

DLR Center for satellite based Crisis Information - ZKI

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German Remote Sensing Data Center – DFD
Earth Observation Center – EOC

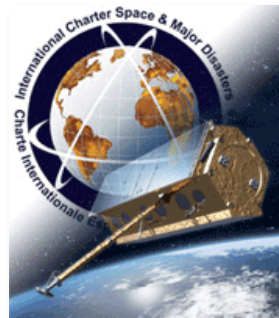
EGSIEM Meeting, Oberpfaffenhofen, 8-9 June, 2017



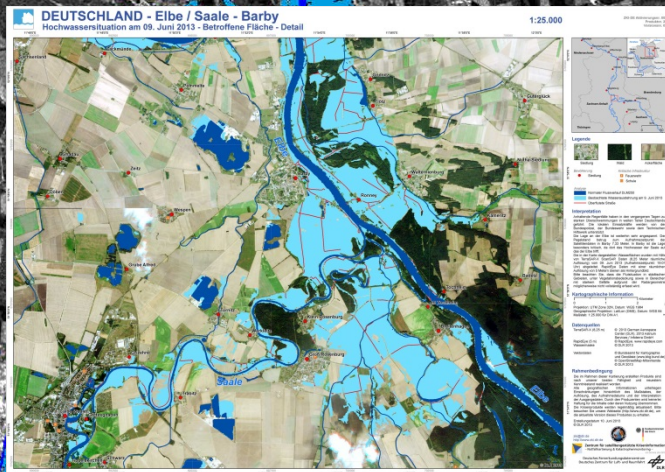
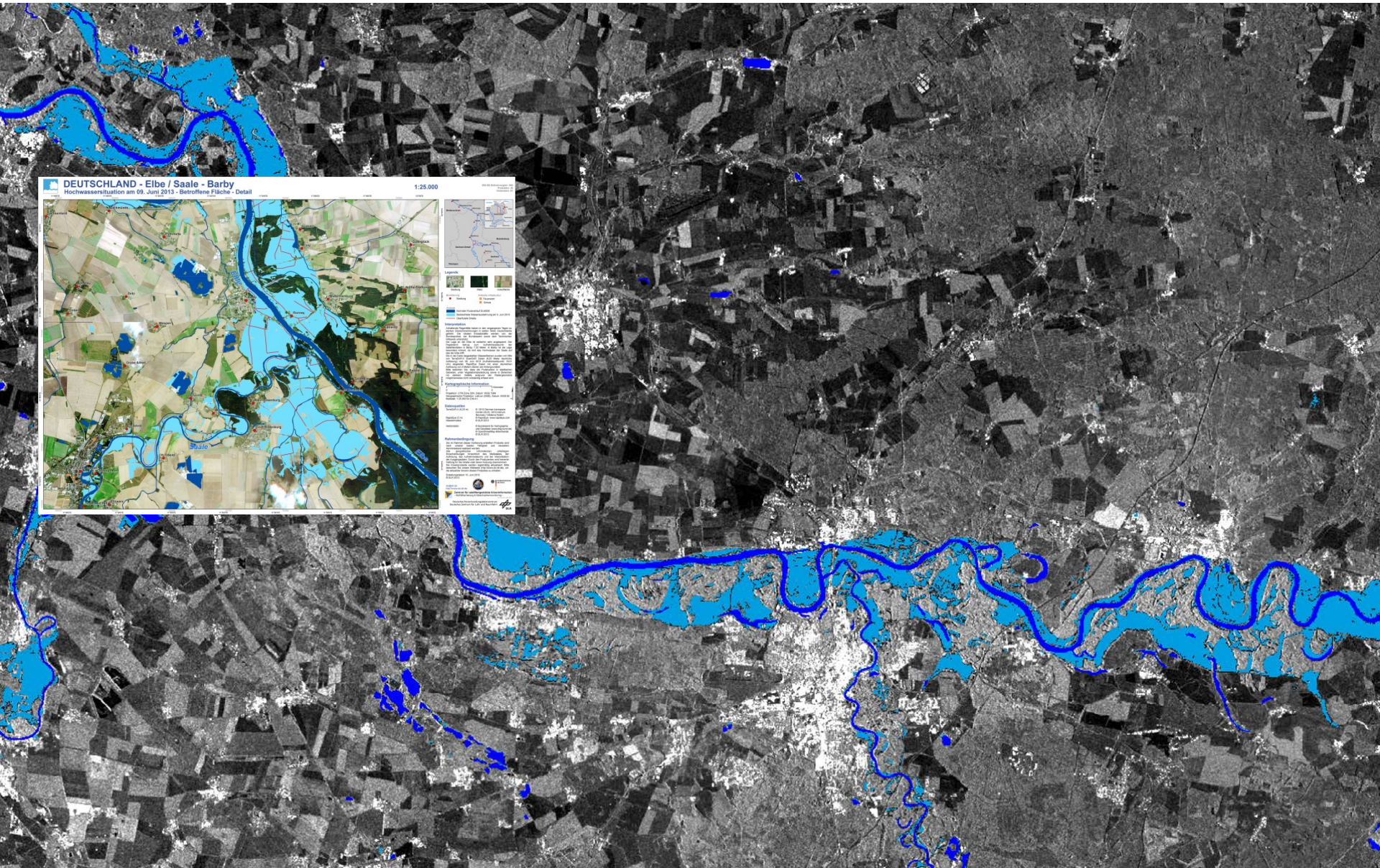
Wissen für Morgen

Center for Satellite-based Crisis Information (ZKI)

- Operational service of DLR since 2004
- Rapid **provision, processing** and **analysis** of remote sensing data in case of
 - natural and environmental disasters
 - humanitarian relief activities
 - civil security issues
- Activities on national/international level
 - Pre-operational Copernicus Emergency Response Service
 - International Charter Space and Major Disasters
 - ZKI Service for Federal Agencies (ZKI-DE)
 - Copernicus Emergency Management Service – Mapping (EMS)



Floods in Germany, June 2013



Fusion of multi sensor data for situational awareness



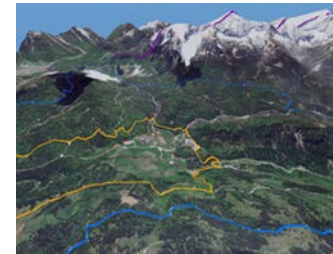
Combination different data sources for a better operational picture



Support to situations centers



3-D Animations/Videos

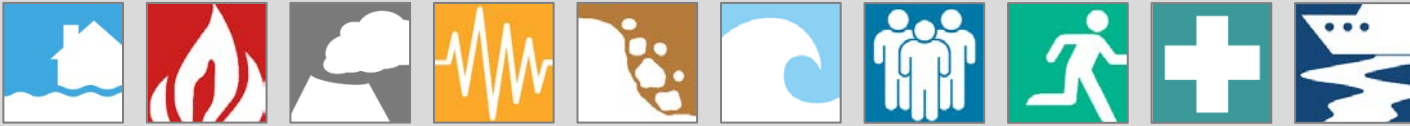


GIS-Ready Data Layers

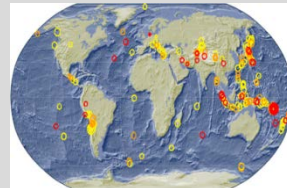
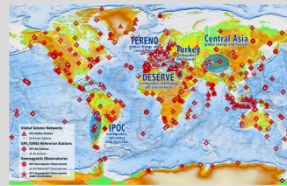
Digital and analog
Information products



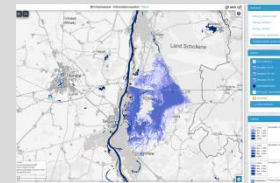
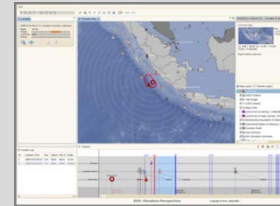
Multi-Hazard Risk Assessment & Early Warning



HAZARD



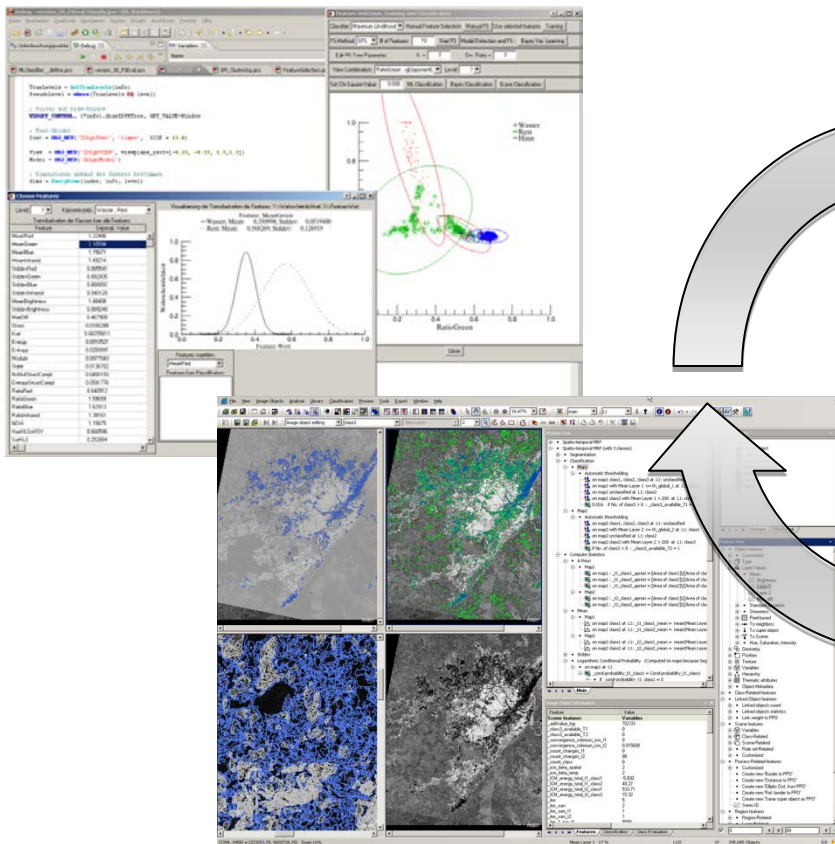
MONITORING



EARLY WARNING



Key driver for DLR/ZKI: feedback between R&D and Service Provision



Research & Development



Services



Involvement of ZKI on national and international level

GERMANY

Emergency Mapping
Service Provision within a
national mandate for the
German Federal Ministry
of Interior



ZKI-DE

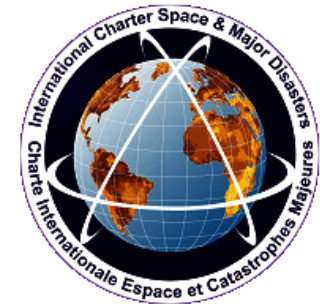
EUROPE

Contribution through
research projects, pre-
operational and
operational services



WORLD

DLR as member of the
International Charter
,Space and major
disasters‘





ZKI-DE by DFD/DLR

ZKI Service für Bundesbehörden (ZKI-DE)

Analyseprodukte zur Unterstützung des
Notfallmanagements



Bundesministerium
des Innern

<http://www.zki.dlr.de/de/services/zki-de>



Szenarios

Crisis Management



Flood



Earthquake



Wild Fires and
Burn Scars



Tsunami



Severe storm



Landslide



Vulcanic
Erruption



Technical
Accident



Humanitarian
crisis

Civil Security



Mega event



Evacuation and
Preparedness



Personal Protection,
Hostage



Police Investigation



Example: Floods in Germany, Summer 2013

Affected area and infrastructure



1. Satellite image



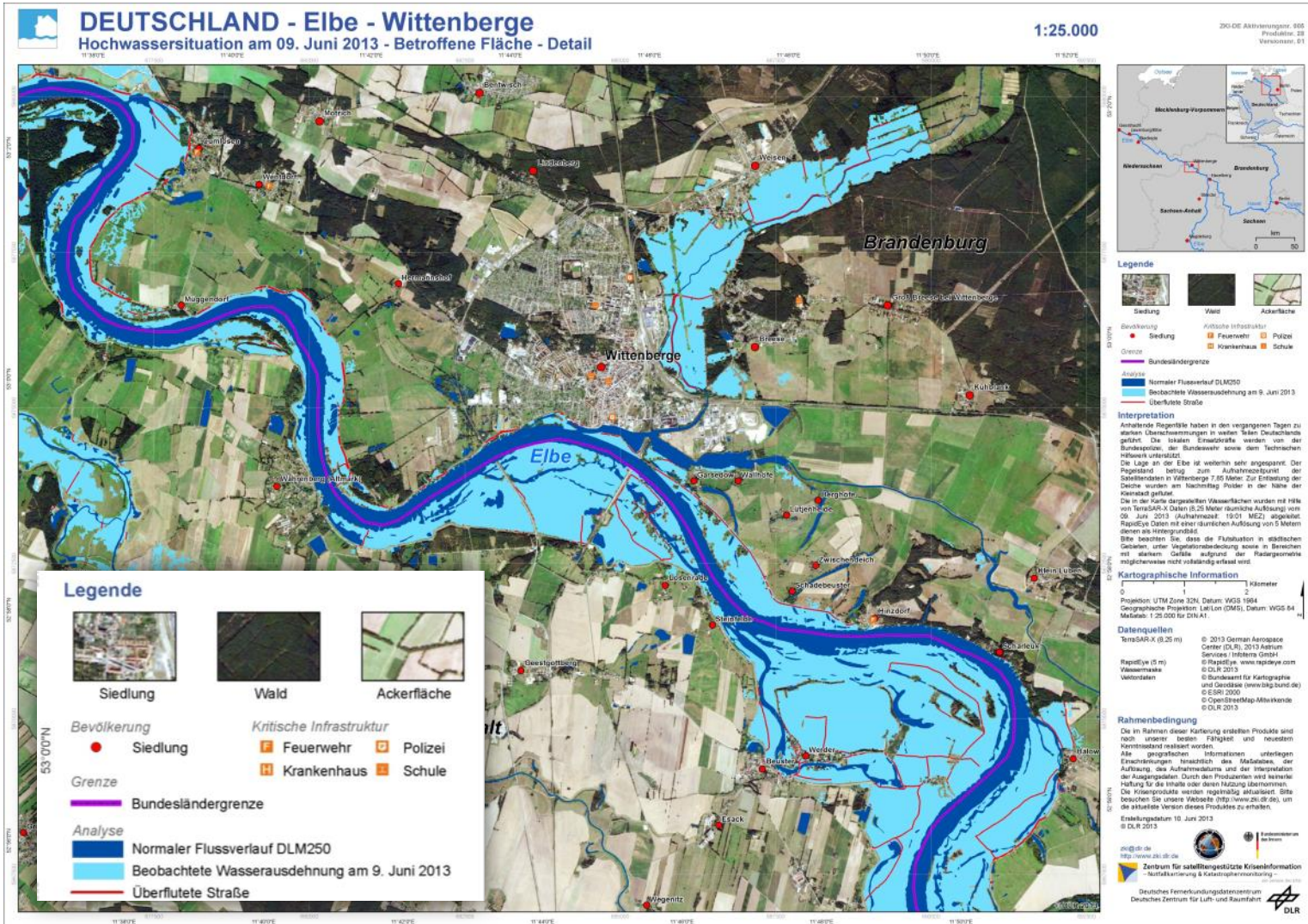
2. Water mask



3. Map product



4. Additional information





Disaster types supported

The International Charter executes priority tasking of different EO missions in a rapid fashion; it is designed to address requests concerning major disasters caused by:

Natural events

Earthquakes
Floods
Landslides
Tsunamis

Fires
Ice jams
Ocean storms
Volcanic eruptions

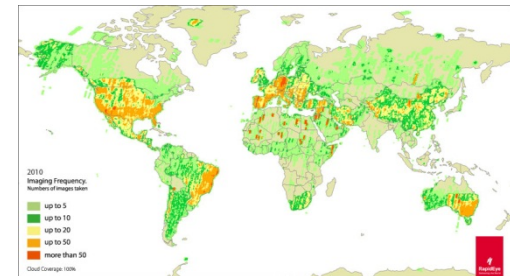
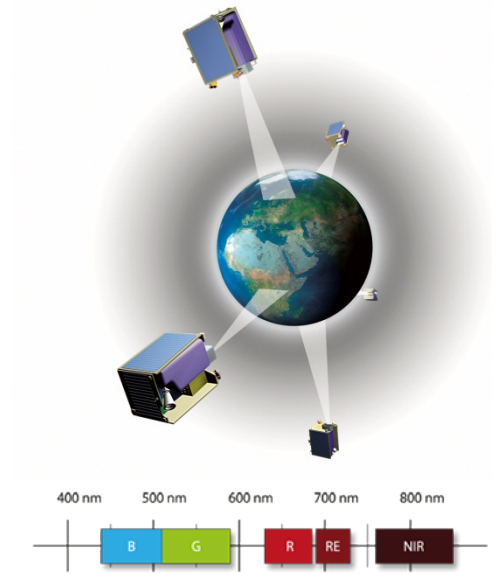
Man-made events

Oil spills
Industrial accidents



RapidEye - characteristics

- constellation of 5 satellites
 - *Quick response time*
- Solar-synchronous orbit in 630 km height
- 5 bands (blue, green, red, Red Edge, NIR)
- GSD 6,5m; pixel size (orthorectified) 5m
- Swath width: 77 km

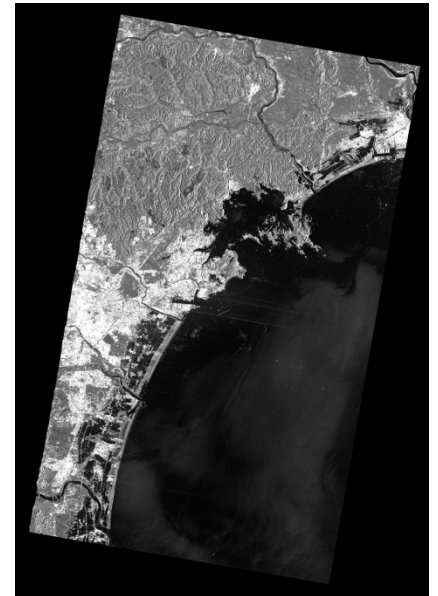


DLR contribution to the Charter

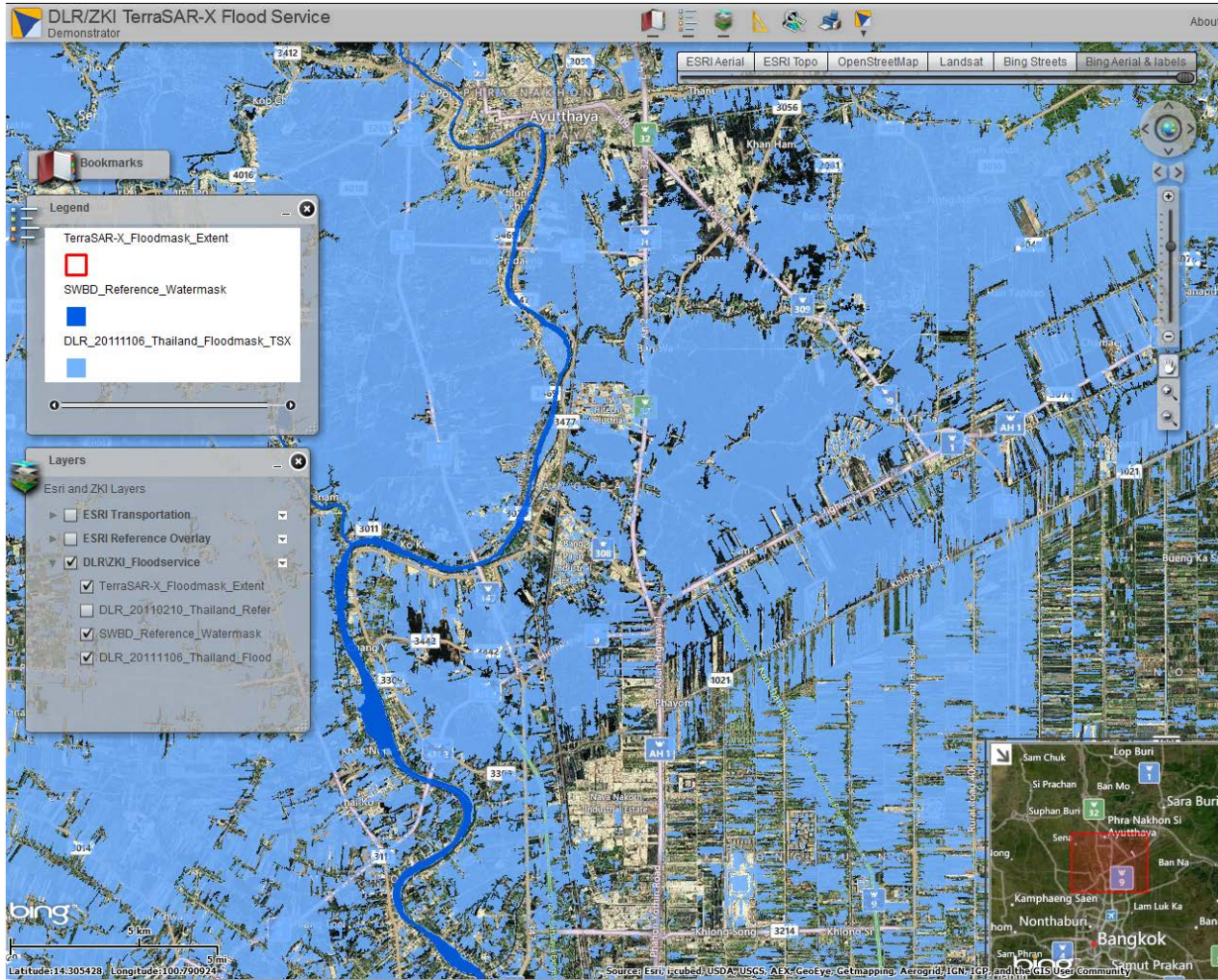
- TerraSAR-X/TanDEM-X standard products

- WideScanSAR (WS)
- ScanSAR (SC)
- StripMap (SM)
- Spotlight (SL)
- HighResSpotlight (HS)

Acquisitions are realized through TerraSAR-X and TanDEM-X (but no DEMs)



TerraSAR-X Flood Service

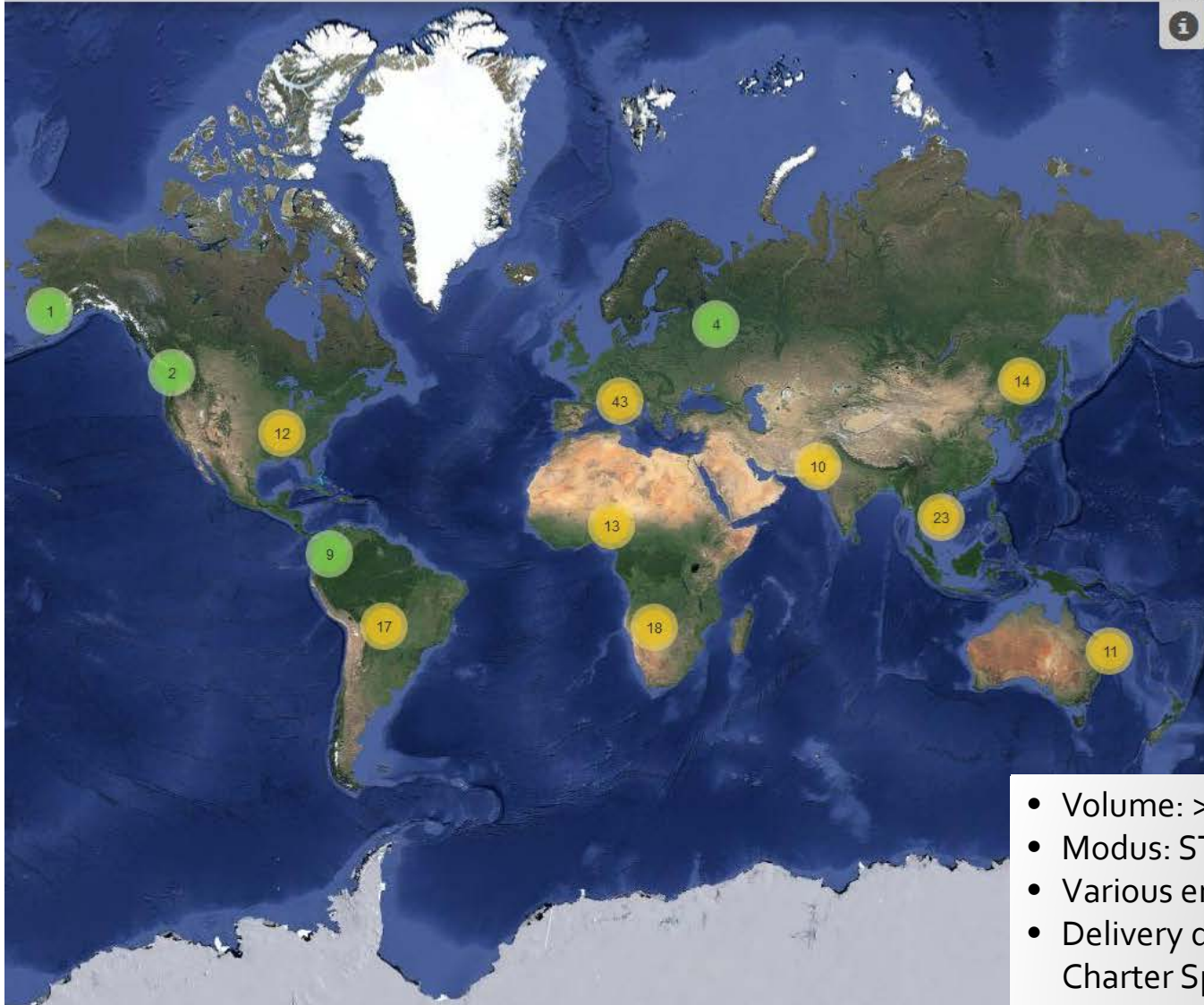
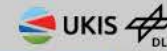


- Fully automatic service
- TSX resolution: ~0.25-40.0m
- Local to regional scale flood mapping
- On-demand triggering in case of emergencies



TerraSAR-X Flood Service: *Results*

TerraSAR-X/Sentinel-1 Flood Client | 1.1.0



Layers

	Footprint	<input type="checkbox"/>
	TerraSAR-X Image	<input type="checkbox"/>
	Non-Floodmask	<input type="checkbox"/>
	Standing-Watermask	<input type="checkbox"/>
	Floodmask	<input checked="" type="checkbox"/>
	Markers	<input checked="" type="checkbox"/>

Baselayers

	ESRI grey
	Cloudmade Pale
	Google Satellite

- Volume: >250 TSX flood scenes
- Modus: ST, HS, SL, SM, SC, WS
- Various environmental conditions
- Delivery during activations of the Int. Charter Space and Major Disasters

TerraSAR-X Flood Service: *Results (Brazil, 2015)*

TerraSAR-X/Sentinel-1 Flood Client | 1.1.0

UKIS DLR

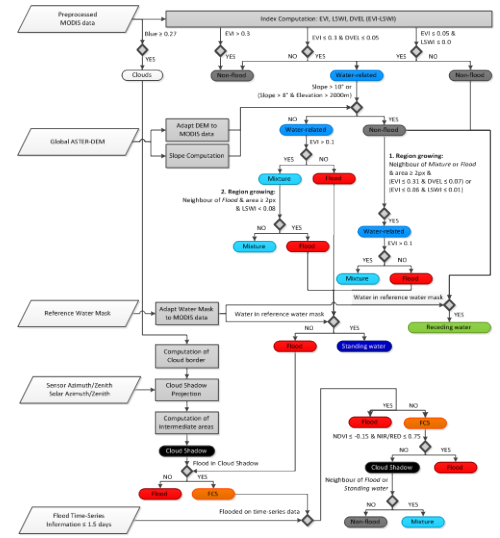
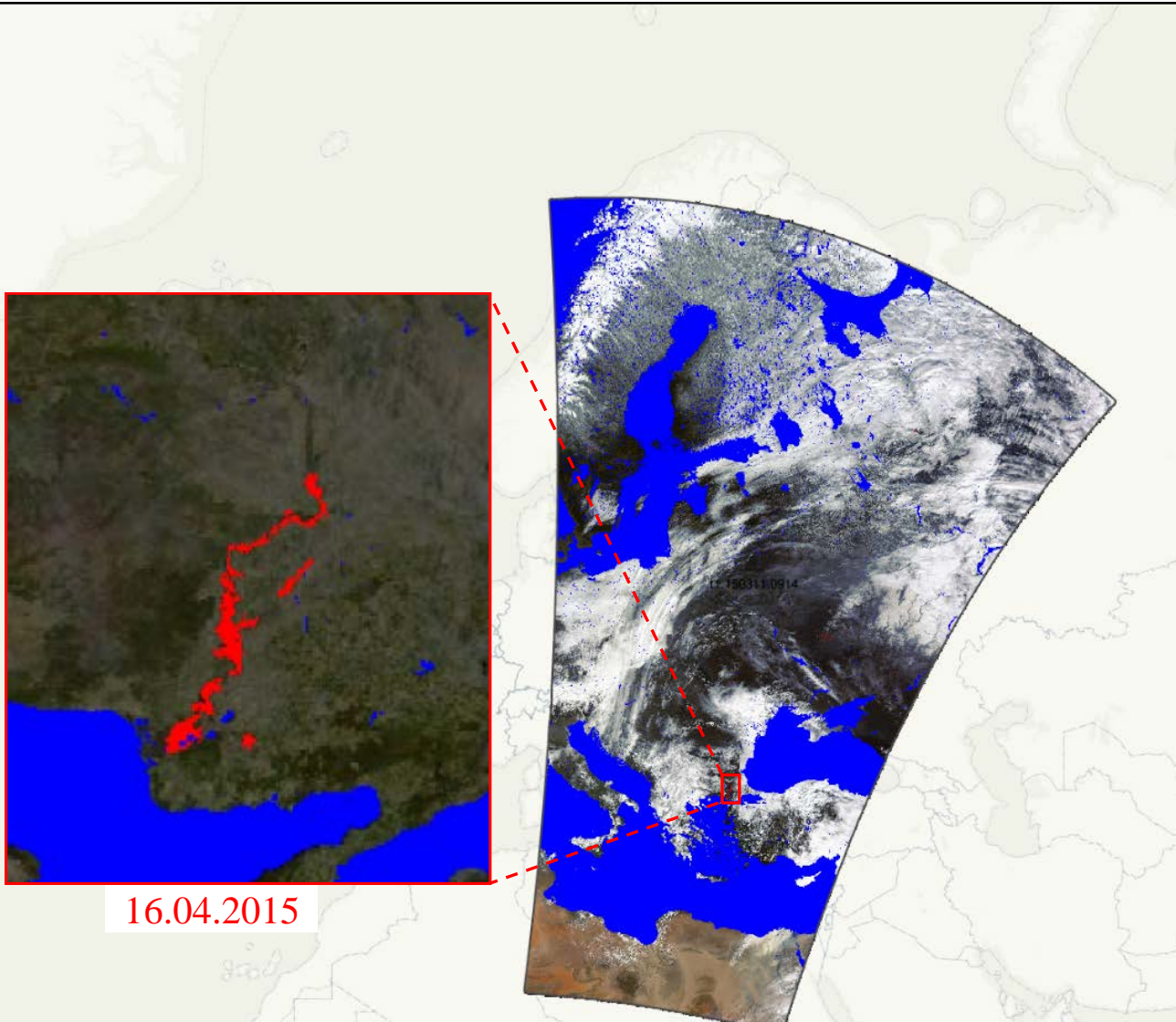
Layers

- Footprint
- TerraSAR-X Image
- Non-Floodmask
- Standing-Watermask
- Floodmask

The image displays a world map with 18 numbered circular markers. Markers 1, 2, 9, and 17 are green, while markers 4, 10, 12, 13, 18, and 43 are yellow. A red dashed line indicates a zoomed-in view of a region in South America, specifically Brazil. This zoomed-in view shows a floodmask where flooded areas are represented by blue patterns against a grey background. The floodmask highlights a complex network of rivers and floodplains.

Brazil, 2015

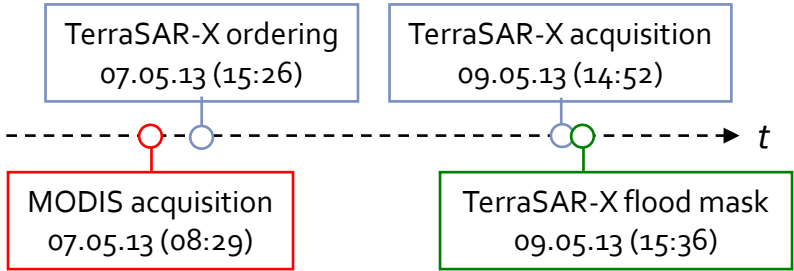
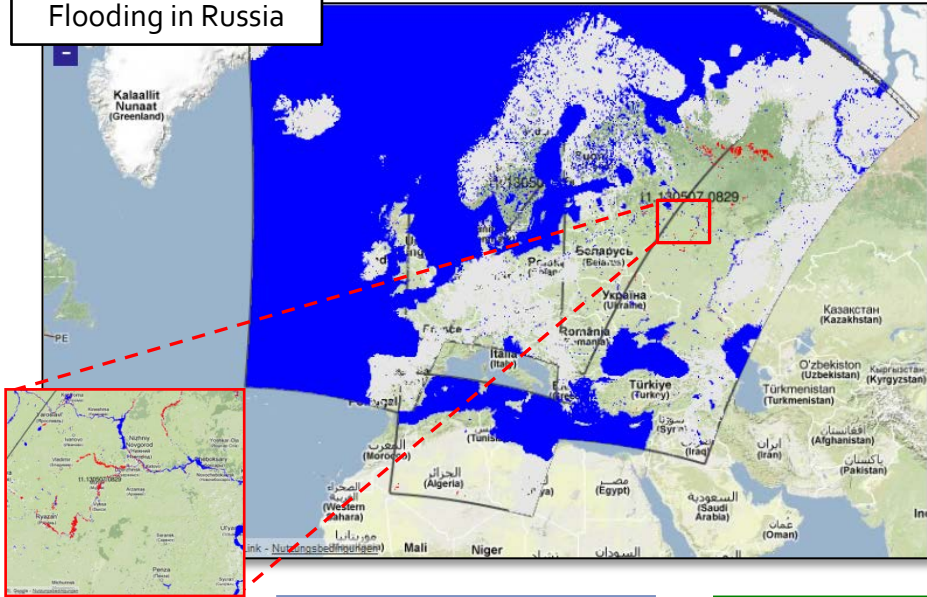
TerraSAR-X Flood Service: *Triggering by MODIS*



- Fully automatic service
- Systematic acquisition
- Large-scale flood mapping (res. ~250m)
- High revisit interval
- Interactive access via Browser/WebGIS

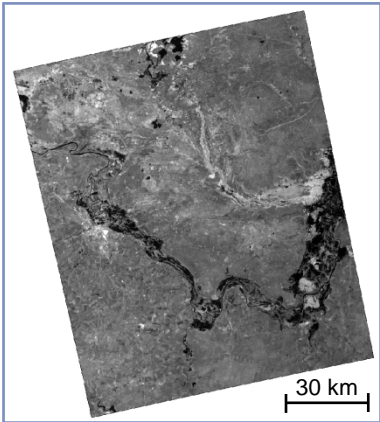
TerraSAR-X Flood Service: *Triggering by MODIS*

Flooding in Russia

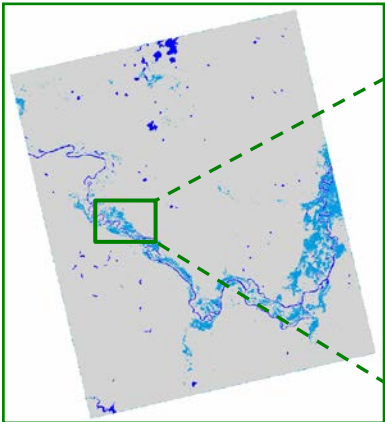


- Activation of on-demand TerraSAR-X Flood Service using results of the MODIS Flood Service
- Increase of probability for detailed flood mapping with high resolution SAR data

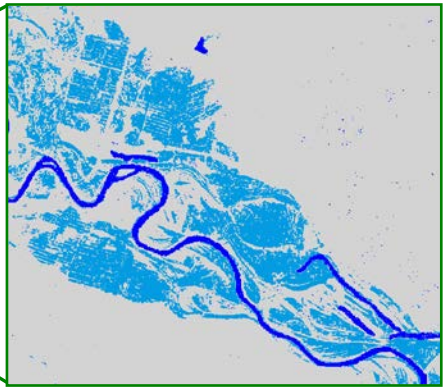
Alerting
Triggering



TerraSAR-X SC (09/05/2013)



TerraSAR-X Flood Mask

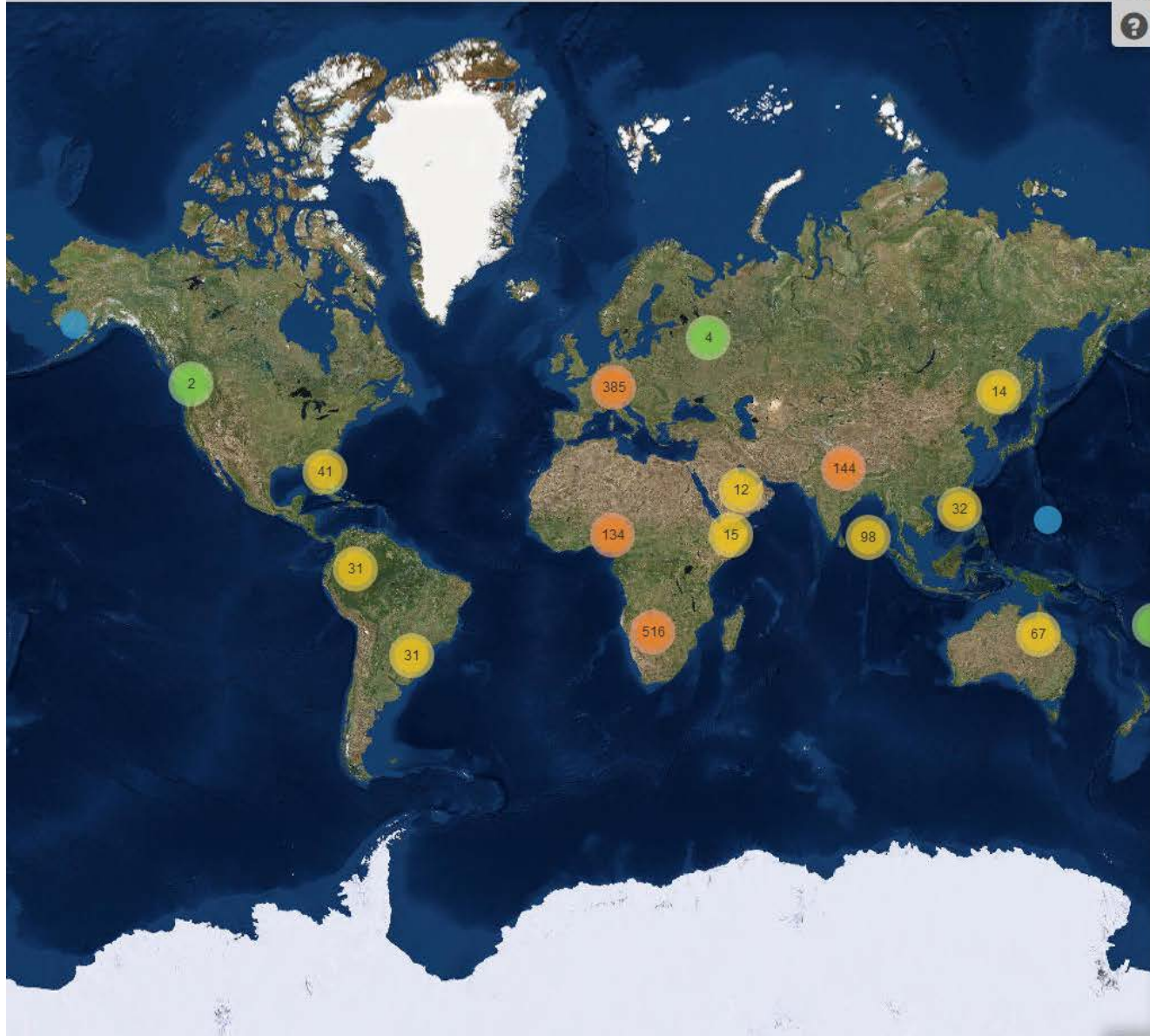


- Flood
- Standing water
- No water
- Clouds



Sentinel-1 Flood Service

TerraSAR-X/Sentinel-1 Flood Client | 1.1.0



Observations

Filter Observations e.g. ID=2115 or Sensor=tsx...

ID	Type	Datetime	Sensor
3645	flood	2016-09-28T16:00:32Z	s1
3644	flood	2016-09-28T00:04:02Z	s1
3642	flood	2016-09-28T00:03:37Z	s1
3643	flood	2016-09-28T00:03:12Z	s1
3640	flood	2016-09-27T19:23:56Z	s1
3641	flood	2016-09-27T19:23:31Z	s1
3638	flood	2016-09-27T04:13:12Z	s1
3634	flood	2016-09-26T16:48:36Z	s1
3635	flood	2016-09-26T16:48:11Z	s1
3639	flood	2016-09-26T16:15:44Z	s1

« 1 2 3 4 5 6 7 ... 154 »

1-10 from 1531 Observations

Create an Observation

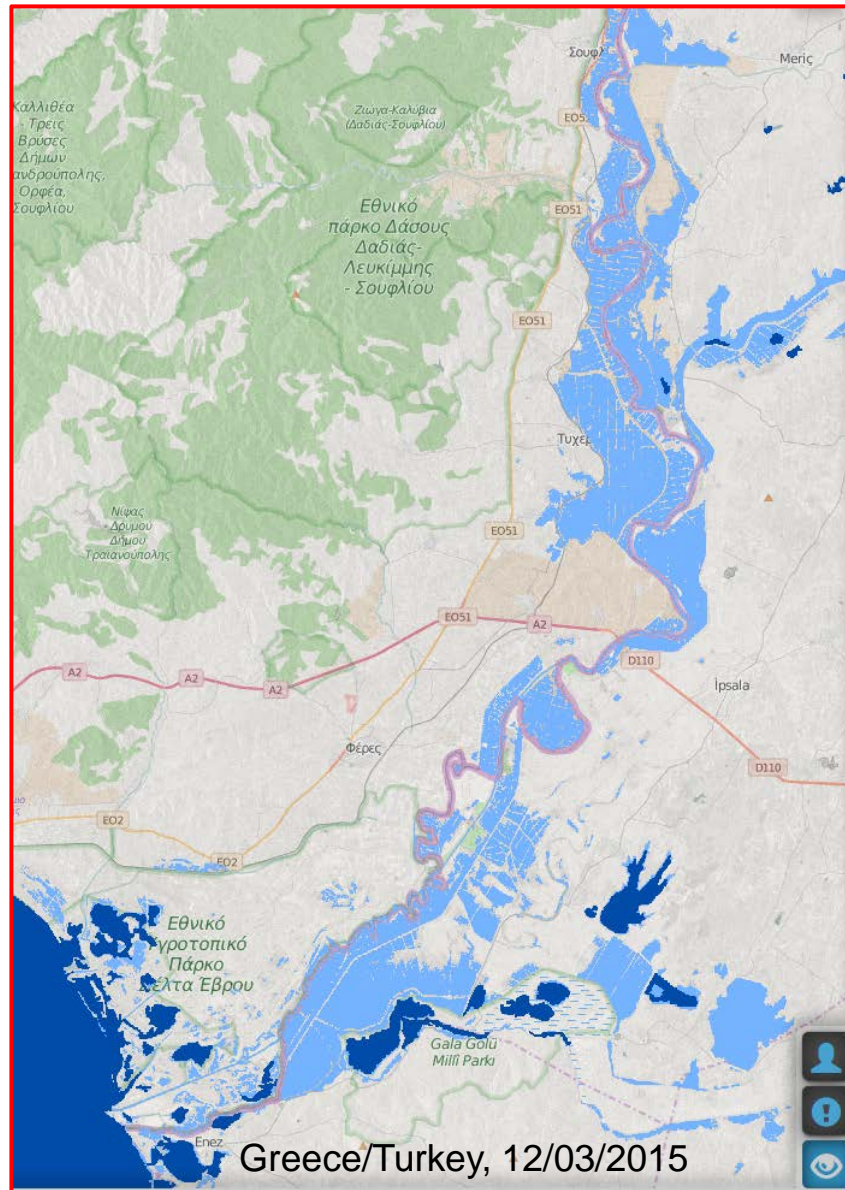
Marker Legend

Thematic Layers

GUF Africa off

GUF Namibia off

Sentinel-1 Flood Service



Characteristics

- Fully automatic service
- Systematic flood monitoring
- Large-scale flood monitoring (IW res. ~20m)
- Repeat frequency: 6 days (Sentinel-1A/B)
- Revisit frequency: ~2 days (Europe)
- Interactive access via Browser/WebGIS



EGSIEM: daily GRACE-based wetness index in combination with daily results from Sentinel-1 & TerraSAR-X flood service

