

→ MAPPING URBAN AREAS FROM SPACE CONFERENCE

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ESRIN – ESA's Earth Observation HQ



Personnel on site: ~ 550

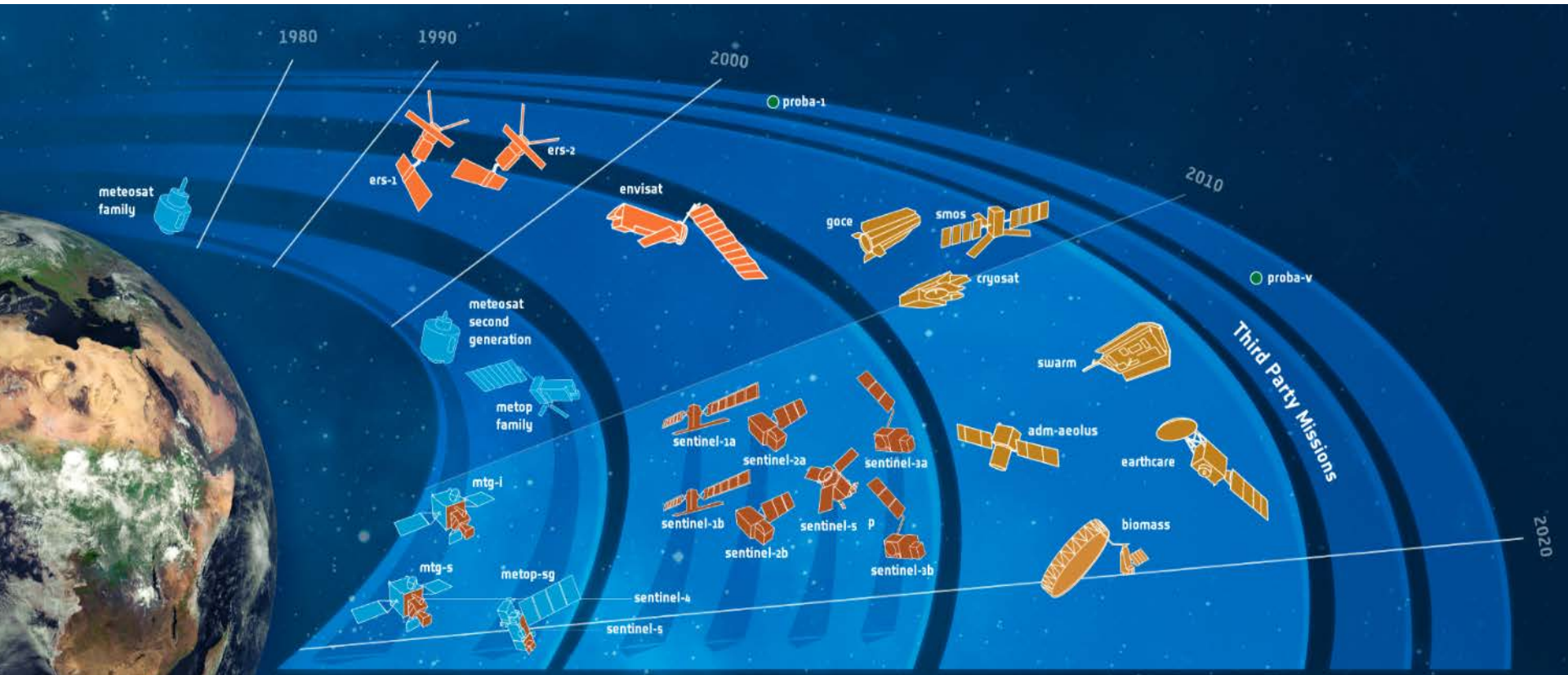
- Payload operations
- EO Data Access (archive)
- EO Data Exploitation and Services
- International Charter for Space and Major Disasters
- User Education & Training
- Communication & Outreach
- Vega Launcher Programme
- ESA IT centre and web portal



The ESA EO Programme



Scientific: Earth Explorer Missions
Operational: Copernicus Sentinel Missions
Operational: Meteorological Missions

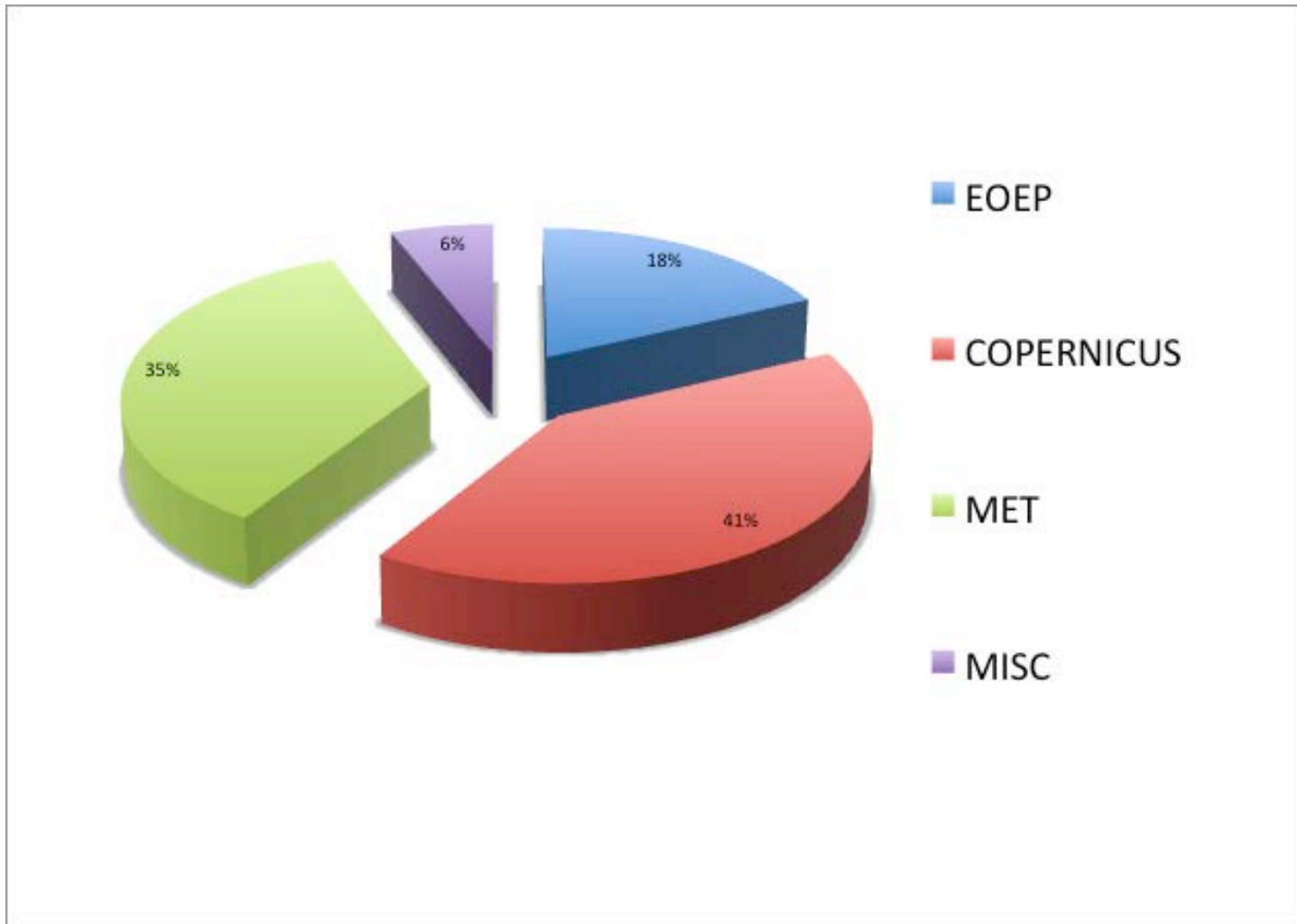


Meteorological

Sentinels

Explorers

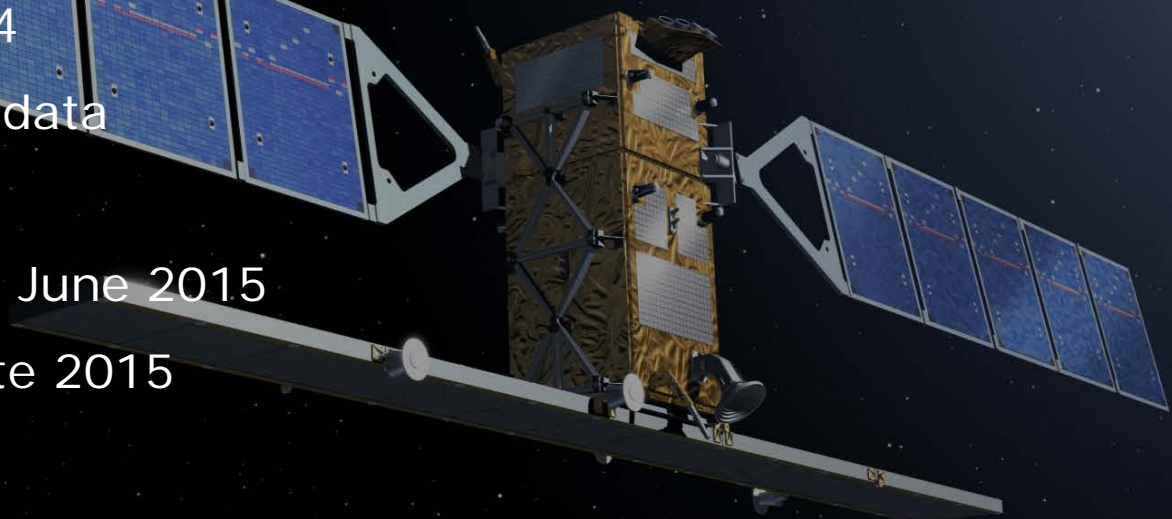
Split of costs in EOP for 2014



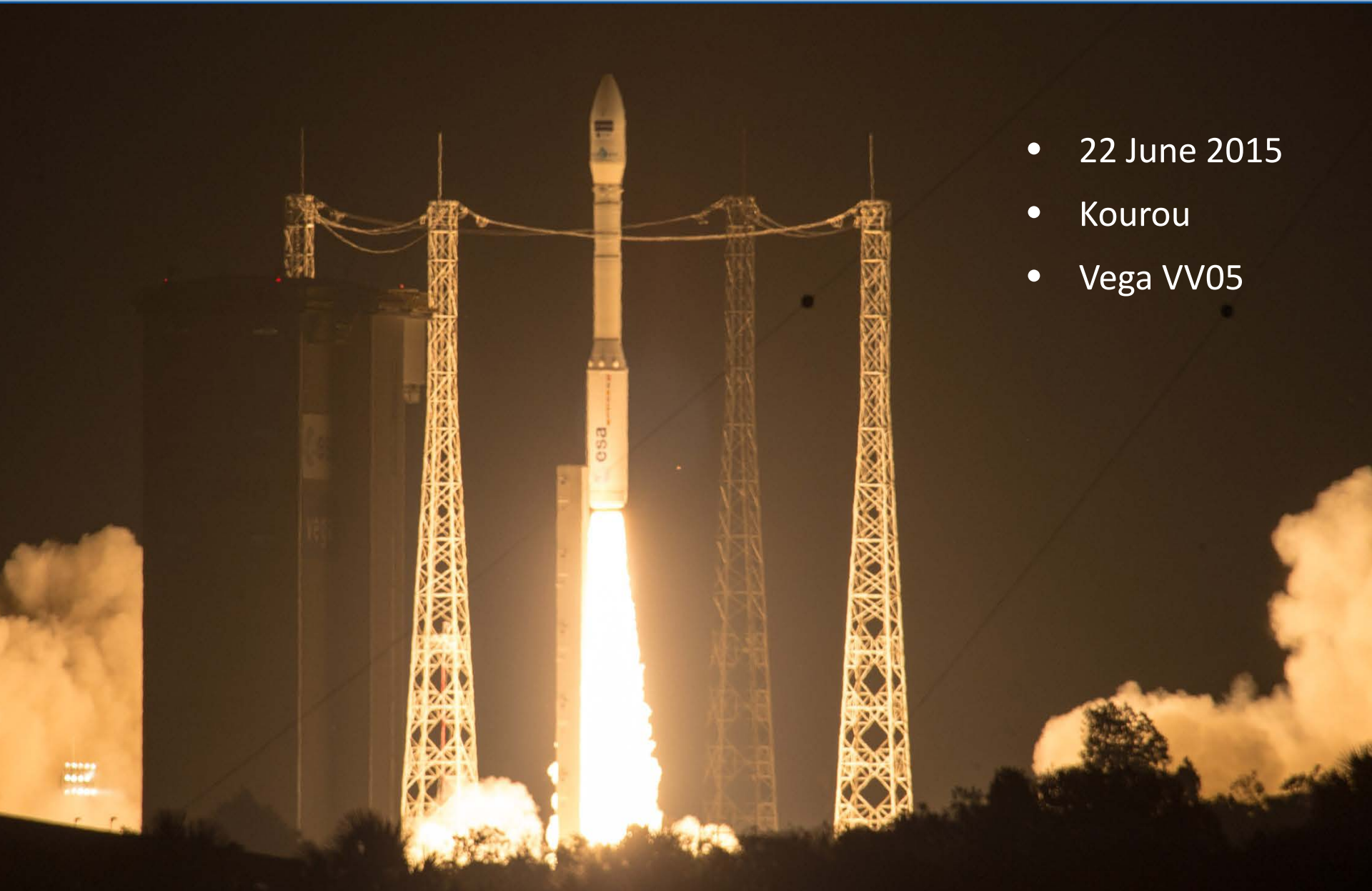
Copernicus – Current Status



- Operations secured until 2021
- Infrastructure secured until 2028-2030
- Sentinel-1A launch on 3 April 2014
 - Data freely available since 3 October 2014
 - More than 2.7 PB of data downloaded
- Sentinel-2A launched 22 June 2015
- Sentinel-3A to launch late 2015



Sentinel-2A launch



- 22 June 2015
- Kourou
- Vega VV05

Sentinel-2A: First images



Northwest Italy and
Southern France

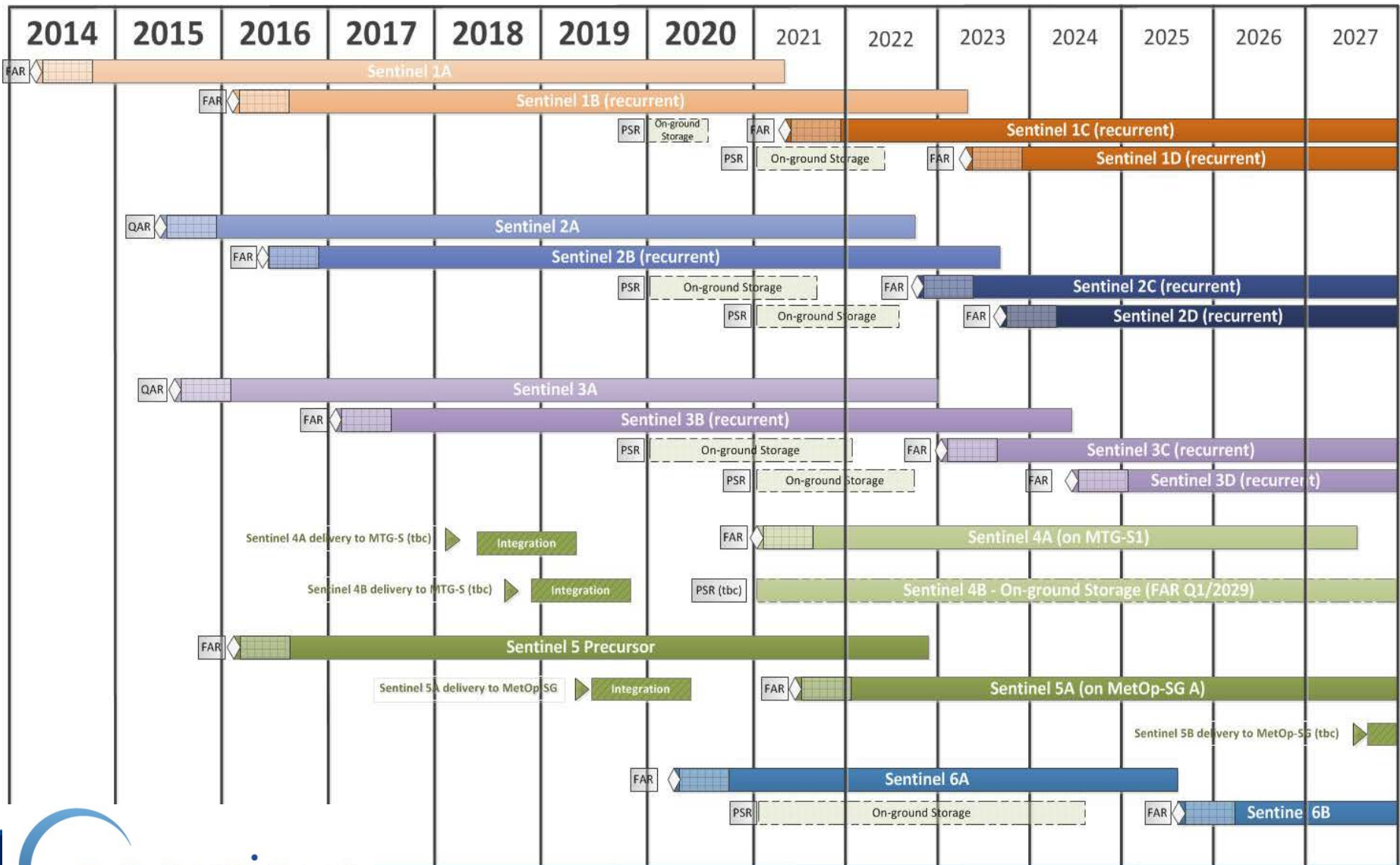


French Riviera

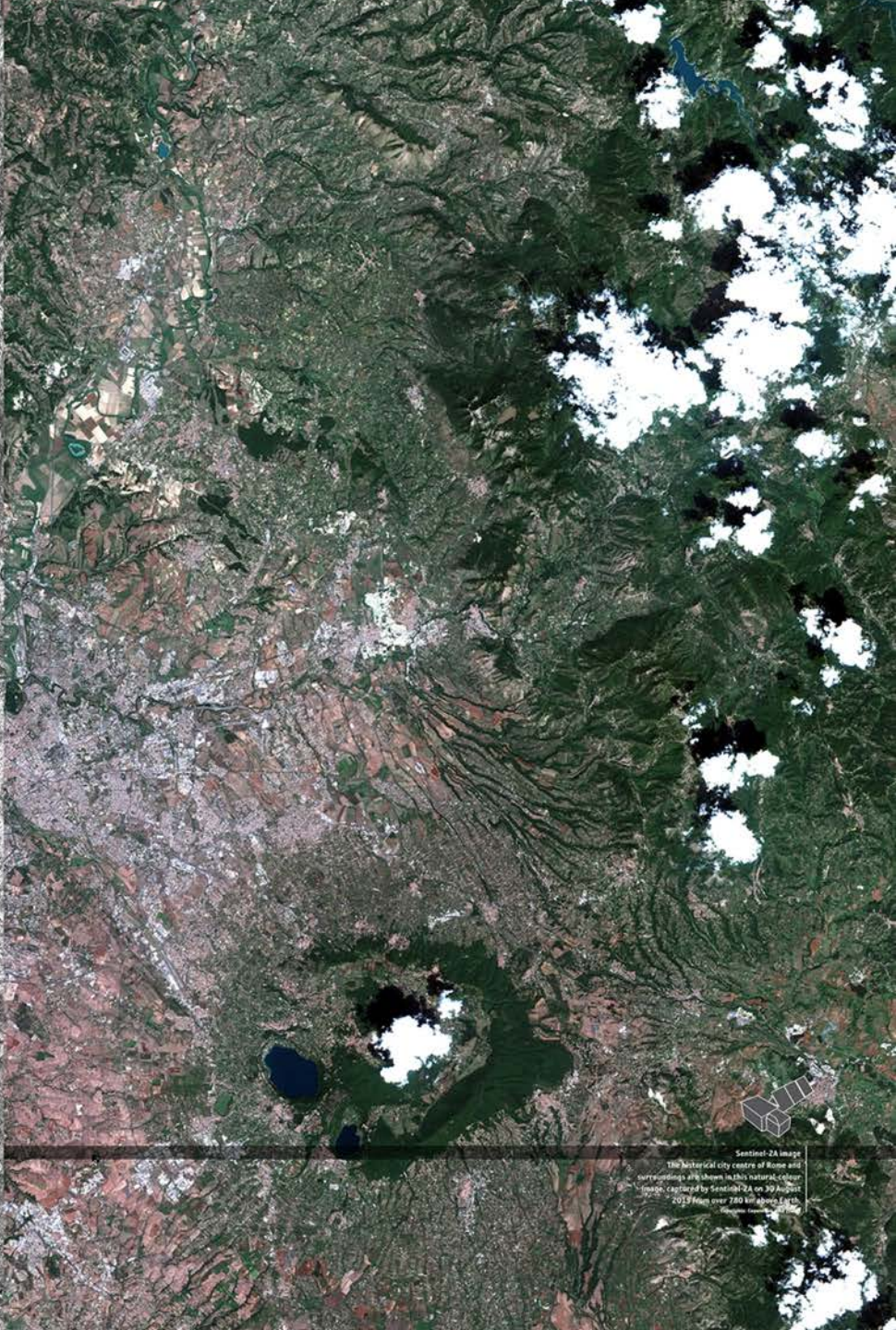
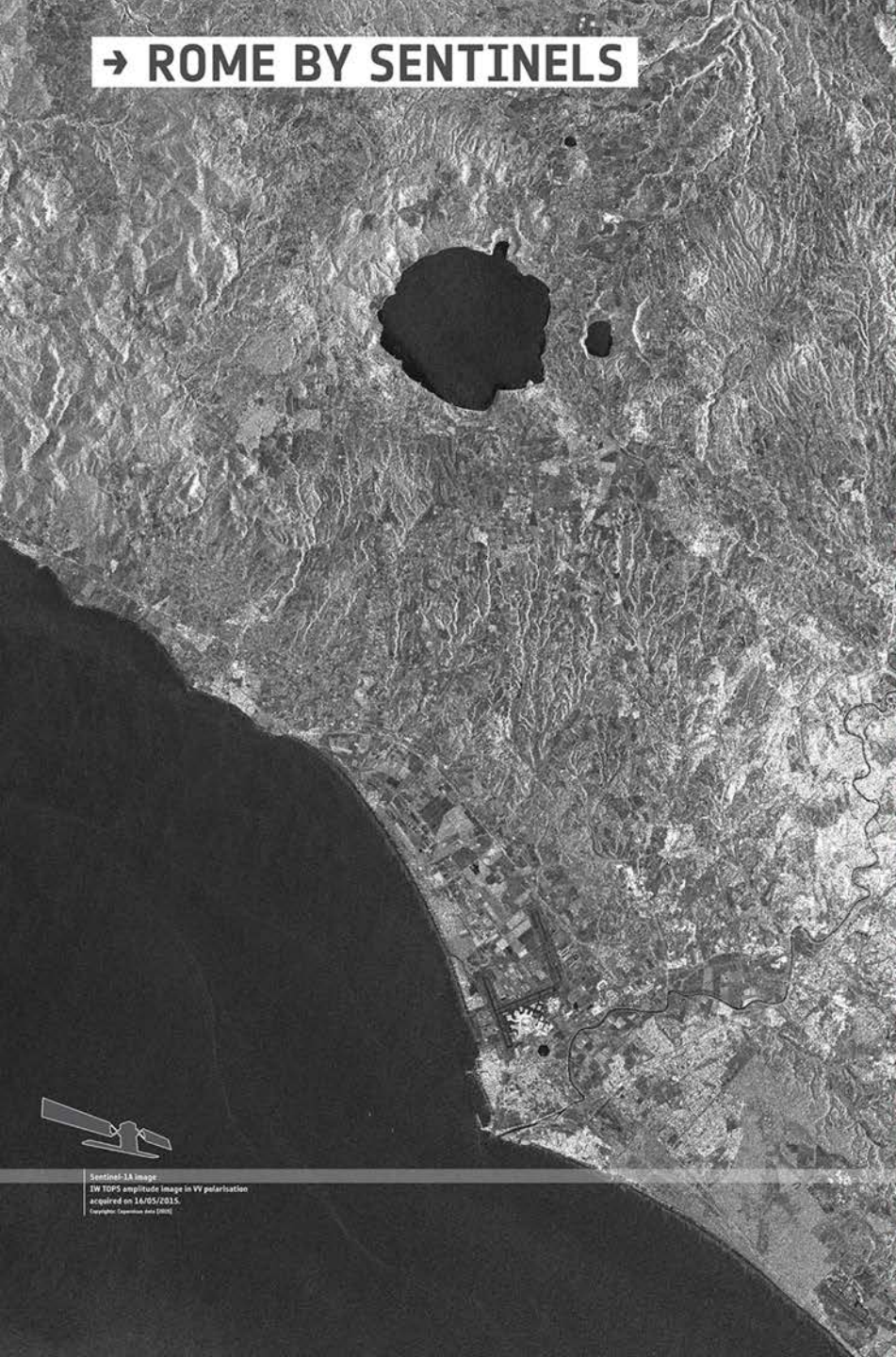


Po Valley

Sentinels provide decade-long observations



→ ROME BY SENTINELS



Sentinel-1A image
IW TOPS amplitude image in VV polarisation
acquired on 14/05/2015.
Copyright: European Space Agency

Sentinel-2A image
The historical city centre of Rome and
surroundings are shown in this natural colour
image, captured by Sentinel-2A on 30 August
2013 from over 700 km above Earth.
© European Space Agency

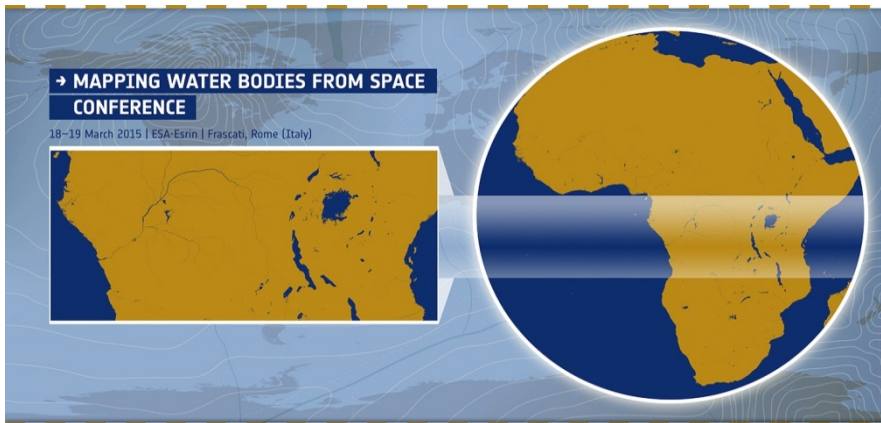


Addressing ESA Thematic Users



- Address new **observations opportunities** offered by the **Sentinels** and other Space assets for major societal challenges
- Shape the **next generation of R&D activities** in the frame of ESA Earth Observation Envelope Programme (EOEP-5, 2017-2021)

Mapping **Water Bodies** from Space
MWBS 15 18-19 March 2015

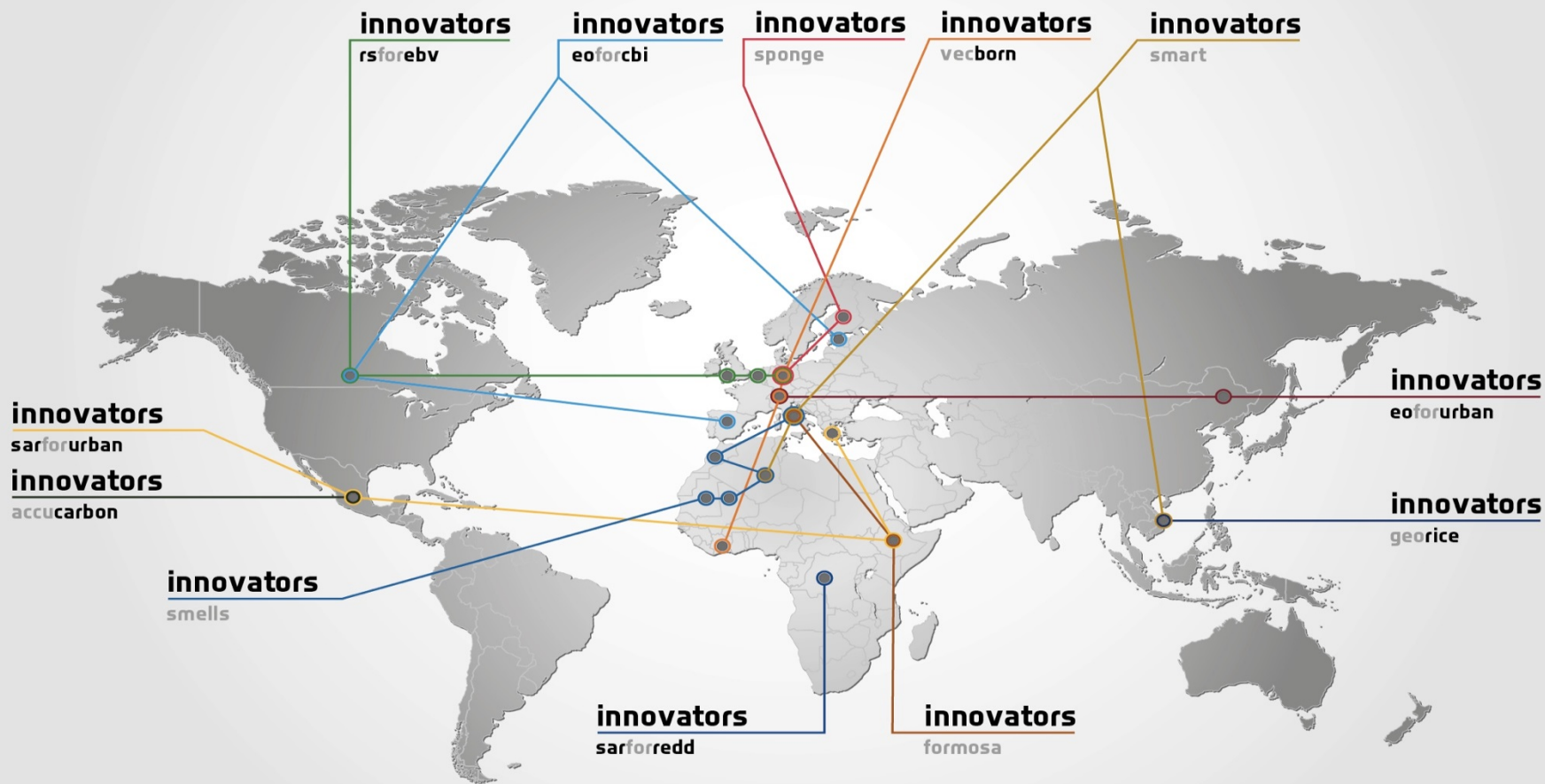


Mapping **Urban Areas** from Space
MUAS 15 4-5 November 2015





innovators



→ CALL FOR INNOVATORS III

Pioneering innovative Earth Observation products and services for long-term exploitation



Innovators III priority lines:

- Respond to the **Research and Development agenda and users requirements** of major international initiatives (e.g. GFOI, GEOGLAM, GEOBON, GEO URBAN, GEO WATER, etc.)
- Perform the necessary R&D preparatory activities of the most innovative aspects of **Sentinel-1** and **Sentinel-2**, for a large scale exploitation by broad user communities.



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*Earth Observation for City
Biodiversity Index*

Space4environment (LU), Univ
Concordia (CA)



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sarforurban

*SAR for global urbanisation
monitoring*

DLR (DE)

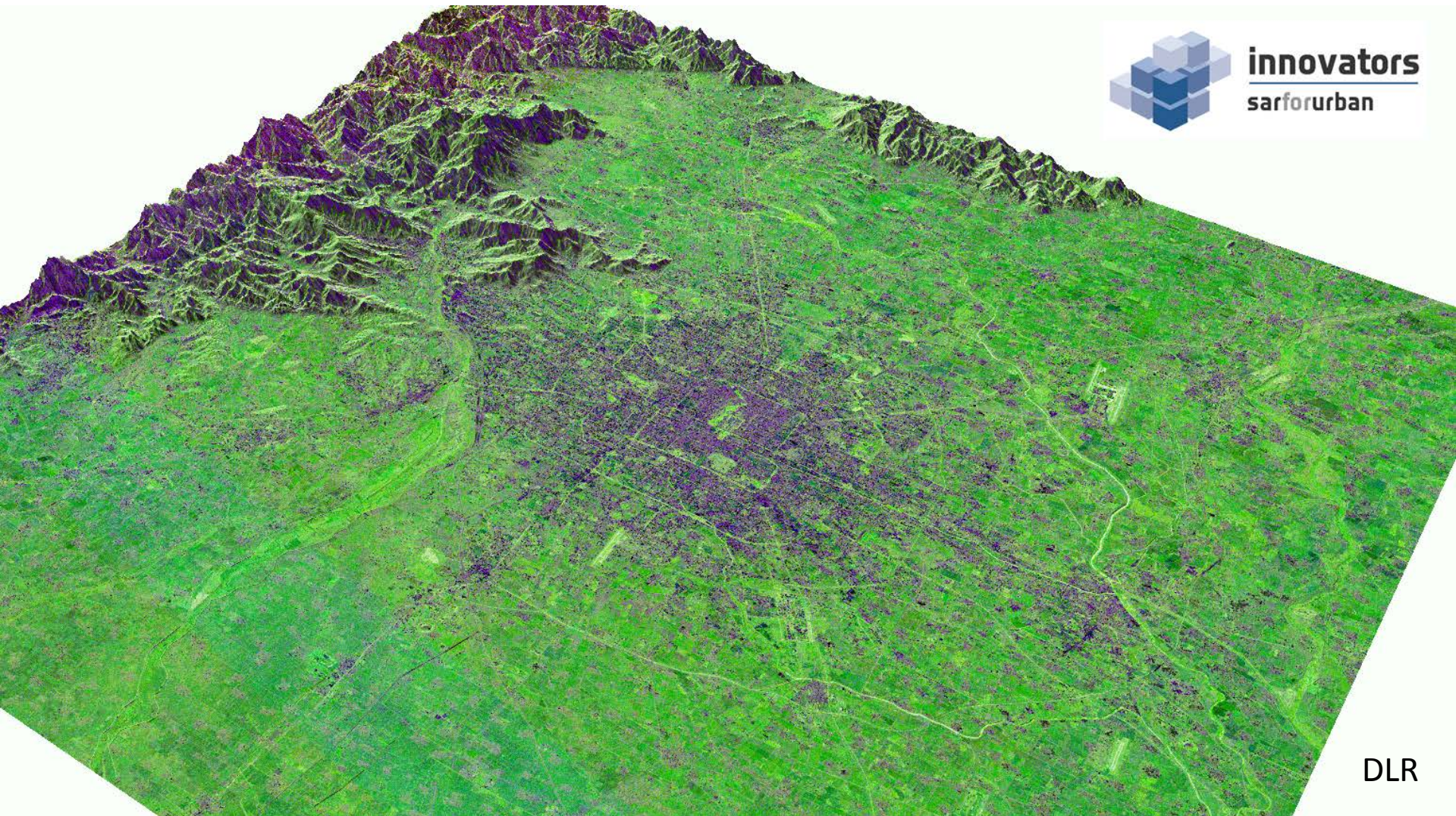


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*Multi-temporal S1 SAR and S2 MSI for
Global Urban Services*

KTH (SE), Univ. Pavia (IT)

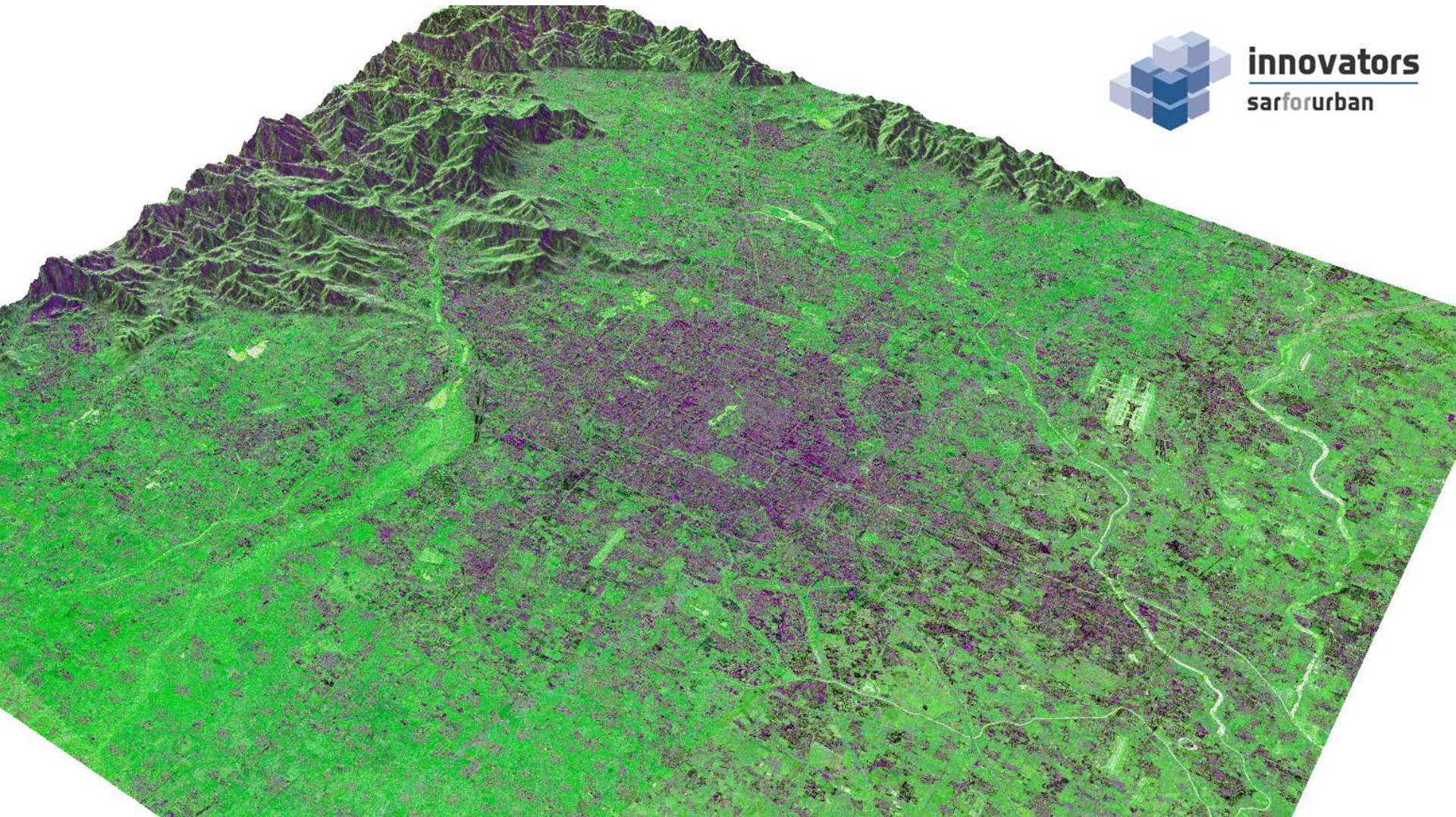
Beijing urban extent, 2002-2003, *based on ERS-2 PRI and ASAR IMP time series*



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DLR

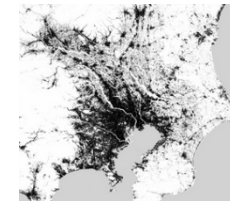
Beijing urban extent, 2001-2015, based on Sentinel 1A IWS time series



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The Urban Exploitation Platform (Urban TEP)

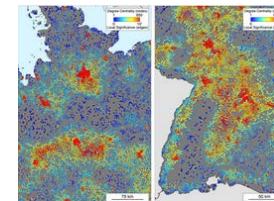
- TEP Urban platform aims at *initiating a step change* in the use of EO data by providing an *open and participatory platform* based on modern ICT technologies and services
- The focus is set on demonstrating functionalities to provide:
 - Value-added basic EO products
 - Innovative urban thematic geo-information products
- Use Scenarios
 - Explore existing thematic content
 - Task individual on-demand analyses
 - Develop, deploy and offer your own content or application
 - Learn more about innovative data sets and methods



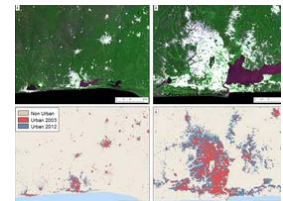
Human settlement map



Flickr/Picasa time stamps



Human settlement properties/patterns



Urban growth



Built-up density/greenness

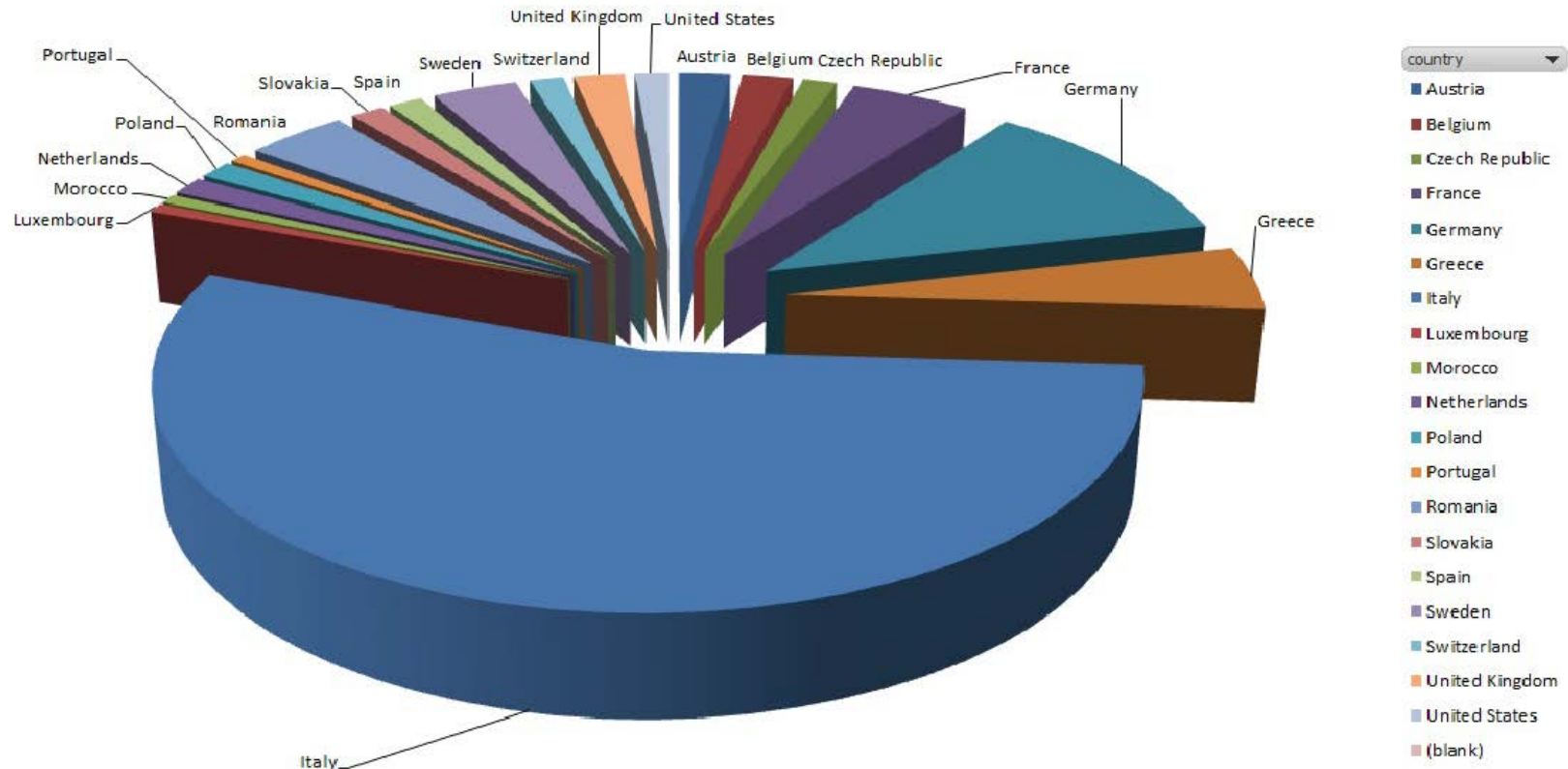


Cellular phone NRT mobility

1. Present up to date results from research and application development from past and current satellites
2. Propose R&D activities that may be implemented in ESA Earth Observation programmes
3. Recommendations to be collected by session's chairs and presented at closing session

Workshop participation

Total



160 registered participants

PRAGUE 09-13 MAY 2016



living planet symposium

PRAGUE
09-13 May
2016



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



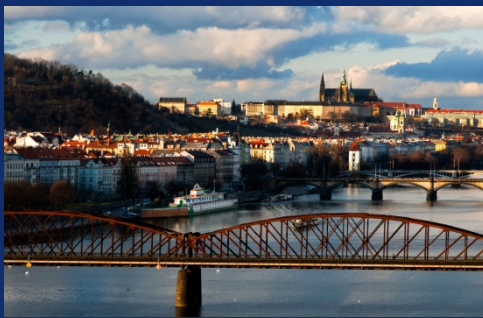
Important Dates:

Deadline for abstract submission	16 October 2015
Notification of Acceptances	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, Inland Water, Hazards, Climate and Meteorology, Solid Earth/Geodesy, Near-Earth Environment, Methodologies and Products, Open Science 2.0

<http://lps16.esa.int>





Thank you for your attention

Back-up

EO4CBI, Earth Observation in support of the City Biodiversity Index



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Objectives:

- CBI is a tool for cities to evaluate progress towards their Aichi 2020 biodiversity targets.
- EO4CBI will develop satellite-based approaches to evaluate the state of biodiversity in cities and support city authorities in the CBI compilation.

Products:

- The project addresses 4 of the 23 CBI indicators:

Indicator 1 "Proportion of natural areas in city"

Indicator 2 "Connectivity measures or ecological networks to counter fragmentation"

Indicator 11 "Regulation of quantity of water" and

Indicator 12 "Climate regulation: carbon storage and cooling effect of water"

User Organisations:

- ICLEI (the world's largest city network)
- Nature Parks Board of Singapore (CBI leader)
- Convention on Biological Diversity (secretariat)
- European Environment Agency (EEA)

→ City authorities of all 10 pilot cities

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4-5 November 2015 | ESA-Esri | Frascati, Rome (Italy)



Phase 1 (2015 - prototyping):

Barcelona, Tallinn, Edmonton

Phase 2 (2016 - roll-out):

10 pilot cities globally

2015-17 | 200 K | 2 March 15

KO Project Teams

- space4environment, Luxembourg
- Concordia University, Canada

SAR4URBAN, C-BAND SAR for global urbanisation monitoring



Objectives:

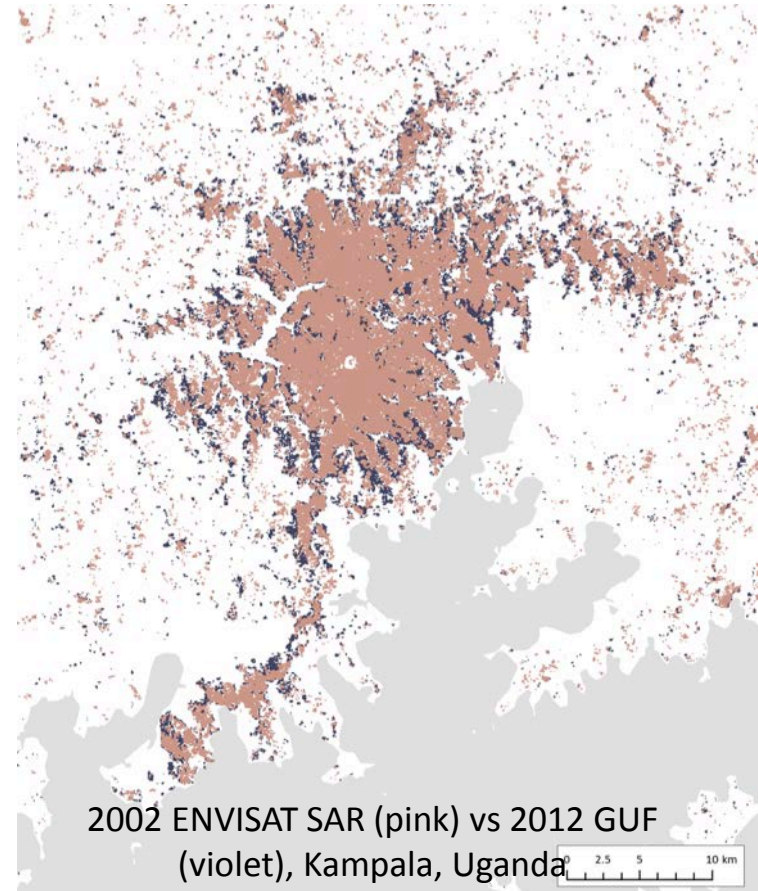
- Development of novel services to automatically delineate past and current extents of urban areas by means of ERS, ENVISAT and Sentinel-1 C-band SAR, in response to requirements from World Bank and GEO.
- Innovative approach that inherits the features of the technique developed for the TerraSAR-X Global Urban Footprint (GUF)

Products:

- Global Urban Extent monitoring

User Organisations:

- World Bank, Washington, US
- Group on Earth Observation (GEO) secretariat, Geneva, Switzerland
- Center for Urban and Environmental Change, Indiana State University, US
- Pilot City Authorities



2015-17 | 200 K | KO April 15

Project Team:

- DLR, Germany

European Space Agency

EO4URBAN, multi-temporal SAR/optical approaches for urban mapping



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Objectives:

- Development of multi-temporal and multi-resolution pilot global urban services based on Sentinel 1 C-SAR and Sentinel 2 MSI in support of sustainable urban development policies.
- Pilot urban service demonstrators for 10 cities representing different urban realities.

Products:

- Urban extent monitoring
- Urban detailed land cover mapping
- Urban change detection (new build-up areas)
- Urban green structures mapping
- Urban water body mapping

User Organisations:

- Stockholm County Administration, Sweden
- National Geomatics Center of China (NGCC)
- City authorities of all 10 pilot cities



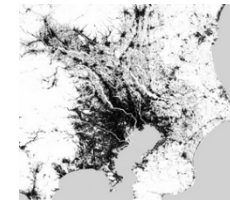
2015-17 | 200 K | KO March 15

Project Team:

- KTH Royal Institute of Technology, Sweden
- University of Pavia, Italy

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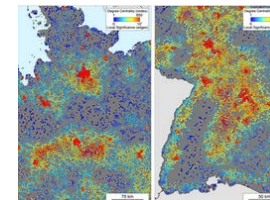
- TEP Urban platform aims at *initiating a step change* in the use of EO data by providing an *open and participatory platform* based on modern ICT technologies and services that enables any interested user to *easily exploit and generate thematic information* on the status and development of the built environment
- The focus is set on demonstrating functionalities to provide:
 - Value-added basic EO products
 - Cloudless multi-temporal stacks/mosaics (e.g., MERIS, Landsat)
 - Seasonality indices (e.g., MERIS, ASAR, Landsat)
 - Innovative urban thematic geo-information products
 - Global human settlement layers (e.g., TerraSAR-X/TanDEM-X, Sentinel-1) and their properties/patterns
 - Regional urban growth (e.g., ASAR, MERIS, Landsat)
 - Regional land use / land cover monitoring (e.g., HR, VHR EO data)
 - Regional imperviousness/greenery index
 - Regional/local transport and commuting pressure (EO data fusion with cell phone and transport data)
- Use Scenarios
 - Explore existing thematic content
 - Task individual on-demand analyses
 - Develop, deploy and offer your own content or application



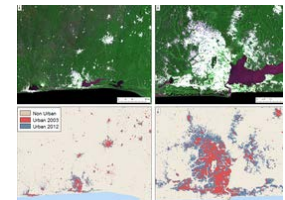
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