

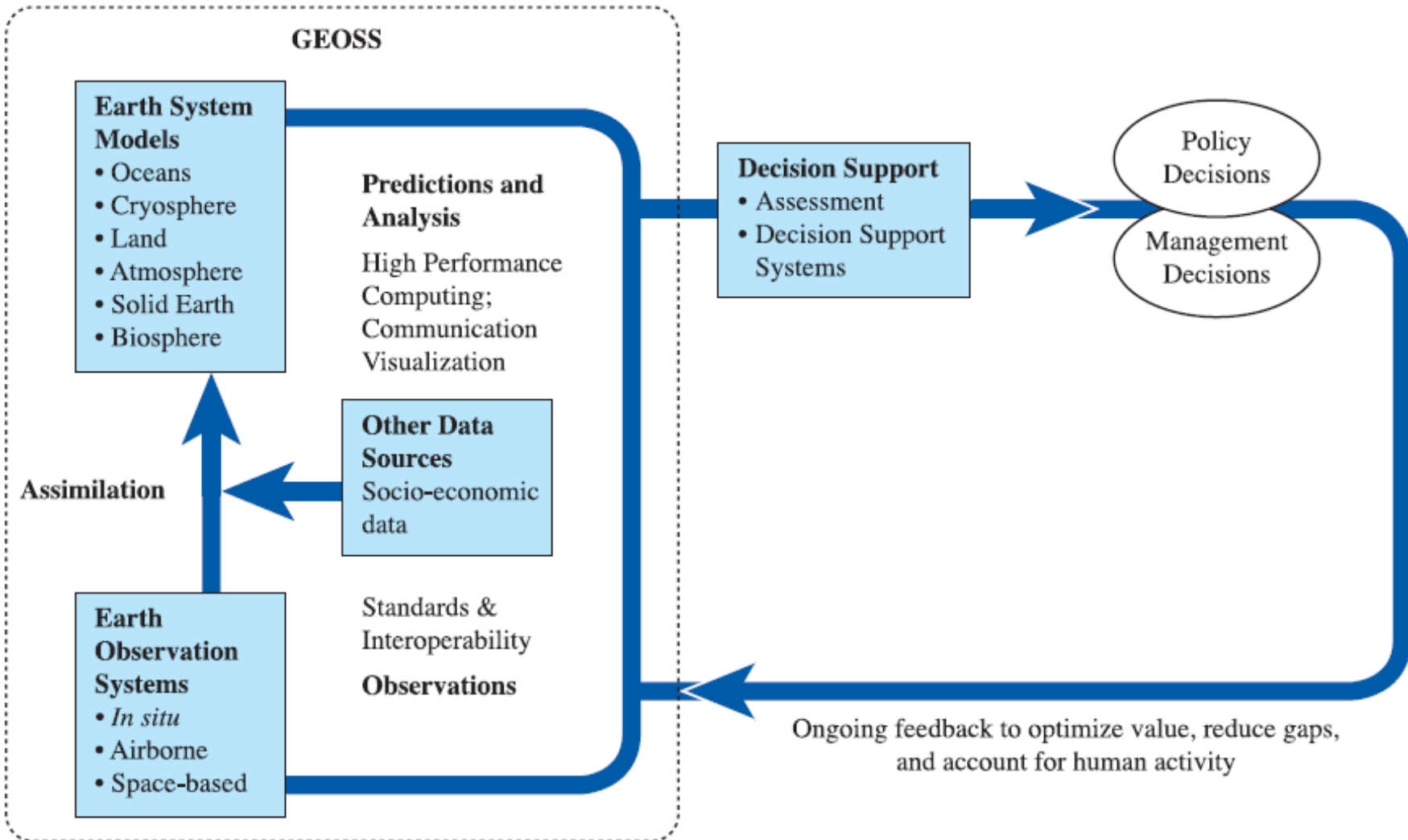
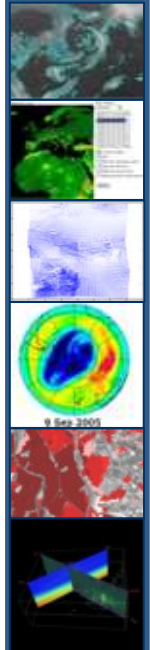
Data Integration for Natural Disasters Monitoring



Prof. Nataliia Kussul,
Sergii Skakun
Space Research Institute NASU-NSAU, Ukraine

UN-SPIDER Workshop
October 13-15, 2008
Bonn, Germany

GEOSS Structure



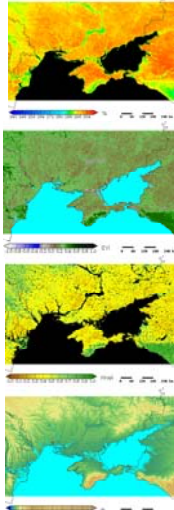
Data Fusion for Disaster Monitoring



Input data (satellite, in-situ)

Basic services

- NDVI
- Land Cover
- DEM
- LAI
- ...

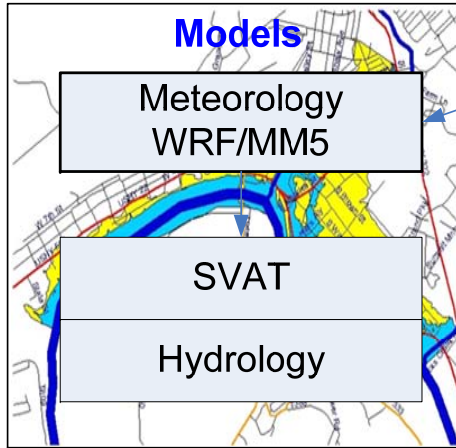


Models

Meteorology
WRF/MM5

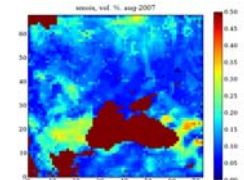
SVAT

Hydrology



Data assimilation

- In-situ
- SYNOP
- RAOB
- D33
- AIRS
- AMSR-E
- QuikScat



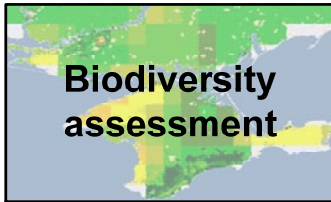
Data assimilation

- MODIS
- MSG

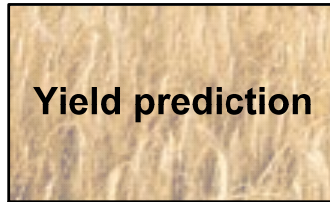


Applied services

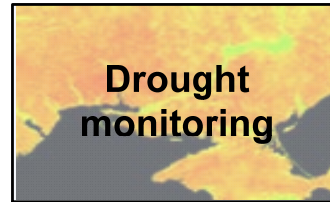
Biodiversity
assessment



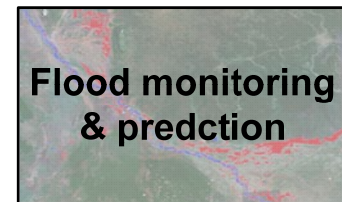
Yield prediction



Drought
monitoring



Flood monitoring
& prediction

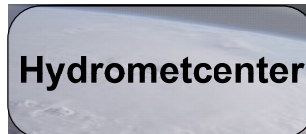


Users

Agriculture



Hydrometcenter



Water
resources
authority



Disasters
Charter

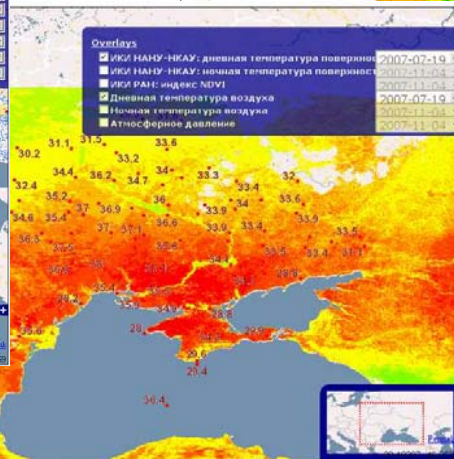
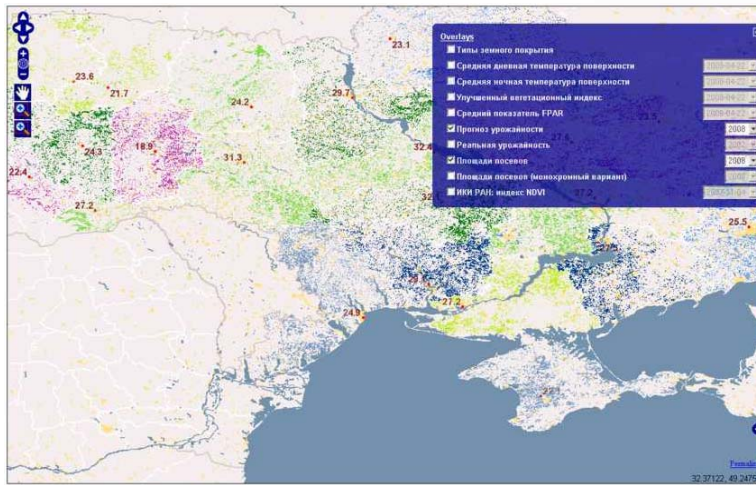
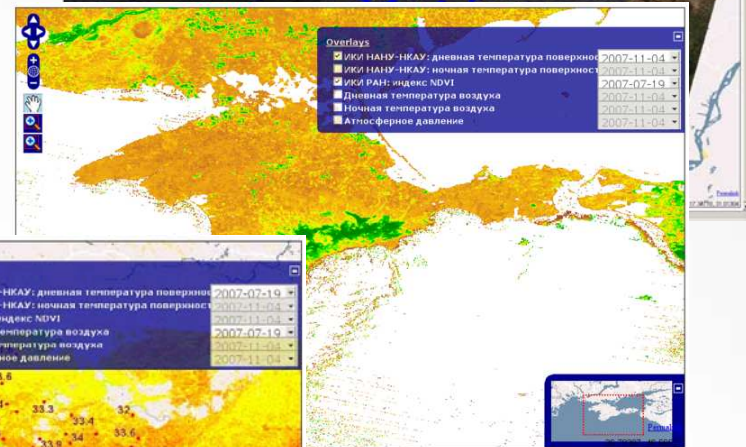
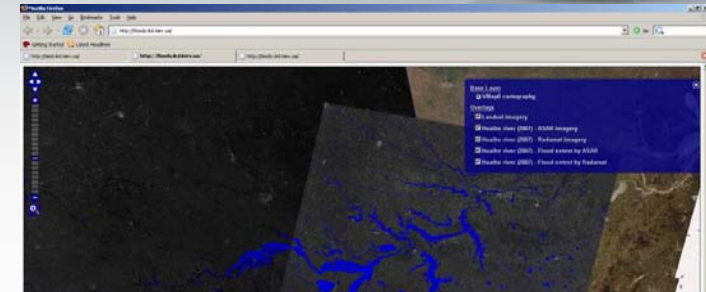


Interested organizations

Online services within GEO-Ukraine



- Biodiversity monitoring
- Land products
- Yield prediction
- Flood monitoring



Biodiversity assessment (with CASRE)



Веgetаційний індекс EVI
Enhanced Vegetation Index

*Частка випромінення,
що поглинута рослинністю*



Середня температура поверхні
Average Surface Temperature

Продуктивність рослинності
Net Primary Production



Типи покриття ландшафту
Land Cover Types



Повний водозбір
Water Vapour Near Infrared



Топографічні дані (SRTM)
Digital Elevation Model (SRTM)



Вологість ґрунту (дані AMSR-E)
Soil Moisture (AMSR-E data)



Service for biodiversity monitoring



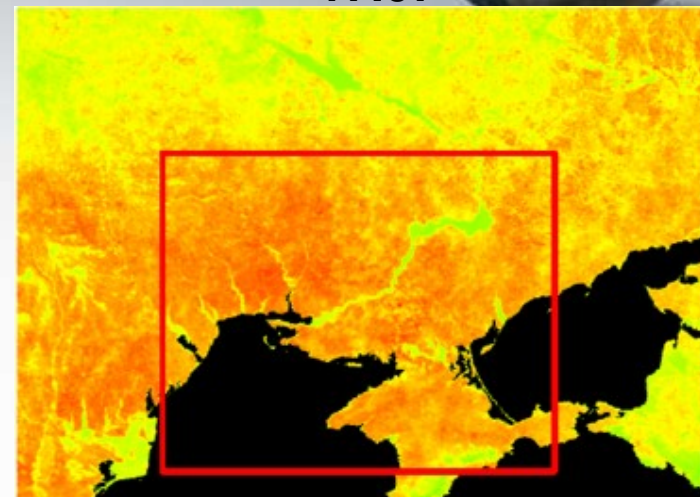
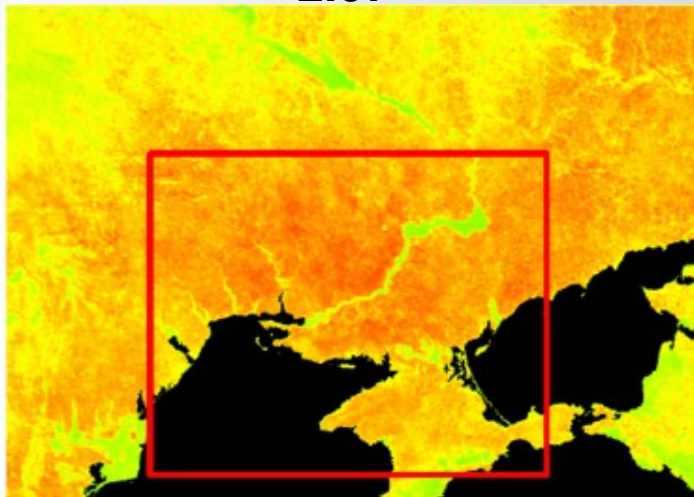
Drought monitoring using MODIS data (2006-2007)



2.07

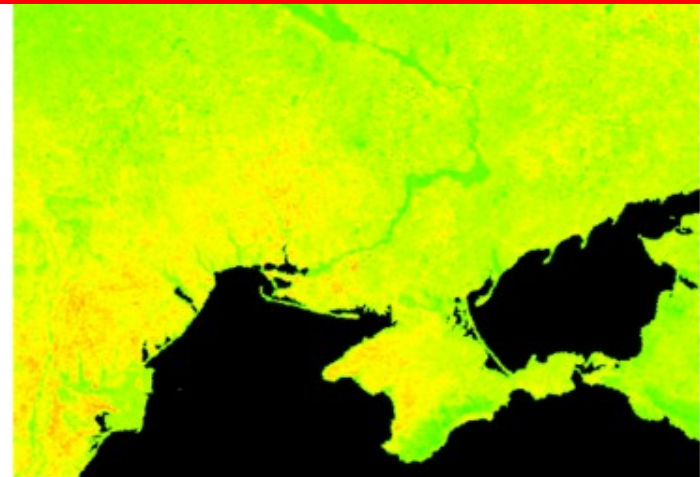
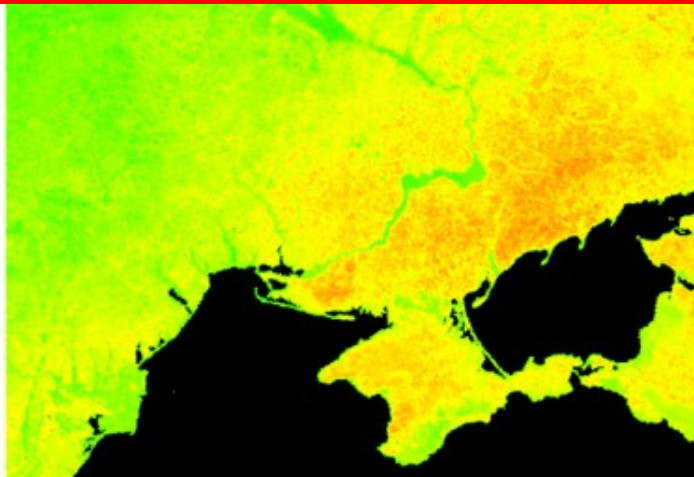
17.07

2007



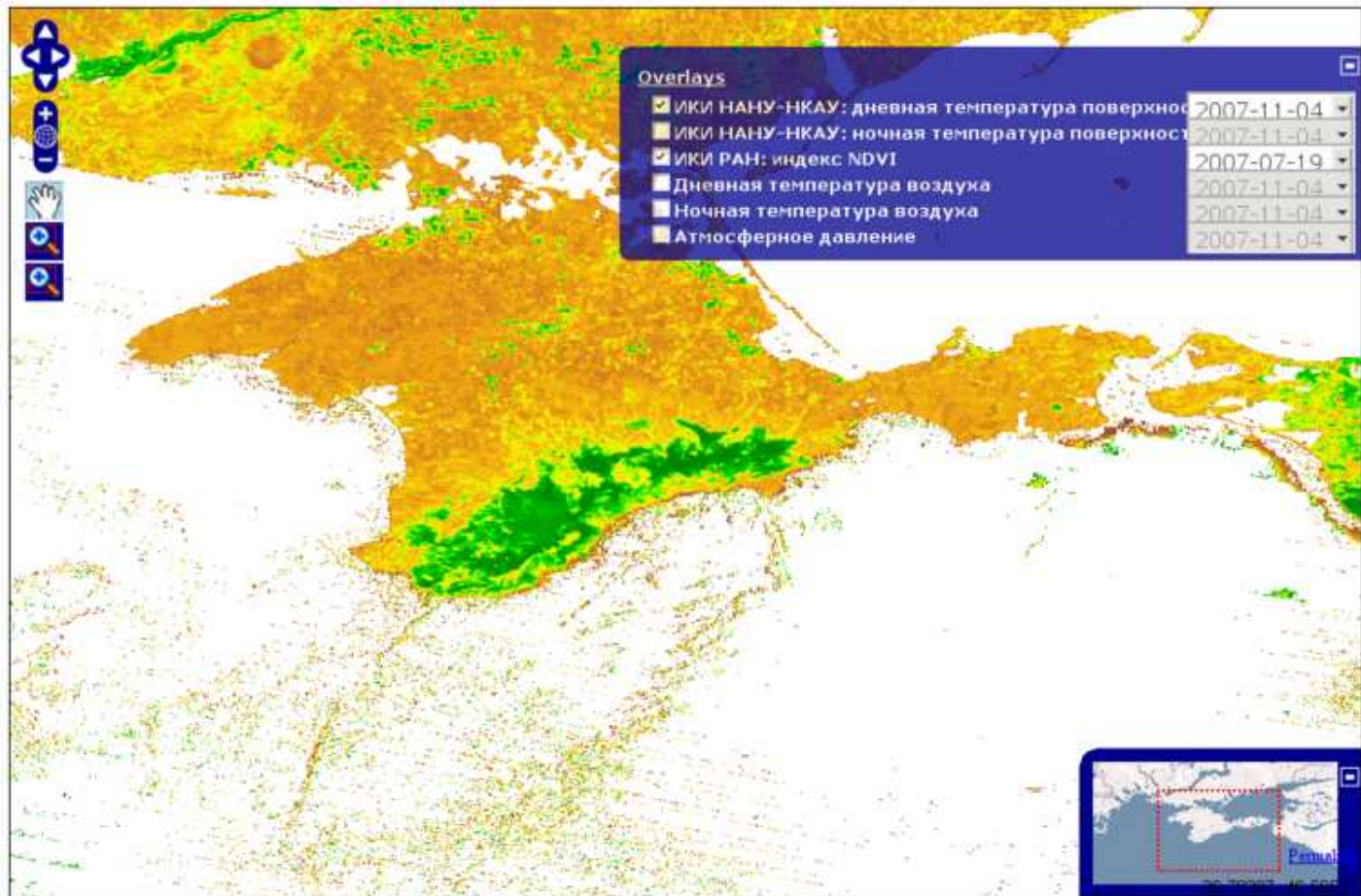
**Drought in Ukraine, 2007: Losses 100 million of U.S. dollars
(source: Ministry of Emergency Situations of Ukraine)**

2006



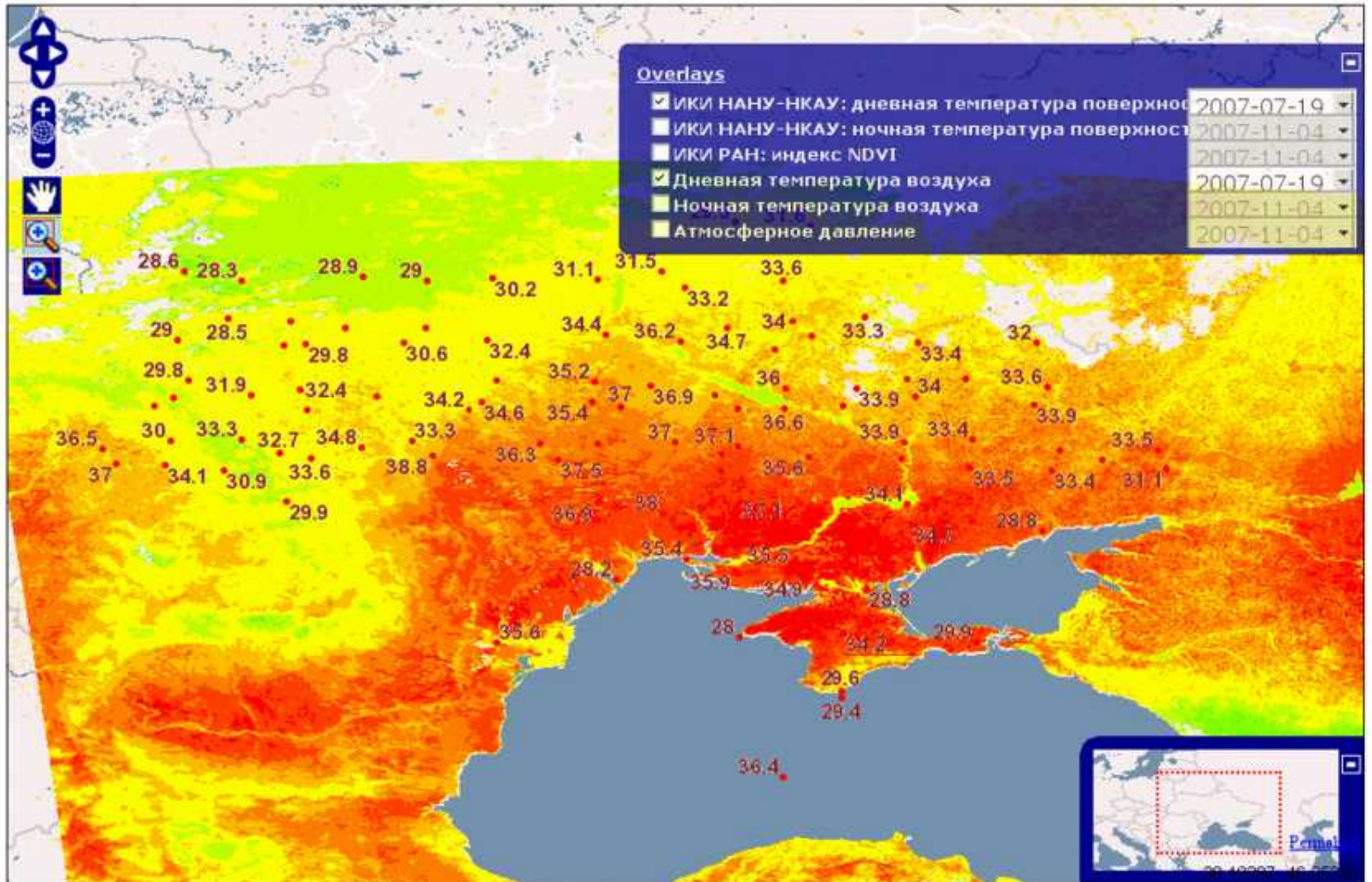
Online services: Land products

ИКИ



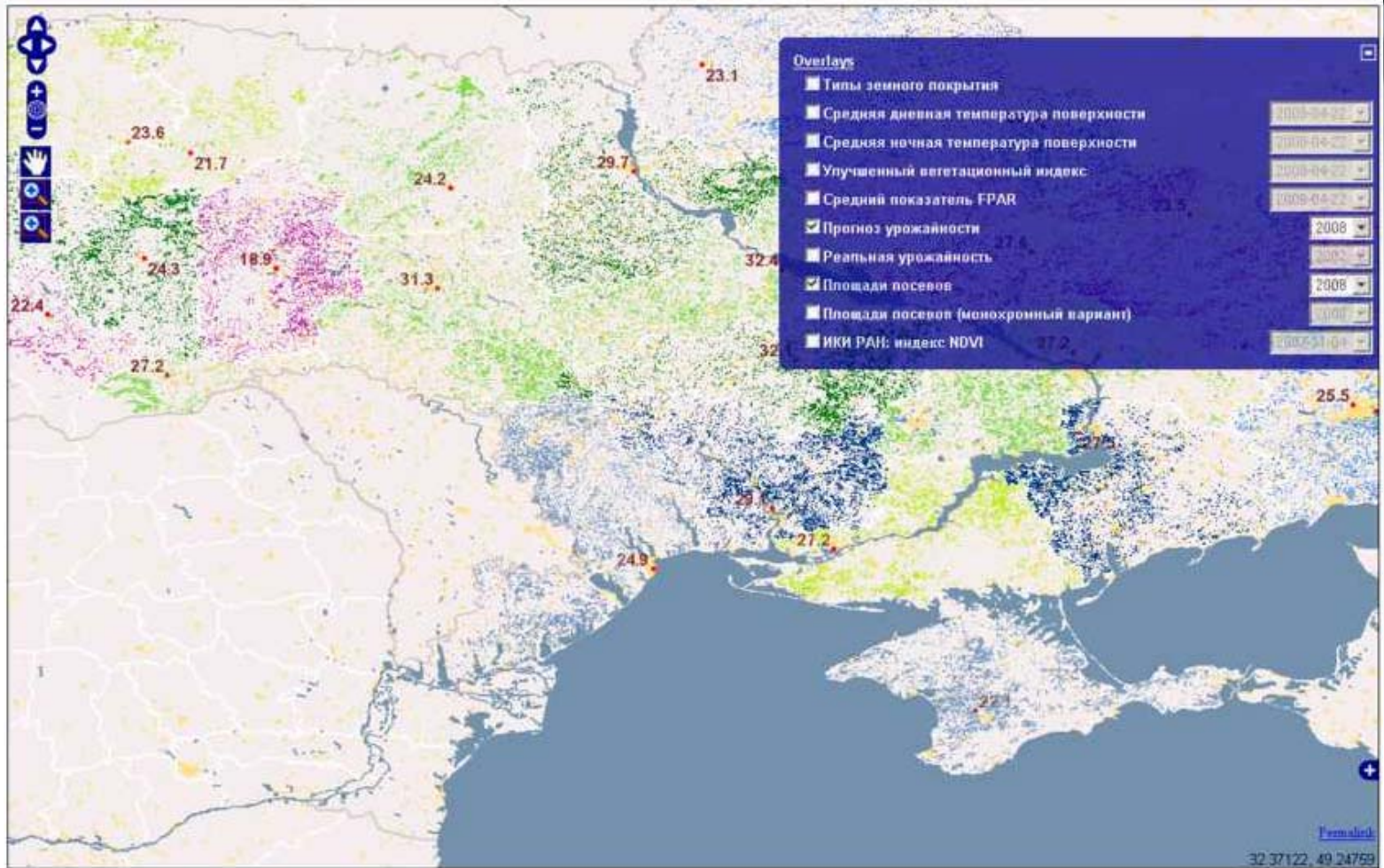
NDVI index derived from satellite data for Crimea peninsula in cooperation with IKI RAS, Russia

Online services: Land products



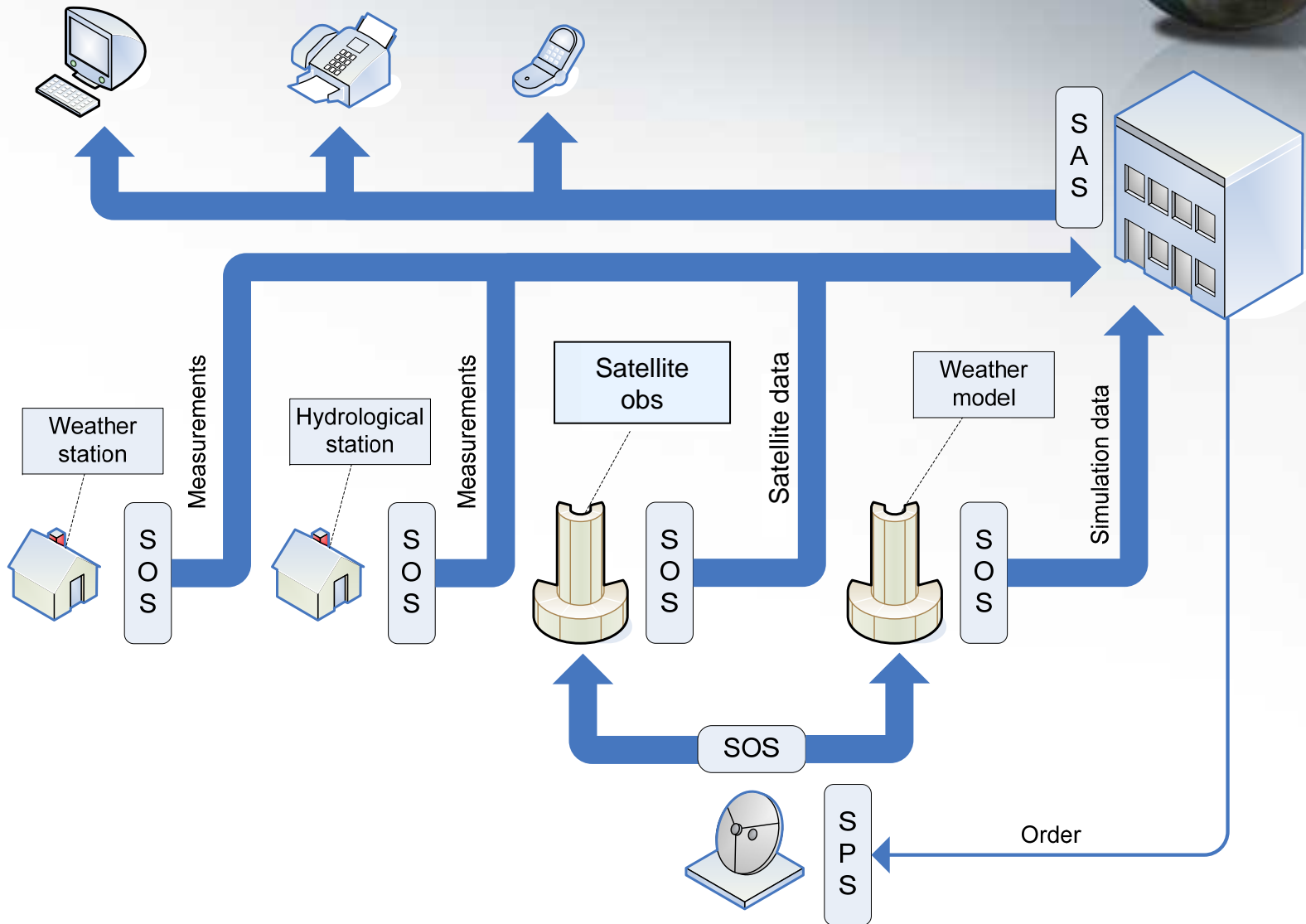
**Land surface temperature derived from satellite data
and meteo stations for Ukraine**

Online services: Yield prediction

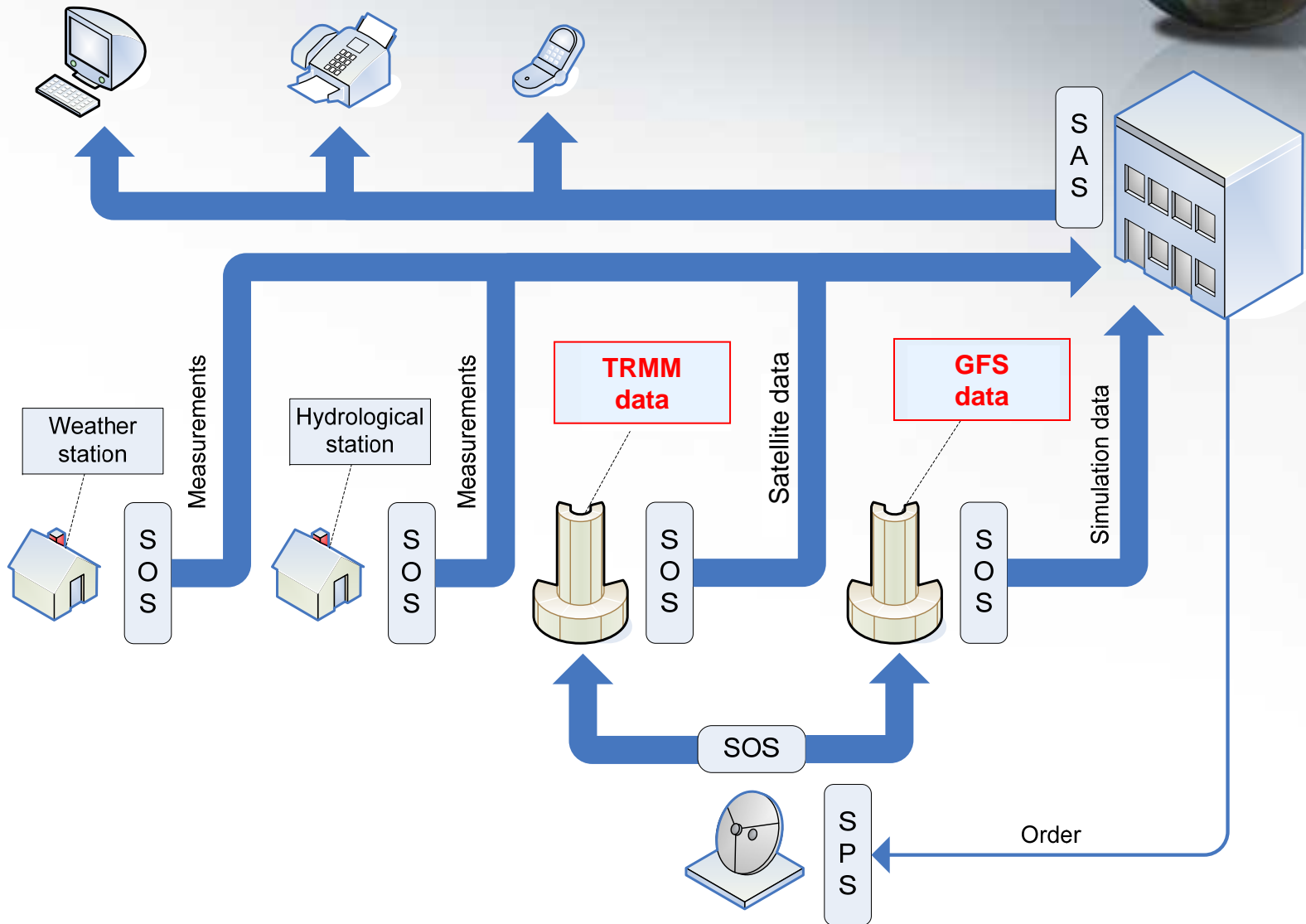


**Crop areas estimation and yield prediction
using satellite data and field measurements**

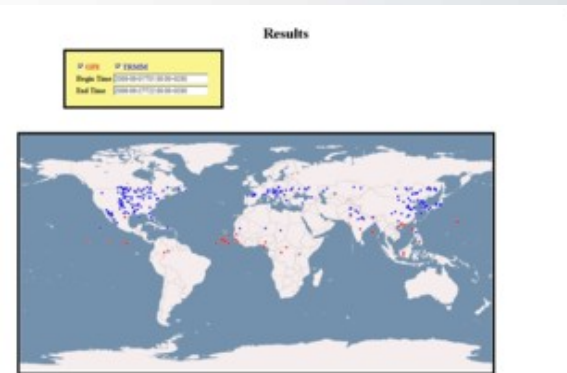
Sensor Web Approach for Flood Prediction & Monitoring



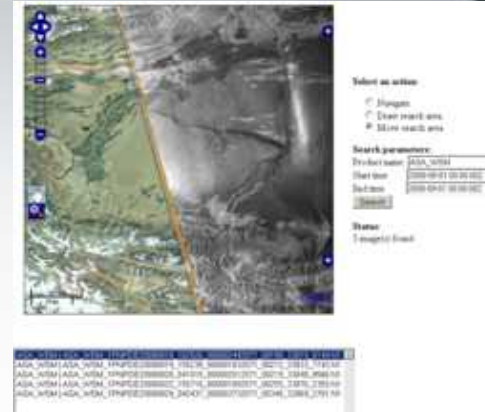
Sensor Web Approach for Flood Prediction & Monitoring



Scenario for Flood Prediction & Monitoring

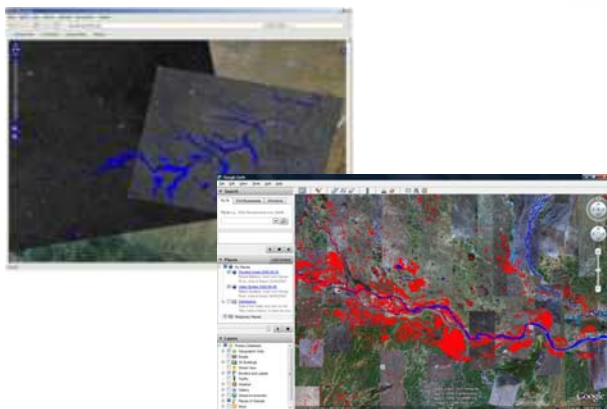


SOS Interface to GFS & TRMM data

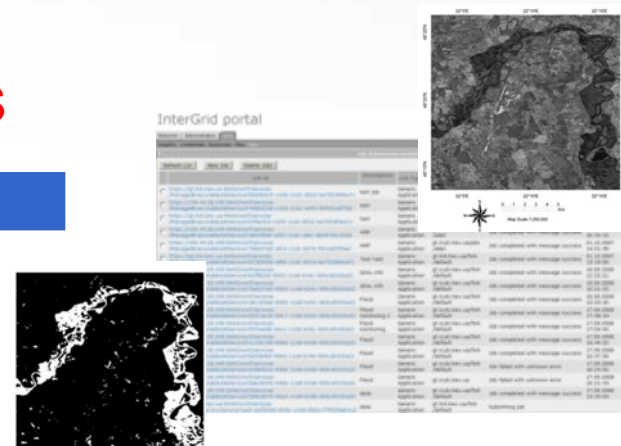


Satellite Observations

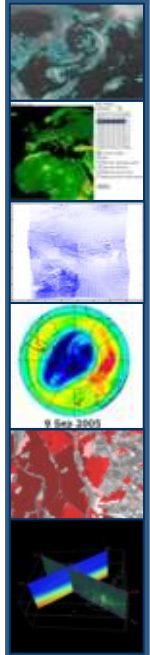
WPS



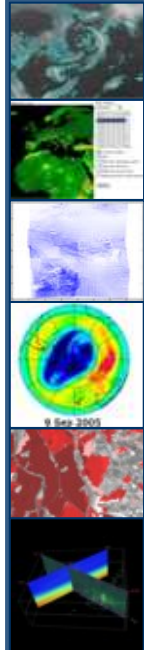
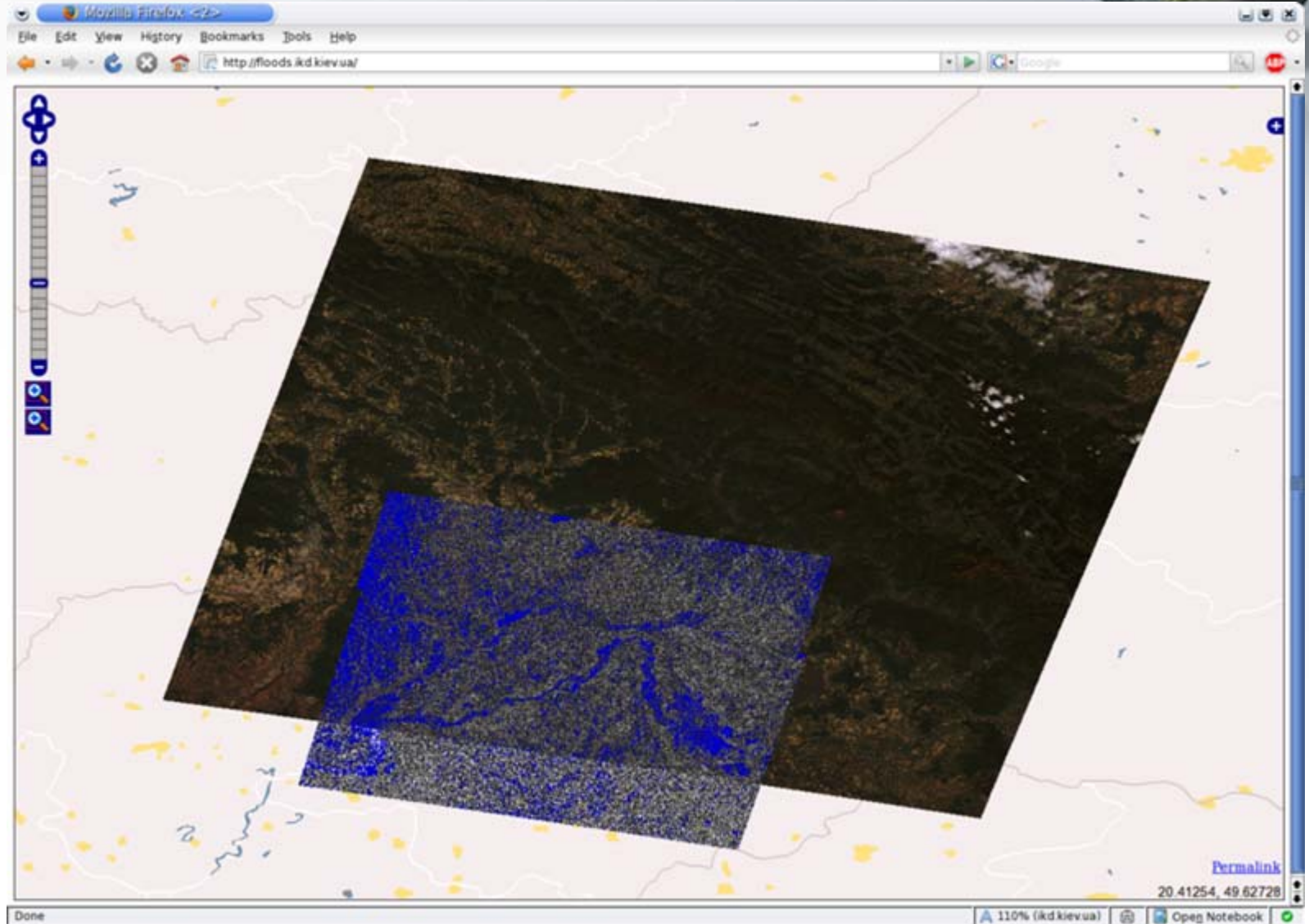
Visualization of Data



Data Processing in Grid



Flood monitoring (Ukraine, Tisza River, 2001)

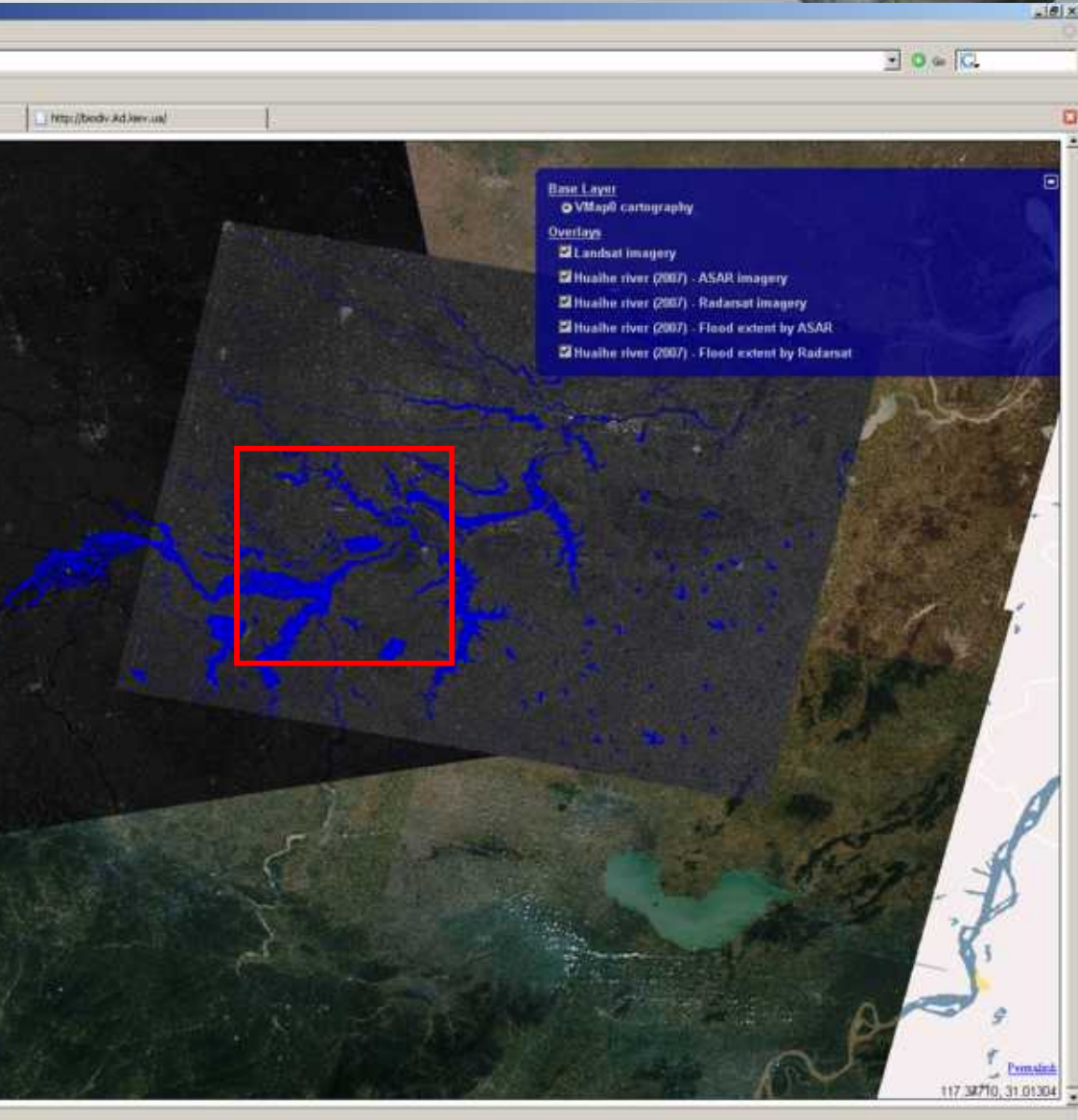
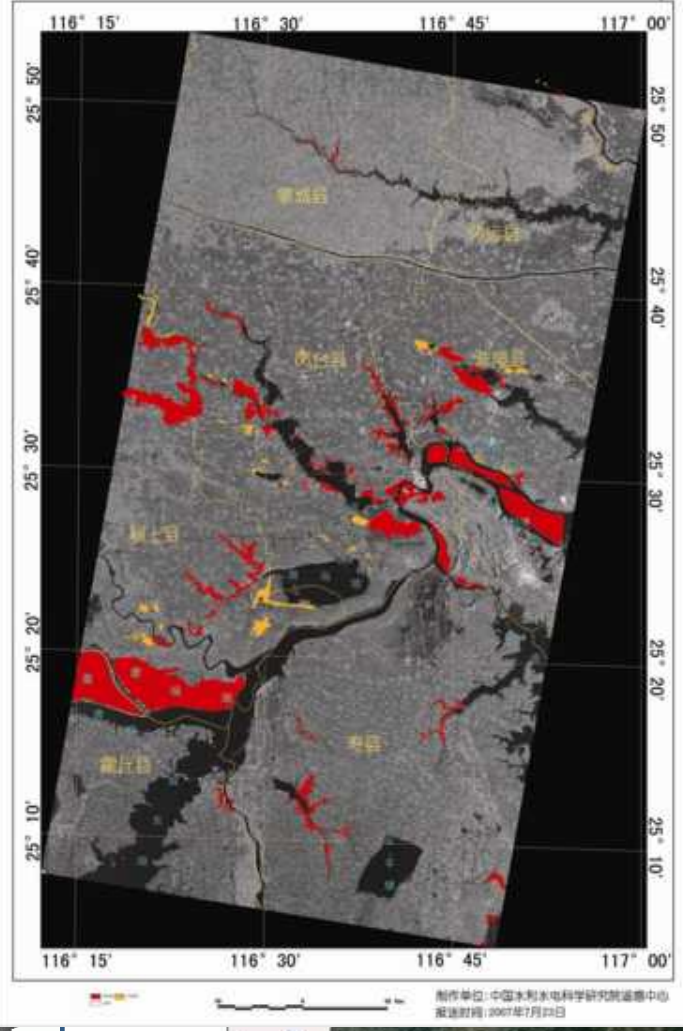


Flood monitoring (China, Huaihe River, 2007)



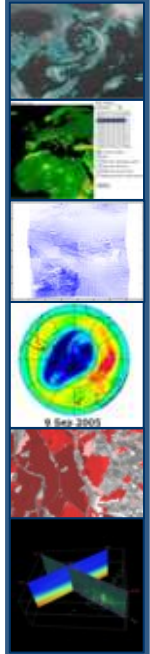
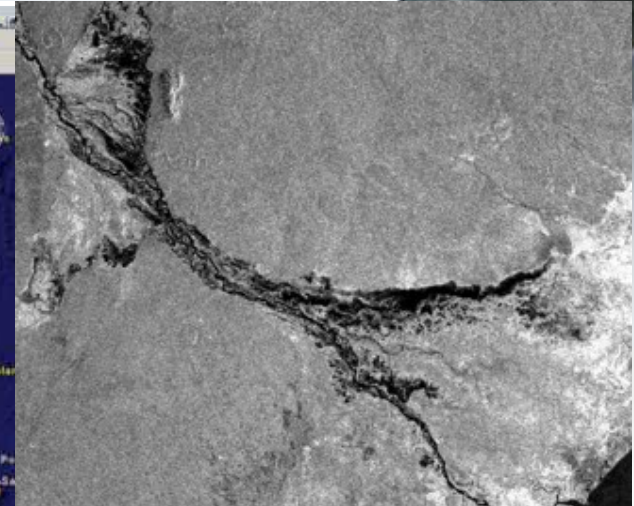
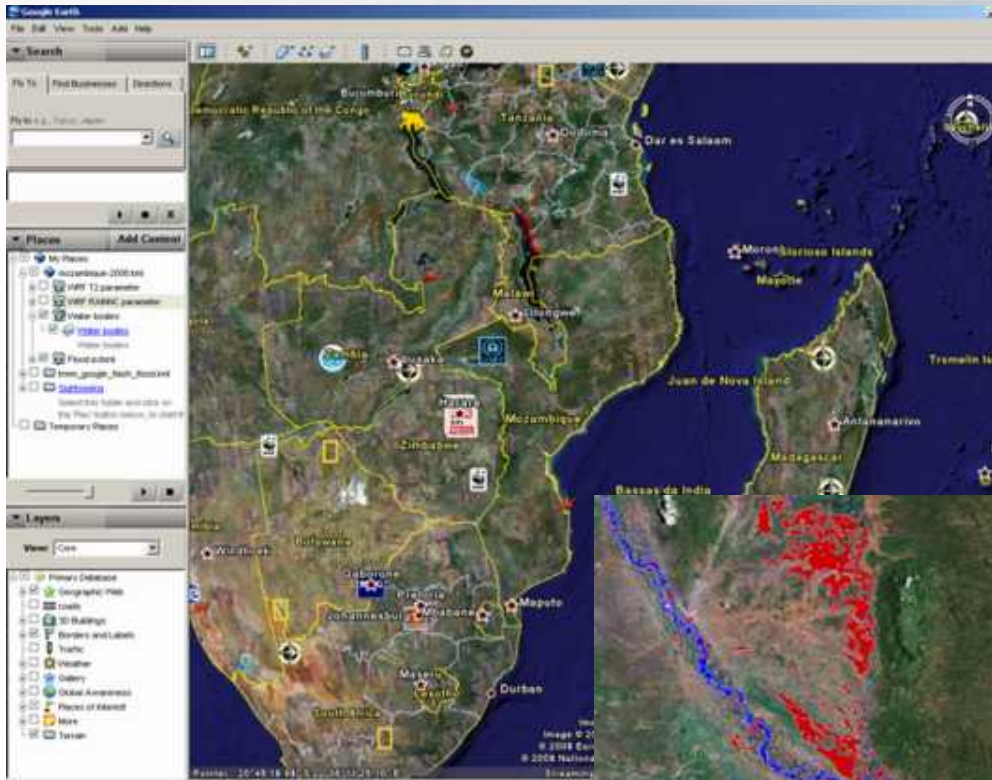
淮河流域中游洪涝灾情雷达遥感监测专题图

ENVISAT 接收时间: 2007年7月20日10时07分

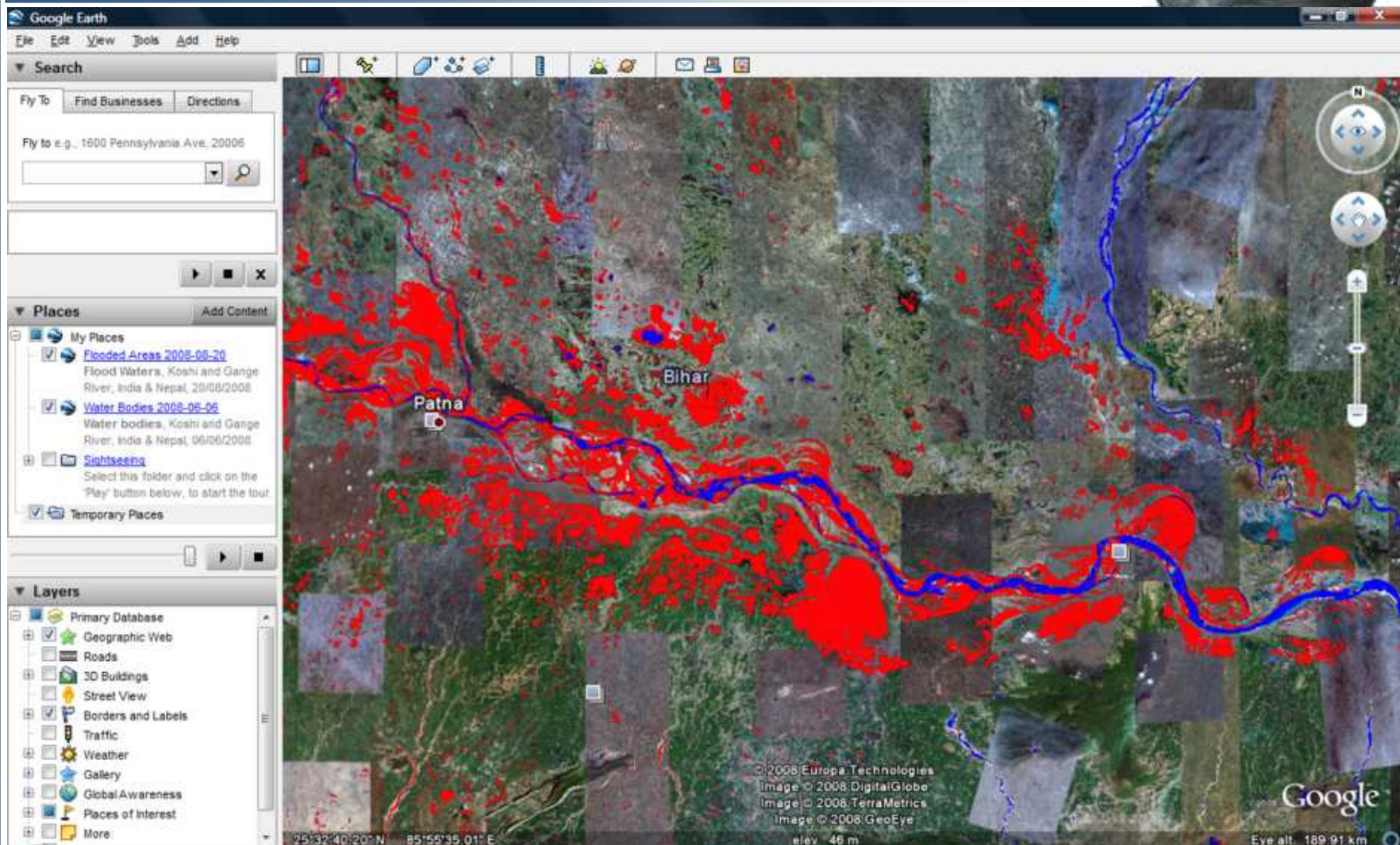


ИКТ

Flood monitoring (Mozambique, Zambezi River, 2008)

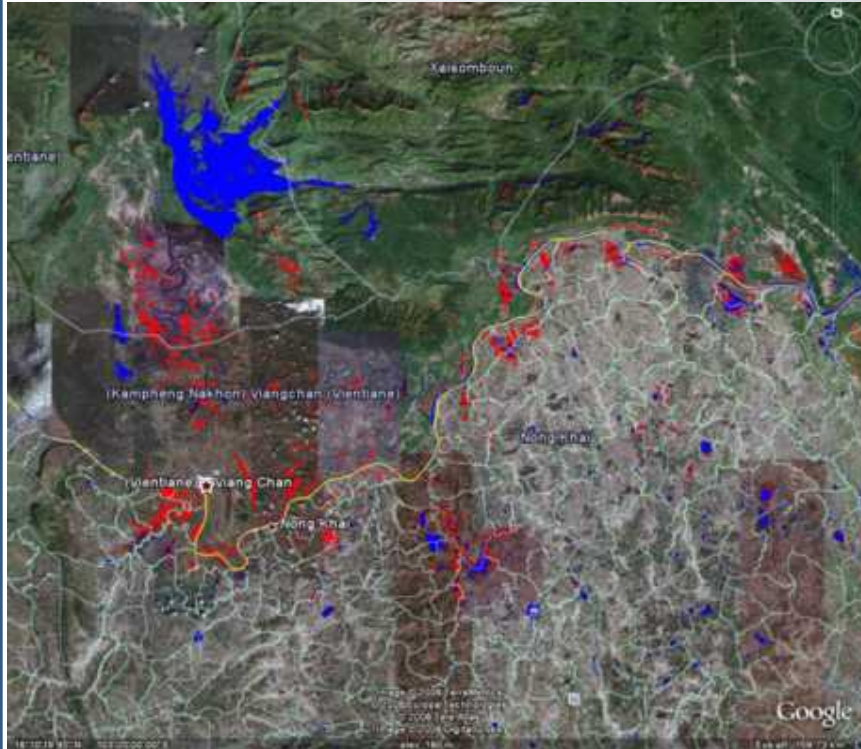


Flood – India & Nepal, 2008



**Flood waters derived from ESA's Envisat satellite imagery
(20 August 2008)**

Flood – Thailand & Laos, 2008



Flood Waters, Mekong River, Muang Pakxam region, 20/08/2008

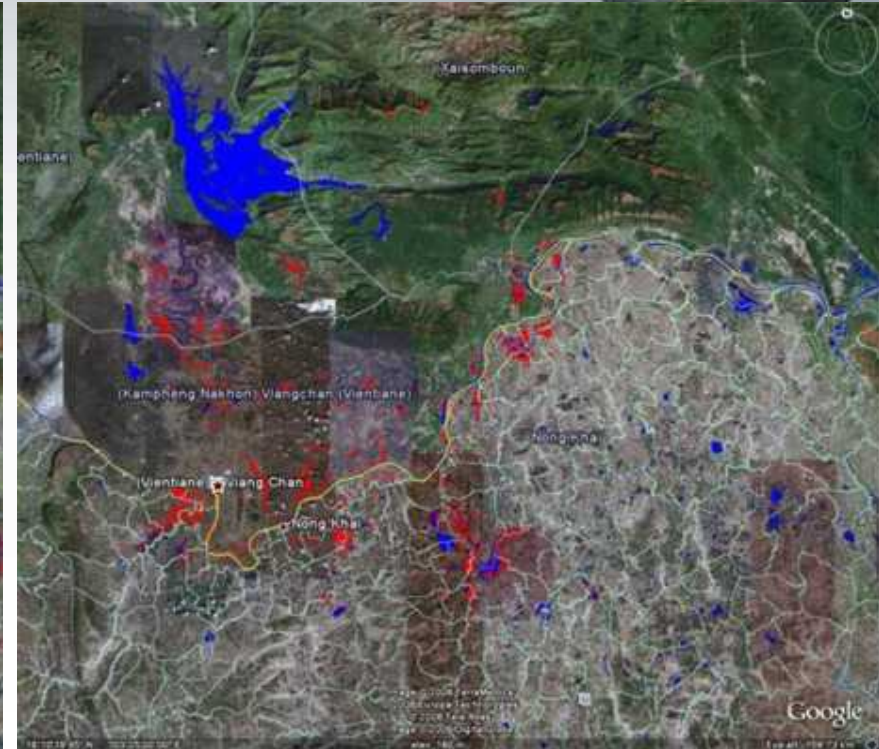
Source: Envisat ASAR, 150 m/pixel resolution.

Acquired: 16/08/2008

Satellite detected flood waters (depicted in red) for the affected region of the Mekong River on the border of Thailand and Laos. Flood water detection was made using ENVISAT-ASAR WSM Synthetic Aperture Radar (SAR) data recorded on 16 August 2008. Additional pre-flood Landsat-7 data (in blue) from 1999 and 2000 was used in this analysis. Preliminary analysis not yet validated in the field.

Credit: Copyright ESA 2008

Image processing, map created 20/08/2008 by Space Research Institute, National Academy of Sciences of Ukraine, National Space Agency of Ukraine.



Flood Waters, Mekong River, Muang Pakxam region, 20/08/2008

Source: Envisat ASAR, 150 m/pixel resolution.

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Credit: Copyright ESA 2008

Image processing, map created 20/08/2008 by Space Research Institute, National Academy of Sciences of Ukraine, National Space Agency of Ukraine.

Flood waters derived from ESA's Envisat satellite imagery (16 & 20 August 2008)

Lessons Learned and Ways Forward



- **Data democracy** is required: access, availability and standardization
- Lack of **in-situ measurements**, especially for developing countries
- Not just portal, but a **distributed information infrastructure** is required (maybe based on Grid)
- Methods for **data fusion** and **data assimilation** should be developed





Thank You!

