Sentinel-1 / COSMO-SkyMed Synergies for ground motion monitoring

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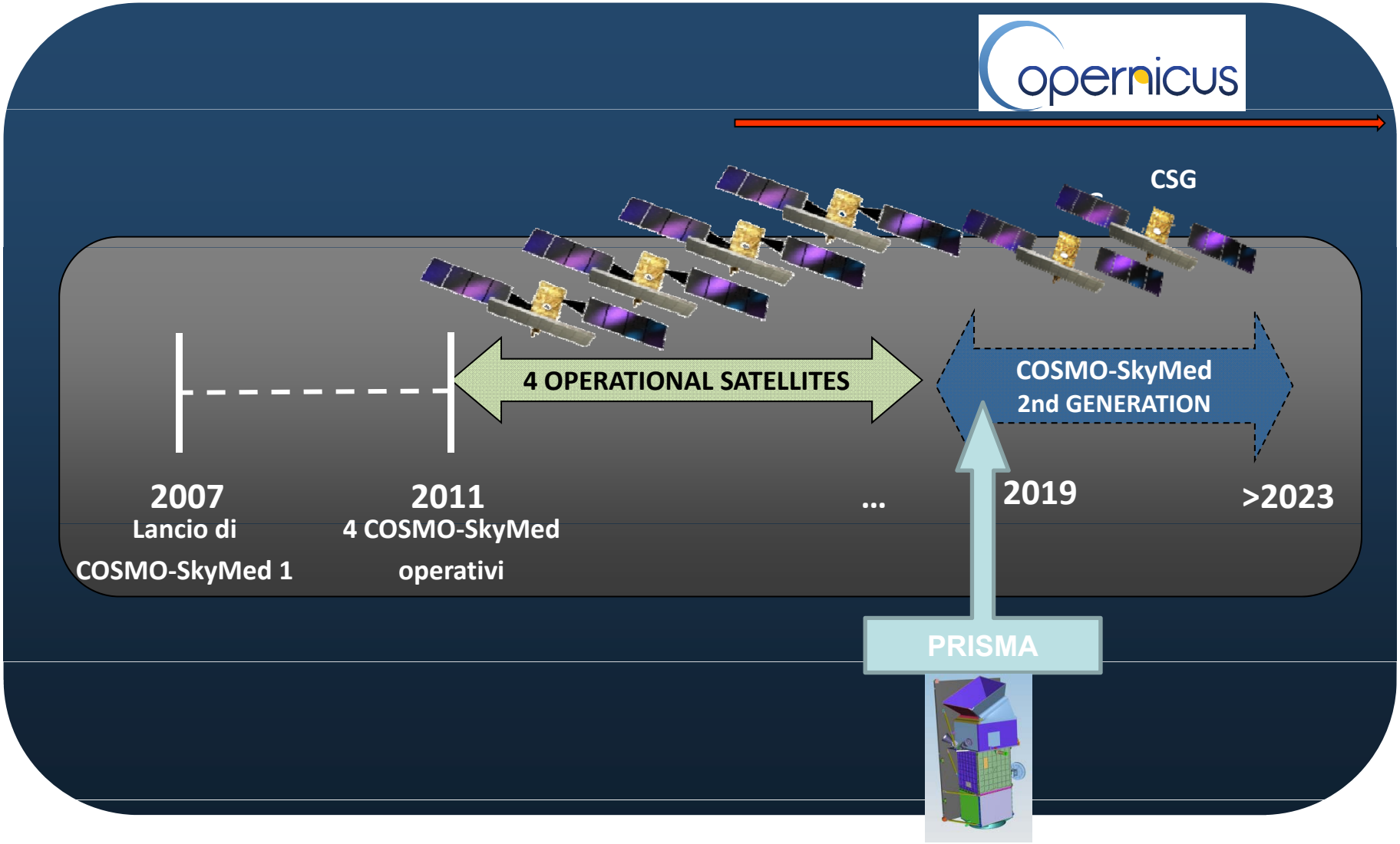
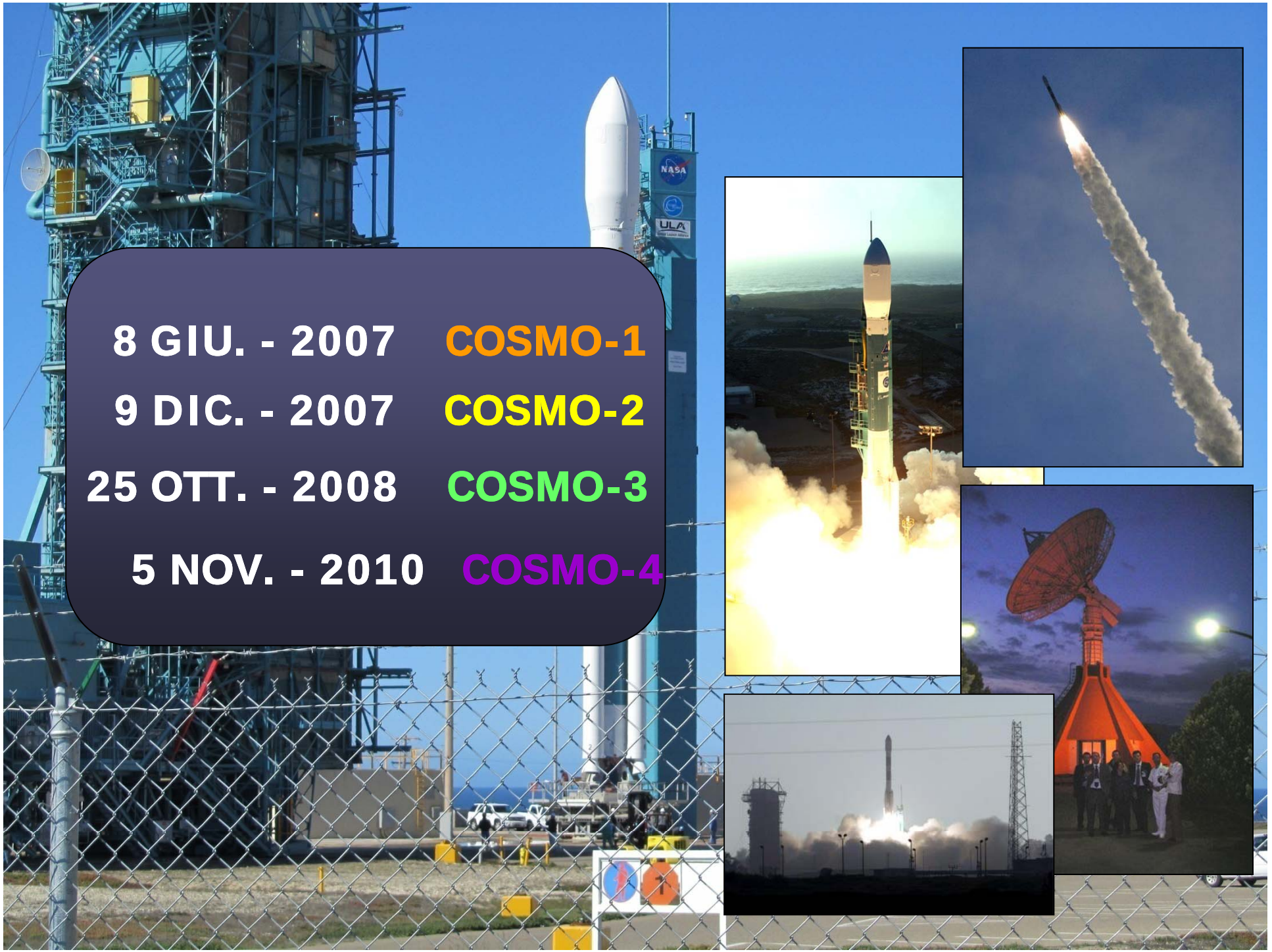
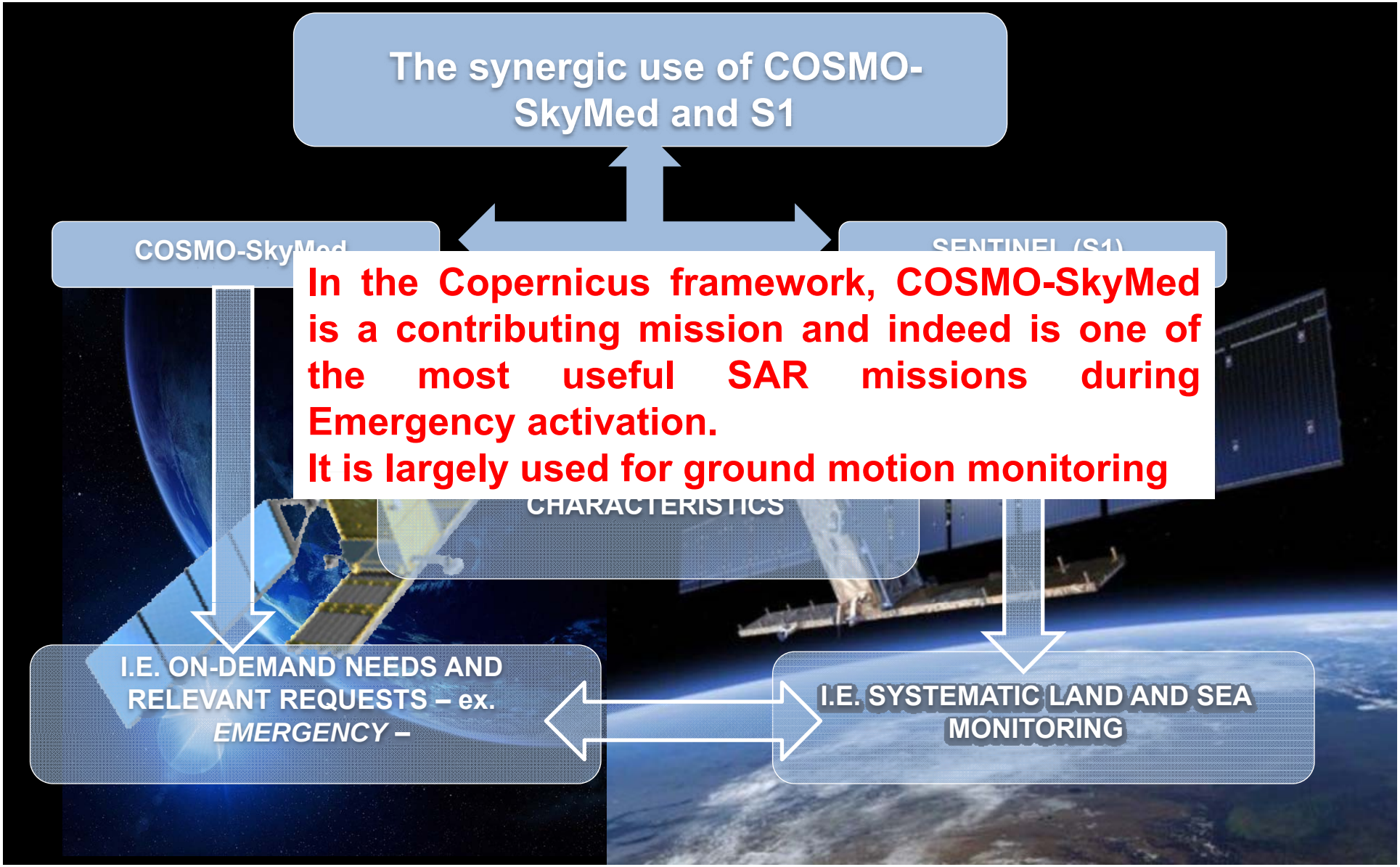
Italian Space Agency

Italian Space Segment




8 GIU. - 2007 COSMO-1
9 DIC. - 2007 COSMO-2
25 OTT. - 2008 COSMO-3
5 NOV. - 2010 COSMO-4


The synergic use of COSMO-SkyMed and S1
COSMO-SkyMed
SENTINEL (S1)
In the Copernicus framework, COSMO-SkyMed is a contributing mission and indeed is one of the most useful SAR missions during Emergency activation.
It is largely used for ground motion monitoring
CHARACTERISTICS
I.E. ON-DEMAND NEEDS AND RELEVANT REQUESTS – ex. EMERGENCY –
I.E. SYSTEMATIC LAND AND SEA MONITORING

Interferometry: S1 vs CSK

- Sentinel-1

  6 days

  Medium resolution

  Systematic monitoring

  C-band

- COSMO-SkyMed:

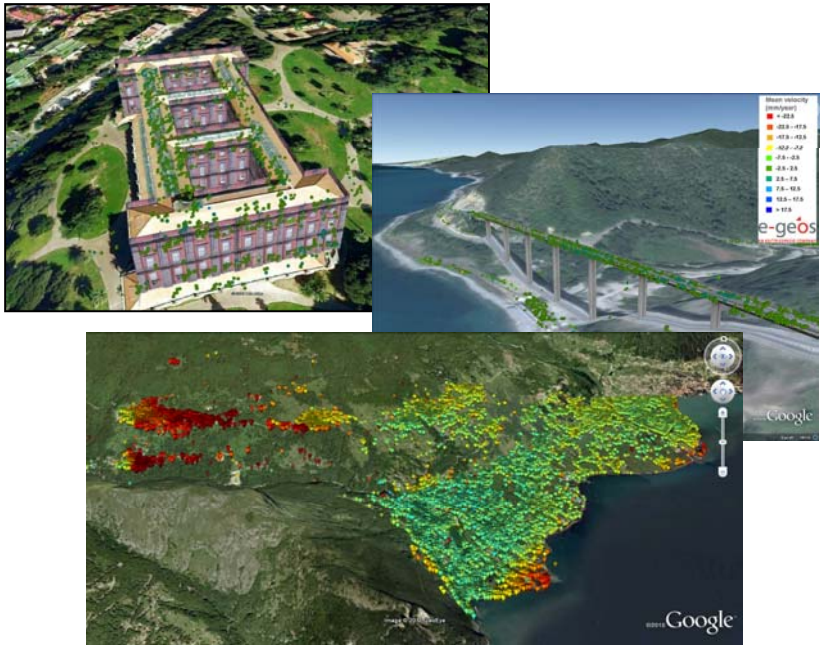
  16 days

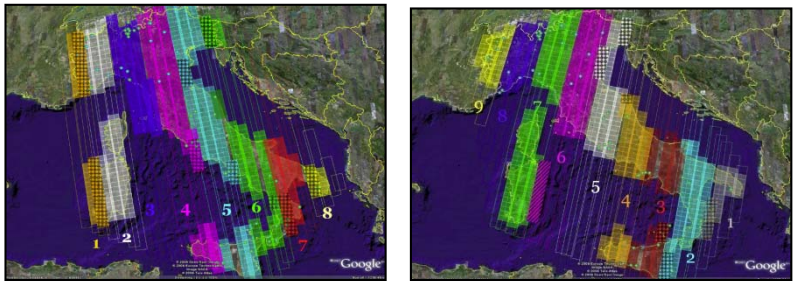
  High resolution

  § Systematic monitoring + On demand

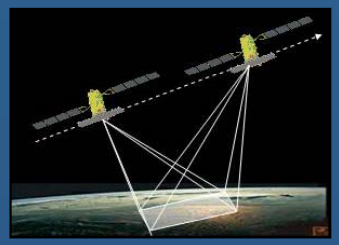
  X-band

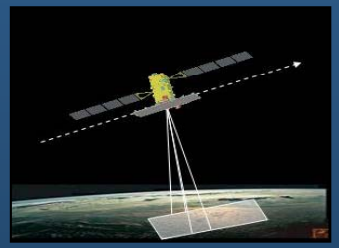
- Excellent to monitor urban areas and infrastructures
- From 2 acquisitions/month up to 8 acquisition/month

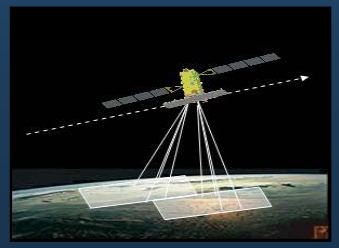




MULTI-MODE ACQUISITION CAPABILITY







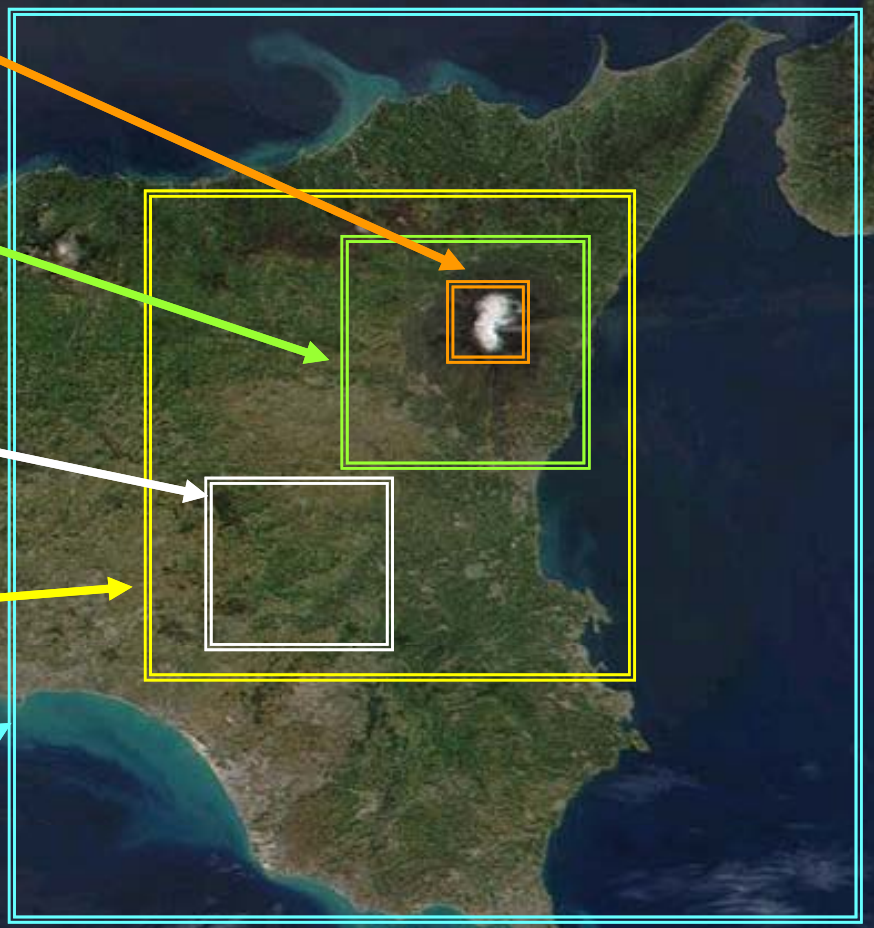
SPOTLIGHT
10 Km X 10 Km
1 m Resol.

STRIPMAP - HIMAGE
40 Km X 40 Km
3 m Resol.

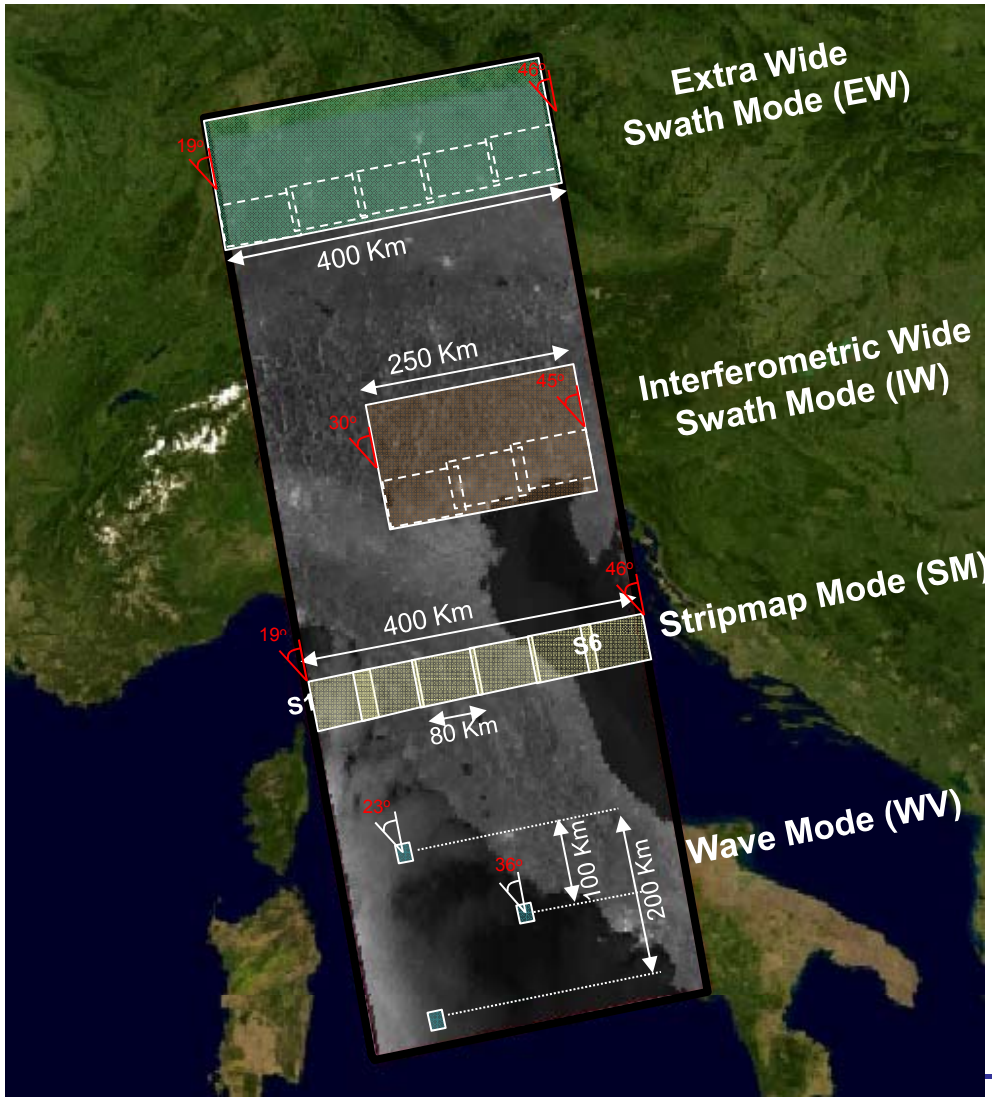
STRIPMAP – PING PONG
30 Km X 30 Km
15 m Resol.

SCANSAR WIDE
100 Km X 100 Km
30 m Resol.

SCANSAR HUGE
200 Km X 200 Km
100 m Resol.



Sentinel-1



Sentinel-1 SAR can be operated in 4 exclusive imaging modes with different resolution and coverage:

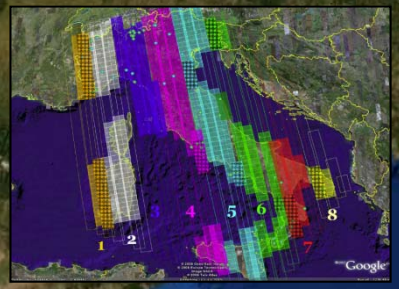
Mode Rate	SAR Mode
High Bit Rate (HBR)	**IW**
	EW
	SM (S1 → S6)
Low Bit Rate (LBR)	**WV**

Polarisation schemes for IW, EW and SM:
- single polarisation: HH or VV
- dual polarisation: HH+HV or VV+VH

For Wave mode: HH or VV

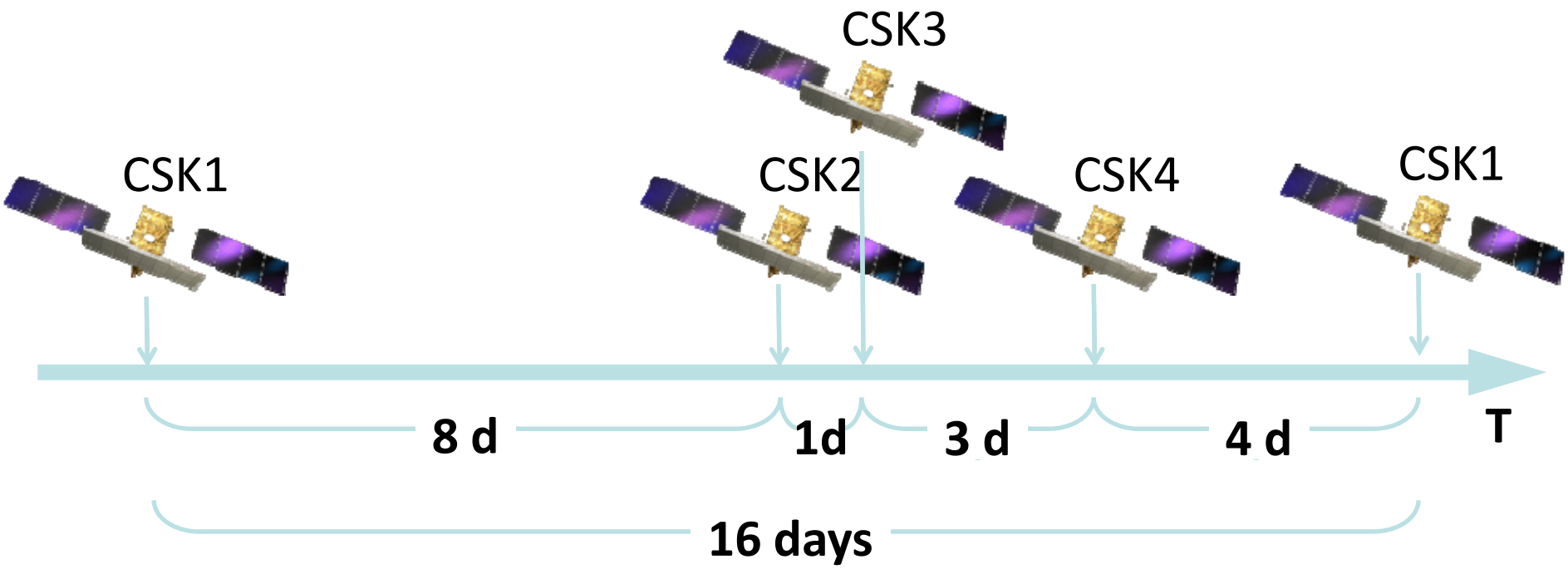
For all of these operating modes, the same family of products is available to users.

MAPPING: ITALY STRIPMAP MOSAIC

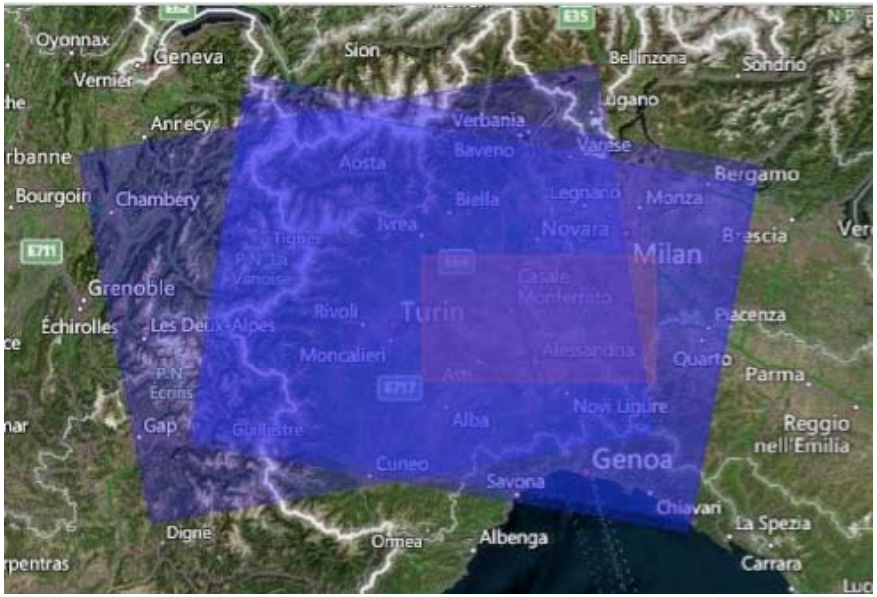


- USE OF 4 SATELLITES
- 16 DAYS PASSAGES (INTERFEROMETRIC ACQUIS.)
- ASC./DESC. PASSAGES

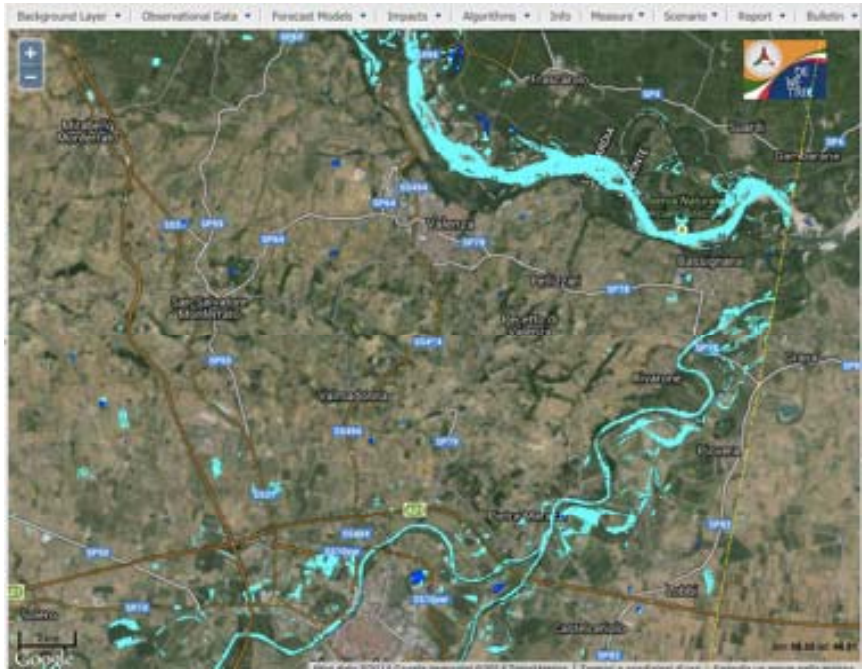
COSMO-SkyMed is a constellation



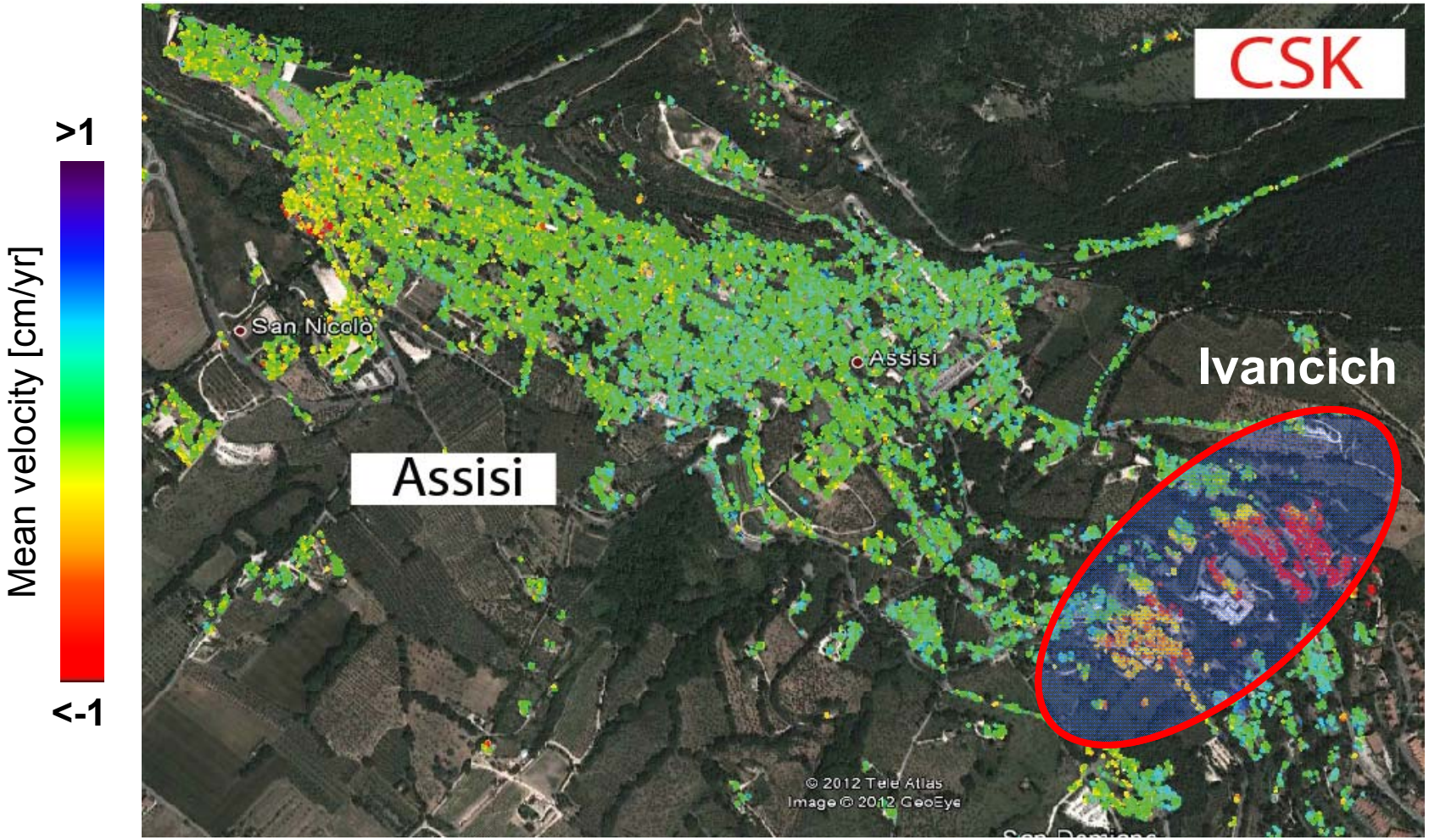
Spatial coverage of S1 (left) and CSK (right) acquisitions for the AOI of the Po river in the period 13-20 November 2014



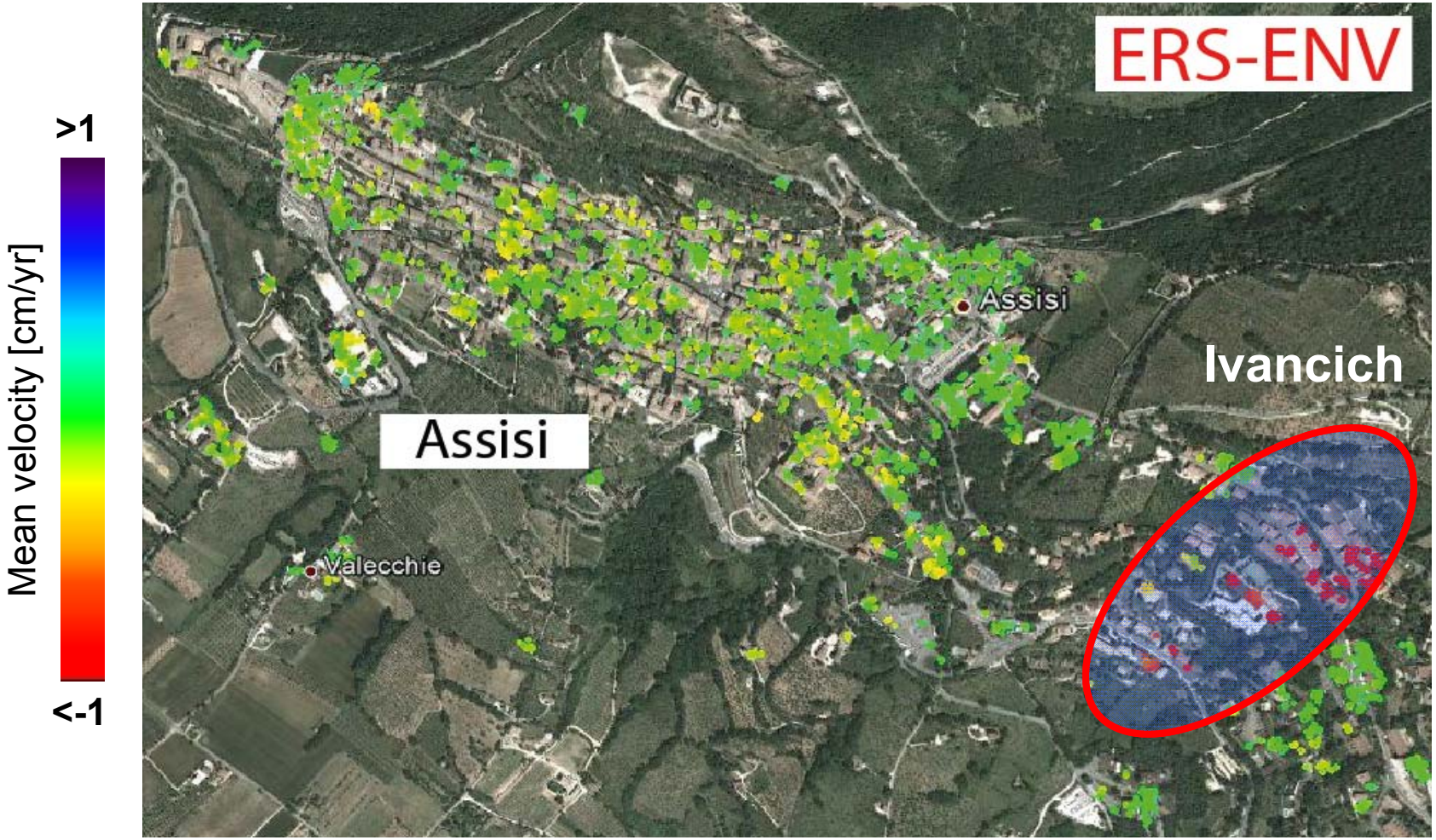
Comparison between the flooded areas derived from S1 (left) and CSK (right) at the same time (18:22 local time) of November 16th. The dark blue color indicates permanent water bodies (S1). Particular of the confluence of Po-Tanaro rivers.



C- and X-band Result Comparison

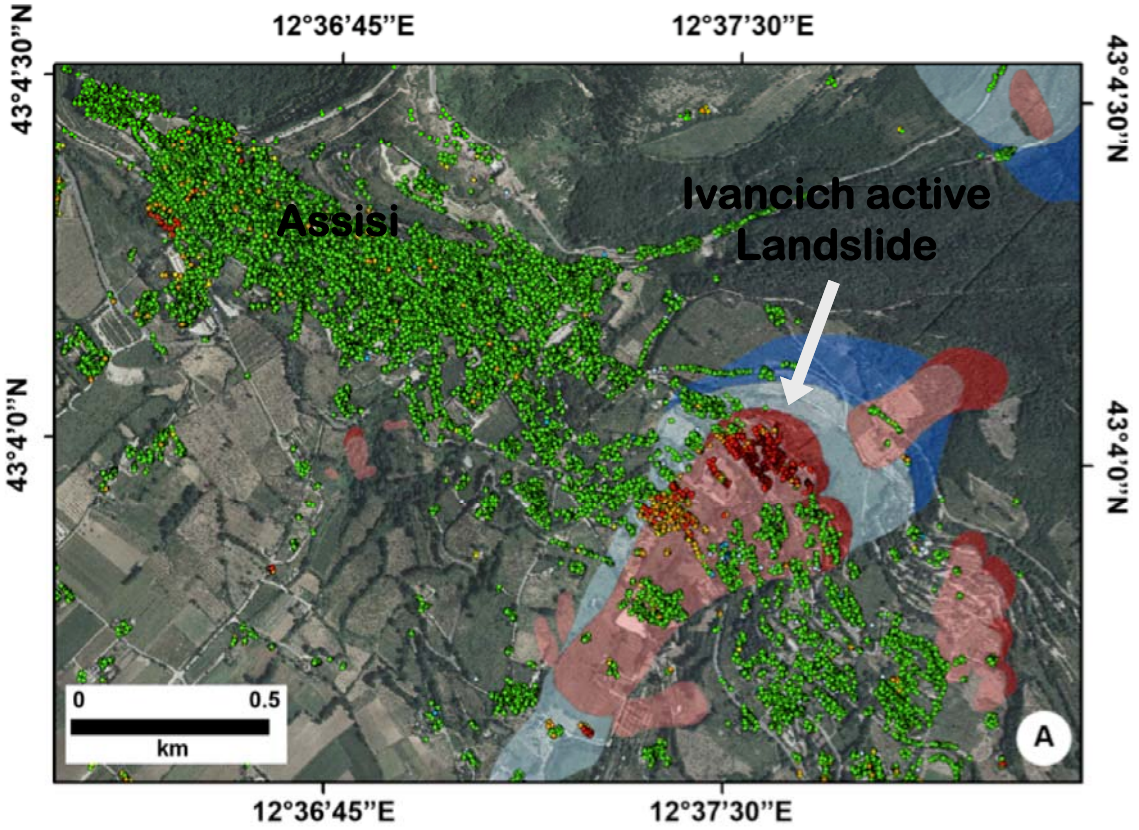


C- and X-band Result Comparison



IVANCICH LANDSLIDE

Earth Observation



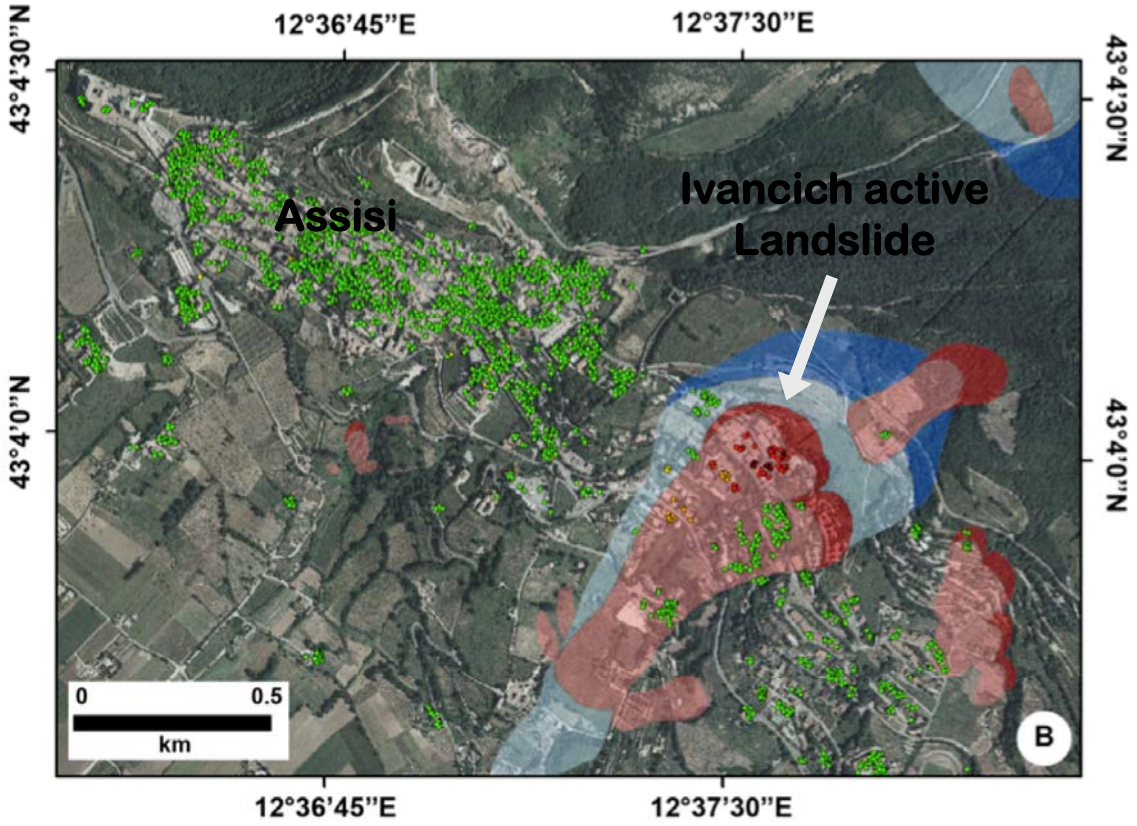
Cosmo-SkyMed | 02/12/2009 – 22/02/2012

mm/yr

< -7.5 -4.5 -3.0 -1.5 1.5 3.0 > 4.5

IVANCICH LANDSLIDE

Earth Observation

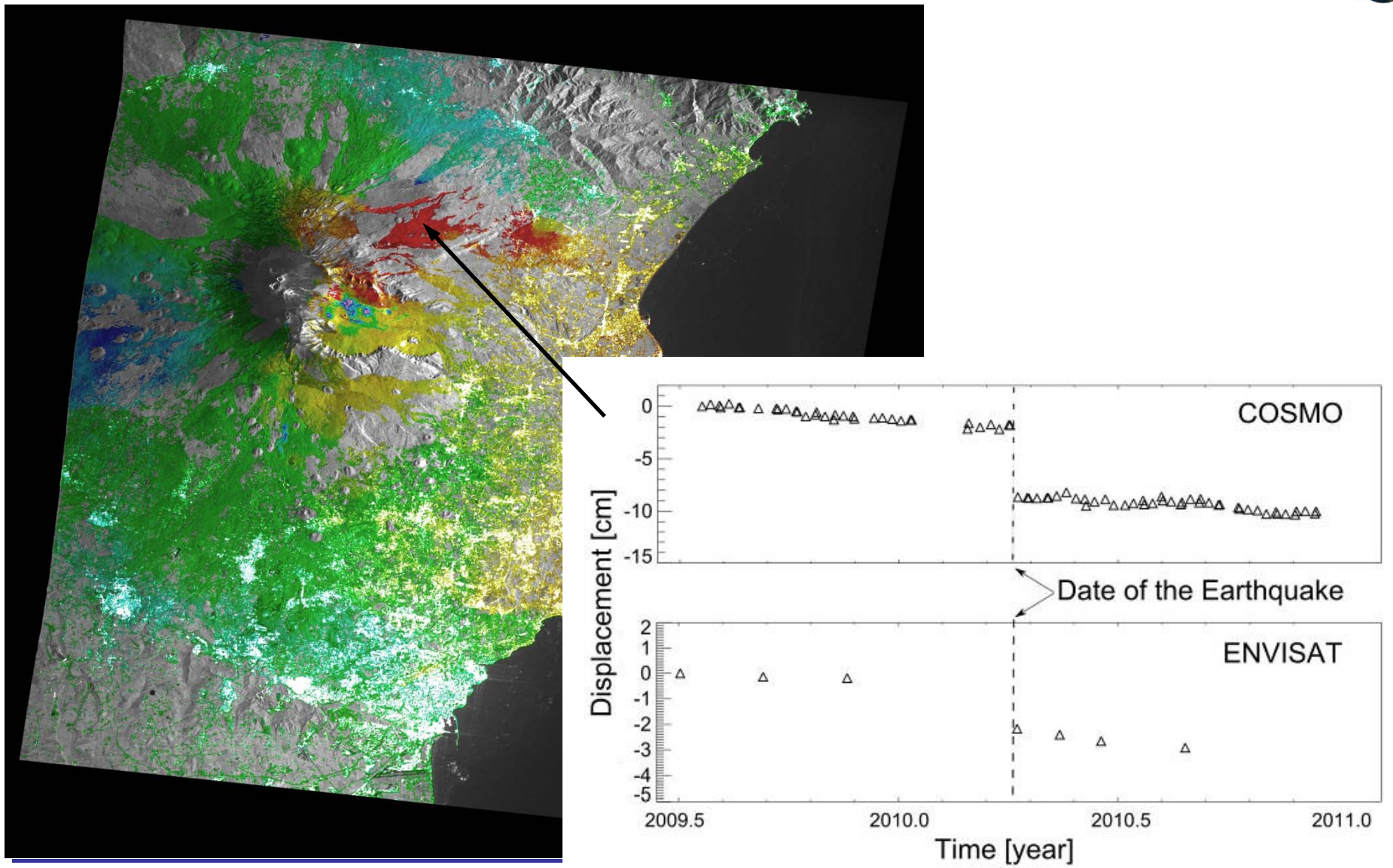


ERS-1/2 & Envisat | 4/1992 – 11/2010

mm/yr

< -7.5 -4.5 -3.0 -1.5 1.5 3.0 > 4.5

Etna volcano

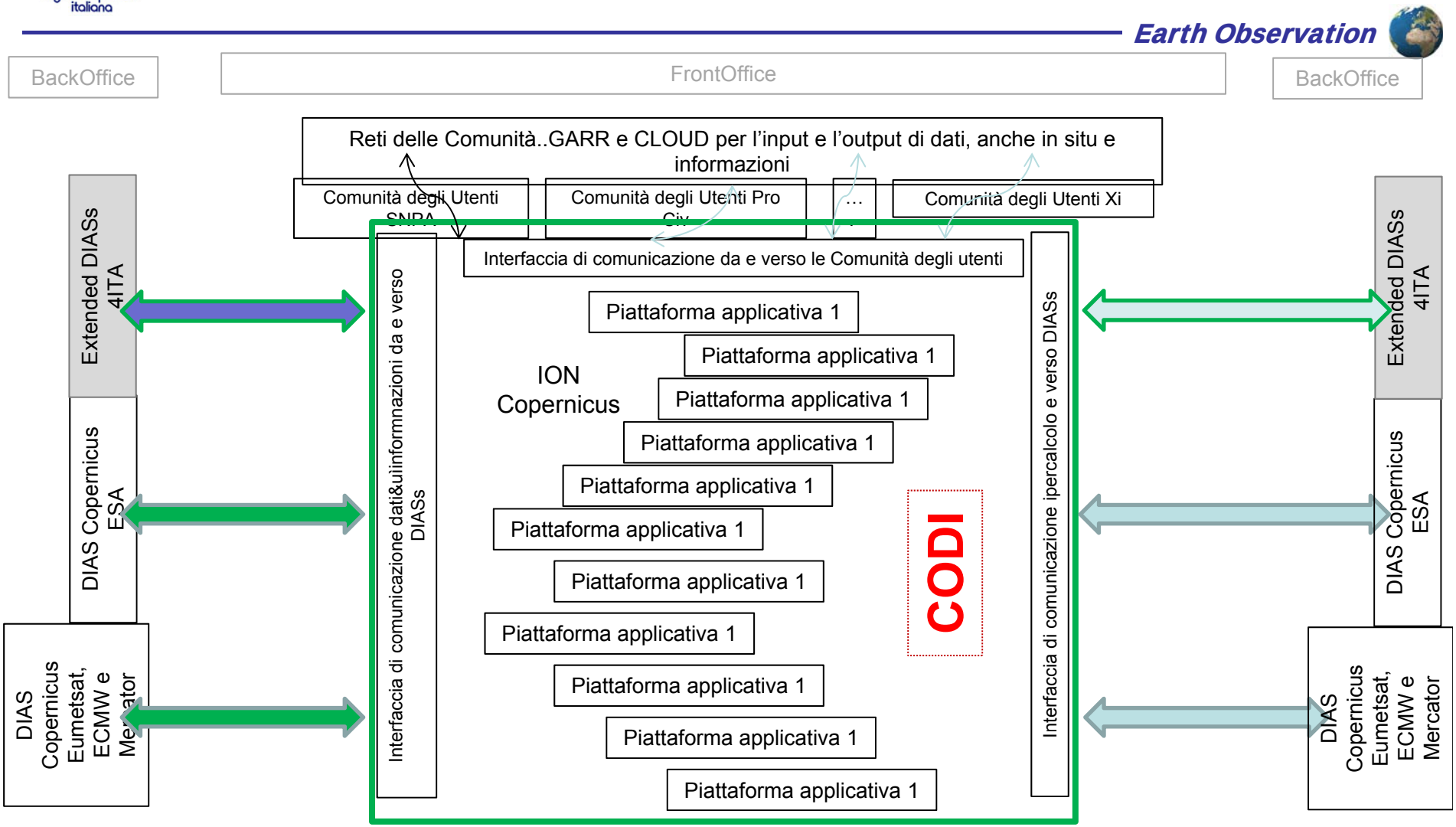


The PI-ION

Italy is developing an istitutional demonstrator to test DIASs.
The **PI-ION** is a national institutional platform aimed to help and facilitate the national institutionals users in accessing the DIAS tu use Copernicus missions data (Sentinels), and **national missions data (COSMO-SkyMed, PRISMA)**, in situ data and higher level products and information produced by institutional downstream services.
It will be the reference infrastructure in developing the Mirror Copernicus

This enabling infrastructure involves BIG DATA ICT technologies and national High Performance Computing (HPC) centres with the capacity to manage the massive quantity of data generated from large observation datasets – coming both from EO satellites and in situ instruments - and model simulations, and will become the environment for the development of national operational service infrastructures (downstream services).

It hosts the italian ground motion dataset and related analytics sw (e.g. SBAS-DinSAR).



PI-ION
Piattaforma per i servizi Operativi di Interesse Nazionale

GRAZIE!