Institute of Meteorology and Water Management
National Research Institute

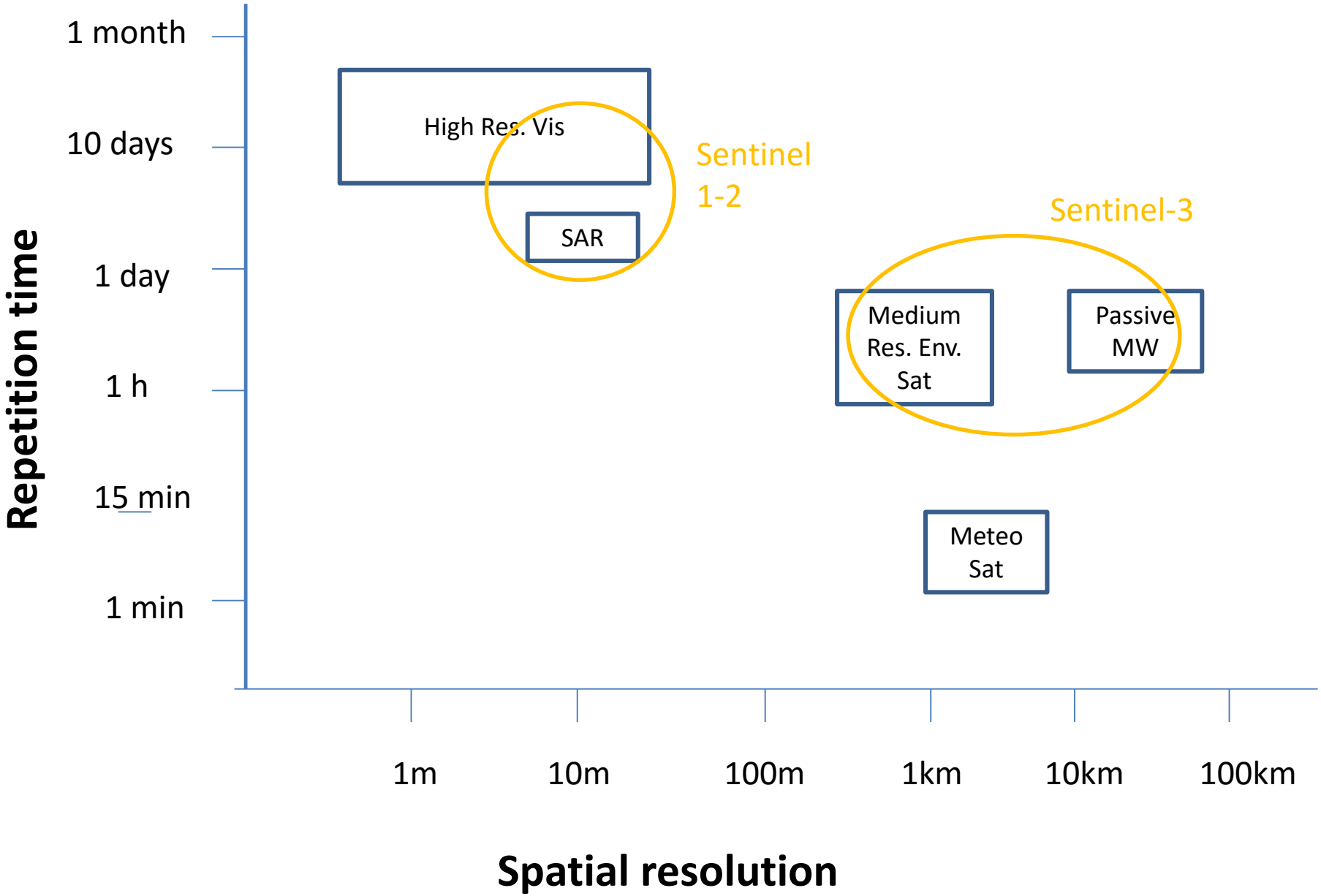
Benefits of the ground segment use for EO data acquisition

Piotr Struzik

IMWM-NRI – Poland, Kraków

Satellite Remote Sensing Department

POGODYNKA PL


1 month
10 days
1 day
1 h
15 min
1 min
Repetition time
High Res. Vis
SAR
Sentinel
1-2
Sentinel-3
Medium
Res. Env.
Sat
Passive
MW
Meteo
Sat
1m
10m
100m
1km
10km
100km
Spatial resolution

Earth Observation applications vs. Timeliness

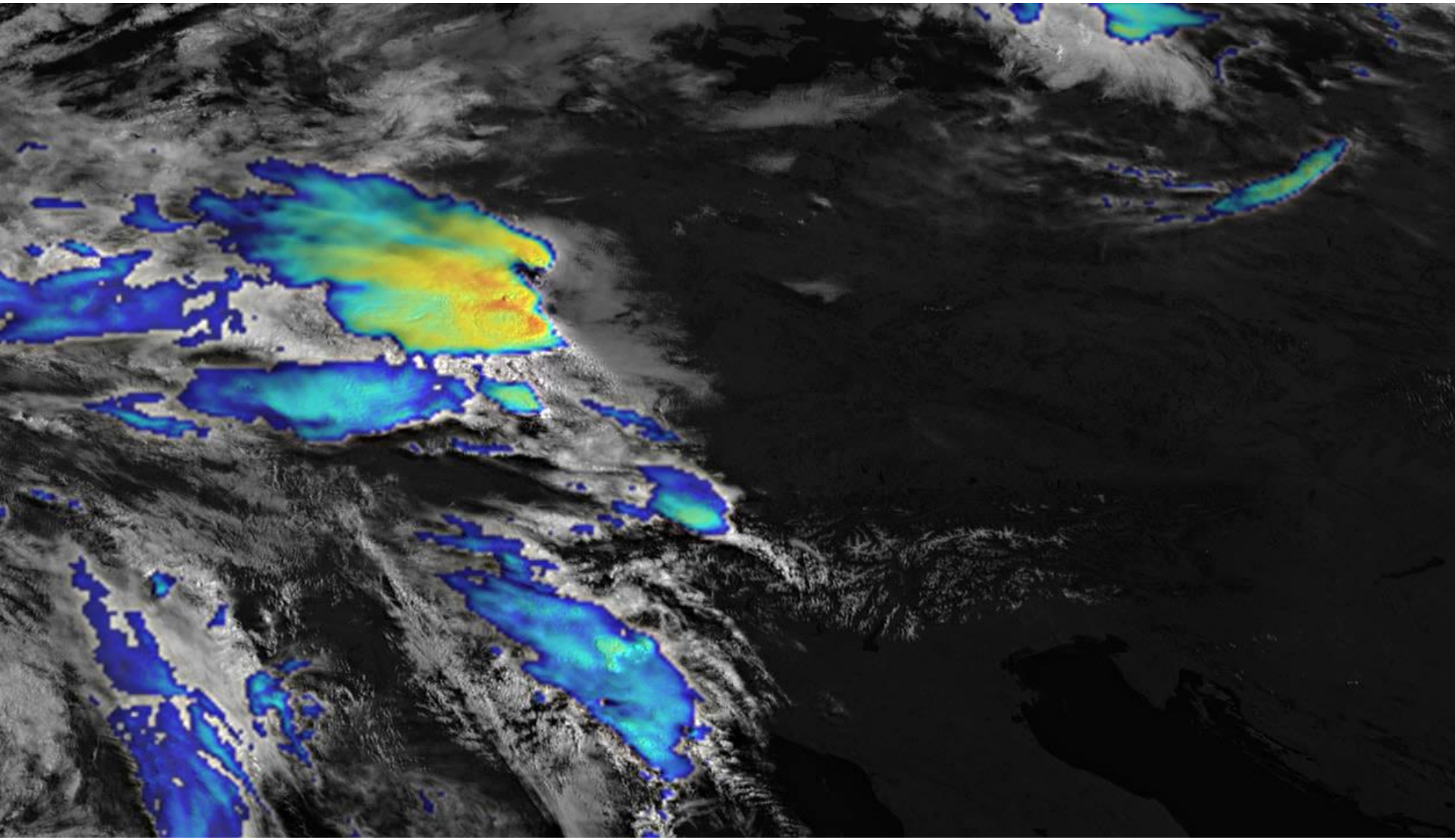
1. Weather: minutes
2. Flight control: minutes
3. Marine safety and polution: minutes - hours
4. Civil protection: minutes – hours
5. Atmosphere monitoring: minutes – days
6. Operational hydrology: 1 hour – 1 day
7. Environment monitoring: hours – days -months – years
8. Regional and urbal spatial planning: months – years
9. Climatology: years

Real time reception, NRT acquisition

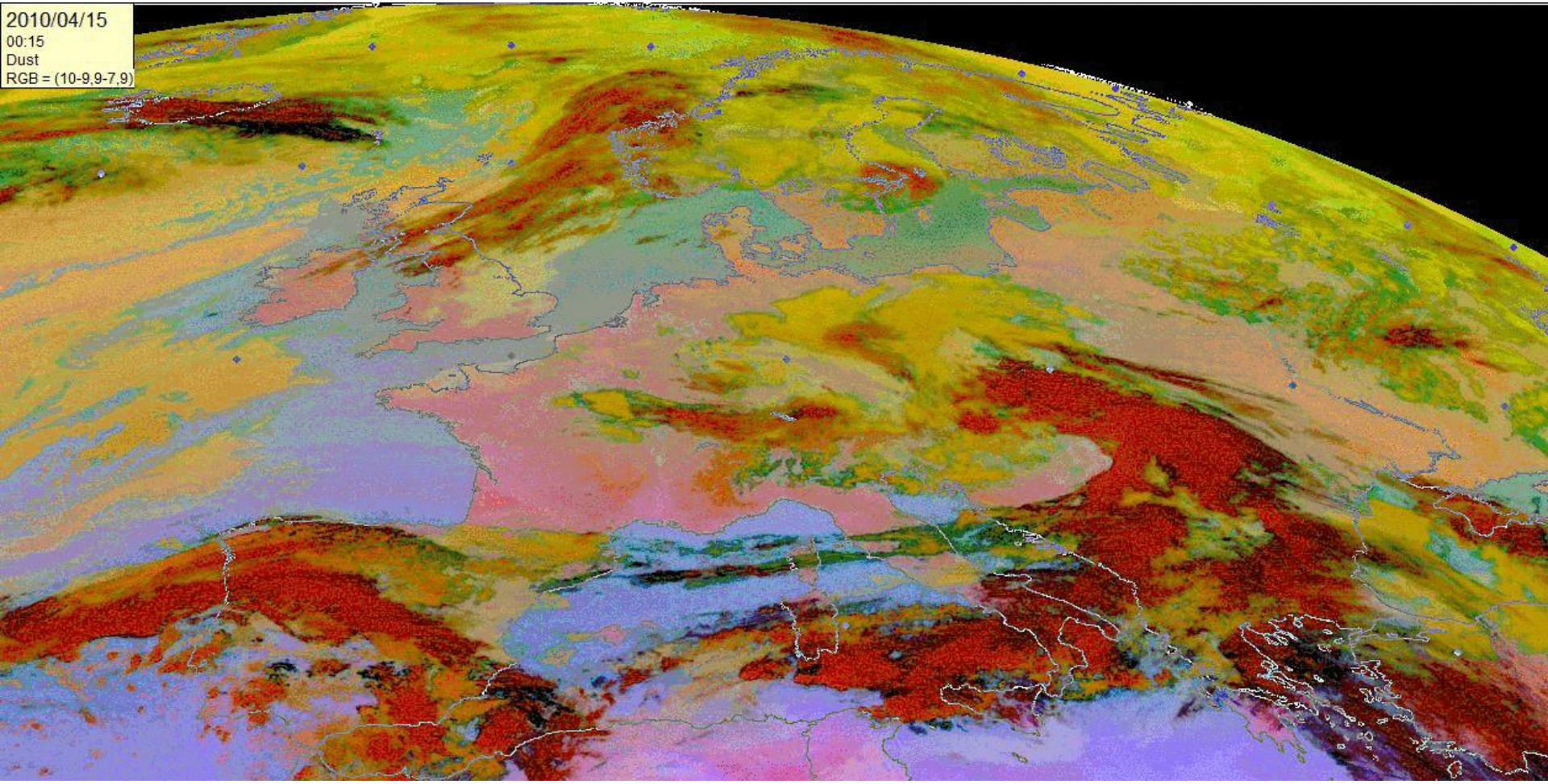
Download from Data hub

Monitoring of convection and storms

2.5 min Super Rapid Scan – Central Europe



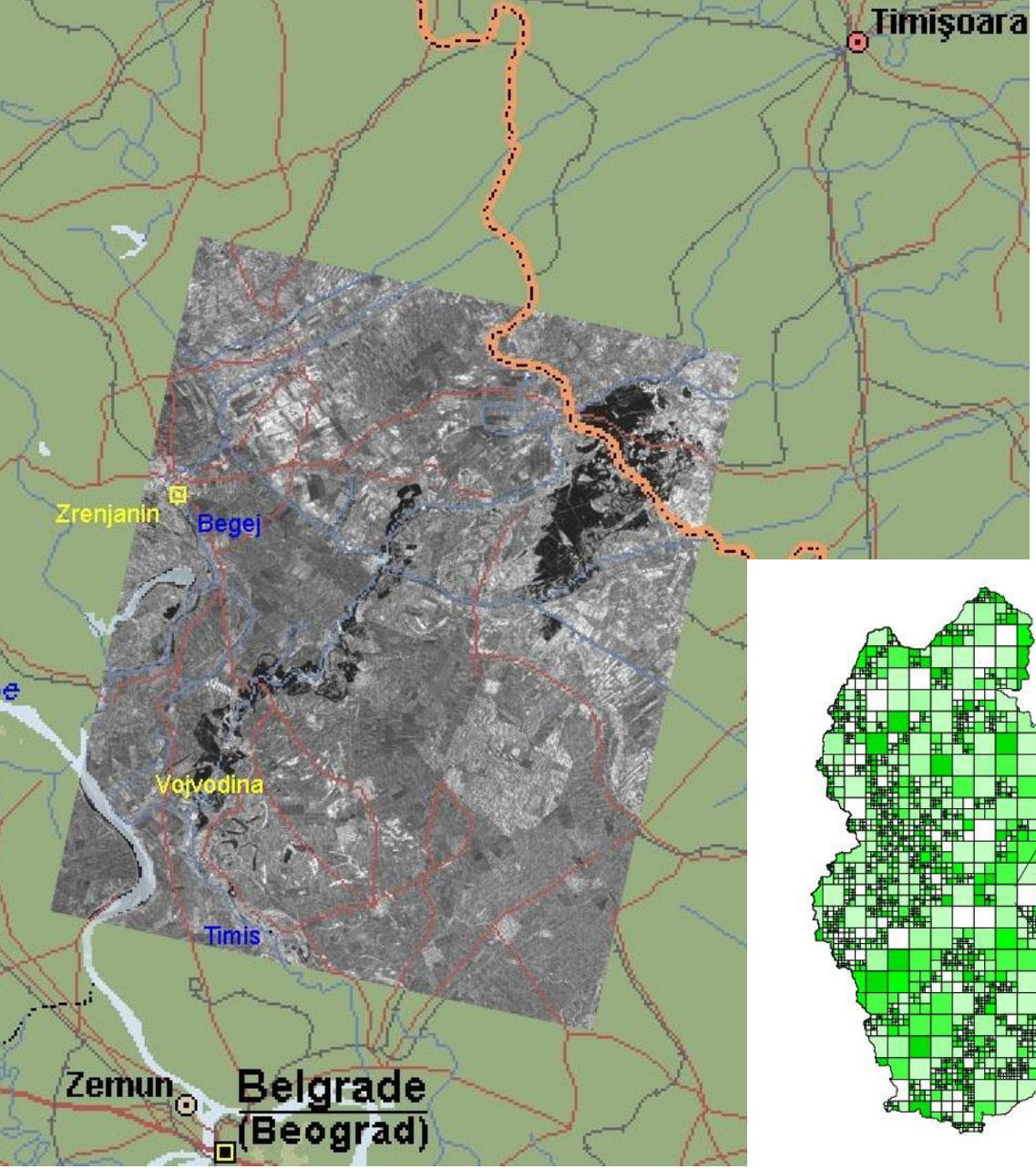
Volcano eruption and volcanic ash transport

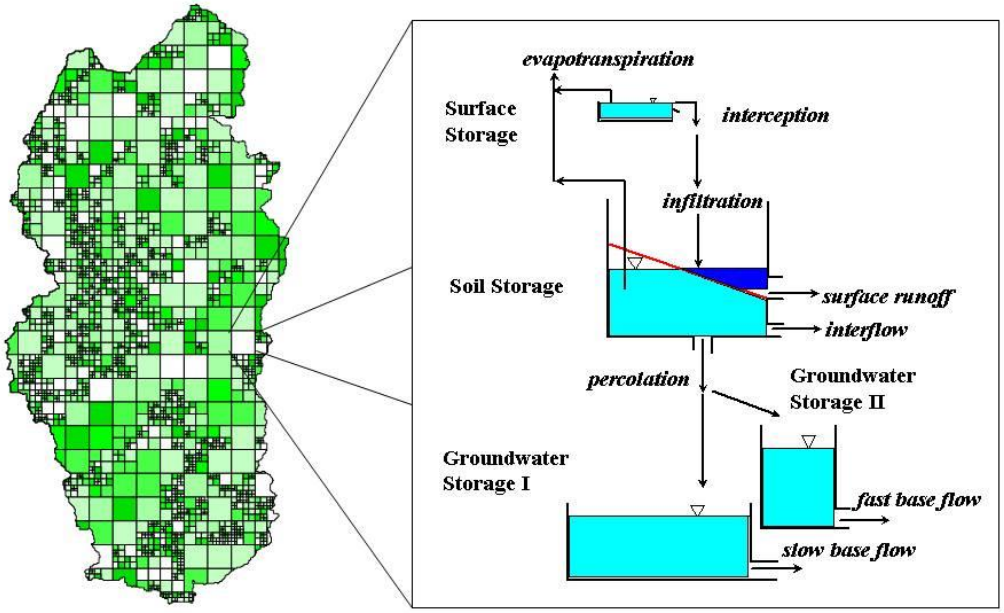


Oli spils / ship tracking with use of SAR data

Monitoring of flooded areas
- Input to Operational hydrological models

Image: Flood in Hungary IV.2000 r.





Flächenverteilte hydrologische Modellierung

Satellite data/products dissemination:

1. Direct reception – products timeliness depends only on user processing system efficiency.
2. NRT dissemination via EUMETCast satellite system – additional delay due to reception in Polar regions (45-90 min) and processing at operator facilities (up to 3 hours).
3. NRT dissemination via Terrestrial EUMETCast system (Geant network) – like in point 2, delivery time on best effort basis.
4. Download via Internet – reception and processing by operator, download speed depend on many factors.

Sentinel Scientific Hub

Attributes

Plik Edycja Widok Historia Zakładki Narzędzia Pomoc

Scientific Data Hub | https://scihub....eu/dhus/#/home

https://scihub.copernicus.eu/dhus/#/home

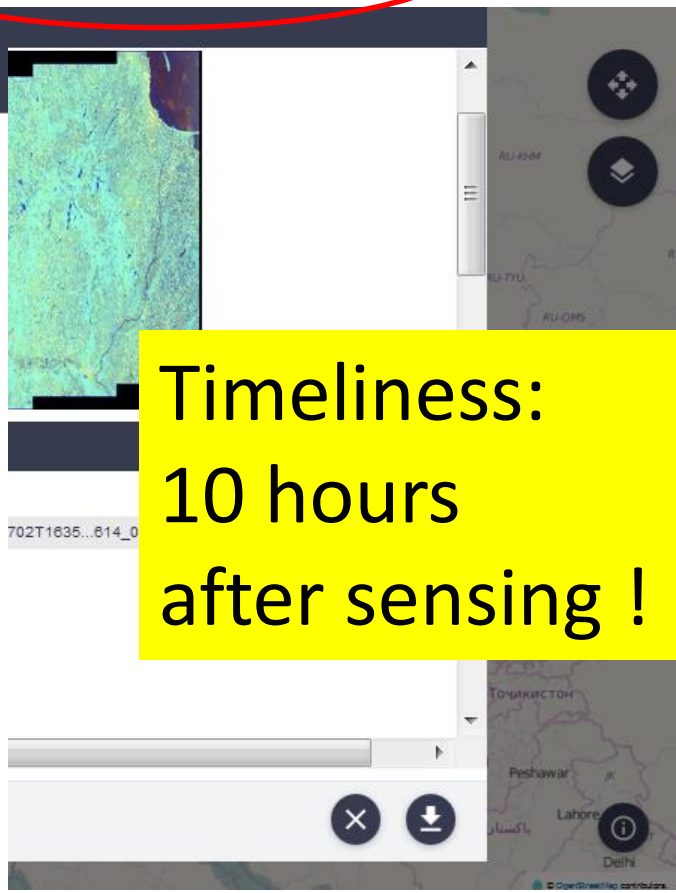
esa opernicus Sentinels

S1A_IW_SLC__1SDV_20160702T163547_20160702T163614_011972_012763_5FF1

Summary

Date: 2016-07-02T16:35:47.368Z

S1A_IW_SLC__1SDV_20160702T163547_20160702T163614_011972_012763_5FF1



Timeliness:
10 hours
after sensing !

Product

Acquisition Type: NOMINAL

Cycle number: 82

Footprint: <gml:Polygon srsName="http://www.opengis.net/gml/srs /epsg.xml#4326" xmlns:gml="http://www.opengis.net/gml"> <gml:outerBoundaryIs> <gml:LinearRing> <gml:coordinates>54.320114,15.304143 54.732616,19.270493 53.113804,19.686695 52.705212,15.872254 54.320114,15.304143</gml:coordinates> </gml:LinearRing> </gml:outerBoundaryIs> </gml:Polygon>

Format: SAFE

Ingestion Date: 2016-07-03T02:25:57.554Z

JTS footprint: POLYGON ((15.304143 54.320114,19.270493 54.732616,19.686695 53.113804,15.872254 52.705212,15.304143 54.320114))

Actual data access:

- Relatively slow, not reliable (*download finished without success !)*,

- Amount of data collected by Sentinels within 24 hours larger than download possibilities.

Possible solutions:

-National operator (dedicated access to Sentinel data)
+ direct reception.
+ EUMETCast reception of data from Sentinel 3, 4, 5, 6
+ direct reception from other environmenal satellites..

Meteorological satellites used operationally by IMGW-PIB

Geostationary:

METEOSAT-10 – basic operational satellite, 15 min scan, 0 deg position

METEOSAT-9 – backup satelite RapidScan 5 min scan, 9.5 deg E position

METEOSAT-8 backup satelite RapidScan 5 min scan, 3.5 deg E position

METEOSAT-7 - MTP series, 57.5 deg E position (Ocean Indyjski)

Indirect acces to:

GOES-E (USA)

GOES-W (USA)

Himawari-8 (Japan)

FY3 (China)

Low eEarth Orbit – direct reception:

Series of NOAA satellites (15, 18 i 19),

European **METOP-A i B**,

Oceanographic **Jason-2**

The newest American **Suomi NPP** (NPOESS Preparatory Programme),

Environmental satellites: **TERRA i AQUA,**

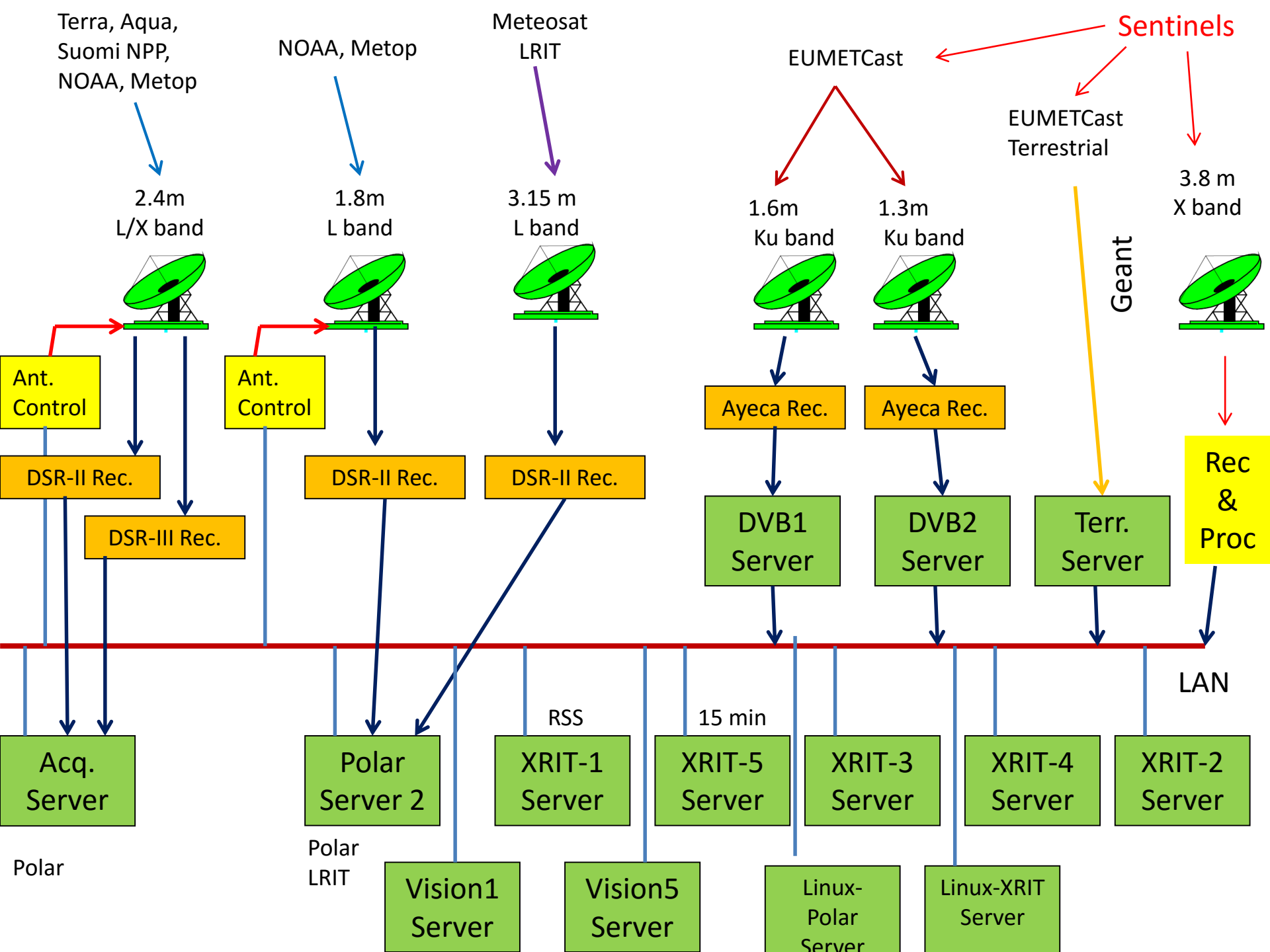
JAXA G-COM-W1

GPM

Jason-2, 3

Sentinel 1,

in future 3,4,5,6


Terra, Aqua,
Suomi NPP,
NOAA, Metop
NOAA, Metop
Meteosat
LRIT
EUMETCast
Sentinels
EUMETCast
Terrestrial
2.4m
L/X band
1.8m
L band
3.15 m
L band
1.6m
Ku band
1.3m
Ku band
Geant
3.8 m
X band
Ant.
Control
Ant.
Control
Ayeca Rec.
Ayeca Rec.
DSR-II Rec.
DSR-II Rec.
DSR-II Rec.
DSR-III Rec.
DVB1
Server
DVB2
Server
Terr.
Server
Rec
&
Proc
LAN
RSS
15 min
Acq.
Server
Polar
Server 2
XRIT-1
Server
XRIT-5
Server
XRIT-3
Server
XRIT-4
Server
XRIT-2
Server
Polar
Polar
LRIT
Vision1
Server
Vision5
Server
Linux-
Polar
Server
Linux-XRIT
Server

Conclusions:

1. Applications which require real NRT data avaiability (minutes) must use direct reception.
2. Direct dissemination available from Sentinel-1, possible from Sentinel 2, 3.
3. Application which require data with timeliness ~3 hours could use EUMETCast dissemination system.
4. EUMETSAT is operator of Sentinel 3 (only Marine Service), 4 (MTG), 5 (EPS-SG), 6 (Jason-CS). Data and products will be disseminated via EUMETCast systems.
5. Actual solution of ESA/Copernicus system could satisfy only scientific users and applications based on historical data.

Thank you
for your attention

Piotr Struzik
Institute of Meteorology and Water Management
- National Research Institute
Satellite Remote Sensing Department
30-215 Kraków, ul. P. Borowego 14
Poland