

Regional Support Office of UN-SPIDER in Ukraine

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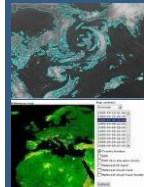
**GEO-UA 2014
May 27-28, 2014, Ukraine, Kyiv**



UN-SPIDER RSO in Ukraine



- Signing of the Agreement during UN Committee on the Peaceful Uses of Outer Space (COPUOS) Session in Vienna in 2010



COOPERATION AGREEMENT

between the

UNITED NATIONS OFFICE FOR OUTER SPACE AFFAIRS
and the

SPACE RESEARCH INSTITUTE OF
THE NATIONAL ACADEMY OF SCIENCES OF UKRAINE &
THE NATIONAL SPACE AGENCY OF UKRAINE

on the establishment of the

UN-SPIDER REGIONAL SUPPORT OFFICE IN UKRAINE

NOTING the generous offer made by the Government of Ukraine to host a UN-SPIDER Regional Support Office;

RECALLING that the General Assembly Resolution 61/110, paragraph 1, which requested the United Nations Office for Outer Space Affairs to "work closely with regional centres of expertise in the use of space technology in disaster management and emergency response", and the United Nations Office for Outer Space Affairs, should "work closely with regional centres of expertise in the use of space technology in disaster management and emergency response";

FURTHER NOTING the guidelines for selecting and setting up the UN-SPIDER Regional Support Offices as stated in A/63/20, paragraph 129, and the Assembly's agreement with those guidelines, as expressed in A/RES/63/90, paragraph 1;

DESIRING to establish a common ground for cooperation between the United Nations Office for Outer Space Affairs and the Space Research Institute of the National Academy of Sciences of Ukraine and the National Space Agency of Ukraine to the operation of the UN-SPIDER Regional Support Office in Ukraine referred to as "Regional Support Office";

THE UNITED NATIONS OFFICE FOR OUTER SPACE AFFAIRS AND THE SPACE RESEARCH INSTITUTE OF THE NATIONAL ACADEMY OF SCIENCES OF UKRAINE AND THE NATIONAL SPACE AGENCY OF UKRAINE,

HAVE AGREED as follows:

1. The Space Research Institute of the National Academy of Sciences of Ukraine shall be responsible for providing infrastructure (computer equipment, office furniture, communication maintenance and operational support) and at least one expert, to be the Regional Support Office, as well as additional funding as needed

participation of the Regional Support Office staff in UN-SPIDER and other relevant activities, as well as to support the agreed UN-SPIDER-related activities to be carried out by the Regional Support Office;

2. The UN-SPIDER Programme Coordinator and the Coordinator of the Regional Support Office shall define in the beginning of every year, through an exchange of letters, an agreed upon workplan, to be carried out by the Regional Support Office and which should contribute to the UN-SPIDER workplan;
3. The Coordinator of the Regional Support Office shall prepare and submit annually a report on the activities carried out by the Regional Support Office during the previous year and which shall be incorporated into the report that the UN-SPIDER Programme Coordinator will prepare and submit annually to the Scientific and Technical Subcommittee of the Committee on the Peaceful Uses of Outer Space;
4. The Regional Support Office may not use the name or logo of the United Nations, the United Nations Office for Outer Space Affairs, or the United Nations Platform for Space-based Information for Disaster Management and Emergency Response, without prior written consent from the United Nations.
5. The present Agreement shall be without prejudice to the privileges and immunities of the United Nations as set forth in the Convention on the Privileges and Immunities of the United Nations (1946).
6. The staff of the Regional Support Office shall not be considered in any respect as officials or staff of the United Nations. The United Nations does not accept any liability for claims arising out of the activities performed under the present Agreement, or any claims for death, bodily injury, disability, damage to property or other hazards that may be suffered by the personnel of the Regional Support Office as a result of their work pertaining to the UN-SPIDER-related activities. However, when the Regional Support Office expert is specifically invited by the UN-SPIDER Programme Coordinator to join a technical advisory mission to a Member State that requests such advisory support, he/she will be considered an "expert on mission" within the meaning of article VI of the Convention on the Privileges and Immunities of the United Nations (1946).
7. This Agreement shall enter into force upon signature by the Parties. It may be terminated by either Party by giving six months prior notice in writing.

Signed on this ____th day of _____, 2010.

For the United Nations

For the Space Research Institute of the
National Academy of Sciences of Ukraine
and the National Space Agency of Ukraine

Mazlan Othman
Director
Office for Outer Space Affairs
United Nations Office at Vienna

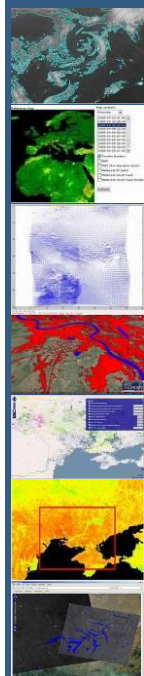
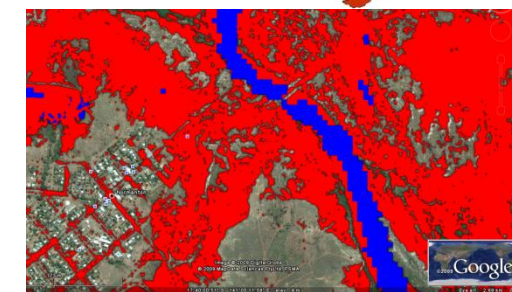
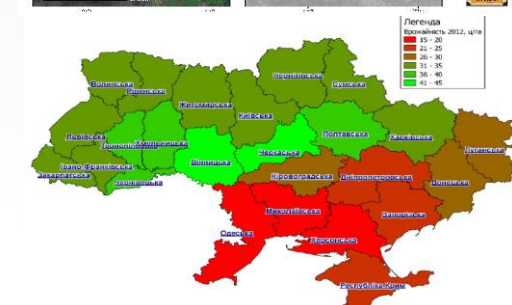
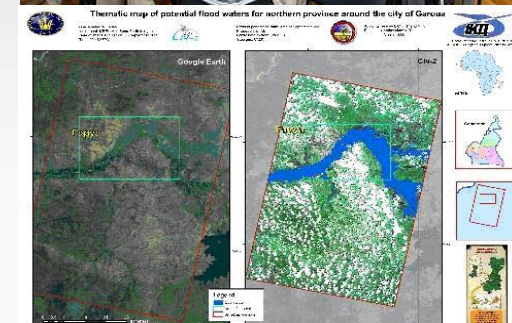
Oleg Fedorov
Director
Space Research Institute of the National
Academy of Sciences of Ukraine and the
National Space Agency of Ukraine



Scope of activities



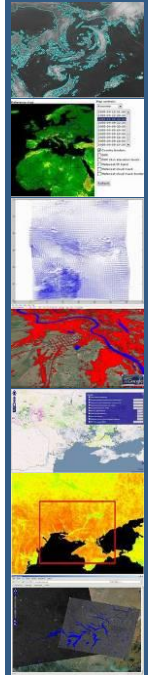
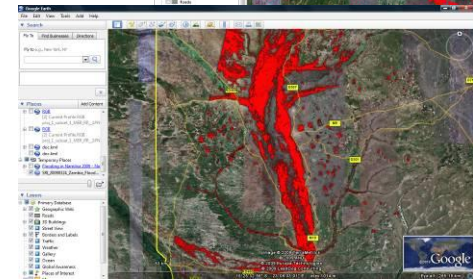
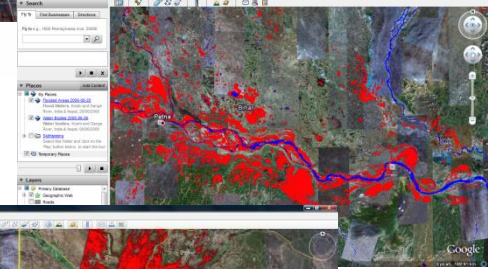
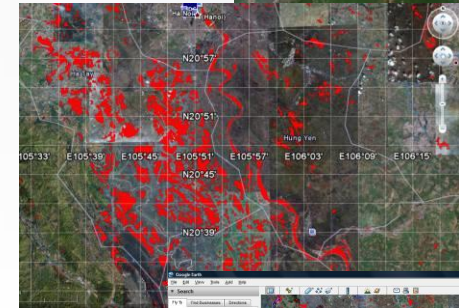
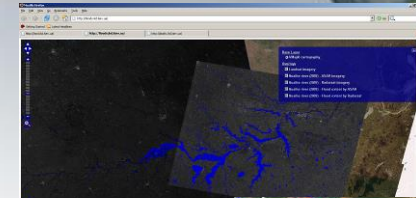
- ***Outreach and Capacity Building***
 - Trainings activities and conferences
 - Contribution to UN-SPIDER newsletters, scientific publications
 - Participation in UN-SPIDER-related events
- ***Technical Advisory Support***
 - Participation in the Namibian SensorWeb project
 - On demand
 - flood risk mapping and flood risk assessment
 - drought mapping and risk assessment
 - crop yield forecasting
- ***Horizontal Cooperation***
 - Operational flood mapping based on satellite data on request from **UN-SPIDER** and **International Charter “Space and Major Disasters”**
 - Rapid mapping (floods, clear-cuts, fires, droughts) on request from local authorities



Areas of expertise



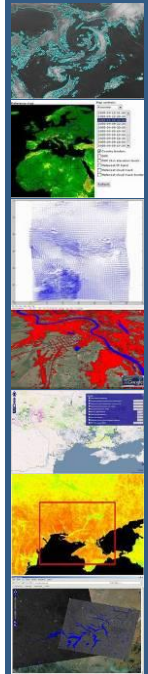
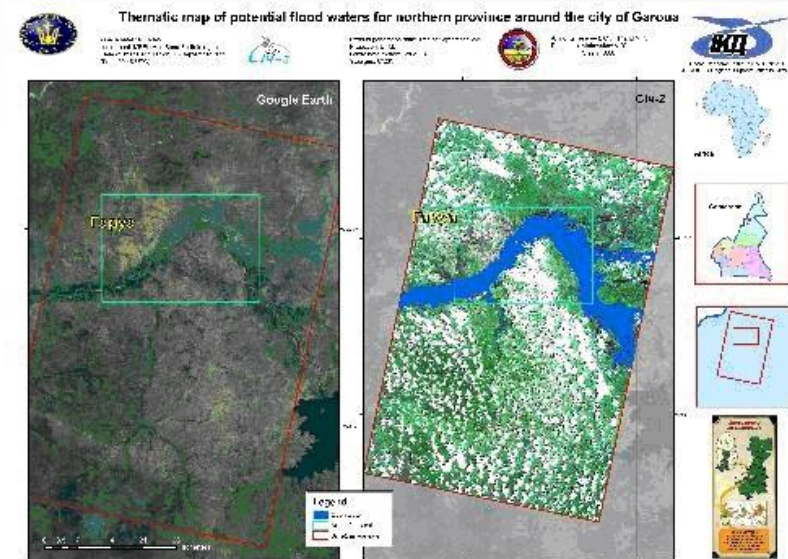
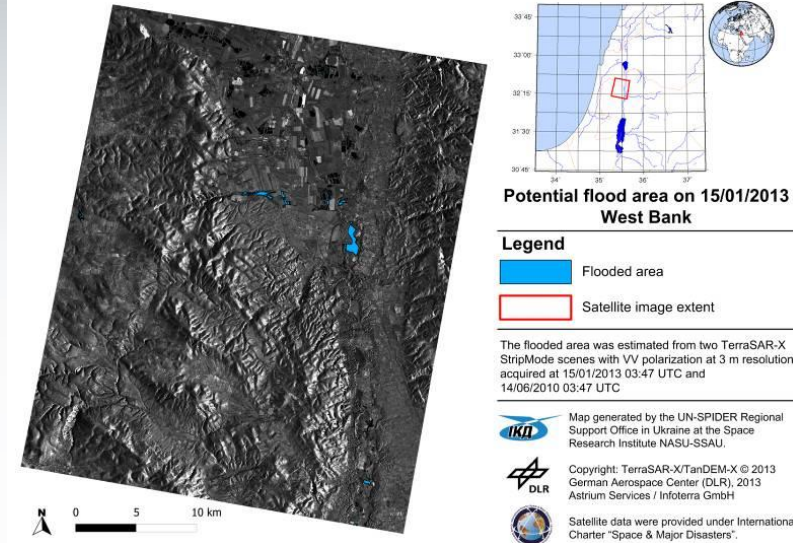
- Flood mapping from optical and SAR satellite imagery
 - For **UN-SPIDER** and **International Charter “Space & Major Disasters”**
 - Within **Namibian SensorWeb Pilot**
- Use of **EO data time-series** for:
 - **Flood** risk assessment
 - **Drought** risk assessment
- **Fire** monitoring



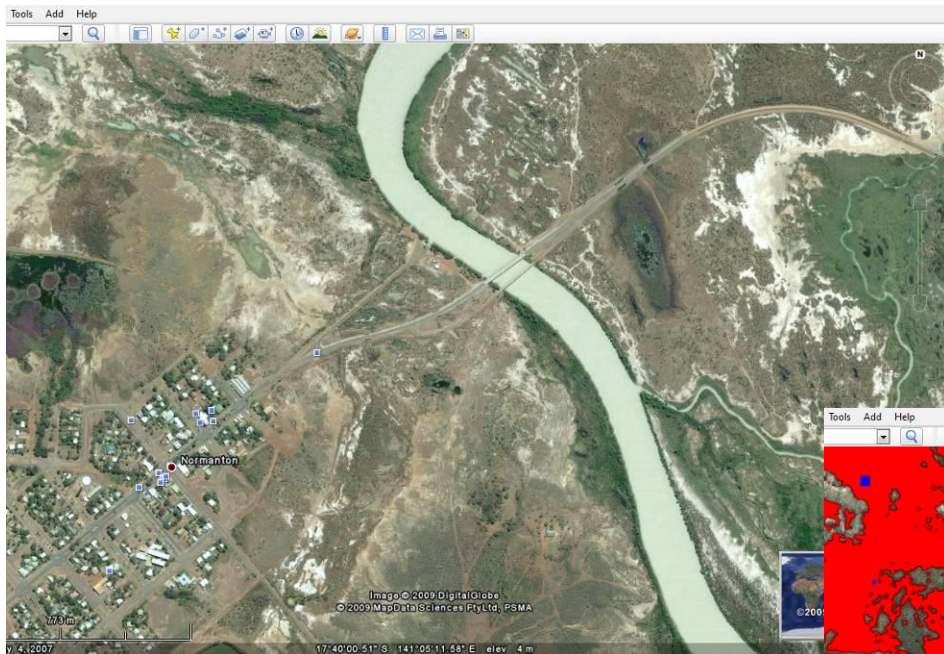
International Charter "Space & Major Disasters"



- Participation in a number of calls for flood maps production as a value-added user
 - **Call for West Bank, January 2013**
 - Processing of TerraSAR-X data
 - **Call for Cameroon, September 2012**
 - The operation flood mapping from Ukrainian Sich-2 satellite
 - **Call for Gaza, January 2010**
 - Processing of ALOS/PALSAR



Flood mapping within GEOSS SBA Disasters





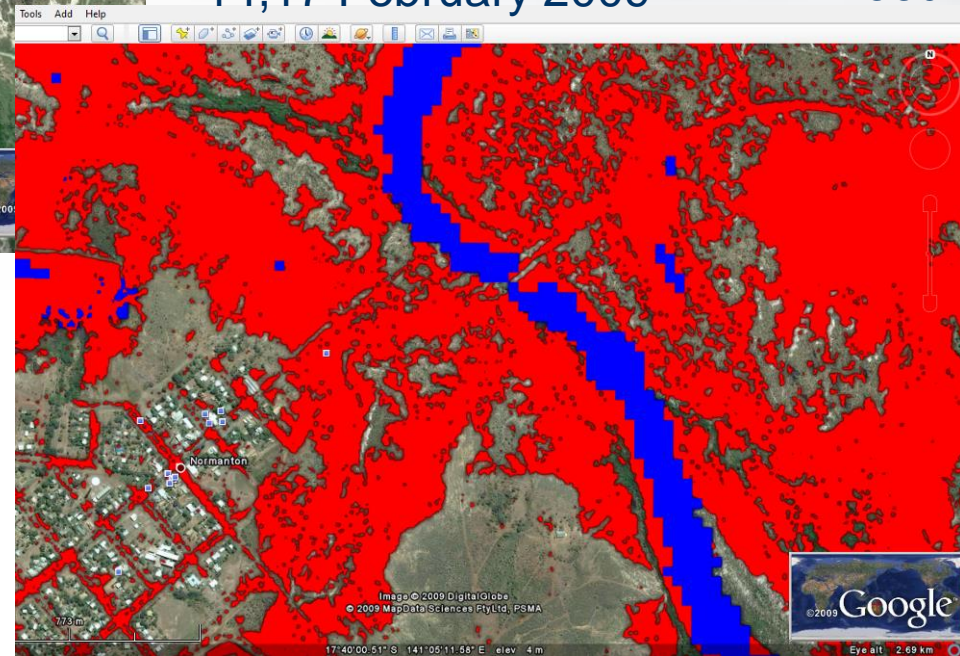
W/out flood

14,17 February 2009

Flood

Normanton, Queensland, Australia

-  Flood extent from RADARSAT-2
-  Water before flood (from Landsat)



GEO Sensor Web Pilot Project

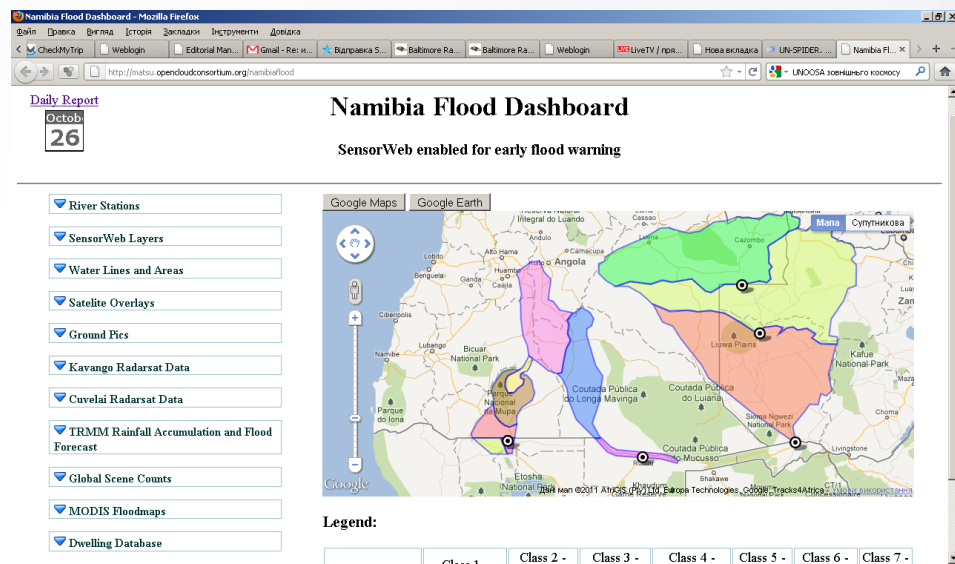
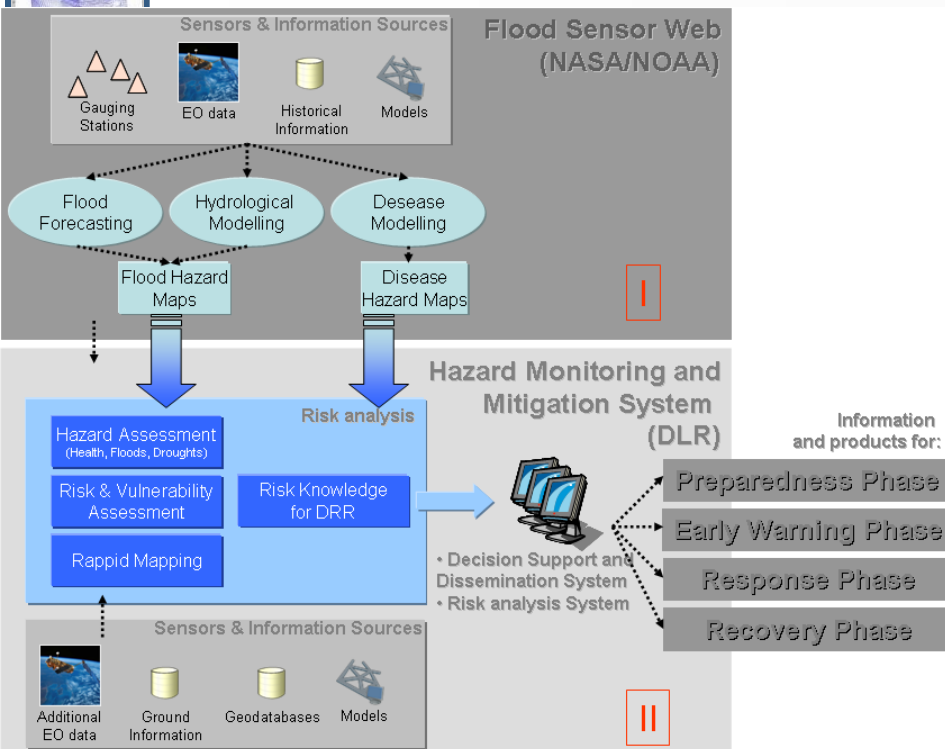


- **Participants**

- UN-SPIDER, NASA, NOAA, DLR, JRC, CSA, ITC, SRI NAS Ukraine and SSA Ukraine

- **Objective**

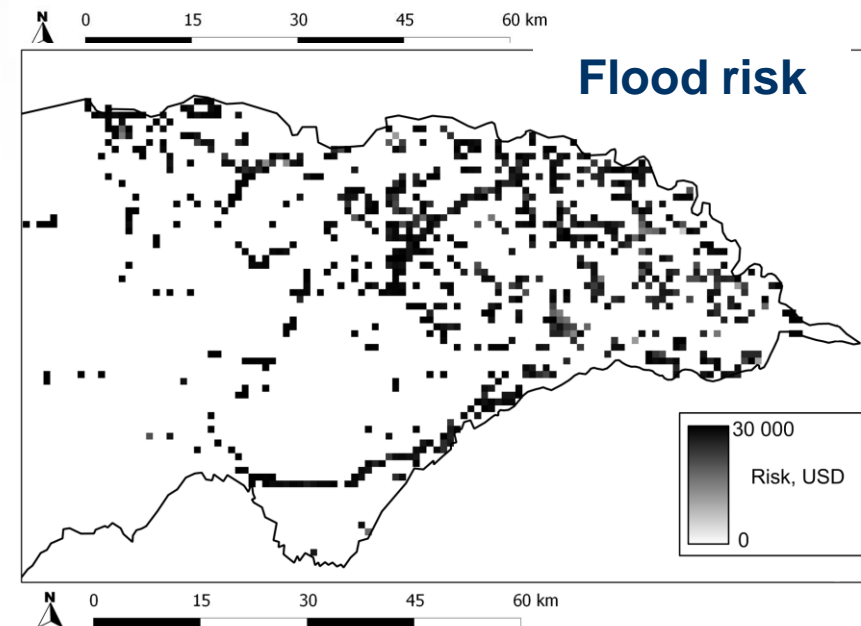
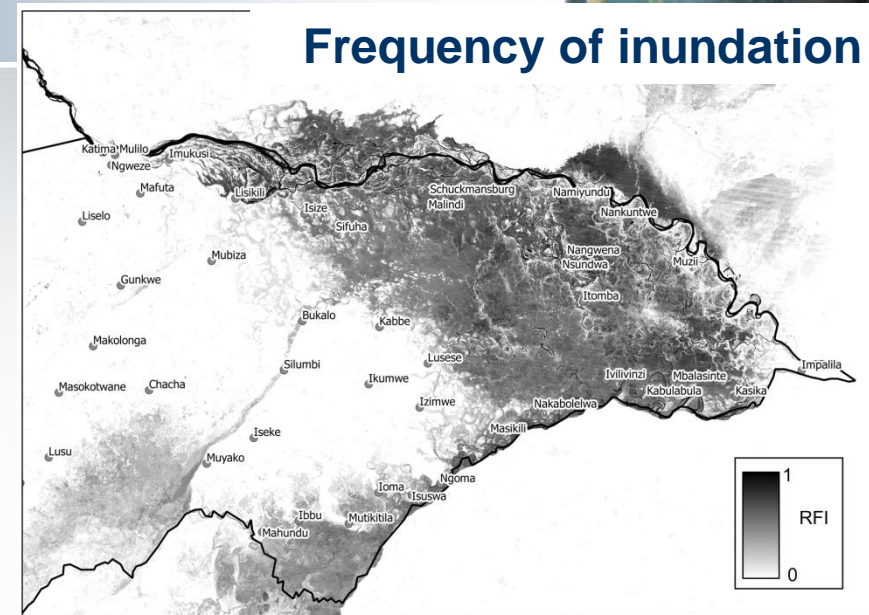
- Sensor Web Flood Monitoring System for Namibia
<http://matsu.opencloudconsortium.org/namibiaflood>



Flood hazard mapping from EO data time-series



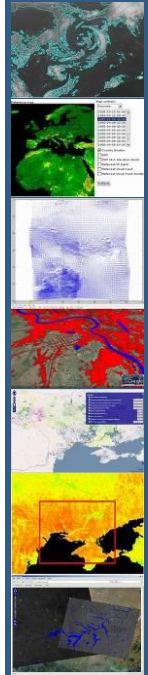
- Within **Namibian SensorWeb Pilot**
- Region: Katima Mulilo, Namibia
- Data
 - Satellite
 - Landsat-5/TM and Landsat-7/ETM+
 - 102 scenes
 - Time period
 - » 1989-2012
 - TRMM
 - Time period
 - » 1999-2010
 - Ground
 - Water level and water flow
 - Time period
 - 1943-1954
 - 1965-2010



Agriculture-related international activities



- **GEO-GLAM & JECAM initiatives**
 - Winter Wheat Yield Forecasting for **the whole Ukraine**
 - Crop classification using SAR data
 - Validation of global products within JECAM Ukraine test site
- **ESA Sentinel-2 for Agriculture (c.p. Dr Benjamin Koetz)**
 - Participation as a “Champion User”
 - Take5 Initiative: SPOT-4 will observe JECAM Ukraine every 5 days to simulate Sentinel-2
- **FP7 SIGMA project**
 - Assessing environment impact of agriculture
- **Within FP7 ImagineS (Implementation of Multi-scale Agricultural Indicators Exploiting Sentinels)**
 - Validation of global satellite products (by **ESA VALERI** protocol)
- **Education within ESA**
 - Participation of 2 Ph.D. students in ESA Summer schools in 2006, 2008

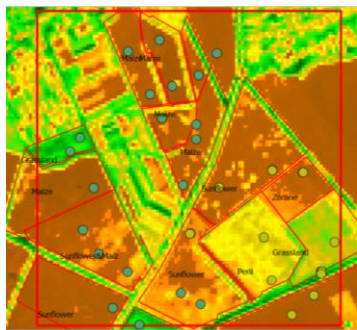


Our approach



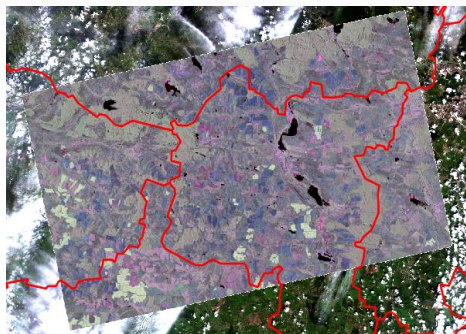
JECAM Activities

Local Scale
Field level
100m – 1km



Validation

Mid-Scale
NUTS3 – NUTS2
50x50 – 200x200 km



Product development

“Large Scale”
Whole Ukraine
1000x1000 km



Operational implementation

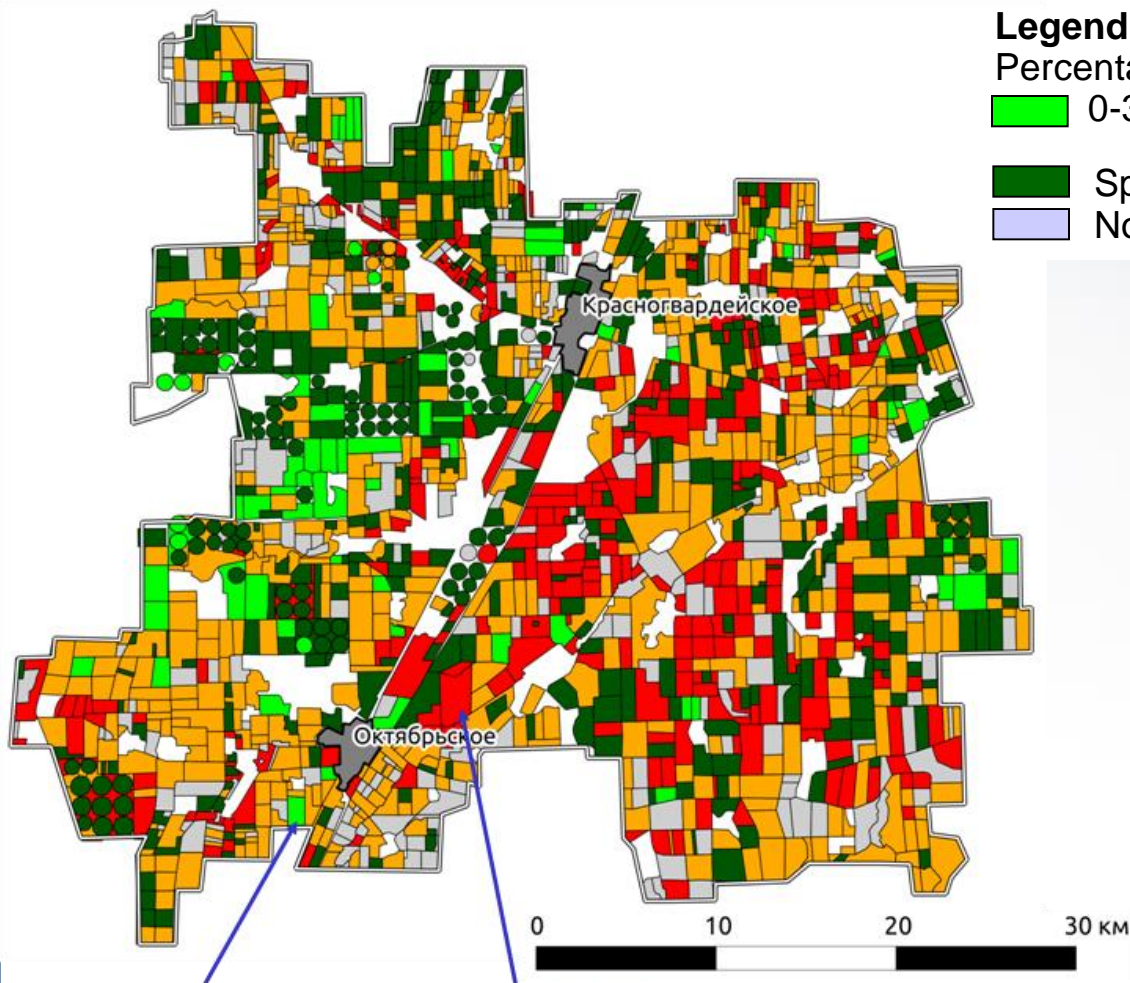
FP7 ImagineS

FP7 SIGMA

ESA Sentinel-2 for Agriculture

PROJECTS

Operational mapping of crop damages due to droughts



Legend

Percentage of damaged crops

0-30% 30-70% 70-100%

Spring crops

Non-cultivated lands

- Crimea Republic, Ukraine, 2013
 - Krasnogvardeisk district
- User:
 - Ministry of agriculture of Crimea Republic, Ukraine
- Produced and delivered in 4 days
- 90% cereals are damaged due to severe drought in May 2013



Drought hazard mapping from EO data time-series

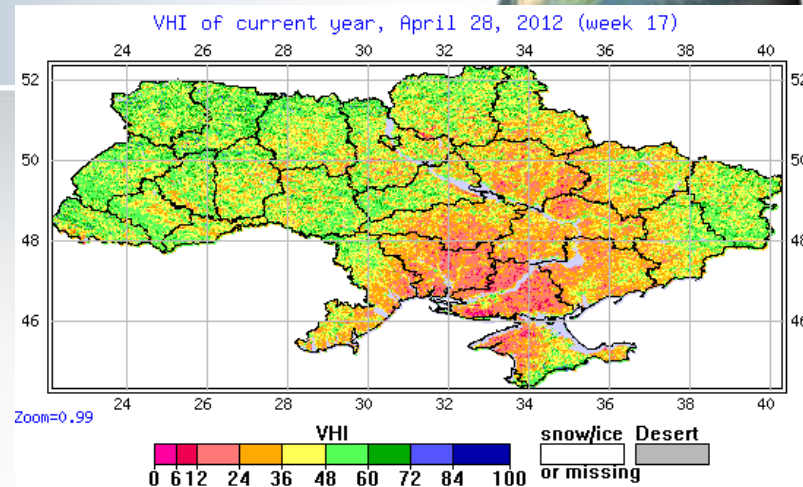


- Application of the extreme value theory (EVT) to EO data

- Vegetation Health Index (NOAA)
- Period: 1981-2012
- Spatial resolution 16 km or 256 km²

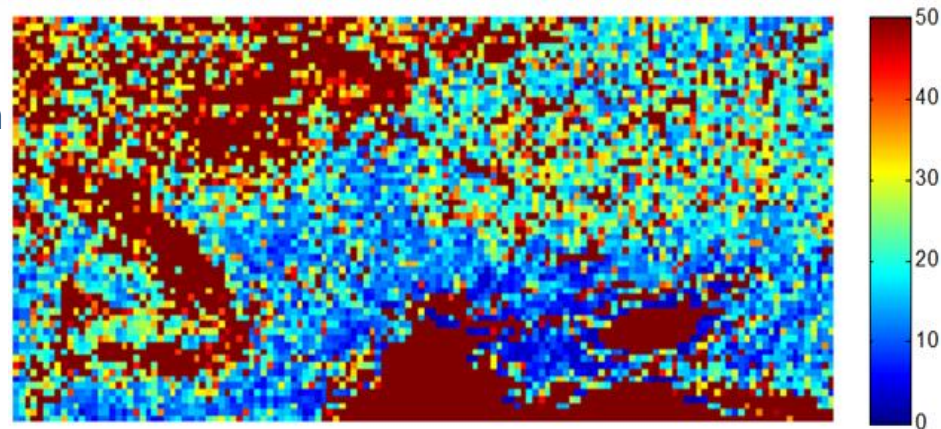
- Density of weather stations in Ukraine: ~3353 km²

Drought level	VHI
Abnormally dry condition	35-40
Moderate	26-35
Severe	16-25
Extreme	6-15
Exceptional	0-5

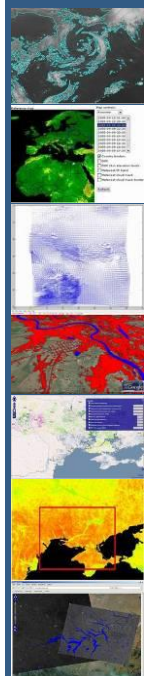


Poisson process and Generalized Pareto distribution (Poisson-GP)

$$P(Y < y | \alpha, k) = 1 - \left(1 - k \frac{y}{\alpha} \right)^k, \quad y = x - x_0$$



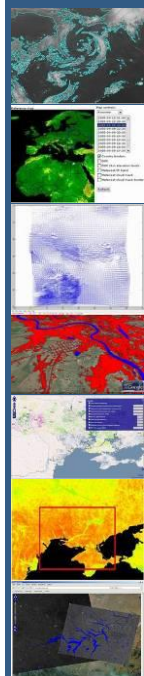
Return period (years) for exceptional droughts (VHI<5)



Our publications



- Mandl, D., *et al.*, “**Use of the Earth Observing One (EO-1) Satellite for the Namibia SensorWeb Flood Early Warning Pilot**”, *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing*, 2013, vol. 6, no. 2, pp. 298-308.
- Kussul N., *et al.*, “**Service-oriented infrastructure for flood mapping using optical and SAR satellite data**”, *International Journal of Digital Earth*, 2013 (in press, online)
- Kogan F., *et al.*, “**Winter wheat yield forecasting in Ukraine based on Earth observation, meteorological data and biophysical models**”, *International Journal of Applied Earth Observation and Geoinformation*, 2013, vol. 23, pp. 192-203.
- Kussul N., *et al.*, “**Interoperable Infrastructure for Flood Monitoring: SensorWeb, Grid and Cloud**”, *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing*, 2012, vol. 5, no. 6, pp. 1740-1745.
- Kussul N., *et al.*, “**The Wide Area Grid Testbed for Flood Monitoring Using Earth Observation Data**”, *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing*, 2012, vol. 5, no. 6, pp. 1746-1751.
- Kussul N., *et al.*, “**Crop area estimation in Ukraine using satellite data within the MARS project**”, *2012 IEEE International Geoscience and Remote Sensing Symposium (IGARSS 2012)*, Munich, Germany, 2012, pp. 3756-3759.
- Lecca G., *et al.*, “**Grid computing technology for hydrological applications**”, *Journal of Hydrology*, 2011, volume 403, no. 1-2, pp. 186-199.
- Kussul N., *et al.*, “**Grid Technologies for Satellite Data Processing and Management Within International Disaster Monitoring Projects**”, In Fiore, S., Aloisio, G. (Eds.). *Grid and Cloud Database Management*, Springer 2011, pp. 279-306.





Thank You!

