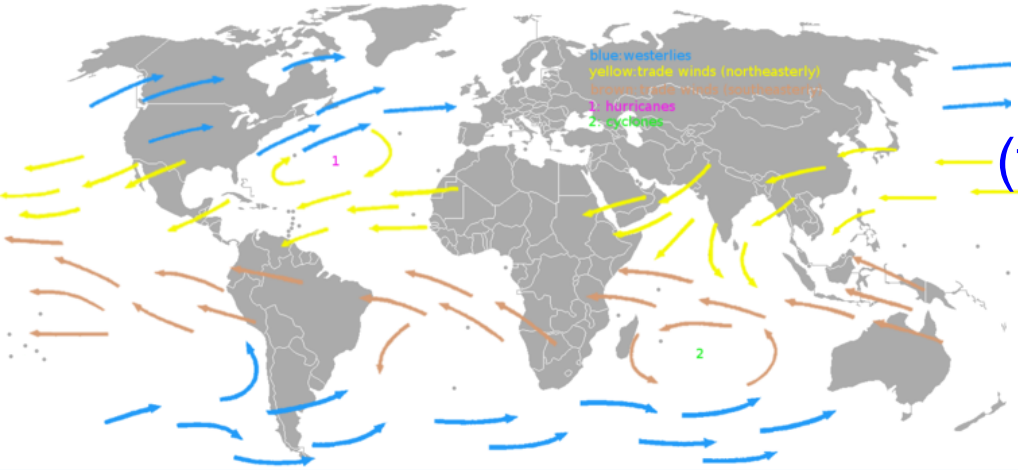
Ocean Dynamic Topography (cm) Oct 3-12, 1992

Dinamica degli Oceani

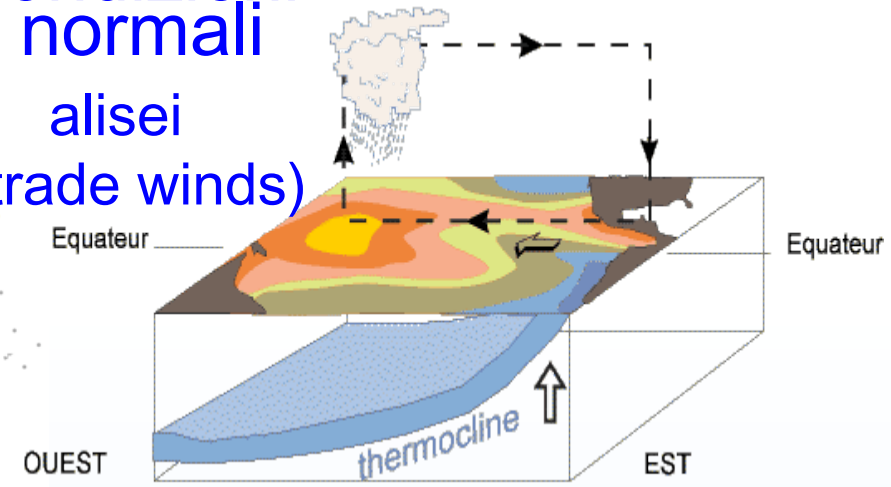


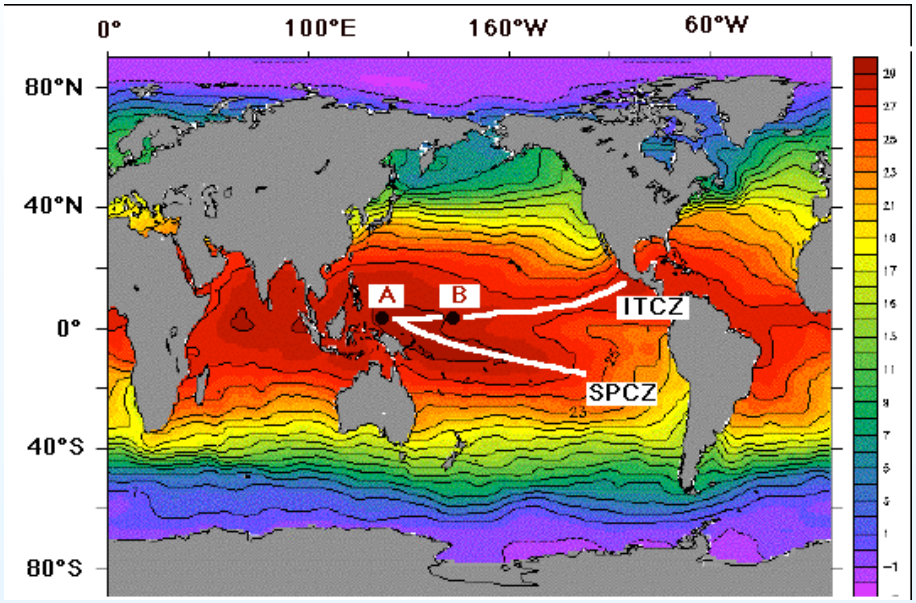
El Niño / La Niña

condizioni normali



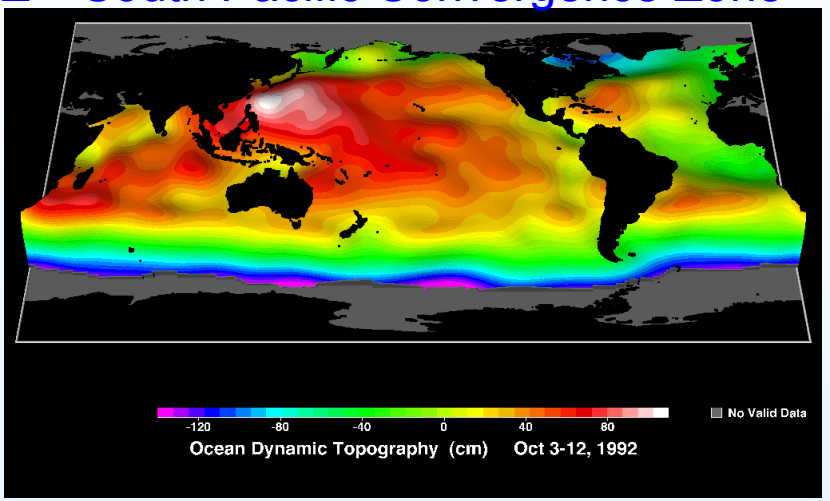
alisei (trade winds)



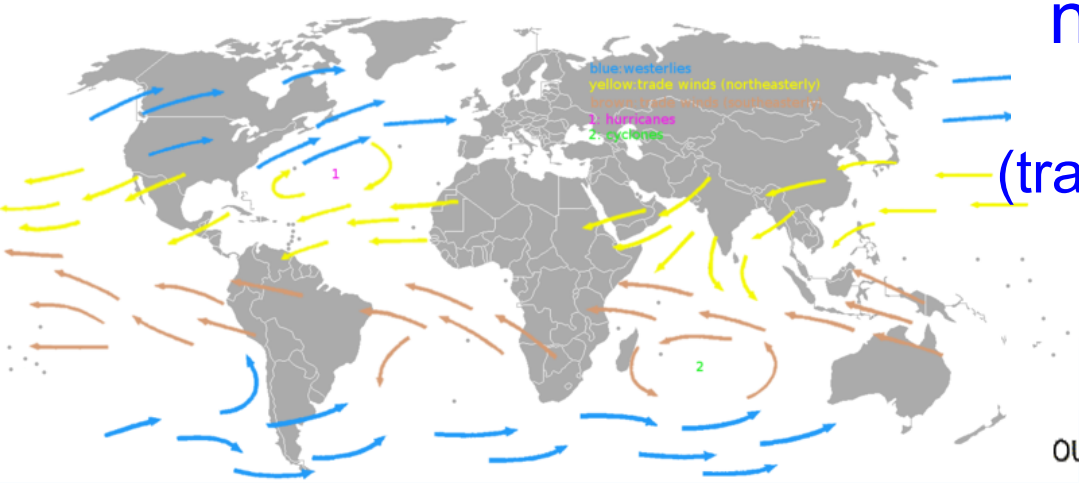


ITCZ – InterTropical Convergence Zone

SPCZ – South Pacific Convergence Zone



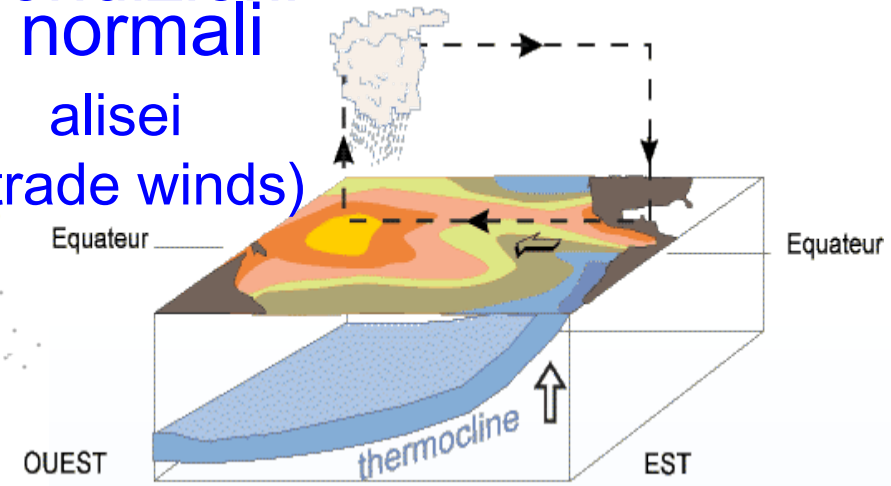
El Niño / La Niña



condizioni normali

alisei

(trade winds)

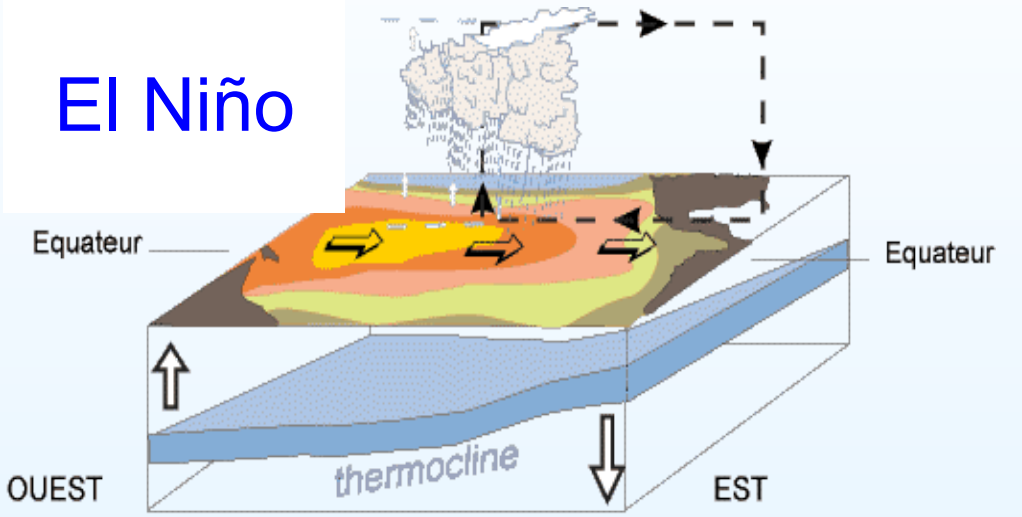


Fine primavera/inizio estate: monsoni (Indian Ocean monsoons) NE→ SW

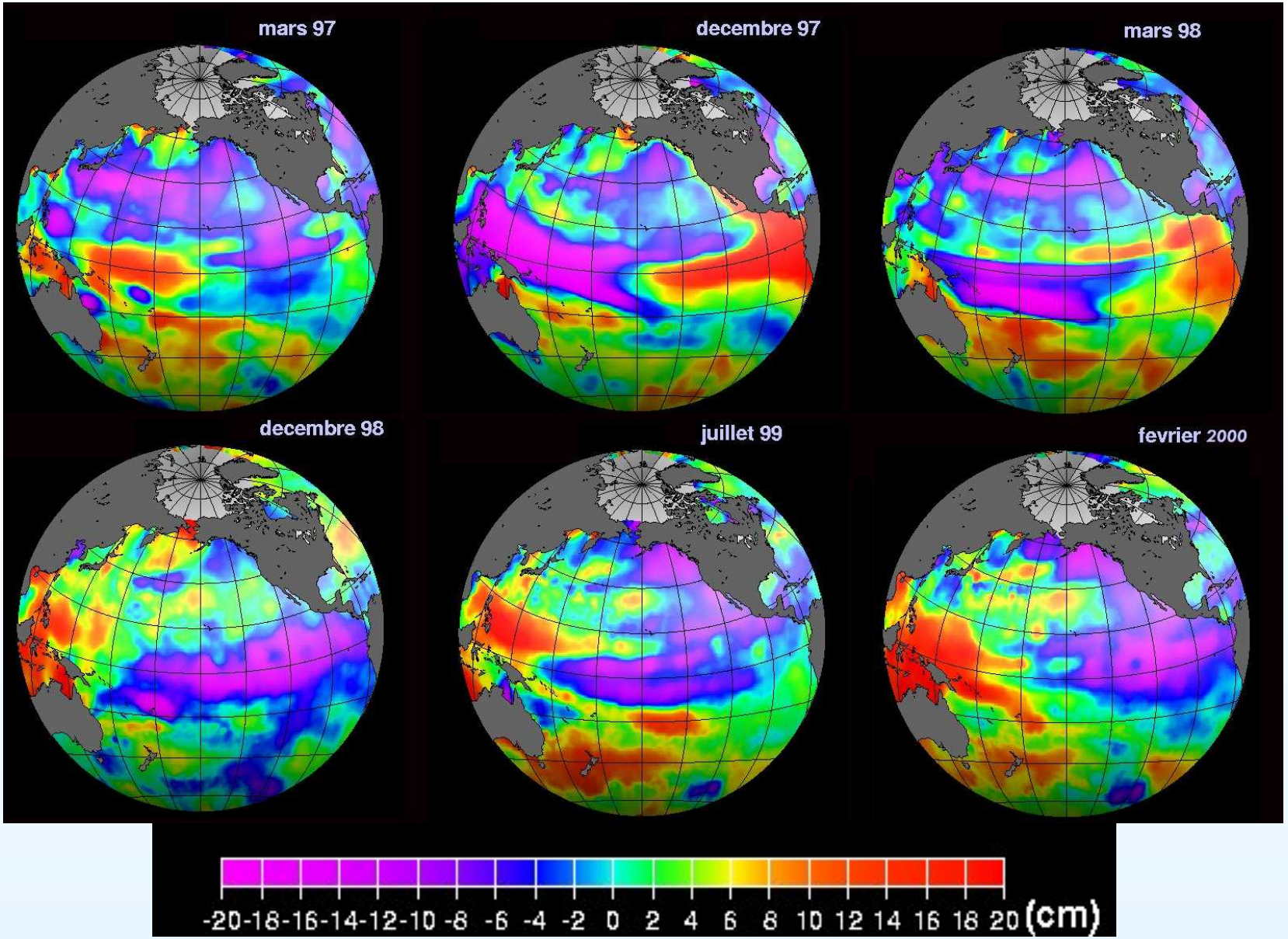
ENSO:

El Niño Southern Oscillations

El Niño



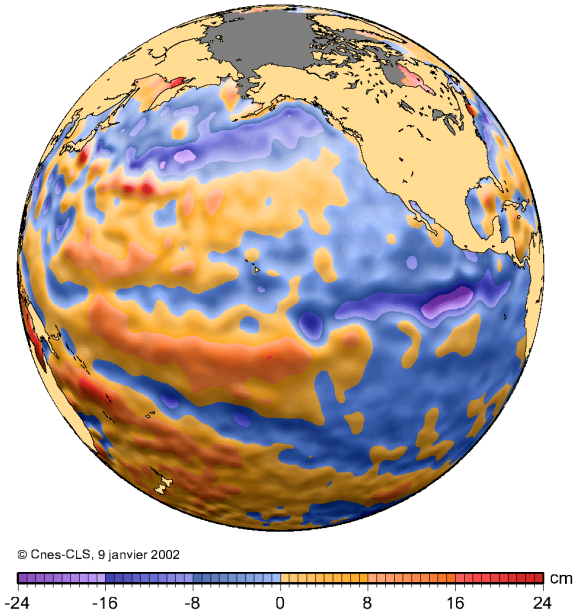
El Niño / La Niña



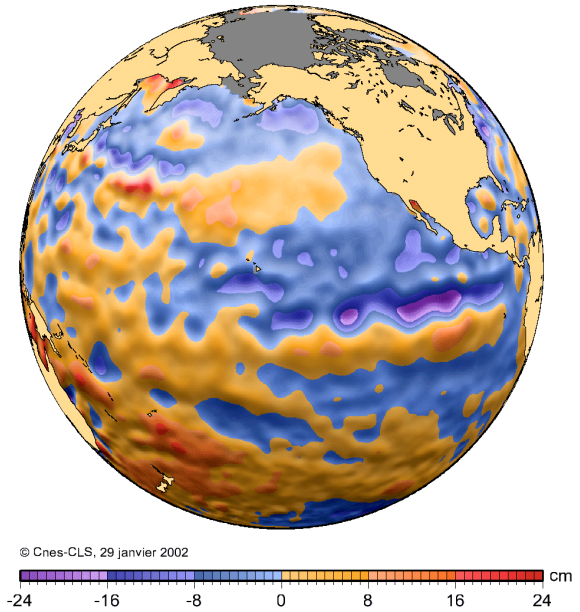
“Futuro ...”

Esempio del 2002

situation au
2 janvier 2002



situation au
23 janvier 2002



Fisica della Terra

ENVISAT