

Overview of National agricultural monitoring activities: Ukraine

N. Kussul

Space Research Institute NASU-SSAU

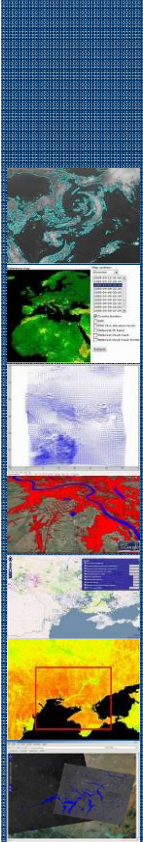
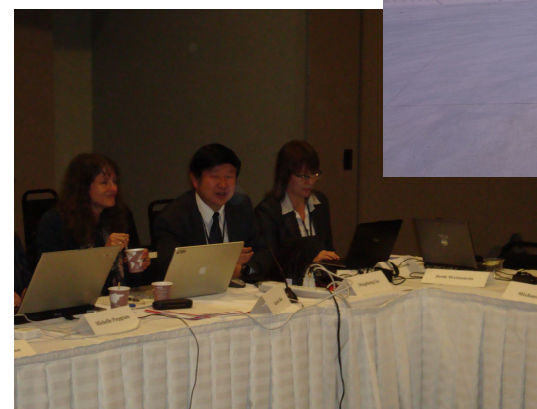
International Meeting on Food Security, Earth Observations and Agricultural Monitoring
November 21, 2013, Brussels, Belgium



Who we are: Current Expertise & International Activities



- **Space Research Institute**
National Academy of Science &
National Space Agency of
Ukraine
 - Department of Space
Information Technologies
- Active participation in the
Working Group on Information
System and Services (**WGISS**)
of the Committee on Earth
Observation Satellites (**CEOS**).
- Participation in international
collaborative activities within
GEO Working Plan
- **UN-SPIDER RSO**

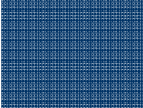
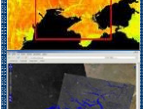
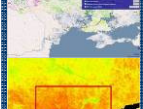
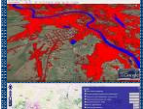
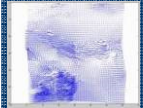
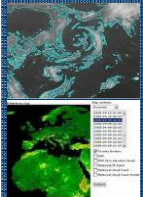
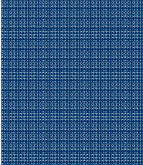


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Current international activities



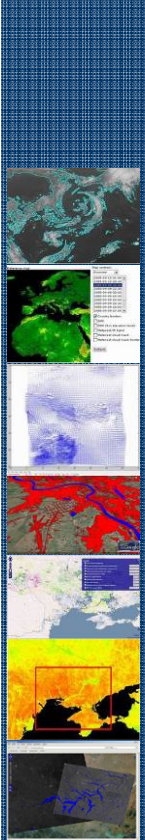
- **GEO-GLAM & JECAM initiatives**
 - Winter Wheat Yield Forecasting for **the whole Ukraine**
 - Crop classification using SAR data
 - Validation of global products within JECAM Ukraine test site
- **ESA Sentinel-2 for Agriculture**
 - Participation as a “Champion User”
 - Take5 Initiative: SPOT-4 observes 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)



Development of new products



- ***Project and initiatives***
 - JECAM and GEO GLAM
 - MDA SOAR-JECAM project
 - **ESA Sentinel-2 for Agriculture**
- ***Applications***
 - Crop mapping
 - Biophysical parameters estimation
- ***Data***
 - Take5 – SPOT4 + RapidEye (5 days interval)
 - SOAR-JECAM – Radarsat-2 (~12 days interval)
- ***Ground observation campaigns***
 - 2013: 350 fields inspected (crop type), 30 ESU bio. params
 - 2012: 300 fields inspected



General approach to agriculture monitoring

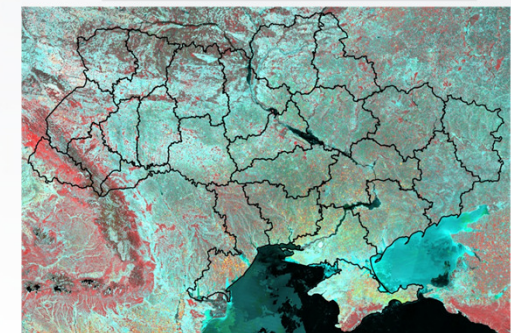
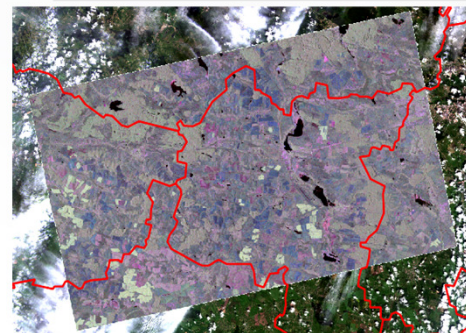
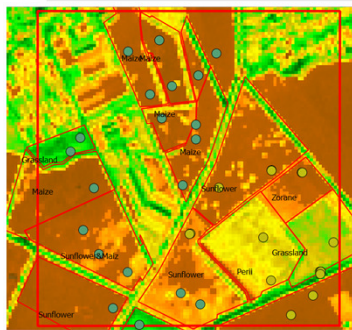


JECAM Activities

Local Scale
Field level
100m – 1km

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

“Large Scale”
Whole Ukraine
1000x1000 km



Validation

Product development

Operational implementation

FP7 ImagineS

FP7 SIGMA

ESA Sentinel-2 for Agriculture

PROJECTS

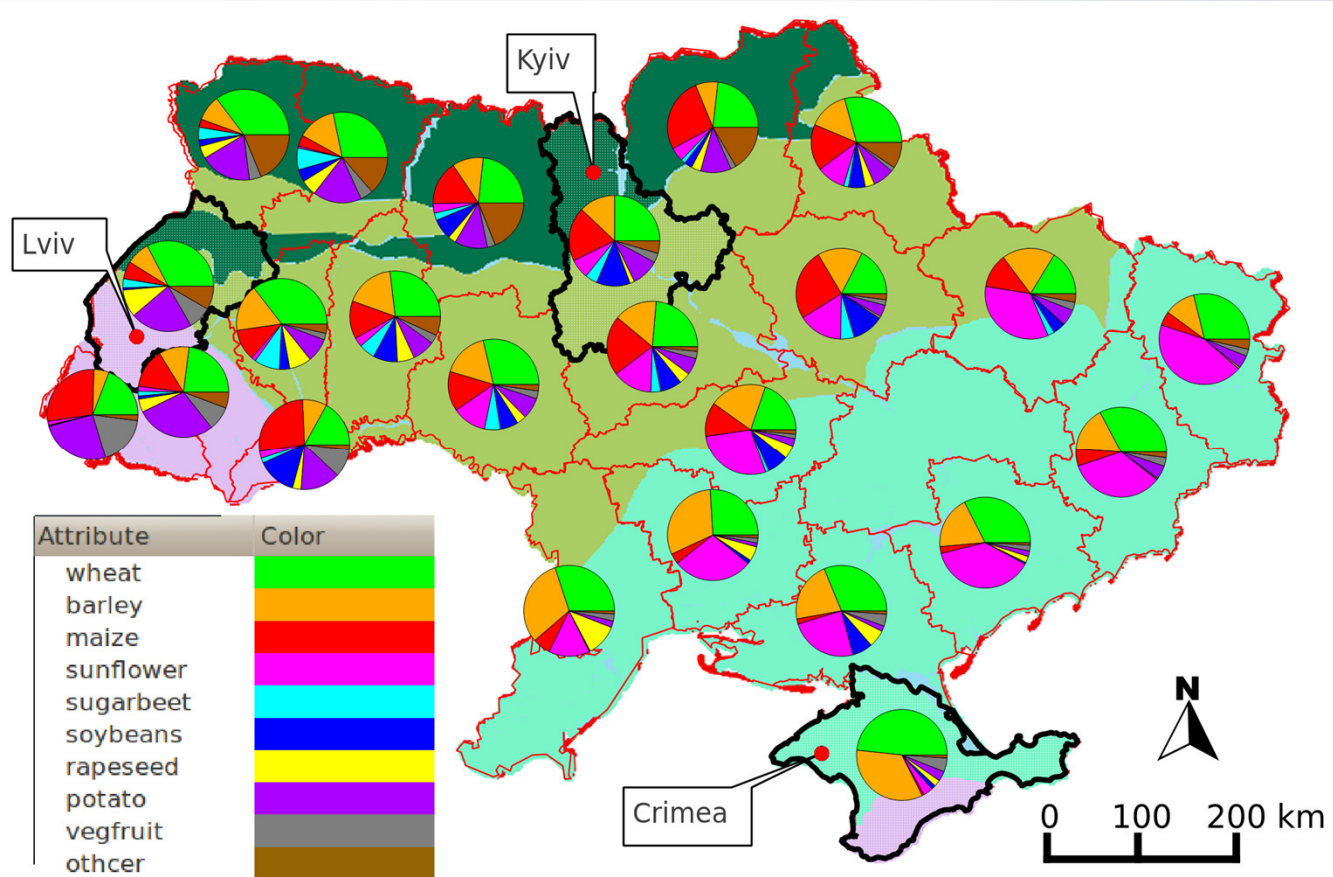


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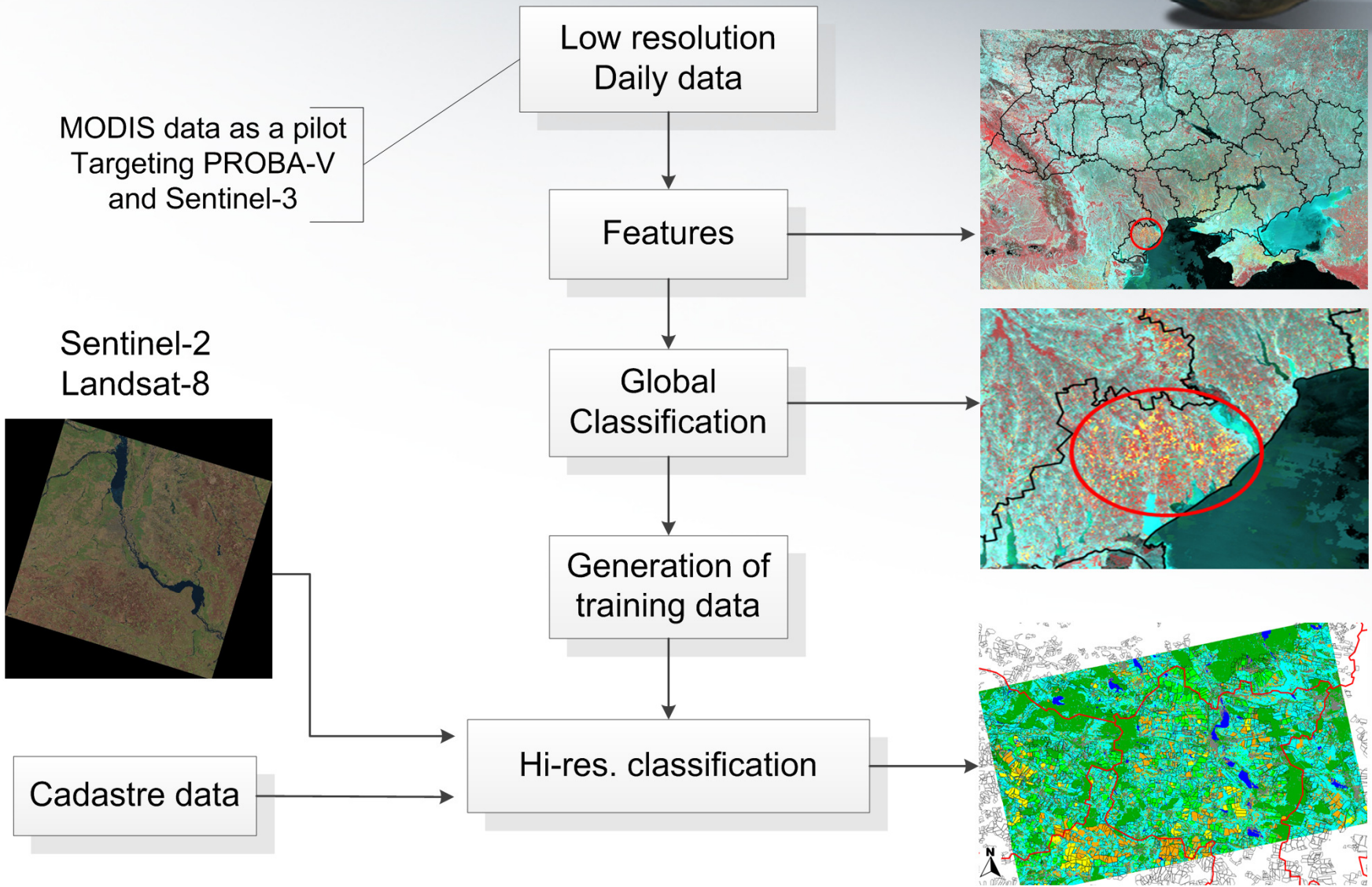
JECAM sites in Ukraine



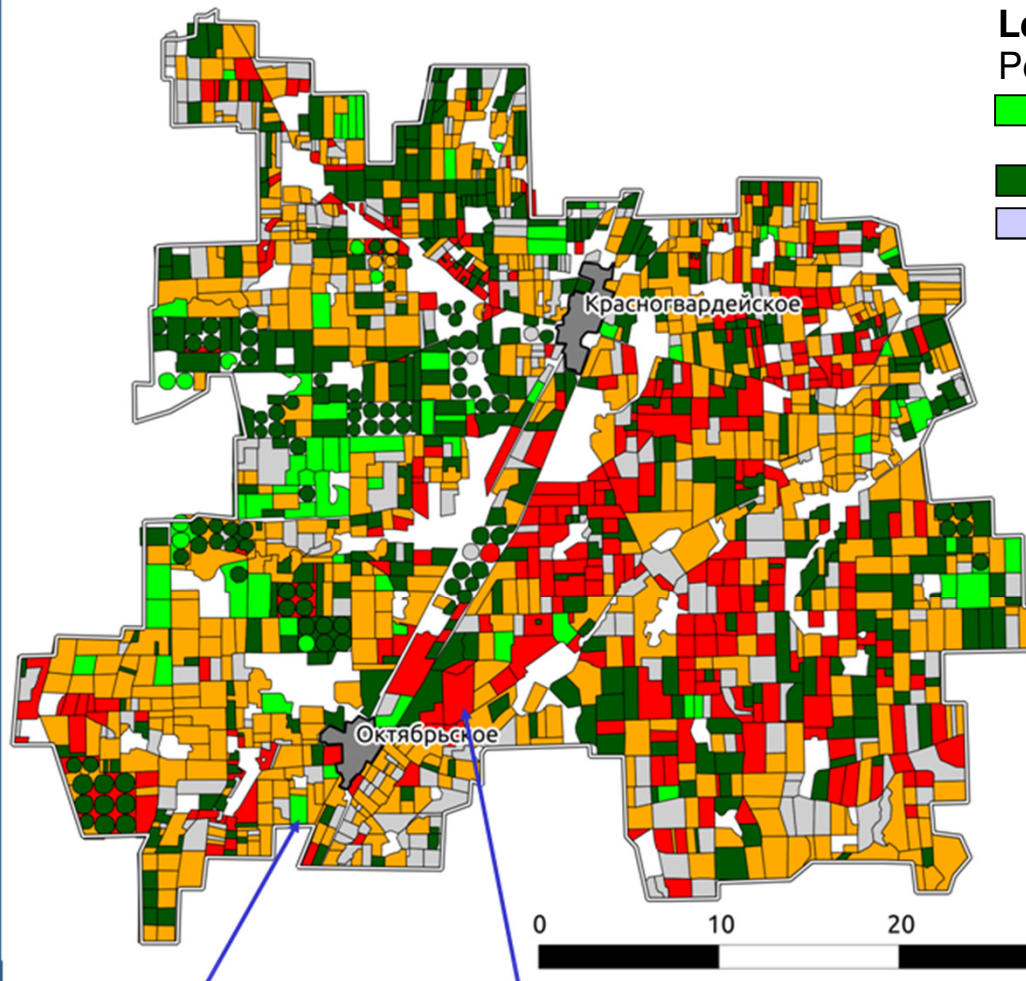
- Crop mixture (winter, spring, summer), important minor crops
- Uneven crop proportions distribution



Large scale crop mapping



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



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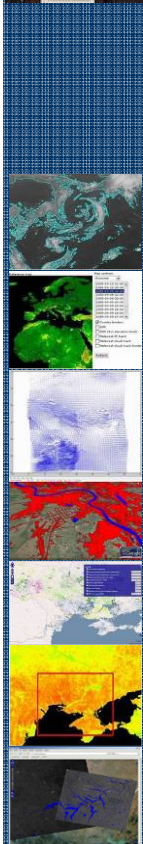
Winter wheat yield forecasting



- Three approaches
 - empirical regression-based model using **MODIS** data,
 - empirical regression-based model using **meteorological parameters**, and
 - adapted for Ukraine **Crop Growth Monitoring System (CGMS)** based on **WOFOST** crop growth simulation model and meteorological parameters;

Minimum RMSE values of winter wheat yield forecasts for 2010 and 2011 produced by different models.

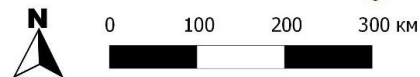
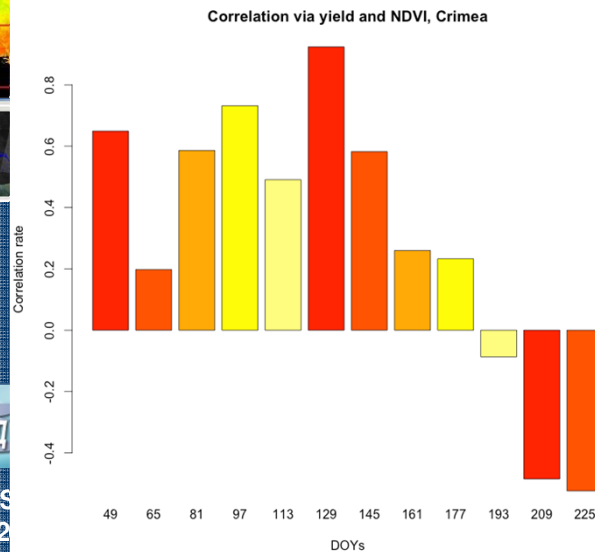
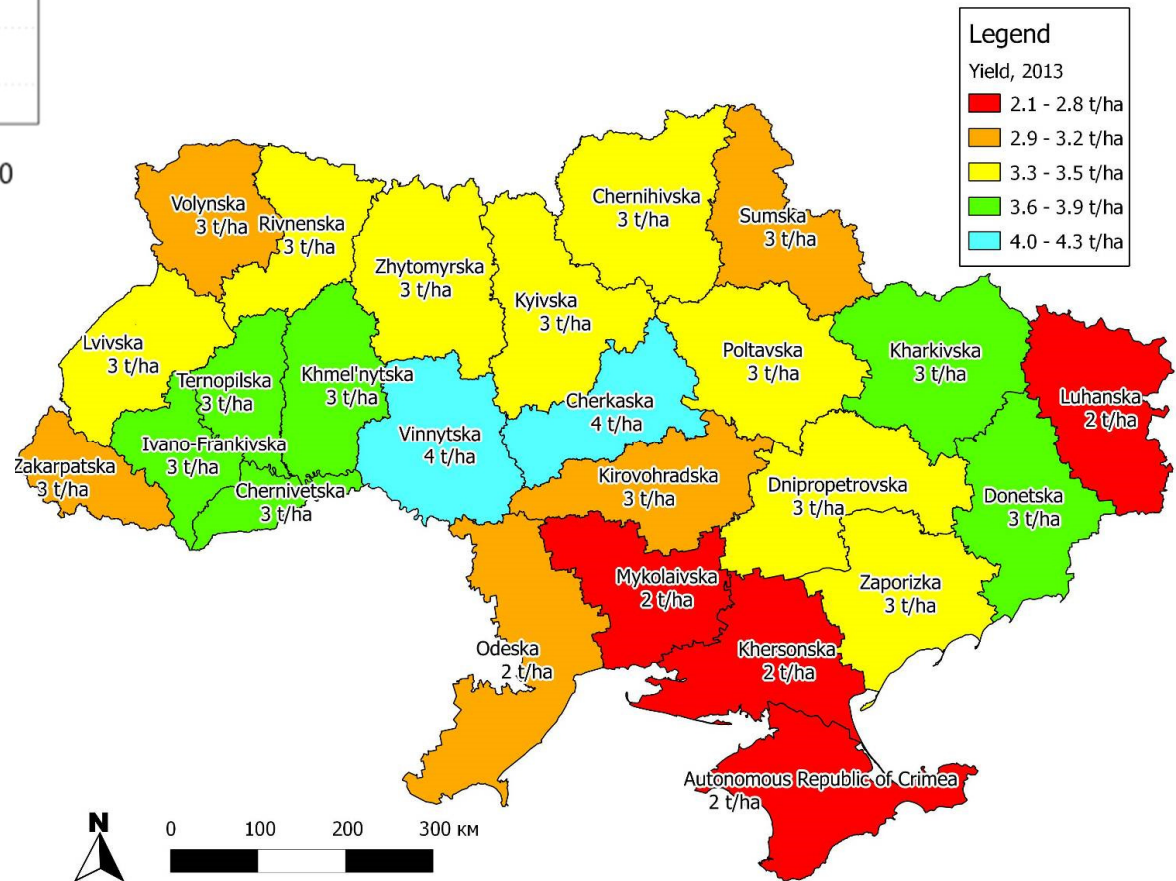
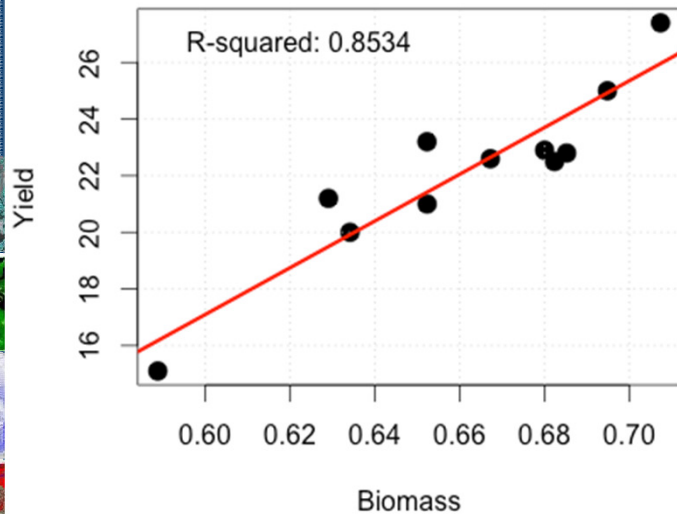
Model and time of forecast	RMSE for 2010, t ha ⁻¹	RMSE for 2011, t ha ⁻¹
MODIS NDVI (2000–2009), April–May	0.794	0.585
MODIS NDVI (2000–2010), April–May	–	0.625
Meteorological (2000–2009), April–May	0.779	0.565
CGMS (2000–2009), June	0.304	–
CGMS (2000–2010), June	–	0.509
Trend model (2000–2009)	1.346	0.944
Trend model (2000–2010)	–	1.050



Winter wheat yield forecasting using satellite data



Crop yield forecast for 2013
Forecast issue date – May 23rd, 2013

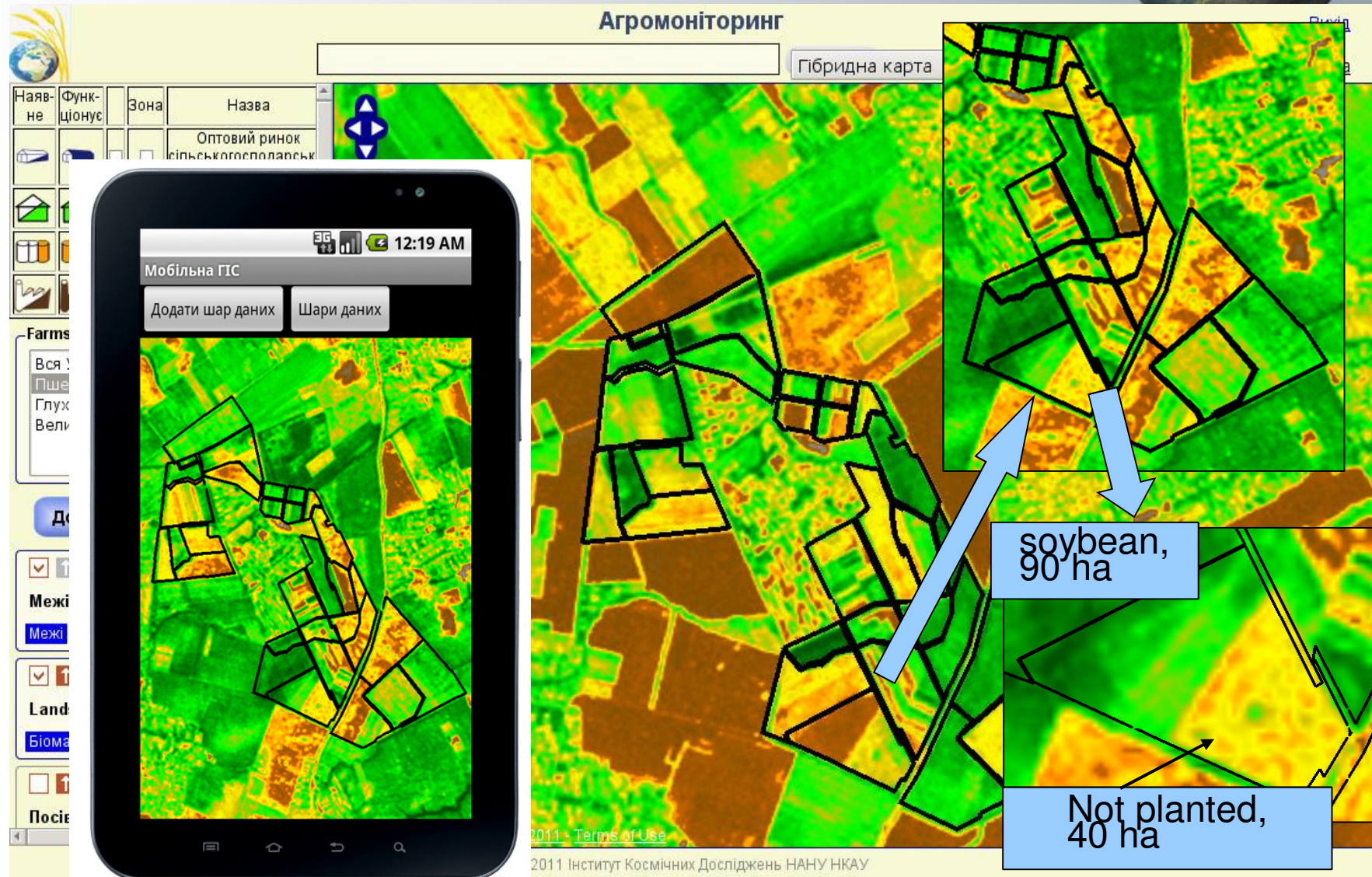


Accuracy of regression models for different predictors



		2010	2011	2012
<i>NDVI</i>	RMSE	8.2	6.2	6.8
	average	6.8	-3.7	-3.4
<i>VHI</i>	RMSE	6.3	5.1	7.0
	average	5.5	-3.8	-3.6
<i>FAPAR</i>	RMSE	8.9	5.2	5.6
	average	7.6	-2.1	-0.5

Geoportal: delivery of EO products

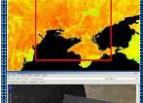
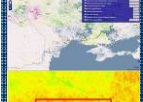
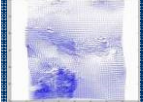
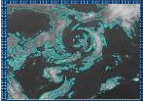
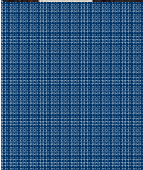
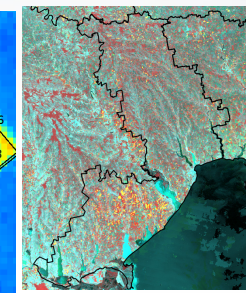
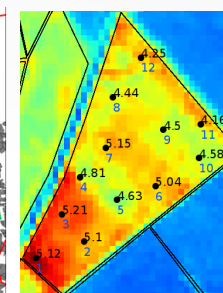
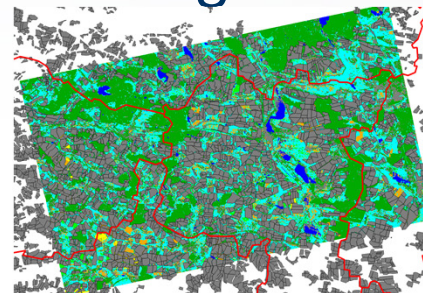
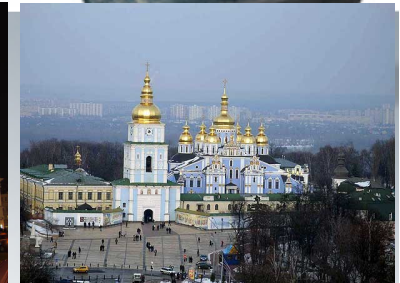
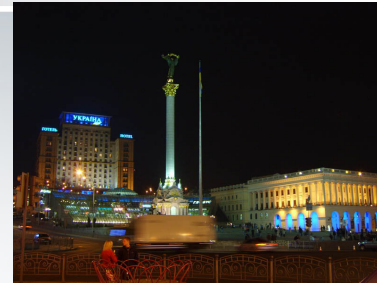


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Conference: GEO-UA 2014



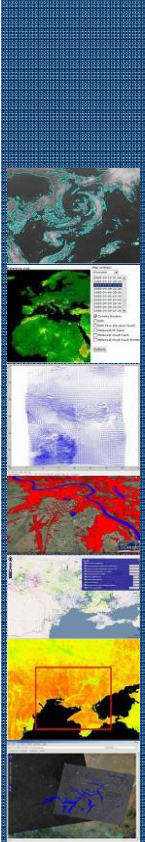
- Date and place:
 - *May 26-30, 2014*
 - *Kyiv, Ukraine*
- Particular theme:
 - *EO for sustainable agriculture*
- Special workshops/sessions:
 - Regional GEO-GLAM meeting
 - JECAM
 - BIOMA
 - FP7 SIGMA
 - UN-SPIDER
- Publications
 - Selected papers will be published in special issue of the international peer-reviewed journal.



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Thank you!



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