CLASS Conference 2014

Cloud computing for Earth observation

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Slovenian Centre of Excellence for Space Sciences and Technologies, Research Centre of the Slovenian Academy of Sciences and Arts and Sinergise

SPACE-SI

UL-NTF
coordinator
Materials, structure, virtual models/

Research institutions:

UL-FMF
Astrophysics, meteorology

UL-FE
Communication, control, processing

IJS
Electornics ceramics

ZRC-SAZU
Remote sensing

Companies:

DEWESOFT
Telemety, data aquisition

SINERGISE
GIS applications

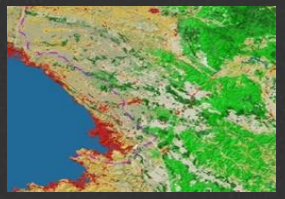
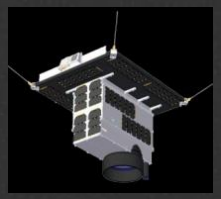
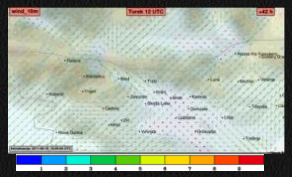
TIC LENS
Laser technologis

IMPOL
Superplastic Al alloys

ISKRA TELA
Antenna systems

ZAVAROVALNICA MARIBOR
End-user of space technologies

R&D activities

SCIENCE	TECHNOLOGIES	APPLICATIONS
wp1: remote sensing 	wp4: satellite technology 	wp7: international missions 
wp2: meteorology 	wp5: communications 	wp8: terrestrial applications 
wp3: astrophysics 	wp6: multidisciplinary lab 	wp9: dissemination 

Microsatellite under development

70 kg satellite for earth monitoring and observation

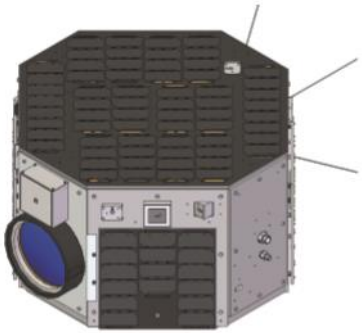
2.8 m gsd from a reference altitude of 600 km

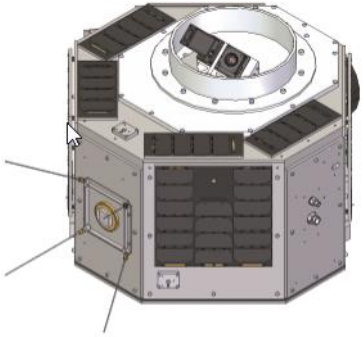
four spectral channels

(450-520 nm, 520-600 nm, 630-690 nm, and 760-900 nm).

high-definition video at 1920 by 1080 pixels.

real-time imaging and video streaming over Slovenia





Ground control infrastructure

three-axis stabilized bus

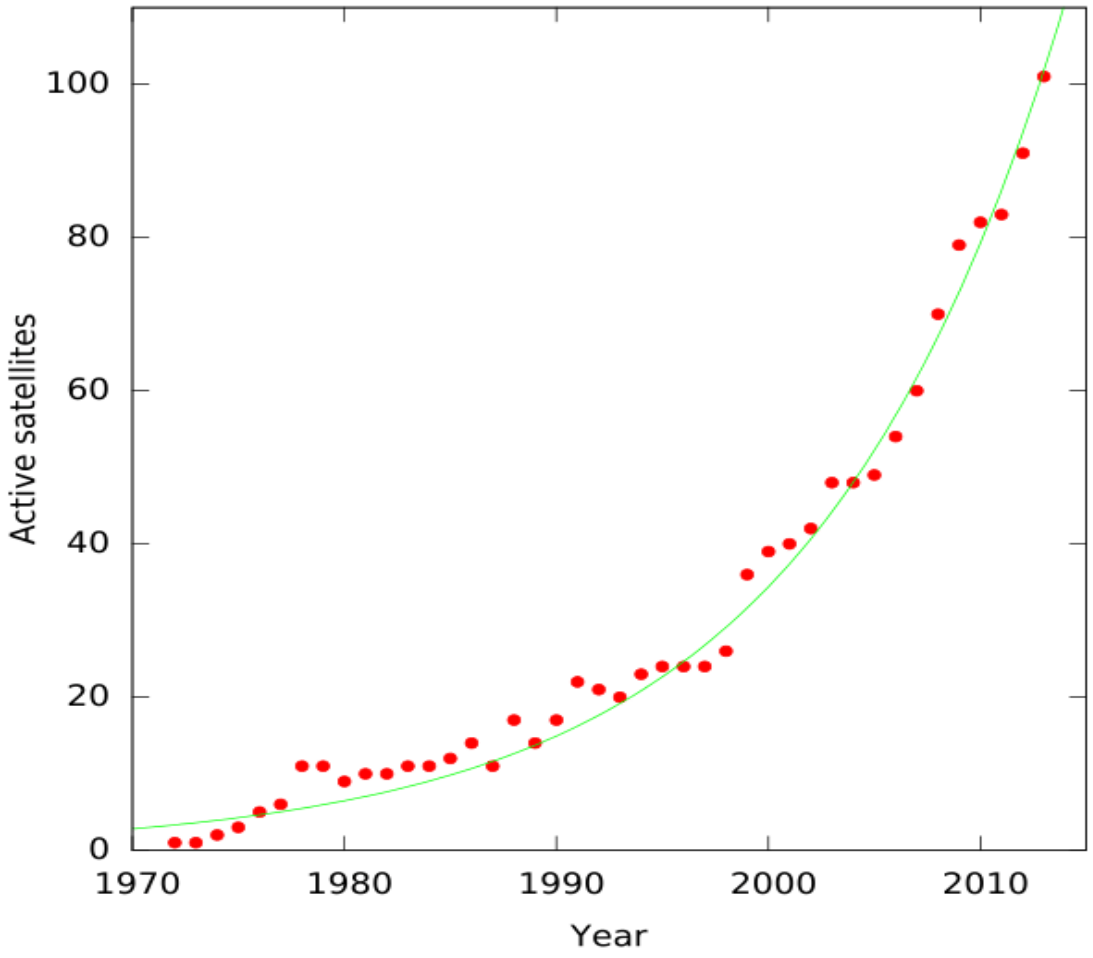
50 mbps x-band downlink

128 gb of on-board storage,

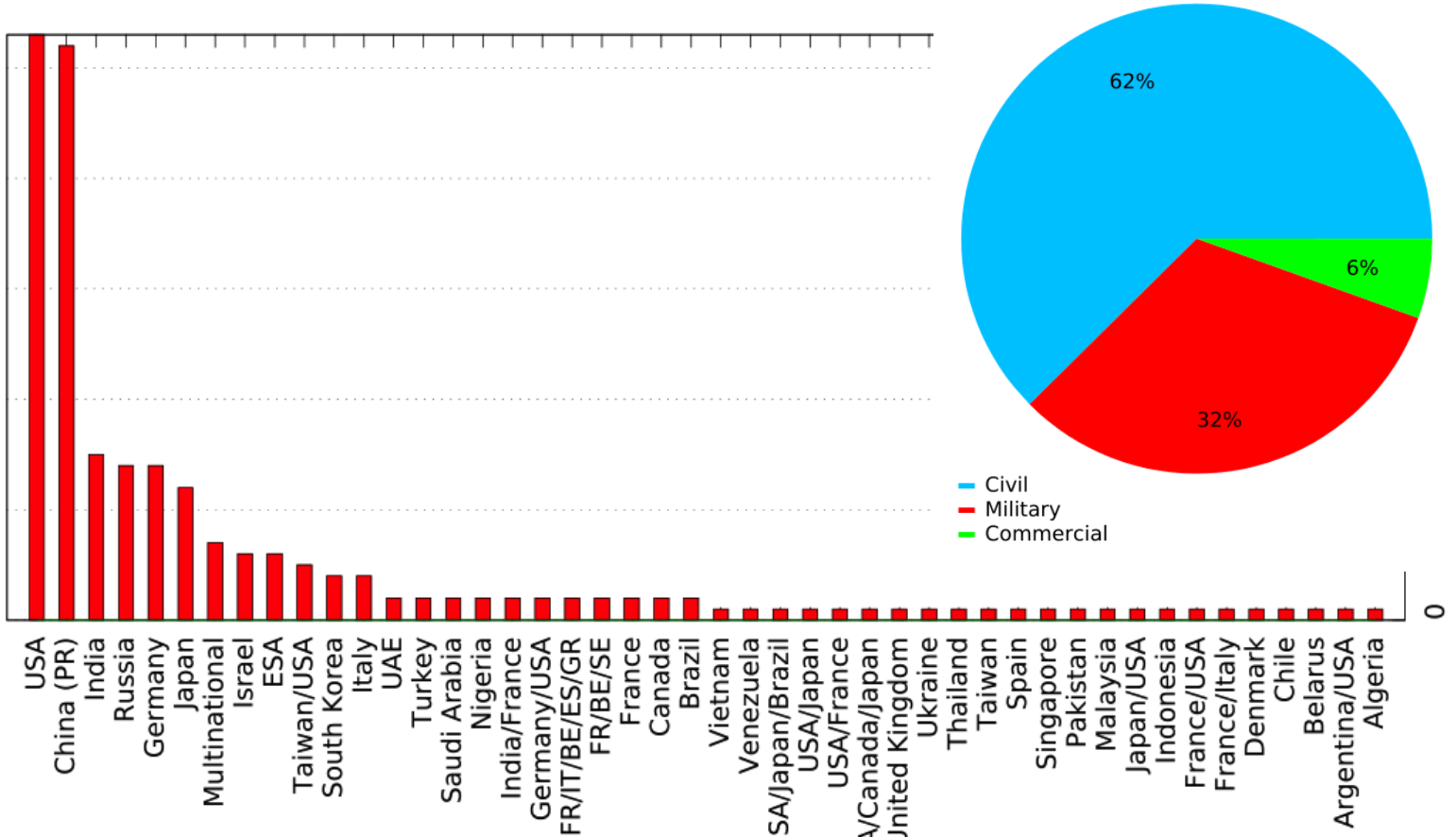
power system generating nearly 90 w

100 w-h li-ion battery.

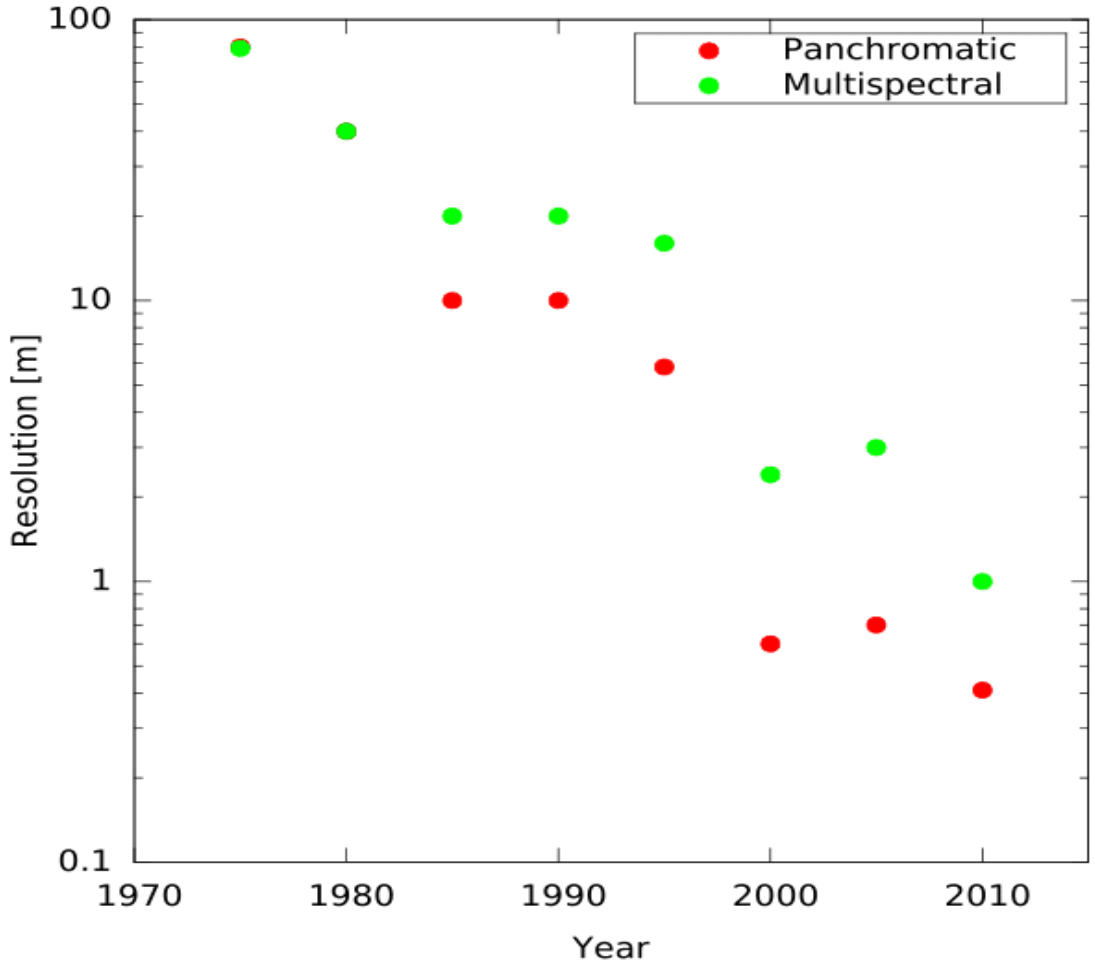
Number of active satellites



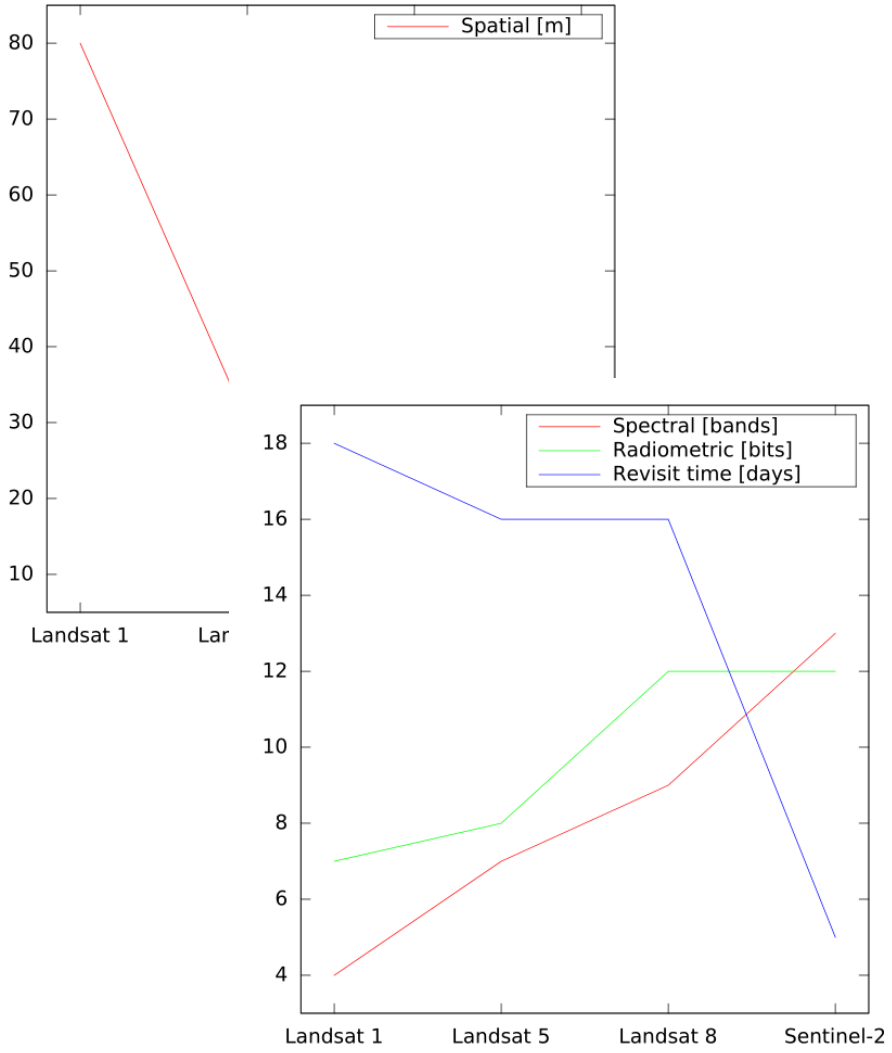
Satellites by country

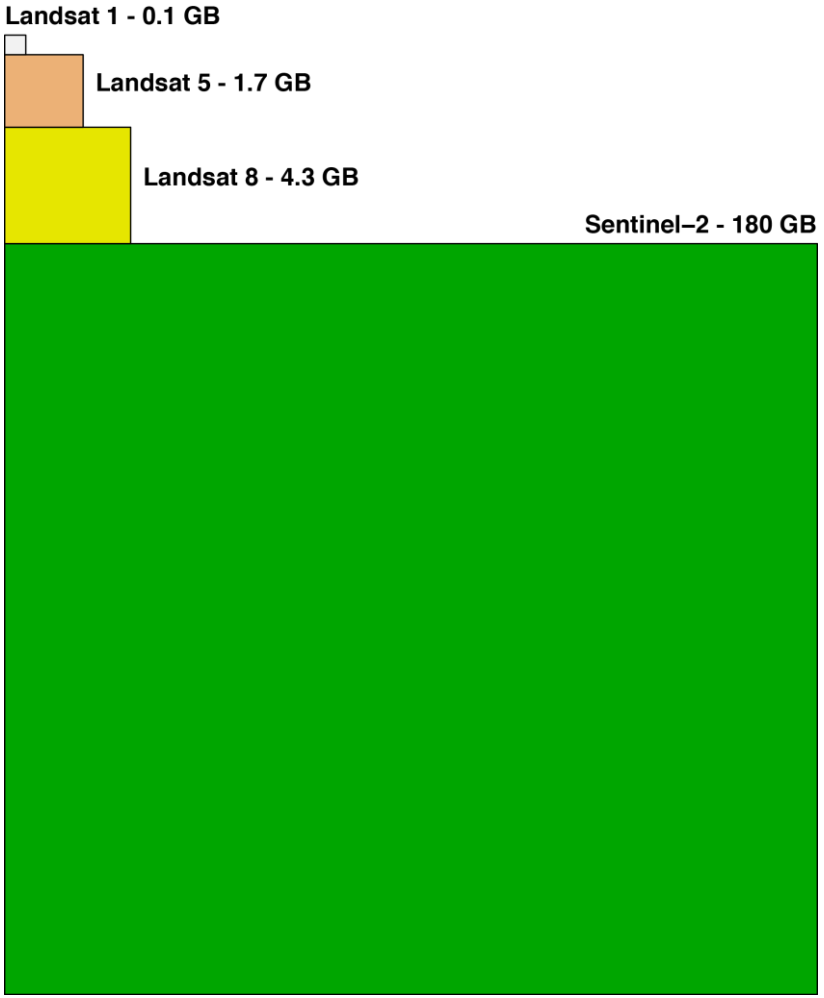


Spatial resolution of images



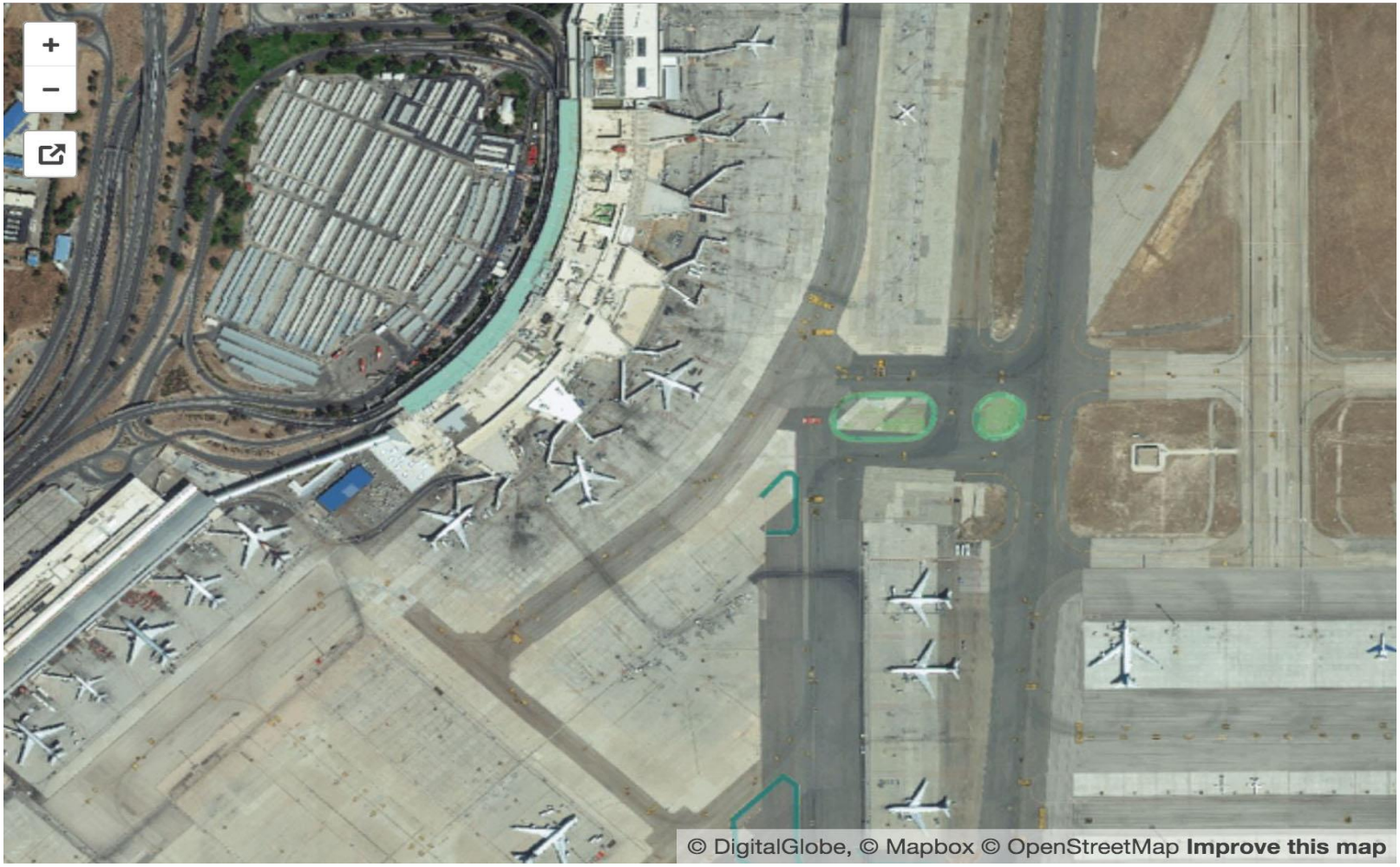
Data volume





TB per year per 100 km^2

WorldView-3 level of detail



WorldView-3

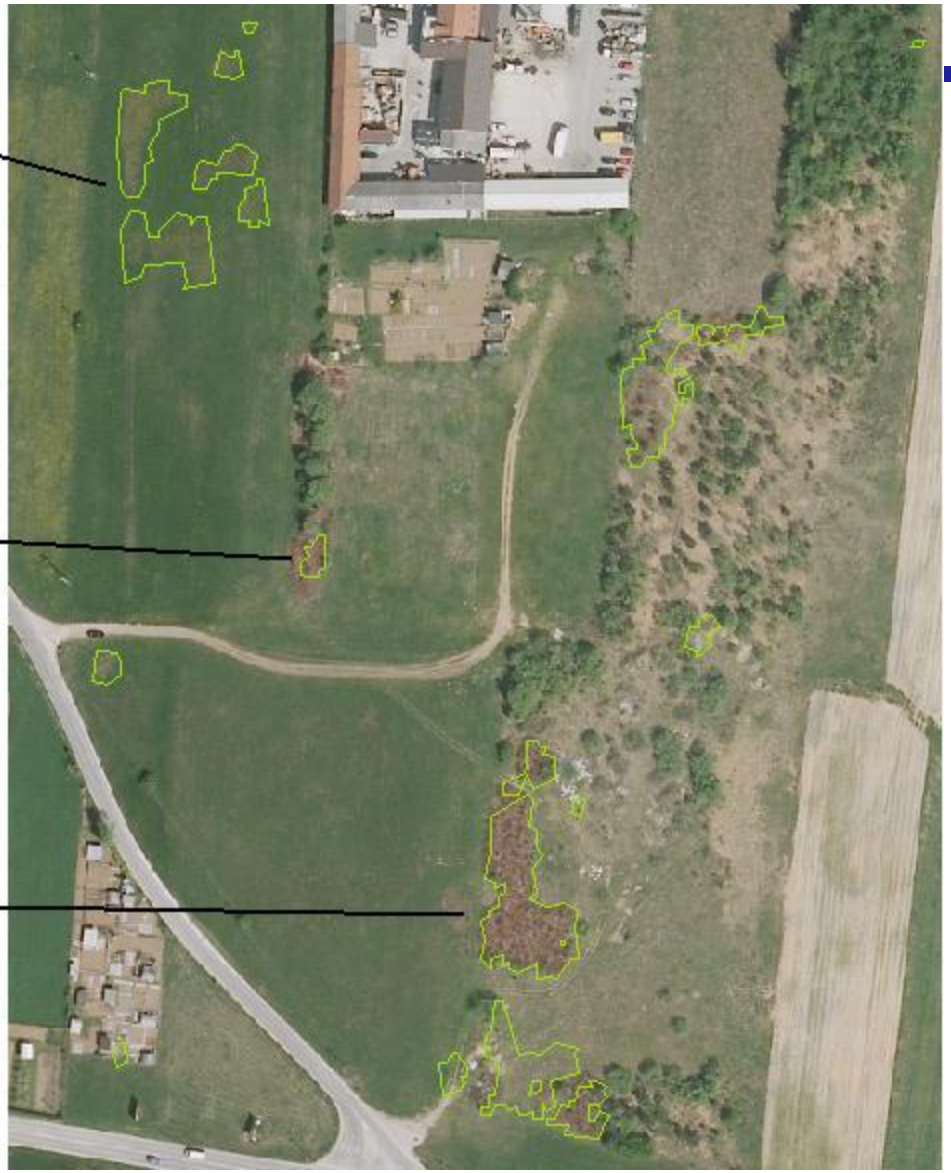
WorldView-3


NO ENTRY
© DigitalGlobe, © Mapbox © OpenStreetMap Improve this map

WorldView-3

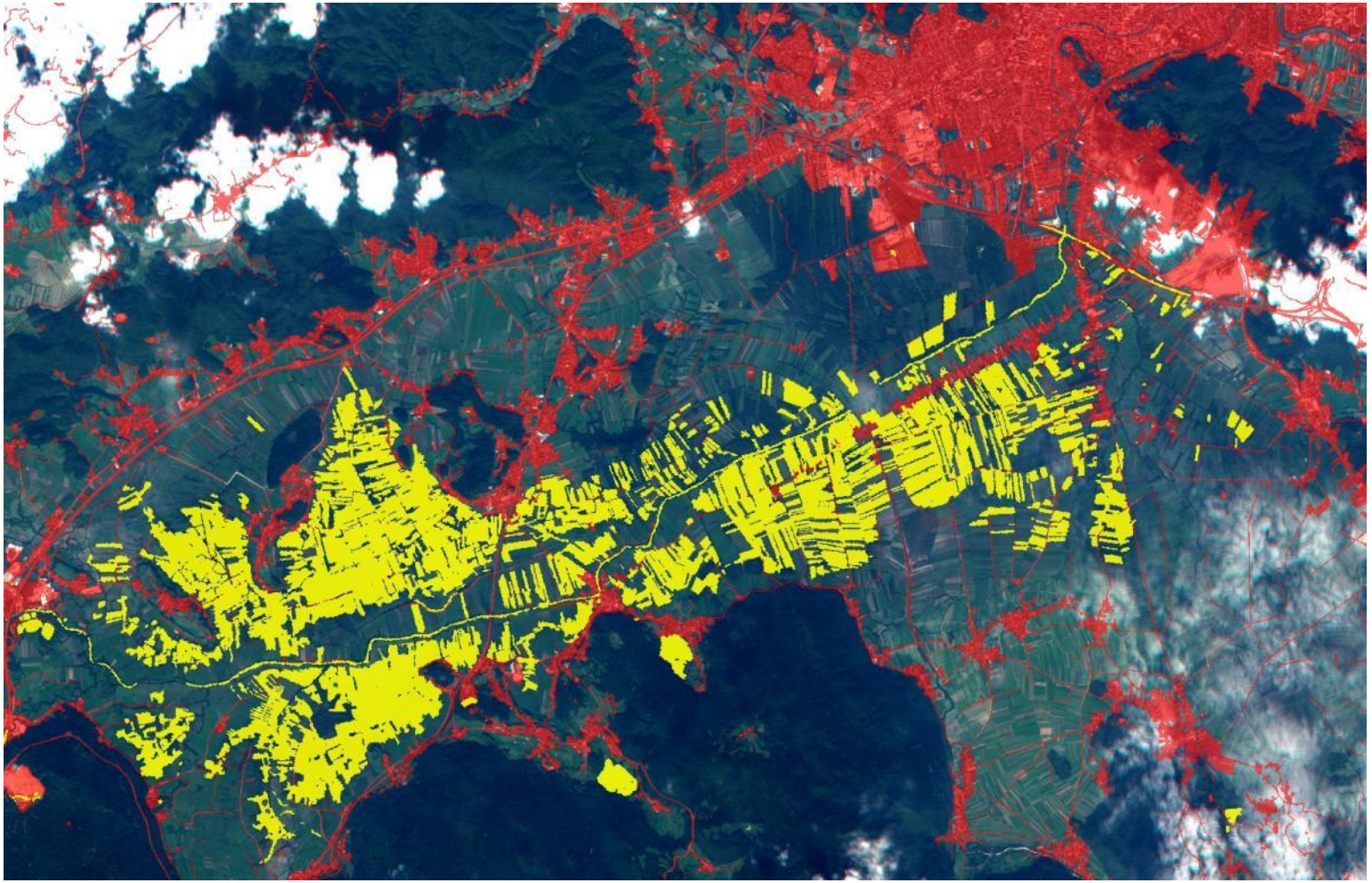
WorldView-3

Detection of Japanese knotweed



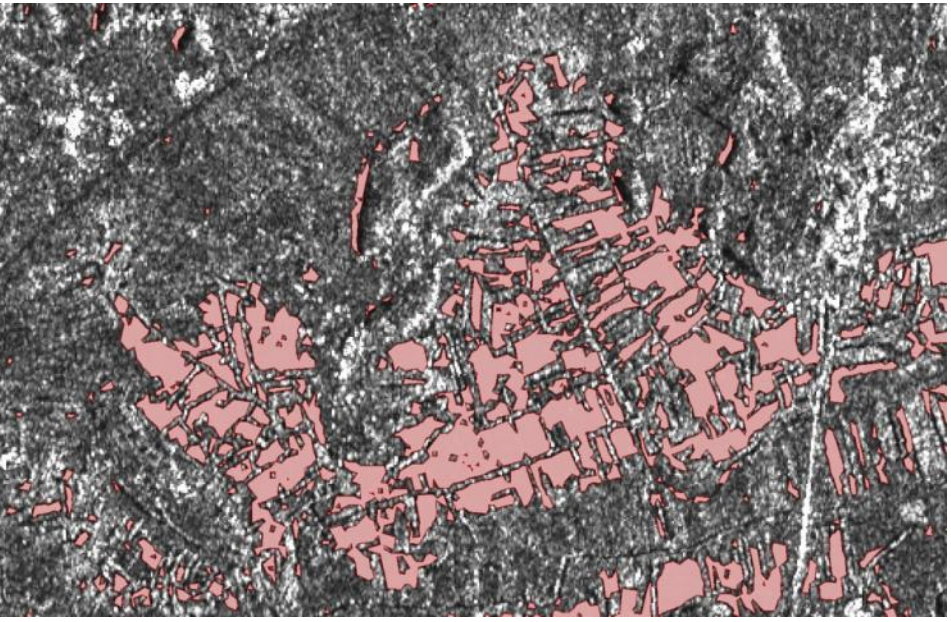
Disaster monitoring

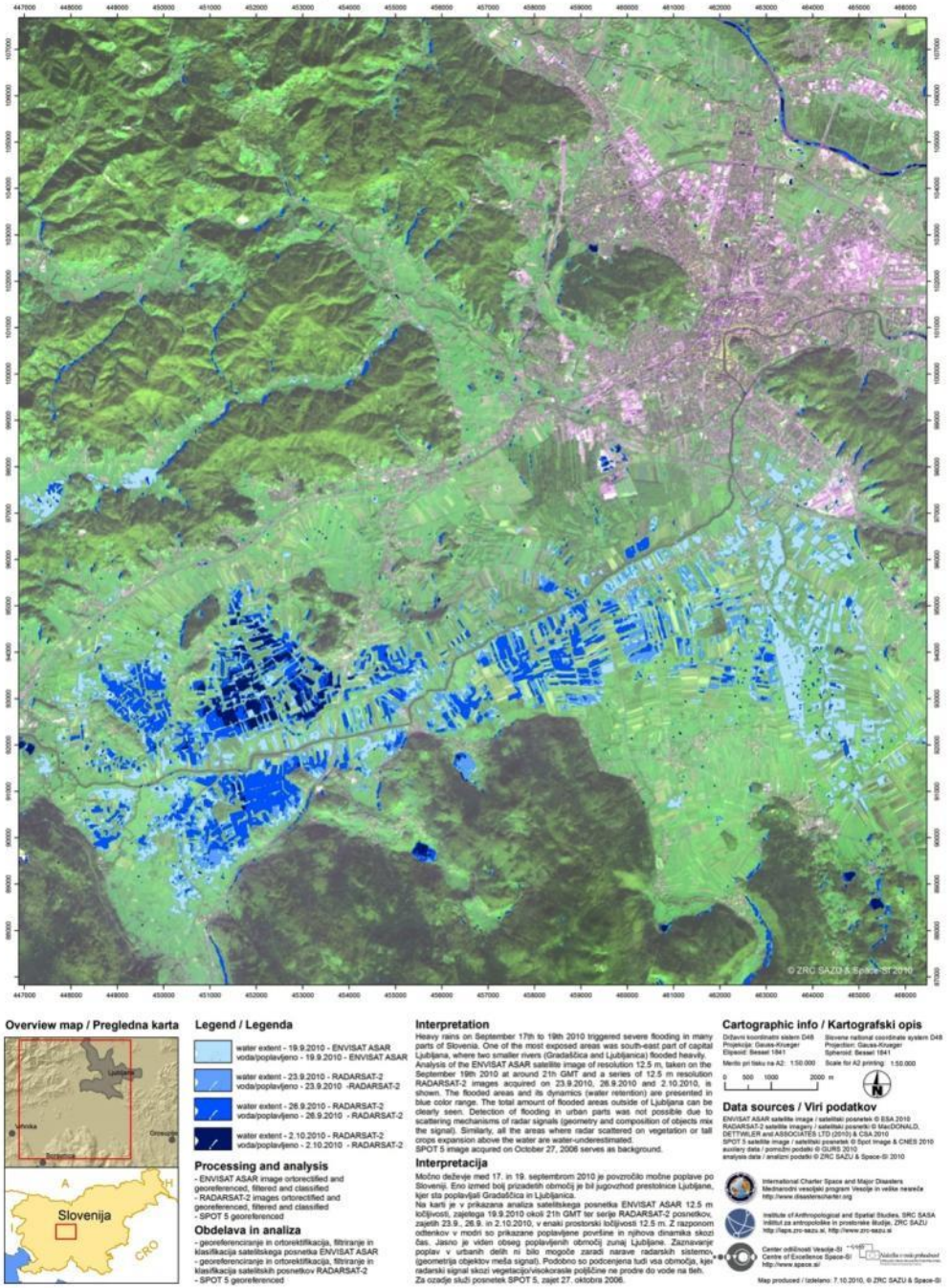
Floods around Ljubljana in September 2010, RapidEye image 23.9.2010



Radarsat-2

RapidEye

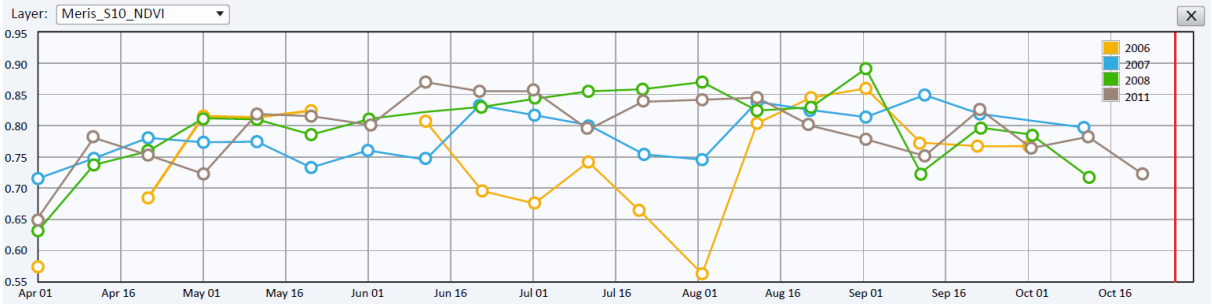




Floods around Ljubljana in September 2010 rapid mapping product

Drought mapping

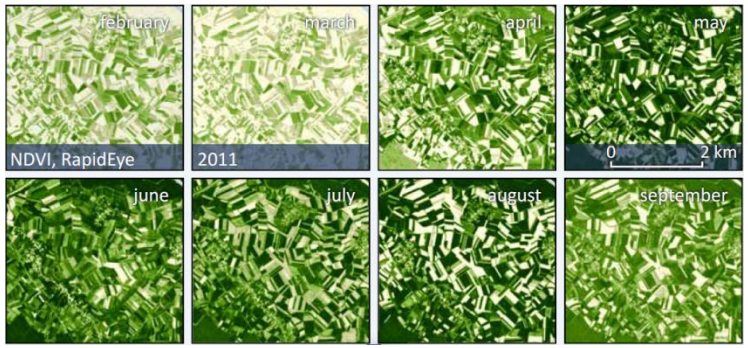
Interactive graphs:

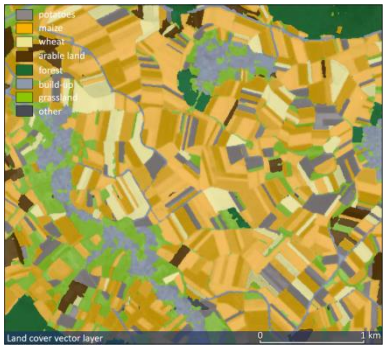


Drought monitoring:

Satellite and ground data collection and synchronization → Data analysis for drought patterns recognition → Data modeling for drought detection → A system for drought monitoring

Multitemporal land cover classification:





Space-SI Processing chain is cloud ready

Remote sensing data

Test data: RapidEye
Various full-frame and pushbroom sensors

Geometric corrections

Data preparation
GCP extraction
Orthorectification

Radiometric corrections

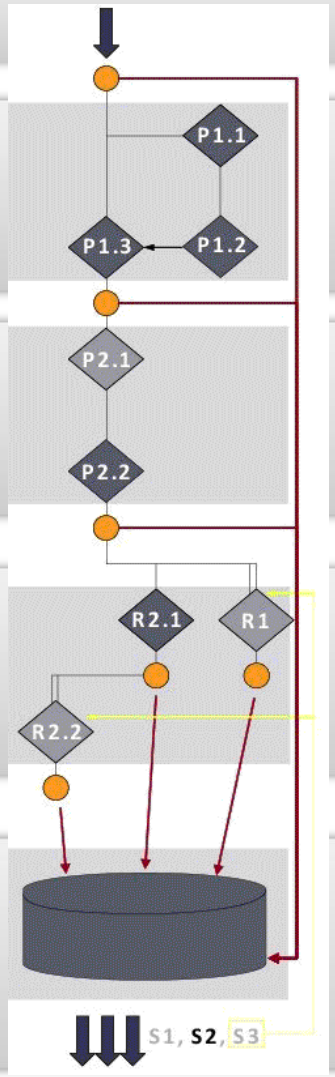
Atmospheric correction
Topographic correction

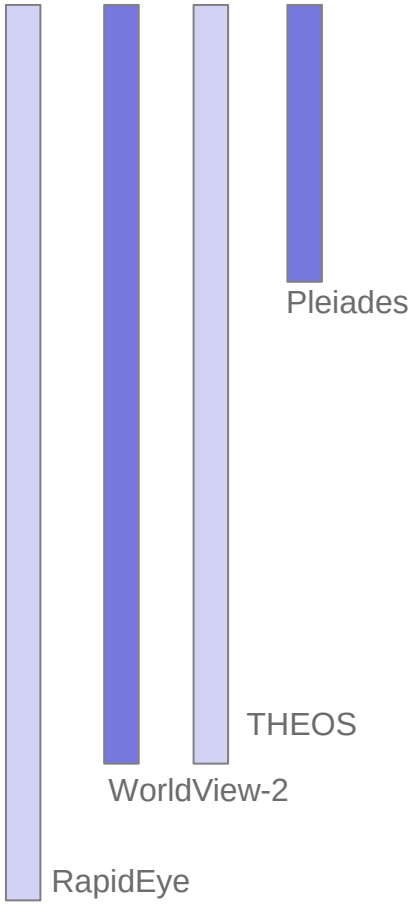
Generation of Results

Change detection
NDVI generation
NDVI changes

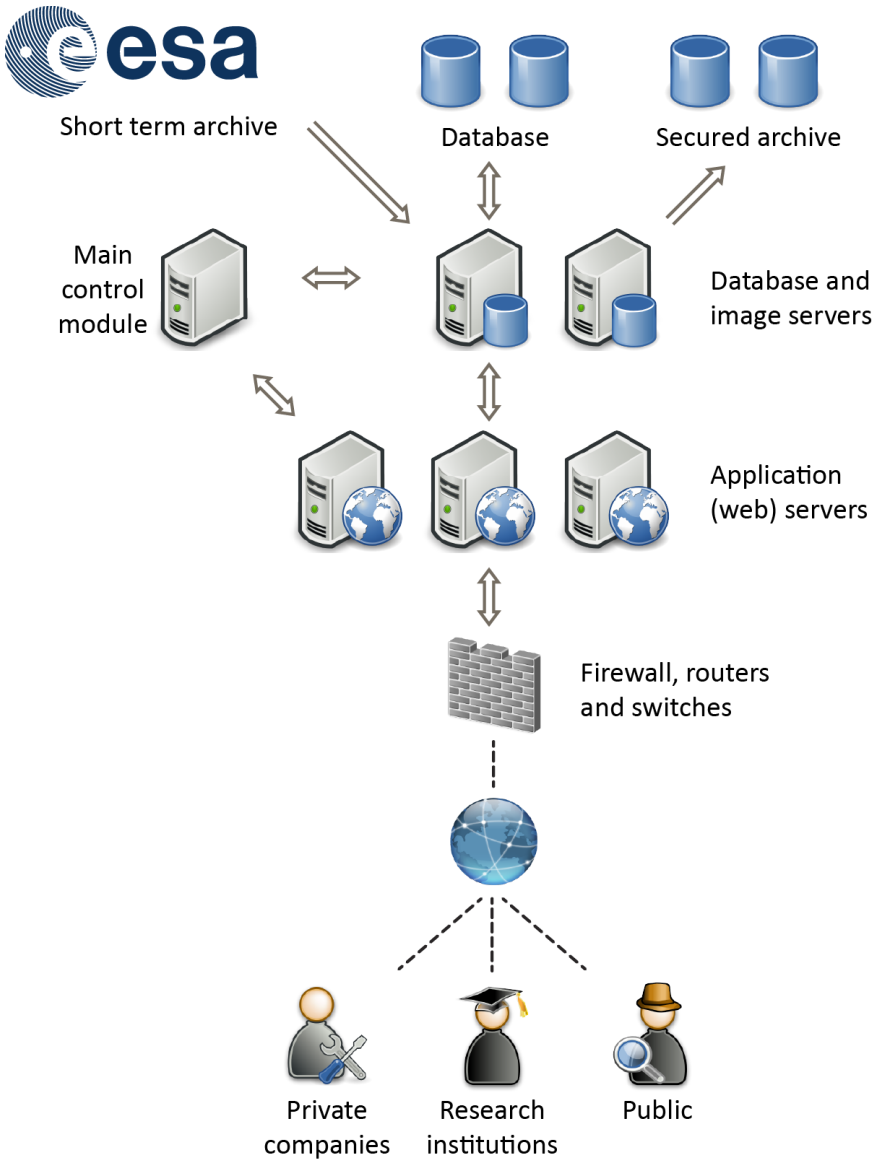
End user Services

Data catalog
Web mapping of products
End user triggered re-processing



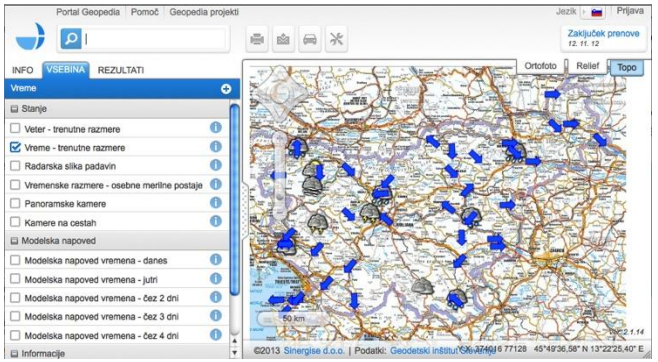


Establishment of a the Sentinel processing and archiving cloud

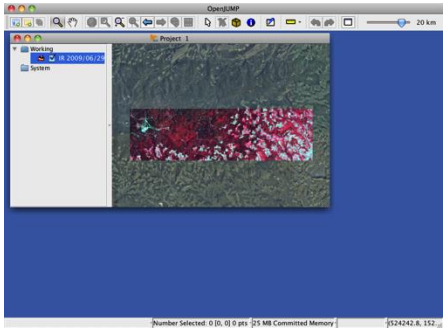


Crowdsourcing

Mobile app



Web GIS

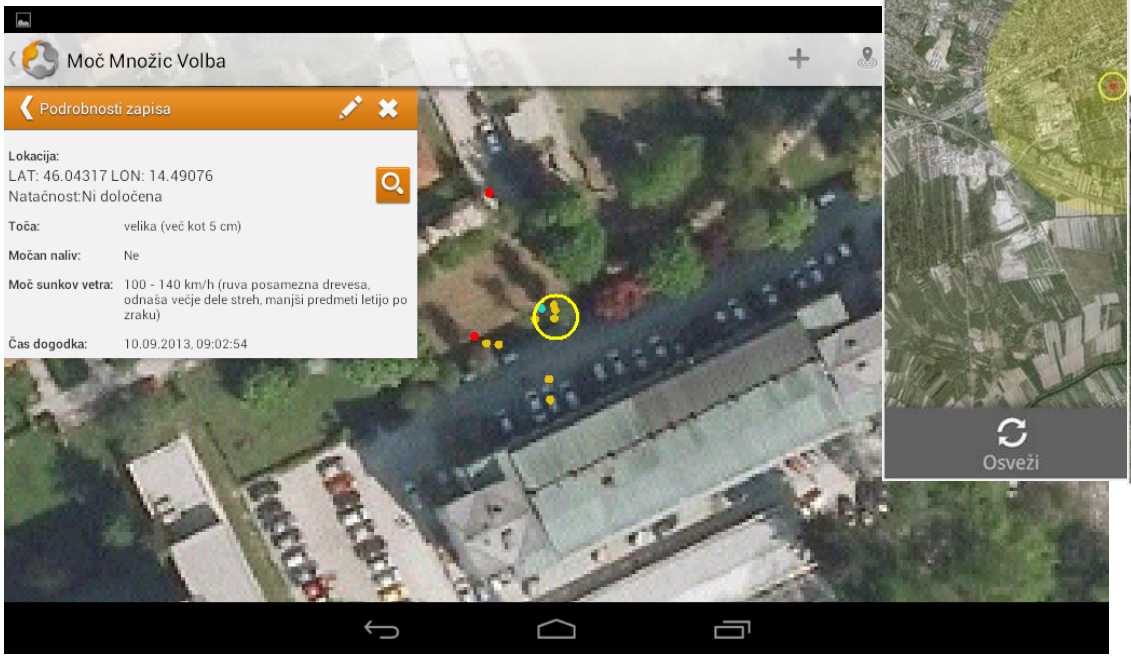


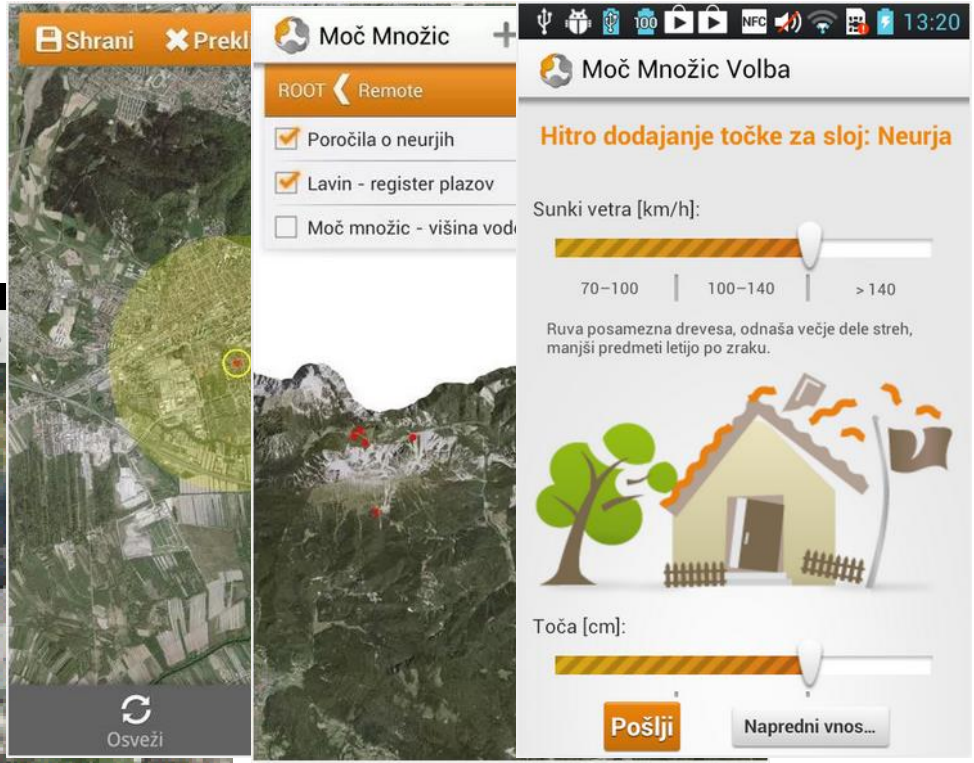
Web services

Close the loop between satellite developers, operators, expert users and genereal public

Mobile app

- Storms, hail
- Water levels
- Water pollution





ANDROID APP ON Google play

Conclusions

- Satellites are generating huge amount of data
- Only information – report, yes/no, alert - is relevant to the end user
- Automatic processing is necessary
- Steps are defined and tested – ready to be implemented in the cloud

Conclusions

- ICT technologies
- Space and ground infrastructure
- Smart cities and communities
  - Spatial data
  - Planning
  - Crowdsourcing
- Smart use of resources
- Health

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