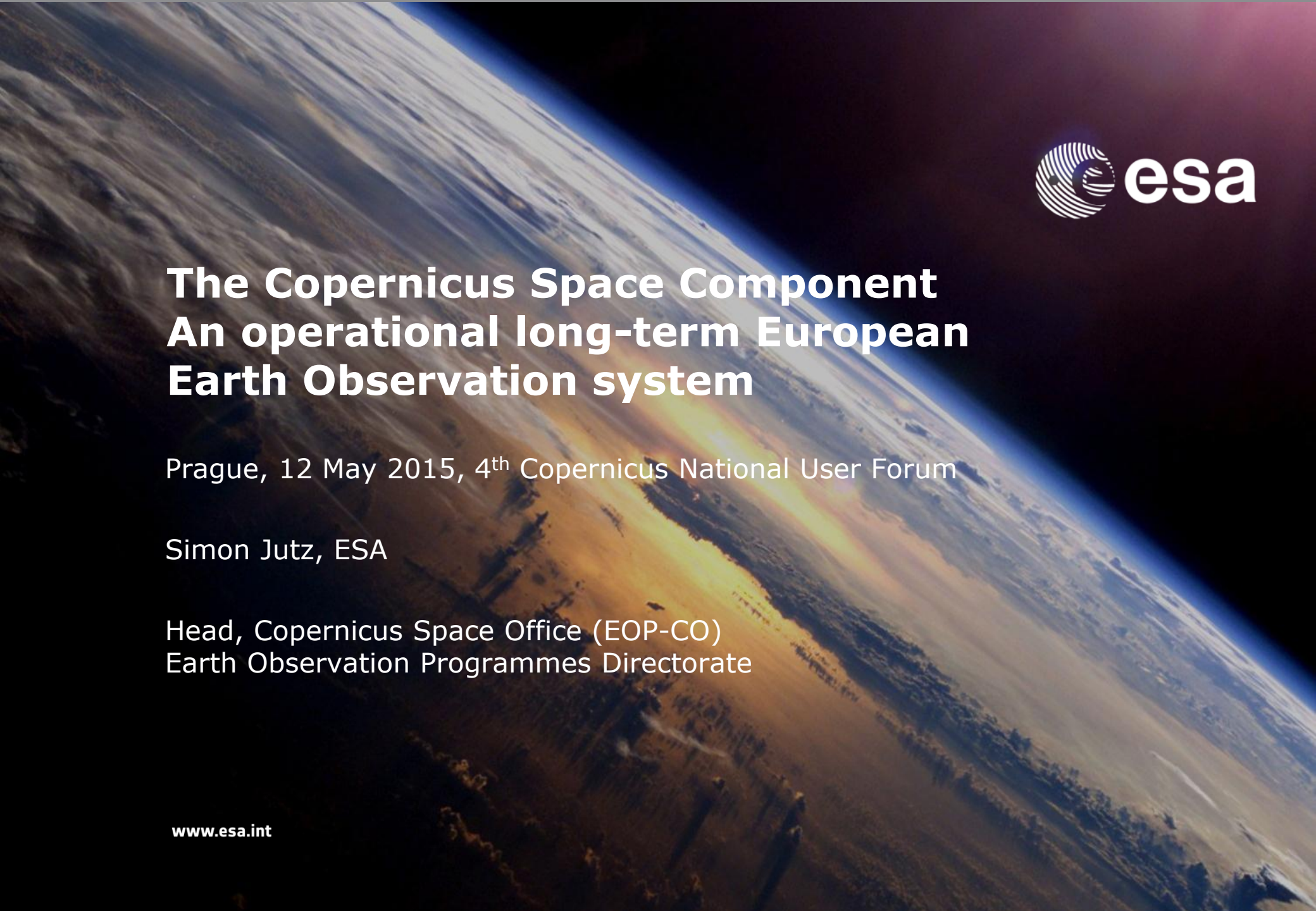


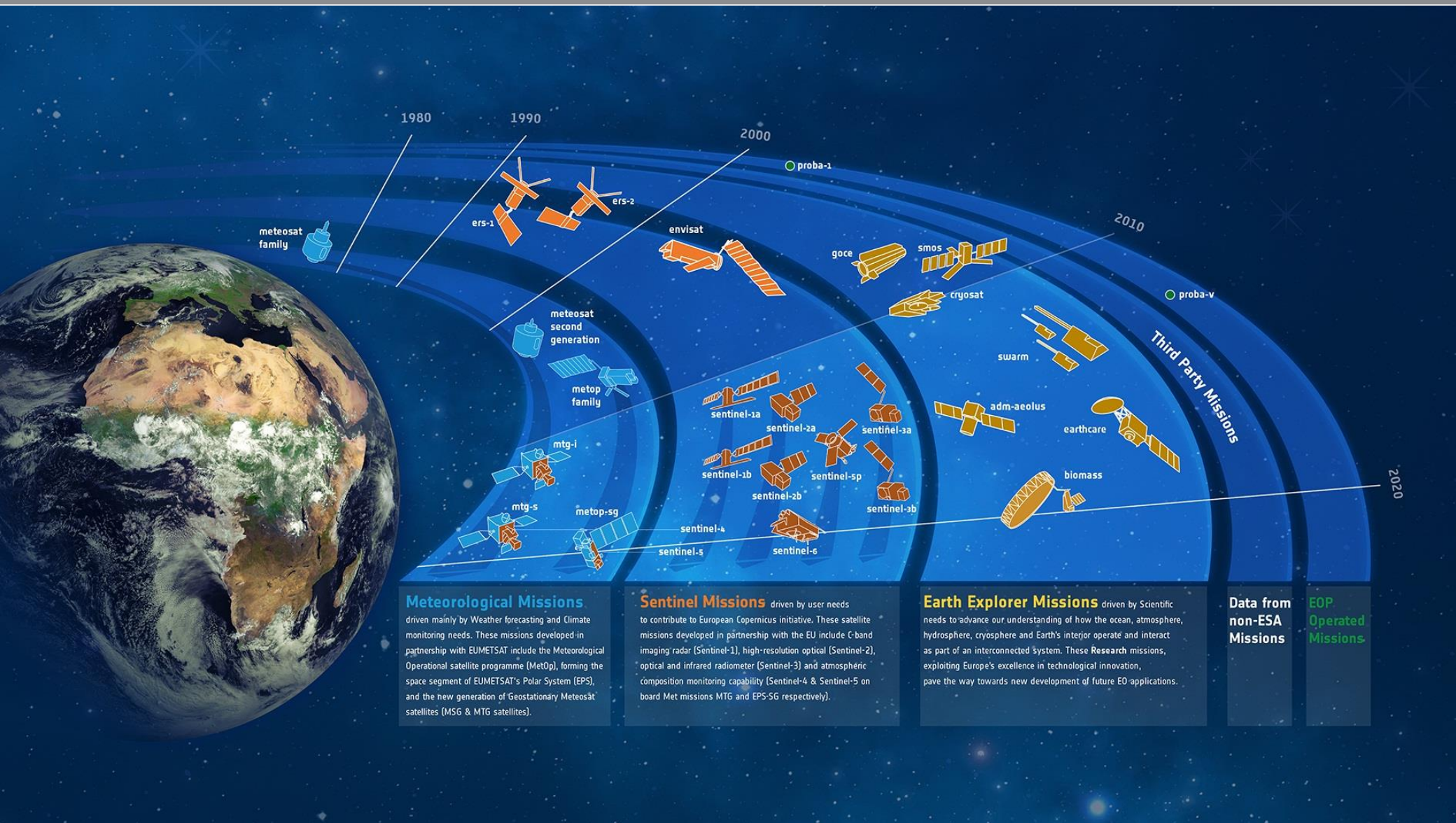
The Copernicus Space Component An operational long-term European Earth Observation system

Prague, 12 May 2015, 4th Copernicus National User Forum

Simon Jutz, ESA

Head, Copernicus Space Office (EOP-CO)
Earth Observation Programmes Directorate

ESA Earth Observation Programmes



The Beginnings of Earth Observation

Civil EO goes back to 1972 (Landsat-1)

Shortcomings of the first decades:

- Typically one-off satellites
- Difficult and costly data access
- Dominated by governmental needs
- Very little use by commercial entities or the general public

The Dawn of Copernicus

At around 2000, Europe took stock of the situation and reflected a way forward

Need for a new approach

GMES as a conceptual vision
(1998 Baveno manifesto)

16 years passed between conceptual vision and launch of the first satellite (Sentinel-1A)

Components & Competences

Coordinators:

Partners:

European Commission

Overall Programme Coordination

Space Component

esa

Industries

Private companies

National Space Agencies

Eumetsat

Services Component

European Commission

EMCWF

EMSA and FRONTEX

Mercator Ocean

Service operators

EUSC

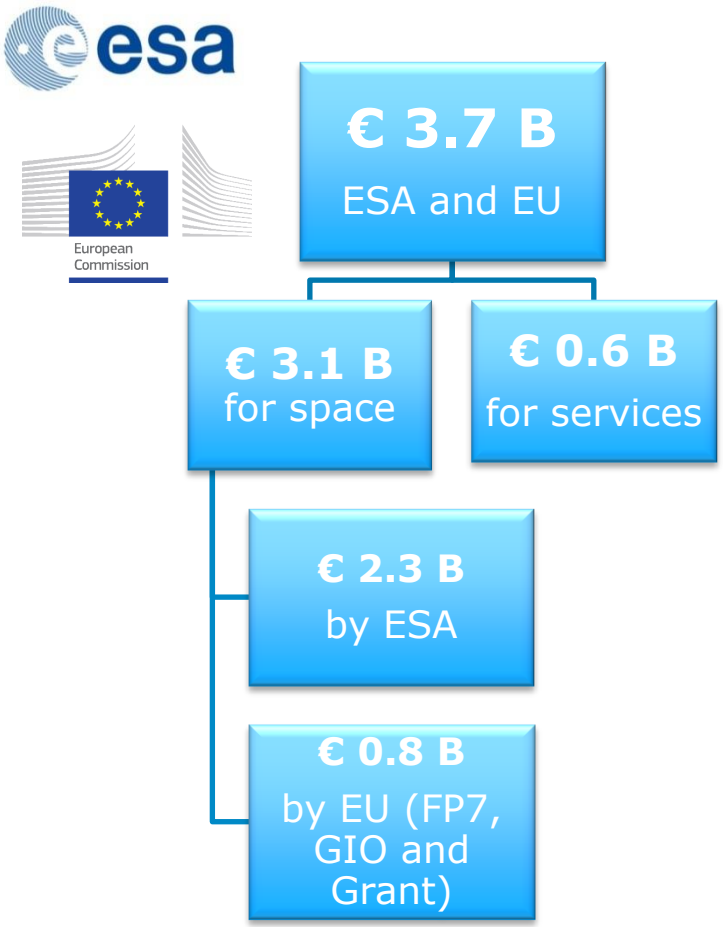
EEA

JRC

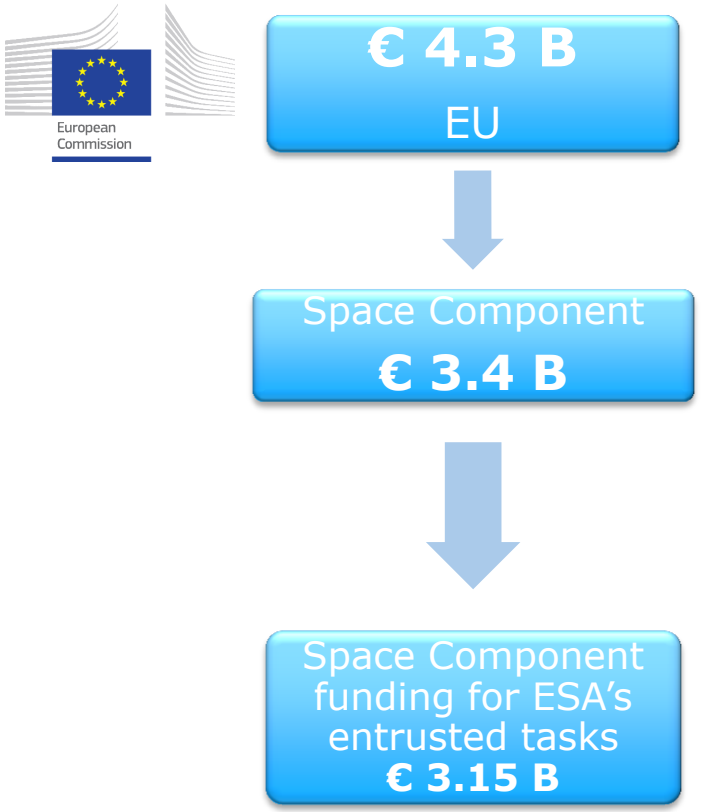
In-situ data are supporting the Space and Services Components

Copernicus Funding 2006-2021

Funding for **Development** Phase (c.e.c.):



Funding for **Operational** Phase & Recurrent Units as from 2014 (c.e.c.):



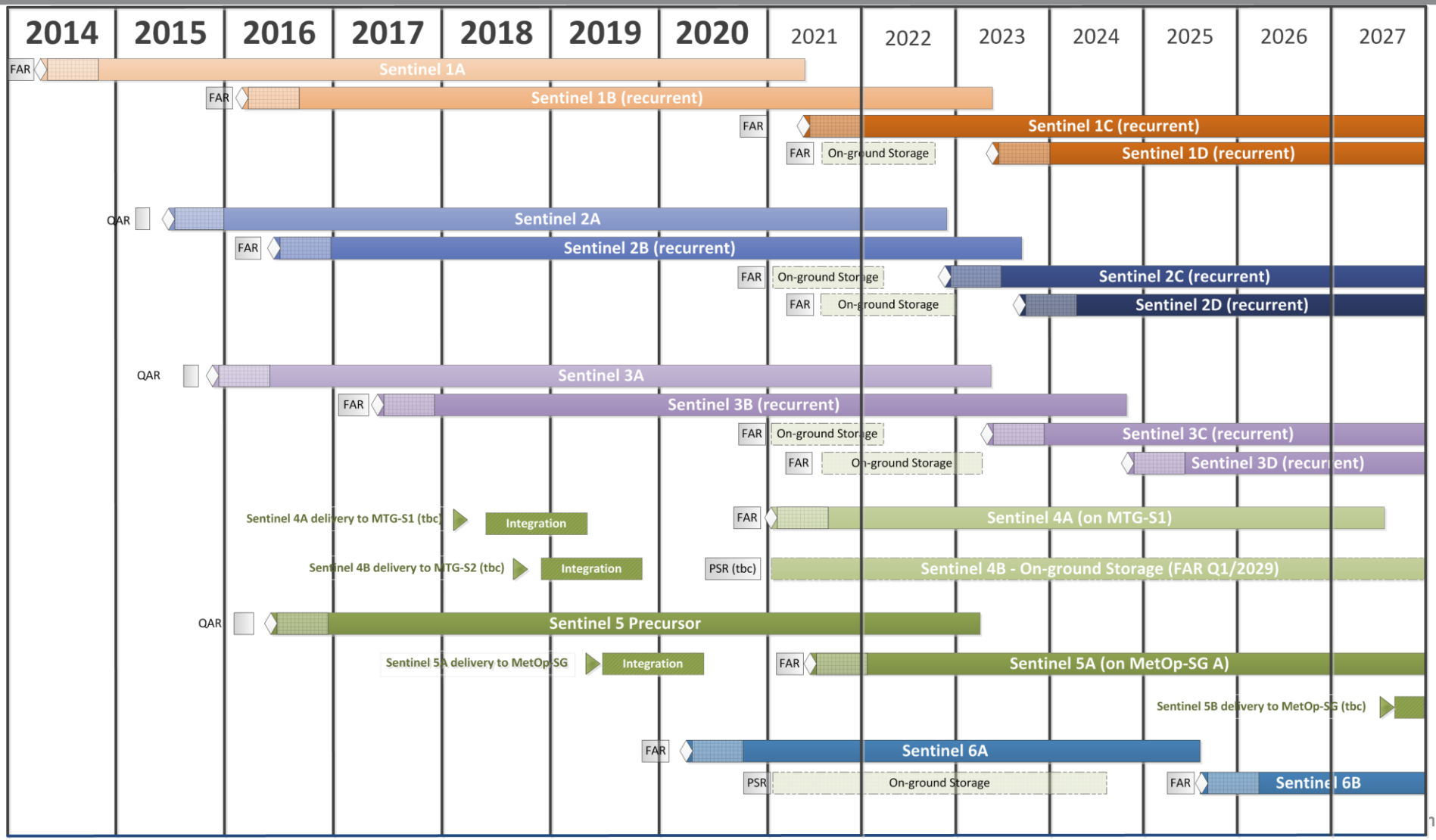
Funding for in-situ measurements and potential contributions by H2020 "Space" not included

The Sentinel Family

The world's most comprehensive suite of EO missions

- S1: Radar Mission
- S2: High Resolution Optical Mission
- S3: Medium Resolution Imaging and Altimetry Mission
- S4: GEO Atmospheric Chemistry Mission
- S5P/S5: LEO Atmospheric Chemistry Missions
- S6/Jason-CS: Altimetry Mission

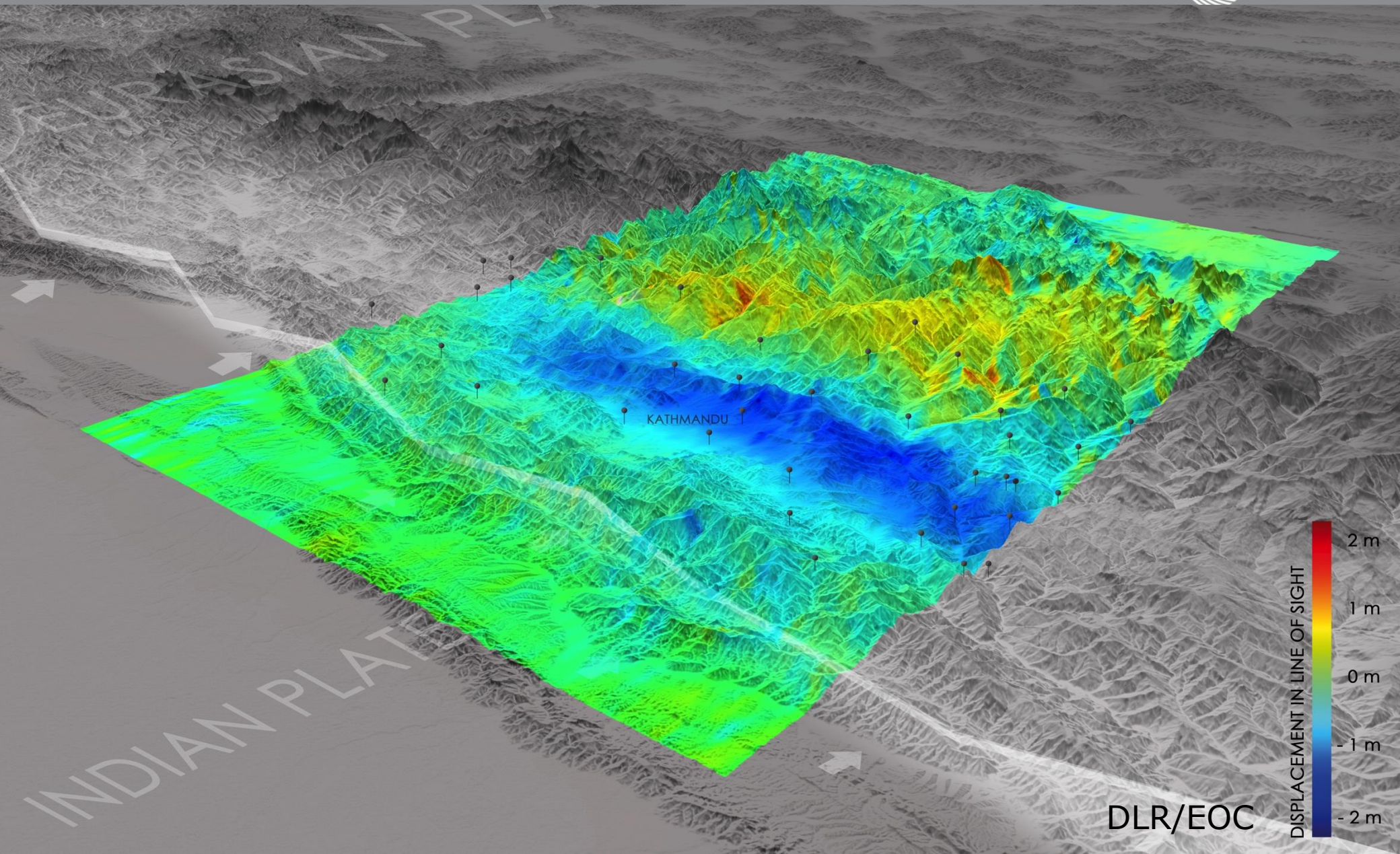
… with a long-term operational perspective



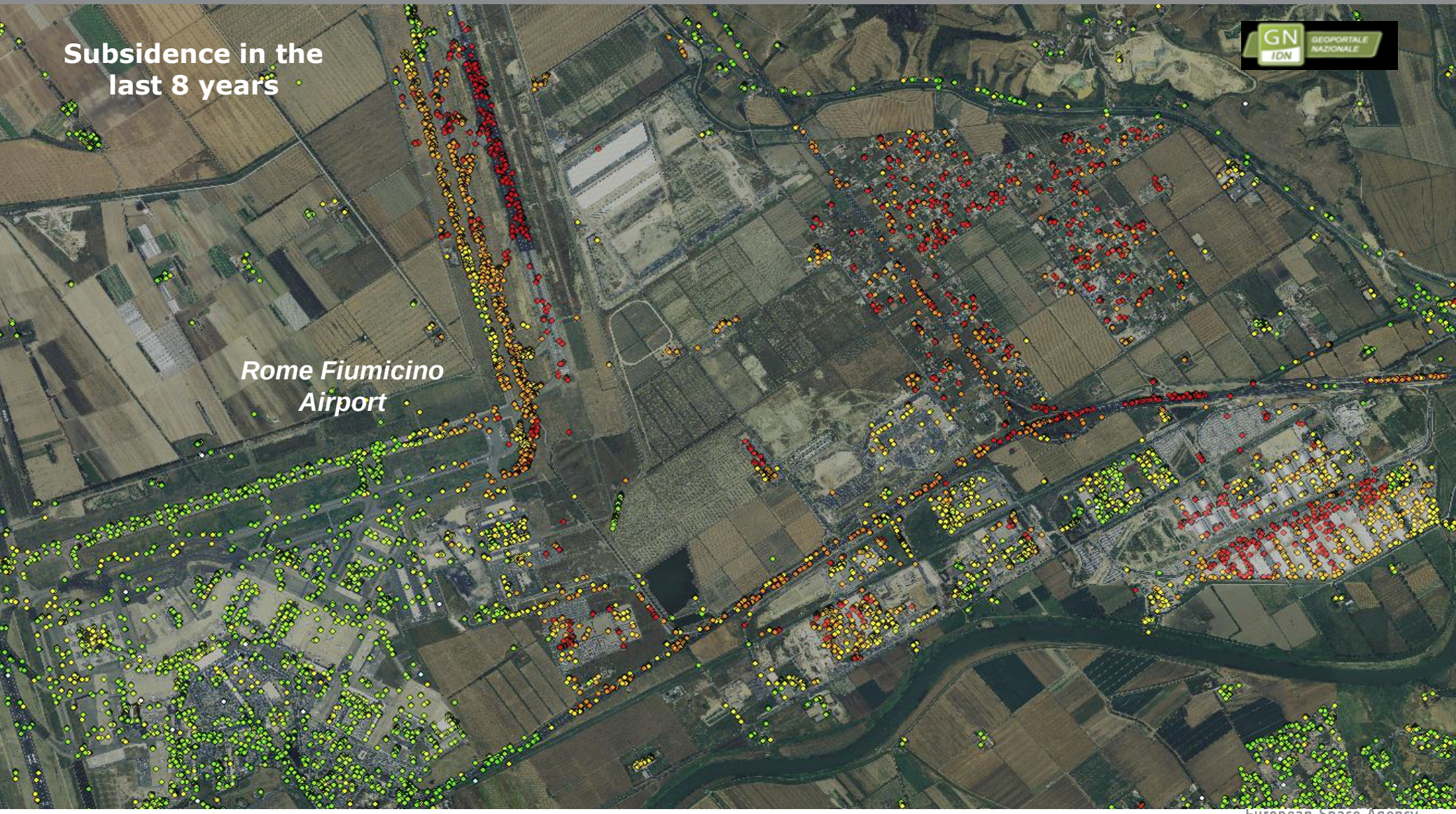
Launch of Sentinel-1A

- 3 April 2014
- Kourou spaceport
- Soyuz-2 rocket
- Once fully operational, Copernicus will be the World's most comprehensive Earth observation system
- A **quantum leap** in many ways…

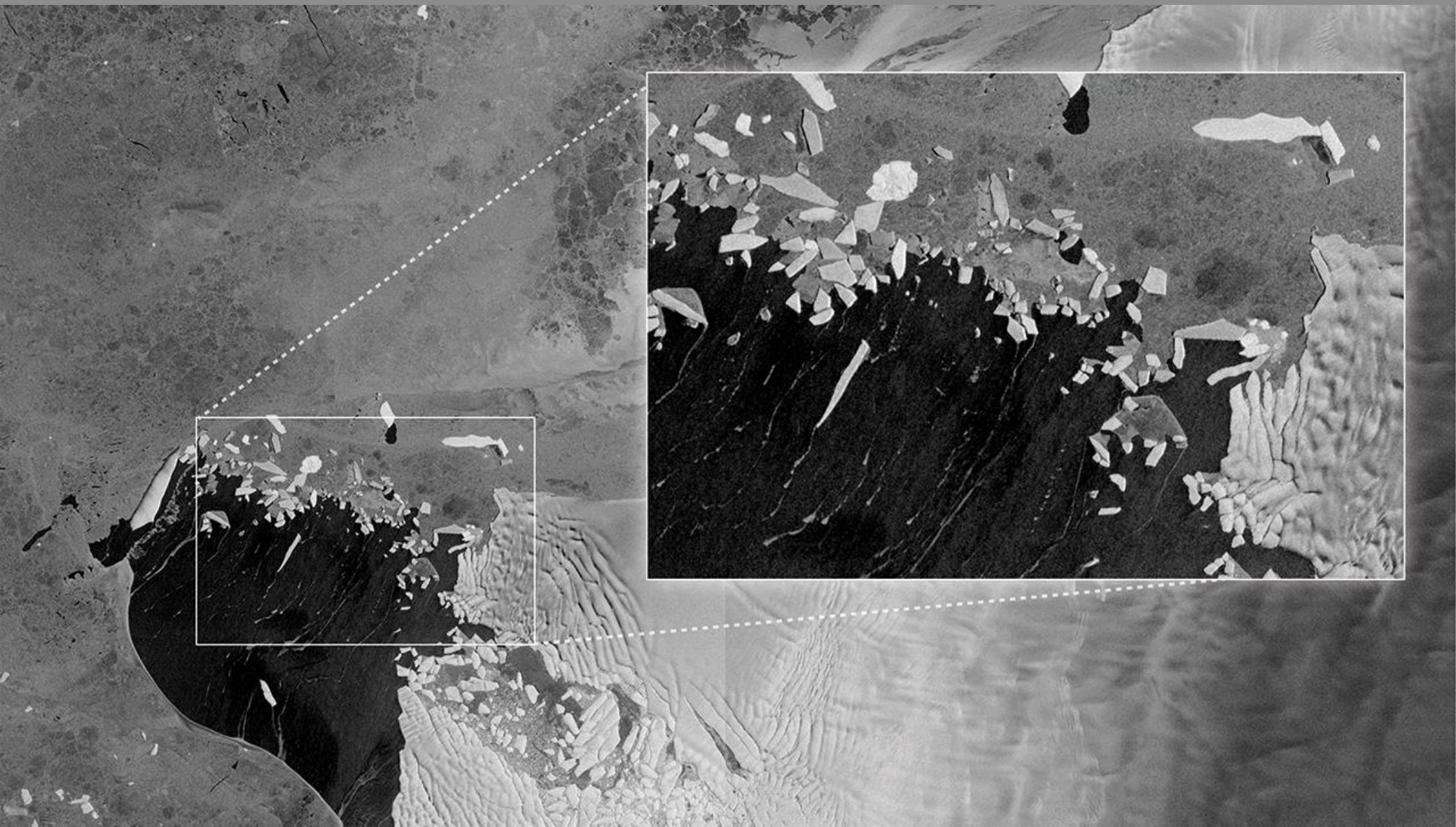
Nepal 25-Apr-15 Earthquake Displacement Measurement with Sentinel-1A



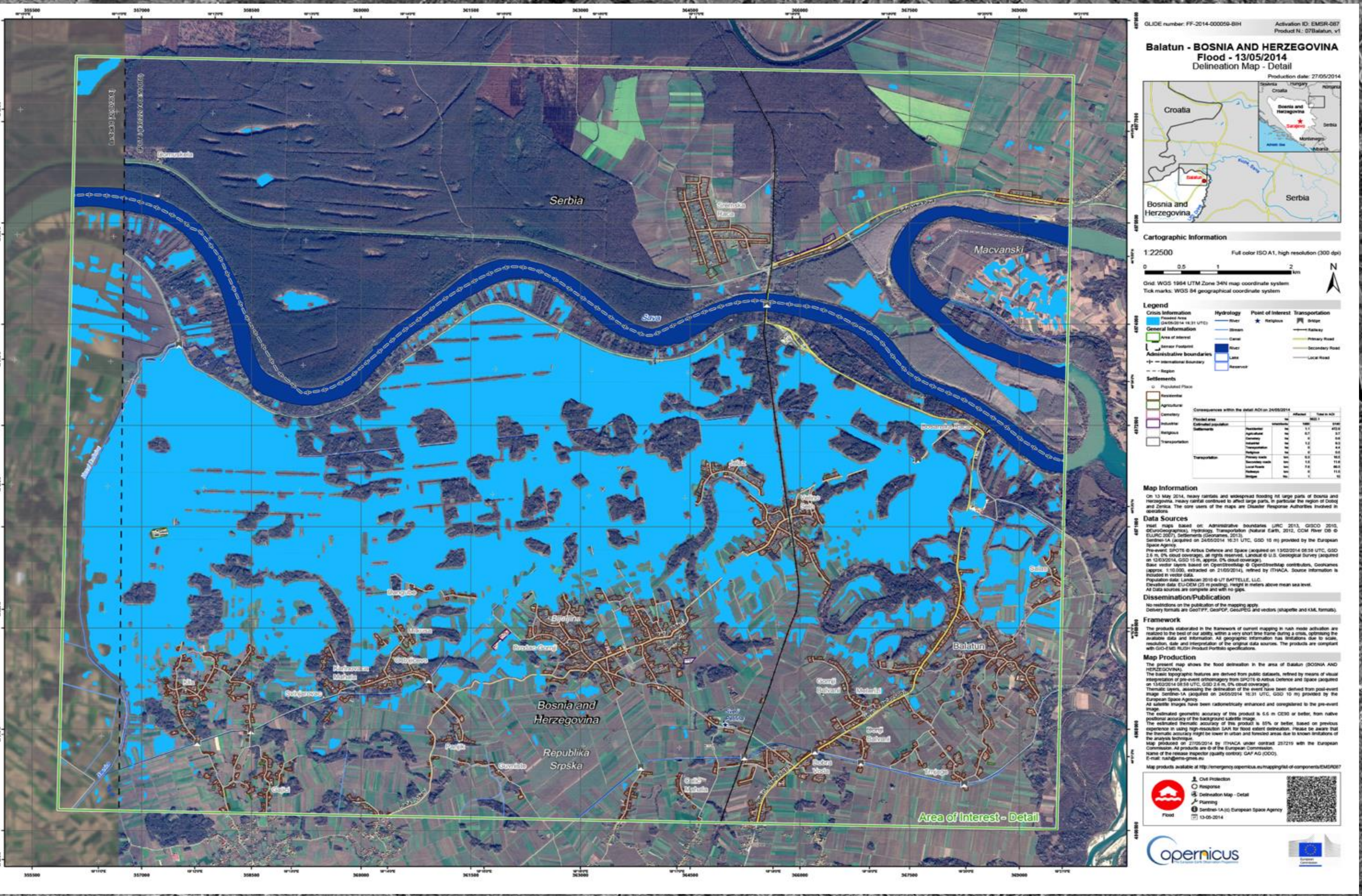
Supporting value adding industry
Precision Land Motion Services



First Images of Sentinel-1A

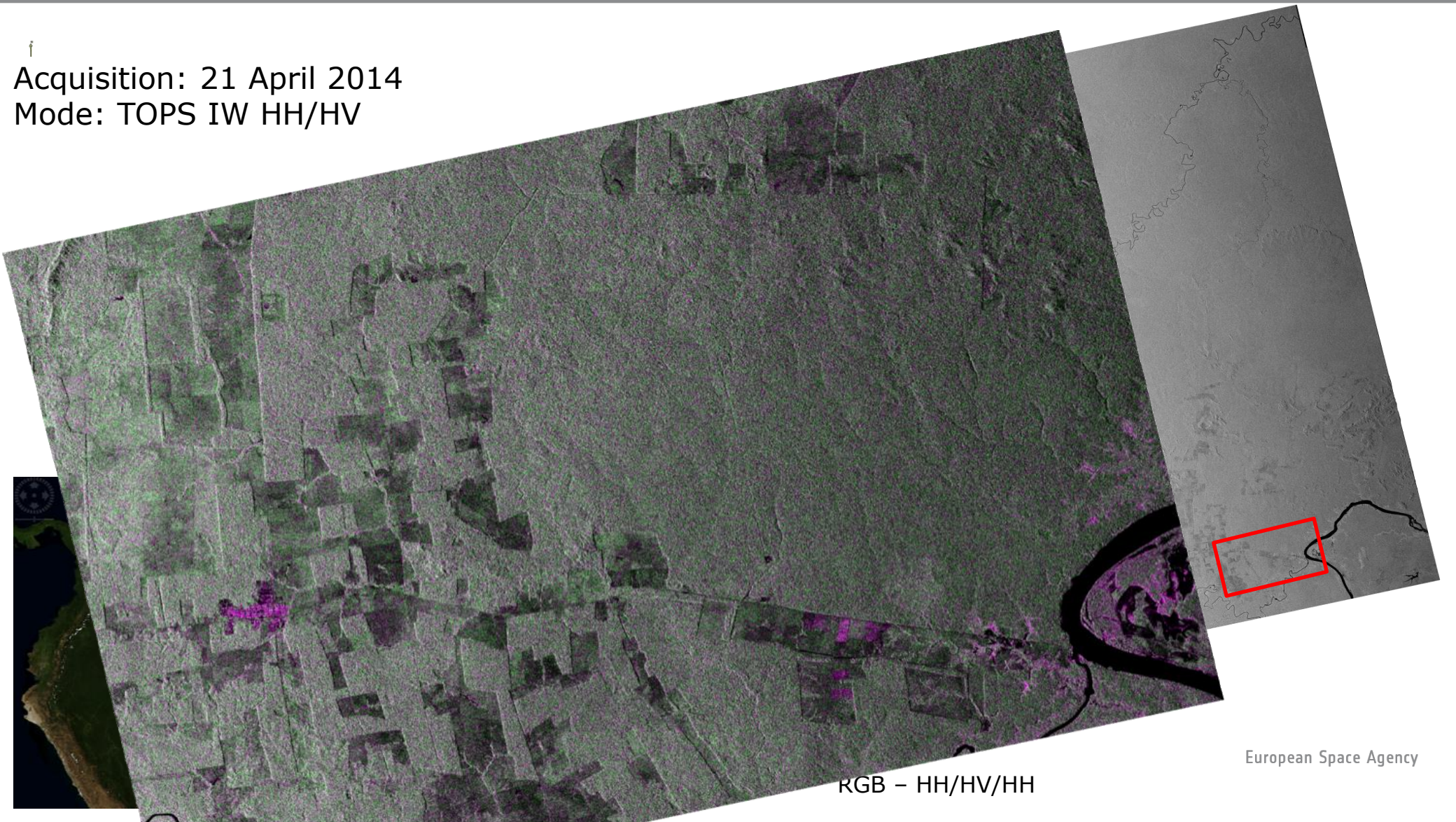


36 Years of Radar Vision


GLIDE number: FF-2014-000059-BIH
Activation ID: EMSR-087
Product N.: 07Balatun, v1
Balatun - BOSNIA AND HERZEGOVINA
Flood - 13/05/2014
Delineation Map - Detail
Production date: 27/05/2014
Croatia
Bosnia and Herzegovina
Serbia
Cartographic Information
1:22500
Full color ISO A1, high resolution (300 dpi)
Legend
Map Information
Data Sources
Dissemination/Publication
Framework
Map Production
Serbia
Sava
Macvanski
Bijeljina
Balatun
Bosnia and Herzegovina
Republika Srpska
Area of Interest - Detail
Copernicus

Sentinel-1A - Deforestation over Brazil

Acquisition: 21 April 2014
Mode: TOPS IW HH/HV



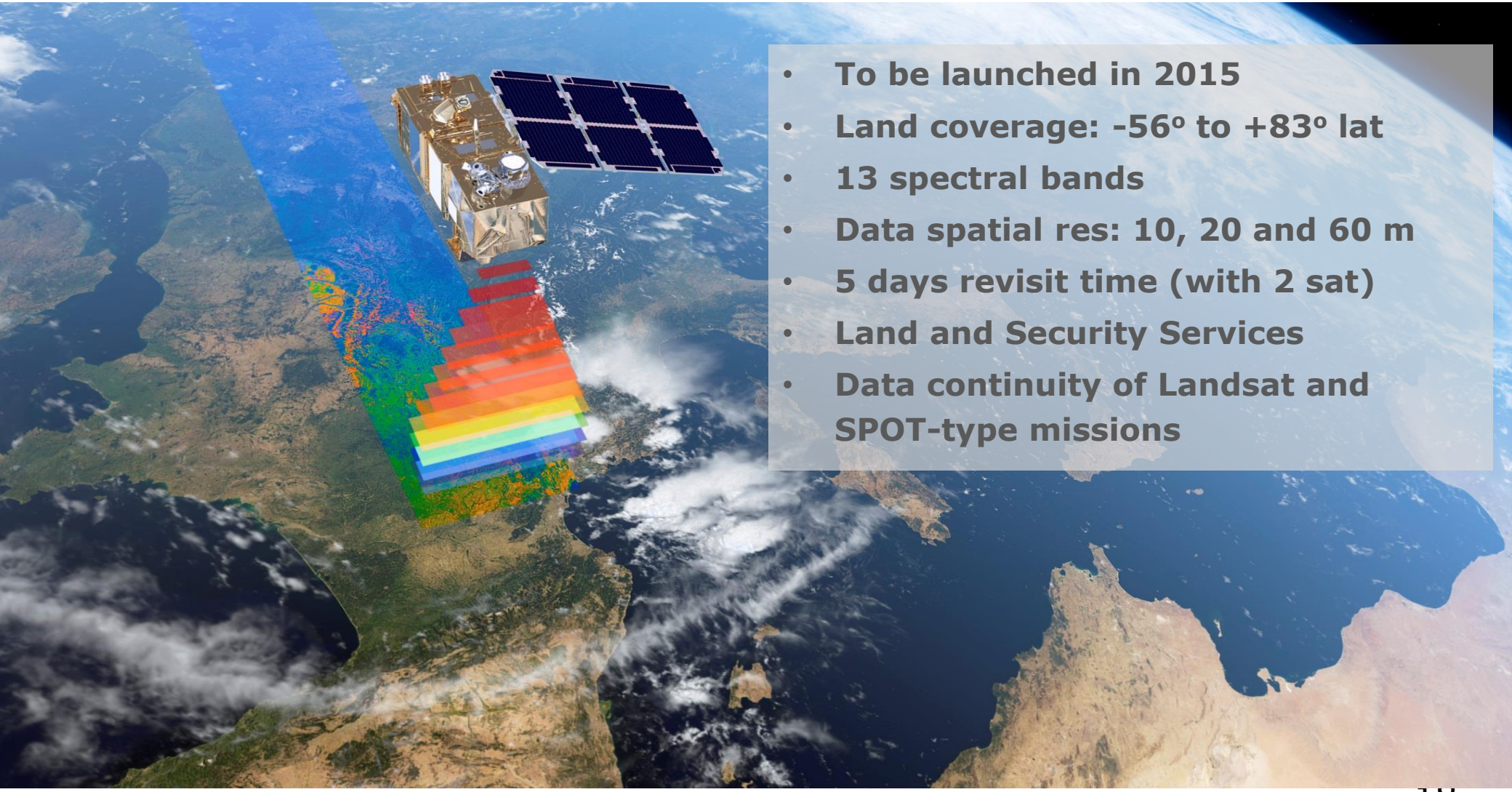
RGB – HH/HV/HH

First Oil Spills Detected by Sentinel-1

Sentinel-1A TOPS EW VV/VH
acquired on 19 April 2014

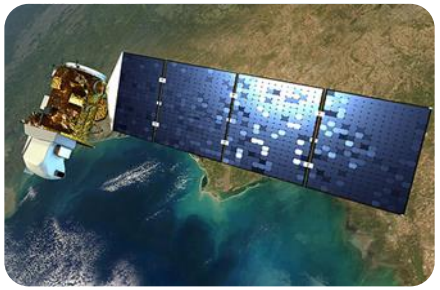
Sentinel-1A TOPS EW HH/HV
acquired on 25 April 2014

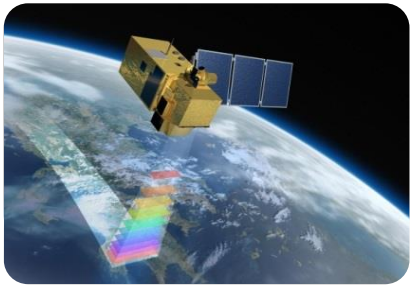
… and Sentinel-2 on its way



- To be launched in 2015
- Land coverage: -56° to +83° lat
- 13 spectral bands
- Data spatial res: 10, 20 and 60 m
- 5 days revisit time (with 2 sat)
- Land and Security Services
- Data continuity of Landsat and SPOT-type missions

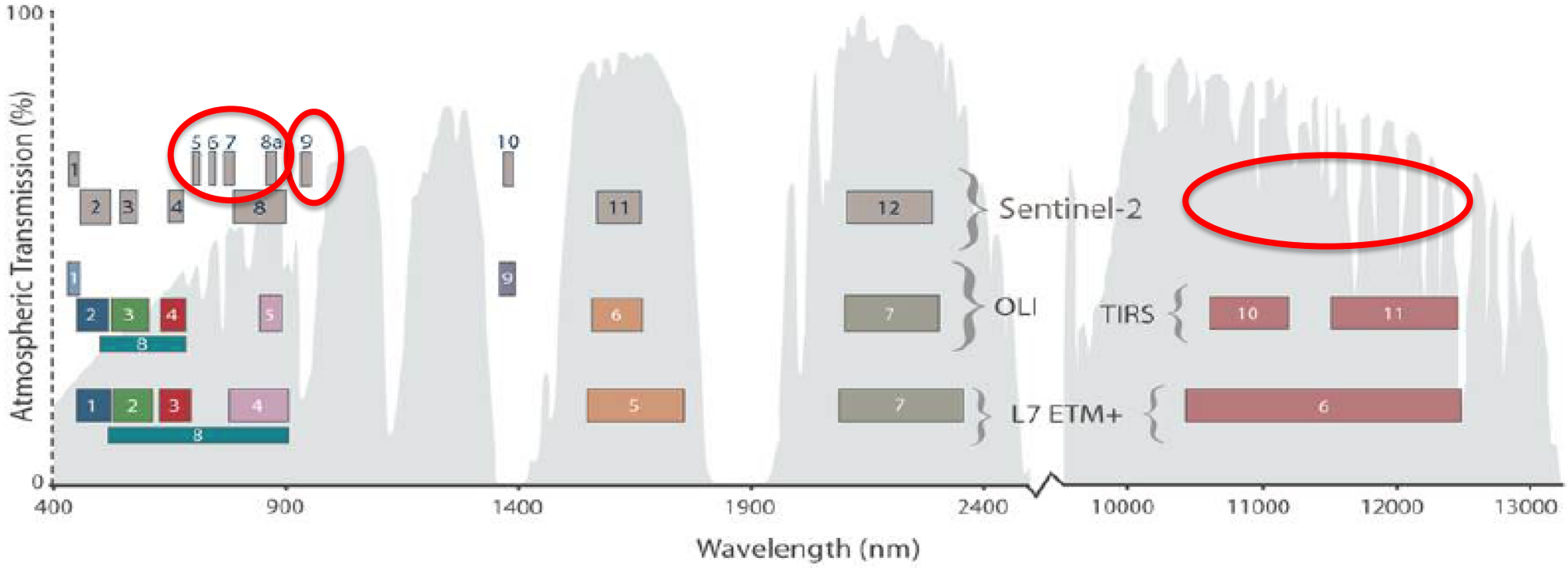
Copernicus Quantum Leap: Sentinel-2





	Landsat-8	SPOT-5	Sentinel-2
Launch (most recent)	2013	2002	2015+
Earth Coverage (days)	16	26	5
Swath (km)	185	2*60	290
Multispectral Bands	8 MS + 1 PAN + 1 TIR	4 MS + 1 PAN	13 MS
Ground Resolution (m)	15, 30	5, 10, 20	10, 20, 60

Comparison Sentinel-2/Landsat-8 spectral bands



Source: http://landsat.usgs.gov/L8_band_combos.php

Pre-flight cross-calibration took place, post-flight campaigns planned

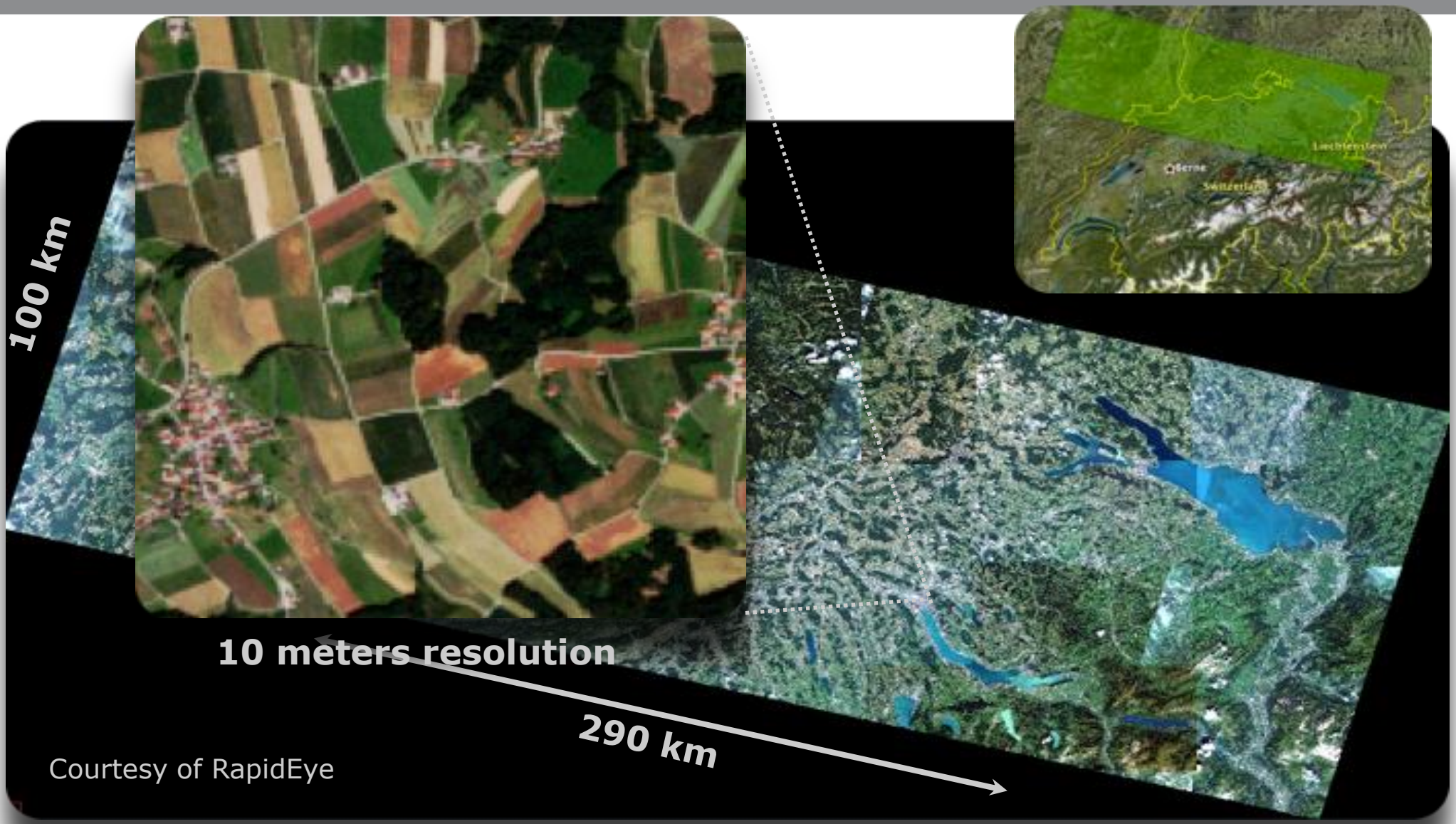
S2 Products Summary

Name	High-level Description	Production	Preservation Strategy	Volume
Level-1B	Top-of-atmosphere radiances in sensor geometry	Systematic	Long-term	~27 MB (each 25x23km^2)
Level-1C	Top-of-atmosphere reflectances in cartographic geometry (UTM/WGS84)	Systematic	Long-term	~500 MB (each 100x100km^2)

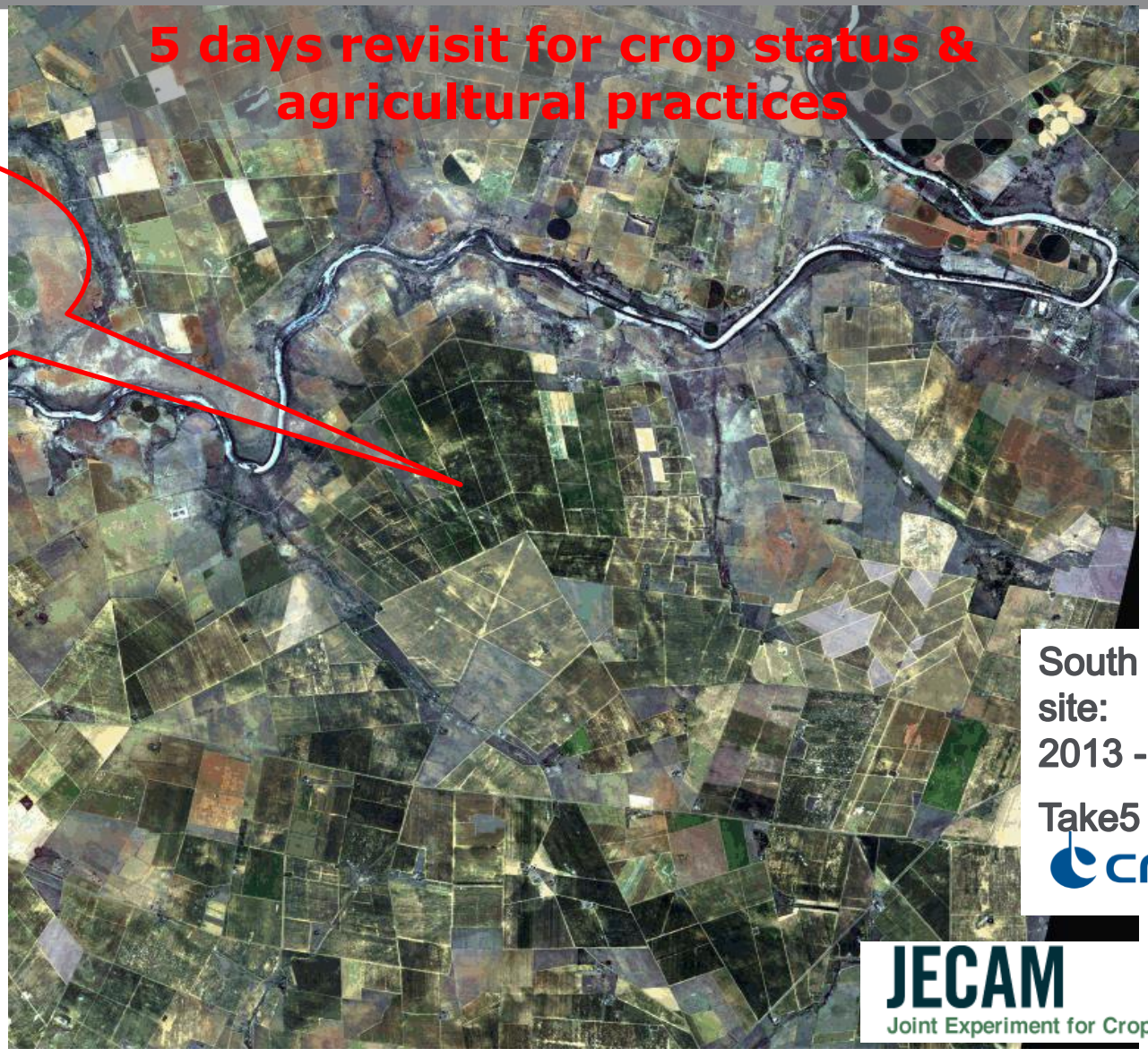
This product is initially offered as part of the Sentinel-2 toolbox:
https://earth.esa.int/web/sentinel-tbx/sentinel-2-toolbox
The possibility of a systematic global production of L2A is currently being explored

S2: Crop Mask and Type Mapping

10 m resolution for field scale mapping



Monitoring Agricultural Dynamics



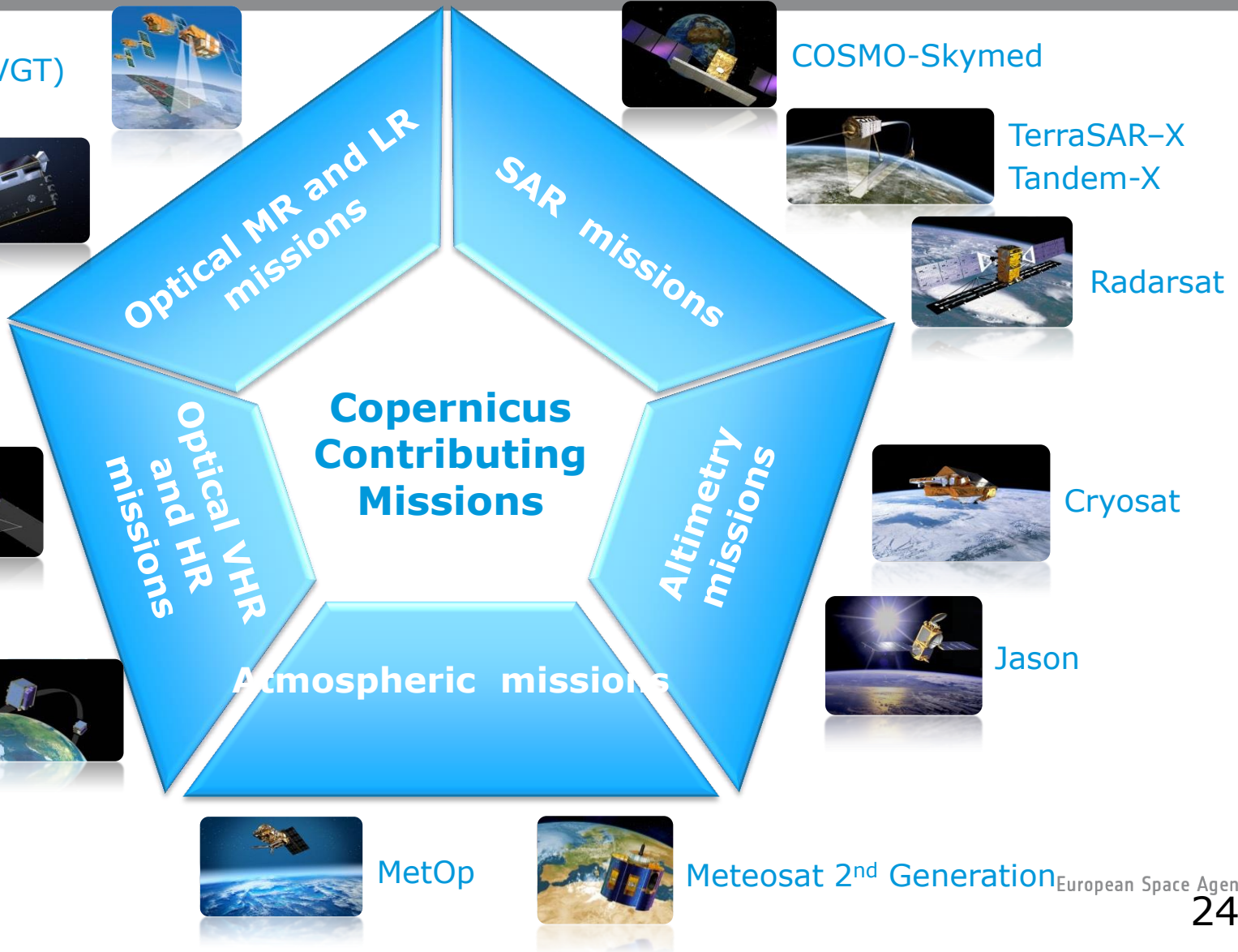
Wheat crop: end of season & harvesting

South Africa JECAM site: February-June 2013 - RapidEye data

Take5 Experiment

JECAM
Joint Experiment for Crop Assessment and Monitoring

Copernicus Contributing Missions



21st Century: New Societal Challenges

- Population Growth
- Food Security
- Energy
- Pollution
- Geo-Hazards
- Climate Change

Important contribution of Copernicus

Copernicus Services Component

Sentinel data are free for everyone

Copernicus Space Component Data Access Portal

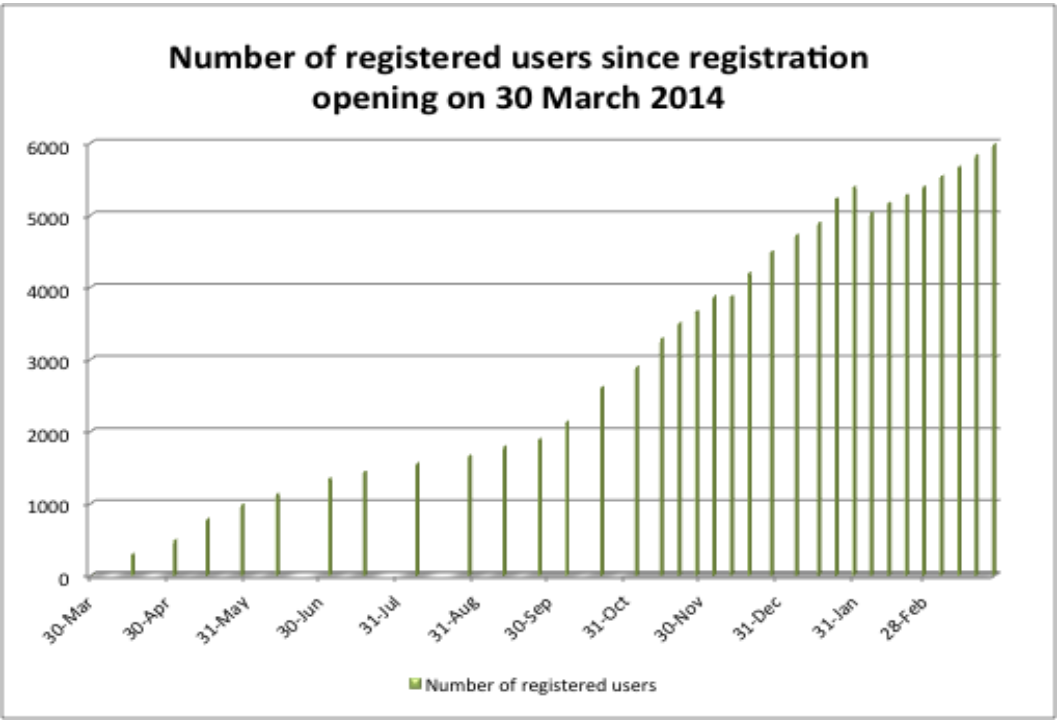
sentinels.copernicus.eu

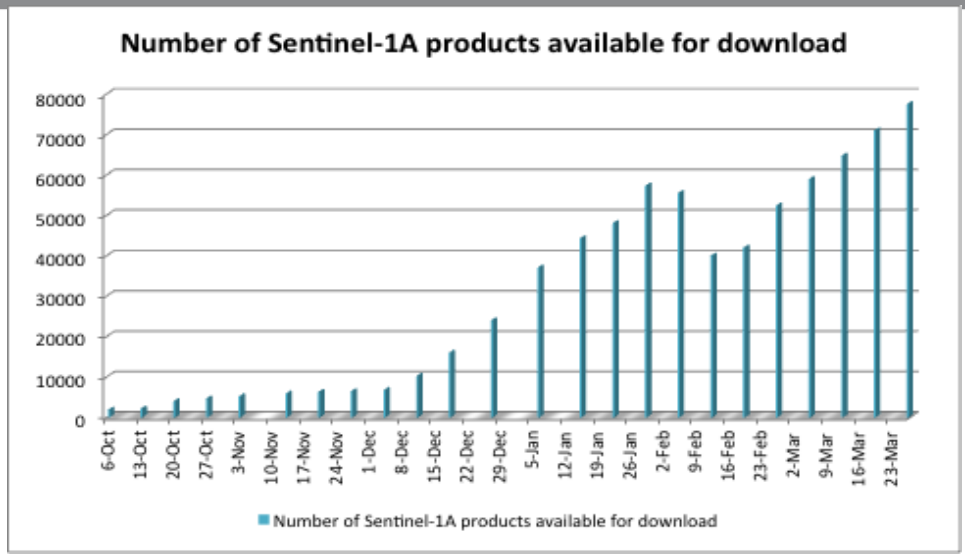
- Copernicus Services Access
- Scientific / Other Access Hub
- Collaborative Access Hub
- International Agreements Access Hub

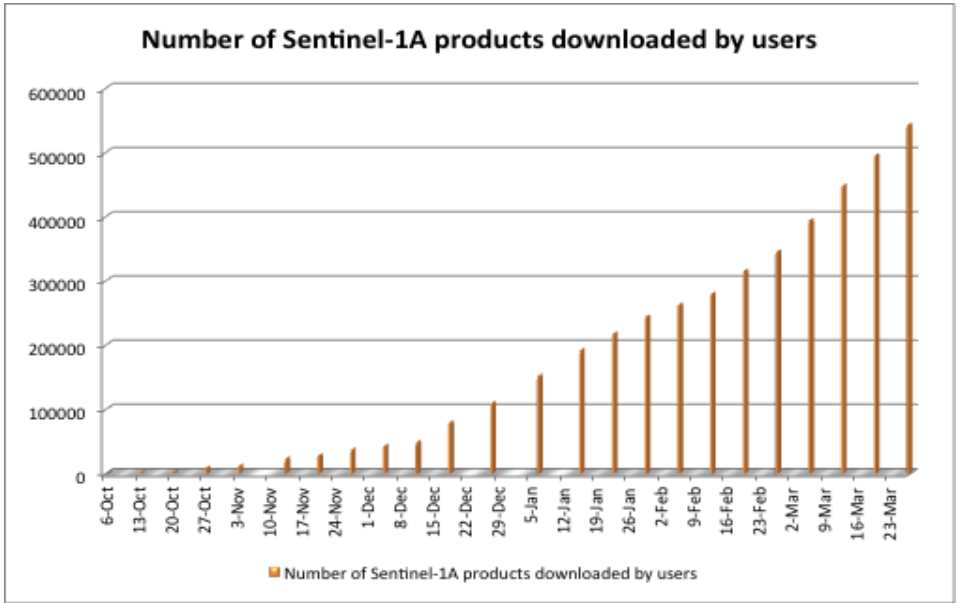
Sentinel-1A already creates large interest

By 9 April 2015:

- ✓ **6243 registered users**
- ✓ **97500 products available for download**
- ✓ **630666 products downloaded by users, representing about 780 TB of data**







Copernicus creates economic growth and jobs

2026-2030 **potential Copernicus benefits =**

€ 130 B or around

€ 6.9 B / year =

0.2% of the EU current annual GDP

- "Money where it matters – how the EU budget delivers value to you"
EC, MEMO/11/469, Brussels, 29 June 2011

Creation of up to 83.000 jobs

- Former Vice President of the European Commission, Antonio Tajani

1 € spent by European tax payer on Copernicus
→ **public return of 10€** can be expected

- "The Socio-Economic Benefits of GMES"
ESPI report 39, November 2011

Stimulating growth & attracting young people

the European Earth Monitoring Competition

www.copernicus-masters.com

PRAGUE 09-13 MAY 2016

esa

living planet symposium | PRAGUE 09-13 May 2016

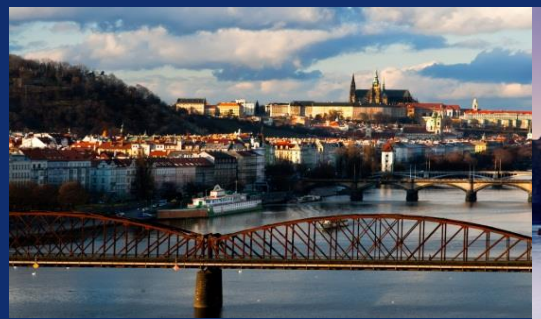
Main Objective:
Presentation of Exploitation Results based on ESA Earth Observation Measurements

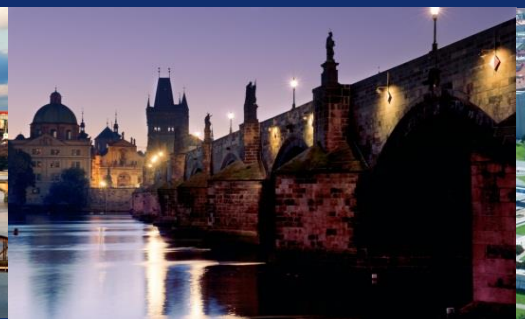
Important Dates:

Deadline for abstract submission	16 October 2015
Notification of Acceptances	End January 2016
Issue of Preliminary Programme	February 2016
Opening of Registration to the Symposium	February 2016
Release of the Final Programme	at the symposium
Submission of Full Papers	at the symposium

Themes:
Atmosphere, Oceanography, Cryosphere, Land, Hazards, Climate and Meteorology, Solid Earth/Geodesy, Near-Earth Environment, Methodologies and Products, Open Science 2.0

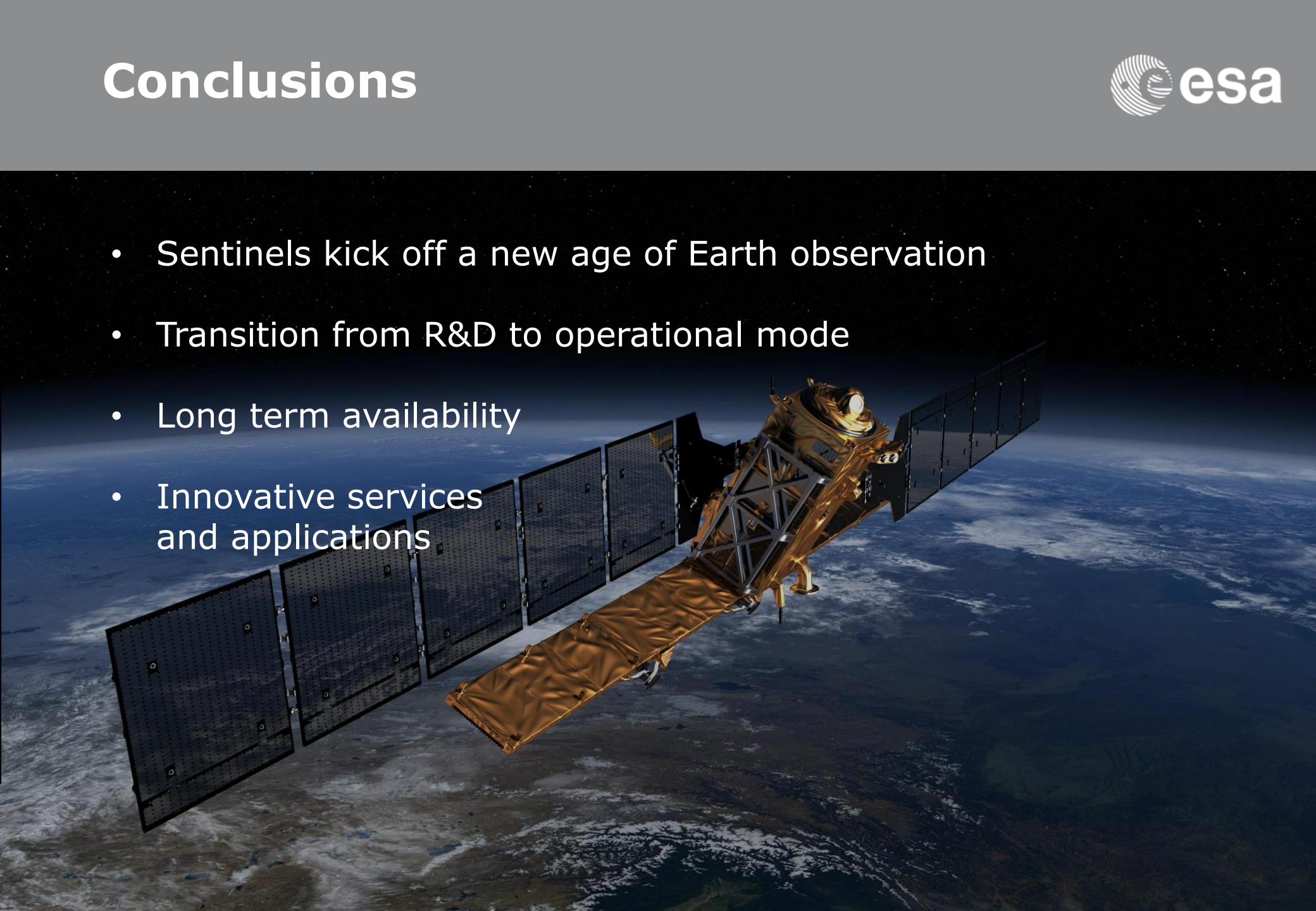
http://lps16.esa.int





Conclusions

- Sentinels kick off a new age of Earth observation
- Transition from R&D to operational mode
- Long term availability
- Innovative services and applications



Interested In More?