



# The GOFC-GOLD South Central and Eastern European Network (SCERIN)

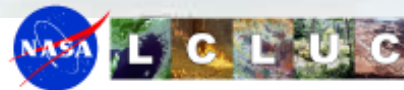


## SCERIN Overview SCERIN-3 Goals and Agenda

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# SCERIN Network Goals

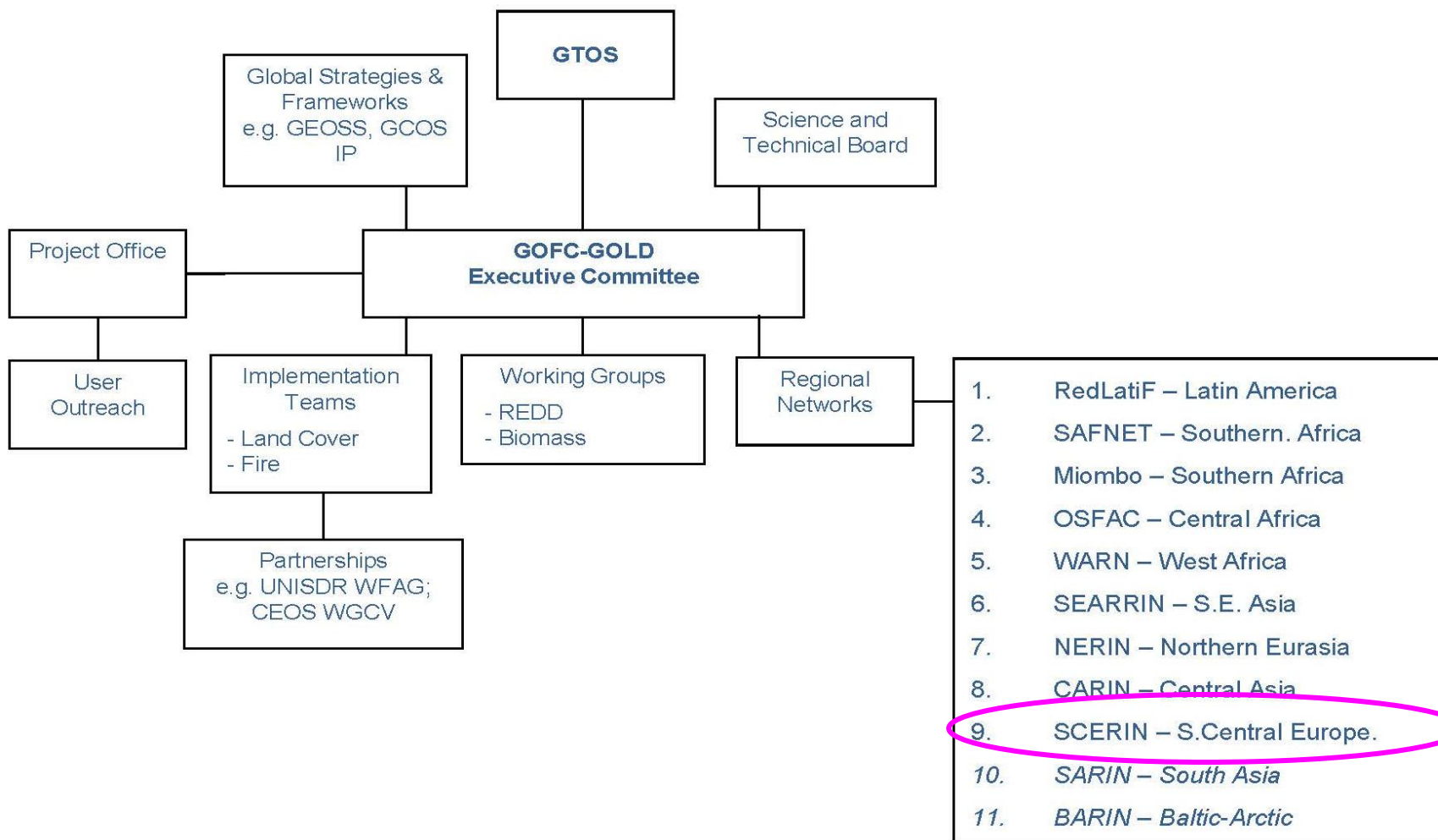
- 1. To contribute for ensuring continuous high quality regional and global observations.**
- 2. To facilitate the consistent implementation of remote sensing and LCLUC methodology in the region by providing a platform for collaboration among remote sensing experts in SCEE.**
- 3. To promote the exchange of regional expertise from the fields of geographic information systems, remote sensing, ecology, plant biology, and sociology -- all needed to study ecosystem processes and LCLUC on local, regional, and continental scales.**
- 4. To improve cooperation in developing methods for monitoring the dynamics, stability, and vulnerability of the major regional ecosystems of SCEE for effective sustainable management and preservation, not only on the local but also regional and pan-European levels.**

# SCERIN Geographic Domain

SCERIN includes: Central & South Eastern Europe, the Danube Watershed & Western Black Sea coast

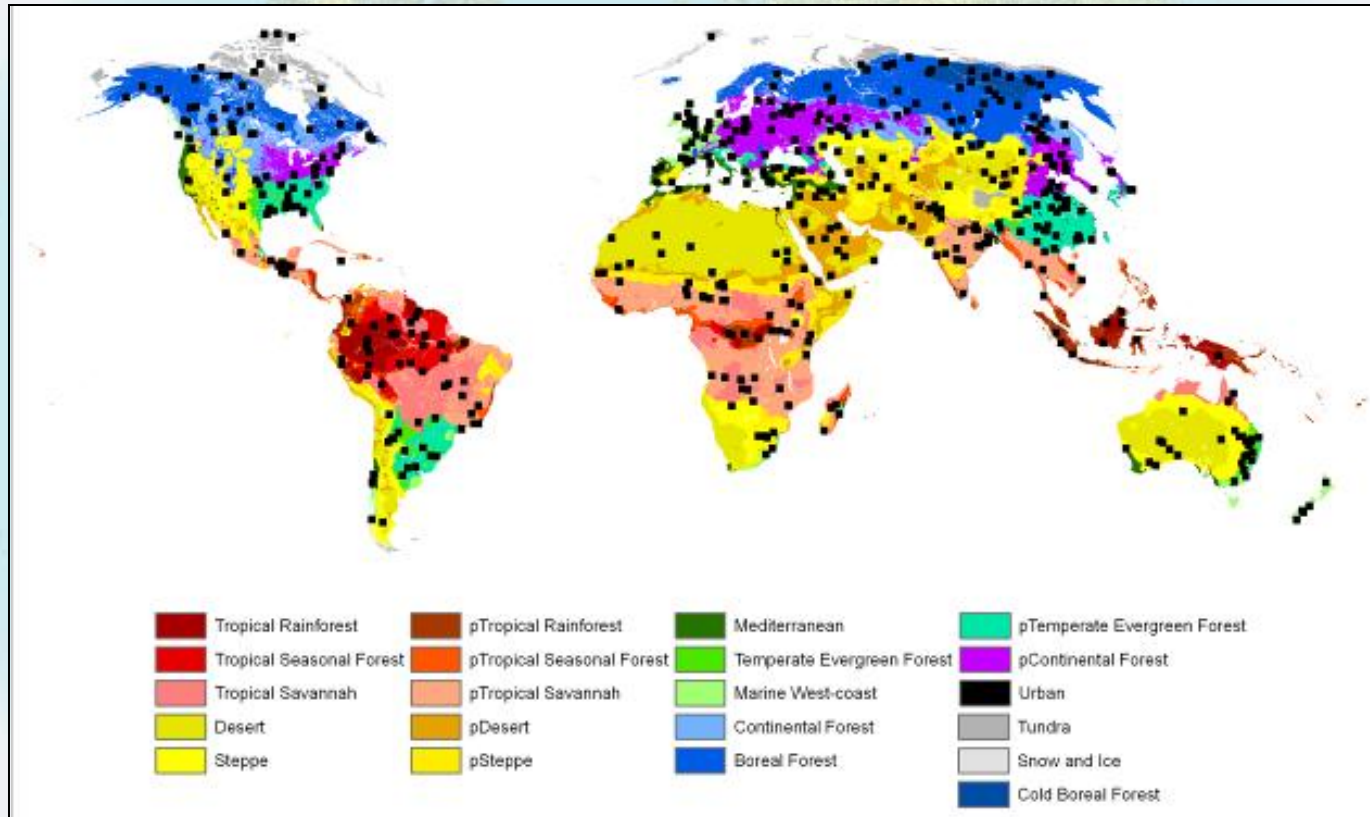


# SCERIN Contributes to GOFC-GOLD



# Global Reference Validation Database for Accuracy Assessment of Land Cover

*Role of GOFC-GOLD and the regional networks in verifying classifications and classifying high resolution images*



**GOFC-GOLD**

Global Observation of Forest Cover and Land Dynamics



Land Cover Project Office



*Brice Mora, 2013*

# SCERIN Participants and Structure

- Network of scientists and other professionals based in the region or with scientific interests in the region.
- SCERIN contributes to GOFC-GOLD and has strong linkages with the NEESPI and LCLUC
- Thematic focus of SCERIN:
  - LCLUC and implications to climate & society
  - Forest function, disturbances, fires
  - Ecosystem carbon storage and flux dynamics



**FG1: Forest changes:** disturbances, biomass production, forest LCLUC, driving forces,

**FG2: Land Cover Changes:** climate change, agricultural land abandonment, urban expansion

**FG3: Validation/verification network for support of current and future satellite missions** [e.g. NASA's LDCM and HypsIRI, and ESA's GMES program – Sentinel 1 and now 2]

# SCERIN

## South/Central European Regional Information Network



### Network Coordinator in U.S.:

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Department of Applied Geoinformatics and Cartography, Faculty of Science, Charles University Prague

# Why SCERIN? REGIONAL SPECIFICS

- Extreme diversity in land forms and environmental conditions --- unique richness and diversity of species, both highly sensitive and vulnerable to the global climatic changes
- Most of the region has been under extensive land use for a very long period --- many of the natural processes of adaptation are dysfunctional
- The economical and social restructuring following the political transition has not reached a stabile phase yet
- Mainstream research and the regional mitigation policy view the effects of land use and land cover changes in SCERIN as lower priority of marginal importance (as compared to socio-economical changes)





# Regional Specifics

- SCERIN is undergoing **active land use change**, presenting a major source of uncertainty in global-scale estimates of land-cover, carbon storage and flux dynamics
- Climatic predictions for SCERIN show **higher uncertainties**, and processes and trends that differ and/or oppose the forecasts for western or north European climatic conditions
- SCERIN is densely populated, and has an important role in food production and industry
- The decline of vitality/stability of the natural ecosystems in SCERIN triggers **extreme events** (e.g., flooding, wild fires, droughts) which result in ecological degradation and a release of the carbon stored in the ecosystems, and/or urban destructions and devastation of settlements
- **UNIQUE**: Possibility/responsibility of applying planned, large-scale measures to support natural processes by human interference

.... ***all the above considerably complicates the socioeconomic consequences of land cover change***

# SCERIN LCLUC/RS Background

- ❖ *Rich archive of long-term LULC data*
- ❖ *Archive of meteorology and field observations*
- ❖ *LUCC research established*
  - ✓ *tradition of 10-20 years in Central EU*
  - ✓ *Tradition of 5-10 years in SE EU*
- ❖ *Availability of regional data – individual institutions or projects, not always uniformly organized and consistent*
- ✓ **Main processes** *in present: suburbanization, land abandonment, grassing over, afforestation, loss of agricultural and especially arable land*
- ✓ **Driving forces:** *transitional processes, EU accession and open market, changes in land preservation and restitutions, private land ownership, nature preservation*

# ***SCERIN LCLUC and RS REQUIREMENTS***

- International cooperation for: sharing of data, experience, and for comparative studies
- Network of field validation sites (including land management data) at regional SCERIN scales
- Developing techniques for up-scaling between sites, networks of sites for detecting and interpreting key indicators of land use and land cover change
- Systems for a cost effective monitoring to facilitate frequent, repeated, regionally coordinated assessment of landscape and ecosystems: distribution, status and trends of change
- LCLUC regional modeling predictions and forecasts

# SEERIN Formulation Workshop

17 April 2012, Sofia, Bulgaria



# SCERIN-1 Meeting, Trip and Trans-Atlantic Training Charles University in Prague, Czech Republic



17-21 June 2013



# SCERIN-2 MEETING

Jagiellonian University in Kraków, Poland, Institute of Geography and Spatial Management



5-10 June 2014



# SCERIN Meetings

! Strong regional focus



## The South Central and Eastern European Regional Information Network

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*Jana Albrechtova, Charles University in Prague, Czech Republic, [jana.albrechtova@natur.cuni.cz](mailto:jana.albrechtova@natur.cuni.cz)*

*Garik Gutman, NASA Headquarters, [ggutman@nasa.gov](mailto:ggutman@nasa.gov)*

### Introduction

The South Central and Eastern European Regional Information Network (SCERIN) is an established network of the Global Observation of Forest and Land Cover Dynamics (GOFC-GOLD) project of the Global Terrestrial Observation System (GTOS). The regional networks perform an essential cross-cutting role in the implementation and integration of GOFC-GOLD's objectives and provide a link between the national/regional agencies and the global user/producer community. The SCERIN network has strong linkages with the Northern Eurasia Earth Science Partnership Initiative (NEESPI), and is well positioned to contribute to the emerging Northern Eurasia's Future Initiative (NEFI) under the auspices of the Future Earth program. The need to establish SCERIN was identified

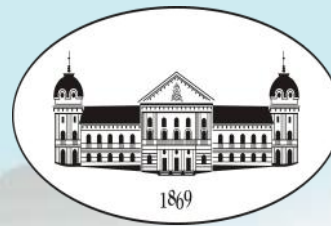
the SCERIN region has produced a unique richness and diversity of species that are highly sensitive and vulnerable to climate change. Currently, mainstream research and the established European mitigation policies view the effects of land-use and land-cover changes in parts of the region as low priority and of marginal importance. However, climatic predictions for the SCEE region show higher uncertainties and processes and trends that differ significantly from climatic forecasts for Western or Northern Europe. The decline of vitality and stability of the ecosystems, especially forests, in the SCEE region may trigger extreme events (e.g., droughts, flooding, wildfires) and result in ecological degradation such as soil erosion and aridification, constraints and pressure on sustainable ecological diversity, and extinction of endangered species. Ecosystem degradation

# SEERIN Formulation Workshop

## Theme: Land Cover Observations in SC Europe, National & Regional Programs

- Hosted by The National Institute of Meteorology and Hydrology at the Bulgarian Academy of Sciences (NIMH-BAS), Sofia, Bulgaria and its Director General Dr. Georgi Kortchev

- **41 participants:** Bulgaria, Czech Republic, Germany, Poland, Romania, Slovakia, Switzerland (ENVIROGRIDS), The Netherlands (GOFC-GOLD LCPO), TFYR Macedonia, Turkey, USA.



*17 April 2012, Conference Center of Park Hotel Moskva, Sofia, Bulgaria*

# SEERIN FW OUTCOMES

- 1) **Achieved a consensus that the regional network is *needed***
  - Outlined the network geographic domain, and name as SCERIN
  - Regional experts discussed the recent research accomplishments in the LCLUC, GOFC-GOLD and GEOSS research areas
  
- 2) **Identified common: *goals, participants* and objectives**
  - Outlined regional/national research & application objectives
  
- 3) **Outlined *next steps* -- capacity building initiatives to be conducted by the network**
  
- 4) **Formulated *SCERIN-1 Meeting* objectives, duration, participants, timing, host & location**
  - Meeting presentations and materials available at [http://www.fao.org/gtos/gofc-gold/net-SEERIN\\_Meetings\\_Sofia.html](http://www.fao.org/gtos/gofc-gold/net-SEERIN_Meetings_Sofia.html)

*17 April 2012, Conference Center of Park Hotel Moskva, Sofia, Bulgaria*

# *Expert Panel, 2012 - KEY APPLICATIONS*

1. Use of Remote Sensing Data for LULC monitoring in Turkey (*D. Maktav, Istanbul Technical University*)
2. Ukraine: Monitoring of New Wetlands Formation in Water Reservoirs and Deltas' Degradation in the Black Sea Basin (*V. Starodubtsev, National University of Life and Environmental Sciences, Ukraine*)
3. LULCC Research in the Czech Republic (*P. Stych, Charles University, Prague*)
4. Poland: Land Use & Land Cover Change Studies in the Northern Carpathians (*J. Kozak, Jagiellonian University, Krakow*)
5. Romania: Issues in Remote Sensing Techniques for Forest Cover Change Monitoring (*V. Gancz, Forest Research & Management Institute*)
6. Slovakia: Land Cover Research, Applications and Development Needs (*A. Halabuk, Slovak Academy of Science*)
7. Macedonia: Current Status of the HMS and Perspectives Regarding the Remote Sensing Monitoring (*V. Spiridonov & Z. Dimitrovski, Hydrometeorological Service*)
8. Use of Remote Sensing for Agricultural Applications in North West of Turkey (*L. Genc, COMU, Turkey*)
9. Bulgaria: Meteorological Satellites in Support to Land Surface Analyses (*J. Stoyanova & C. Georgiev, NIMH-BA, and L. Pessanha, Institute of Meteorology, Portugal*)
10. Monitoring of Forest Condition & Function (*J. Albrechtova & L. Kupkova, Charles University, Prague*)
11. Application of Hyperspectral Data and Artificial Neural Networks for Land Cover Mapping of Mountains Areas (*B. Zagajewski, University of Warsaw, Poland*)

*17 April 2012, Conference Center of Park Hotel Moskva, Sofia, Bulgaria*





17-21 June 2013

- **Theme: Monitoring Land Cover Changes & Forest Condition**
- SCERIN-1 included 43 participants from 9 countries.
- Jana Albrechtova, Lucie Kupkova and Premysl Stych hosted SCERIN-1 at the Faculty of Science of Charles University in Prague, Czech Republic.
- During a scientific field trip the participants viewed LCLUC in Sokolov Region in Northwestern Bohemia affected by mining activities“.
- SCERIN-1 was conducted in coordination with the regional IGU LUCC meeting and a Trans-Atlantic Training at CU.



17-21 June 2013

## OUTCOMES

Two SCERIN Focus Groups (FGs) were formed:

- 1) FG1 Forest monitoring, disturbances, function/health, and biomass dynamics; and
- 2) FG2 Land-cover changes, agricultural land abandonment, and urban expansion.

The goals of the focus groups, are to collaborate on joint projects, review and share the available satellite and *in situ* data and products, and compare the effectiveness of different approaches for land-cover monitoring in SCEE.

Specific science questions, formulated by the SCERIN FGs, include:

- 1) What were the land-change effects, associated with the institutional changes from socialist planning to EU policies?
- 2) How effective are protected areas?
- 3) What are changes to peri-urban areas under EU policies, regarding repurposing of industrialized and residential areas, sprawl vs. intensification, etc.?

The conclusions of the workshop included the need to strengthen collaboration and exchange of information on LCLUC in the region, and the goals and location of SCERIN-2 were identified.



5-10 June 2014

- **Theme: *Current LCLUC challenges in SCERIN - Assessing Ecosystem Function and Processes***
- SCERIN-2 was held 9-10 June 2014, at the Jagiellonian University in Krakow, Poland in coordination with a two day Trans-Atlantic Training. **Katarzyna Ostapowicz** and **Jacek Kozak** [Jagiellonian University, Institute of Geography and Spat. Management] hosted the meeting.
- 51 participants from SCEE and observers from Armenia, Georgia, and Belarus discussed regional and local issues related to satellite data products, methodologies, and end users.
- SCERIN-2 provided forum for discussion of SCERIN's Focus Groups, and discussions of the availability of satellite data, products, and approaches for land-cover monitoring in SCE.

**Established was FG3 for Validation/verification** in support of current and future satellite missions (e.g. NASA's HypsIRI, Landsat and the Sustainable Land Imaging Initiative) and ESA missions (GMES program – Sentinel 1 and 2).

# Transition from Land Cover Change to Land Cover Dynamics (from LCC to LCD)

## *Land cover dynamics*

- characterized by seasonal and inter-seasonal variability of vegetation greenness
- reflected in dynamic change of SI signal

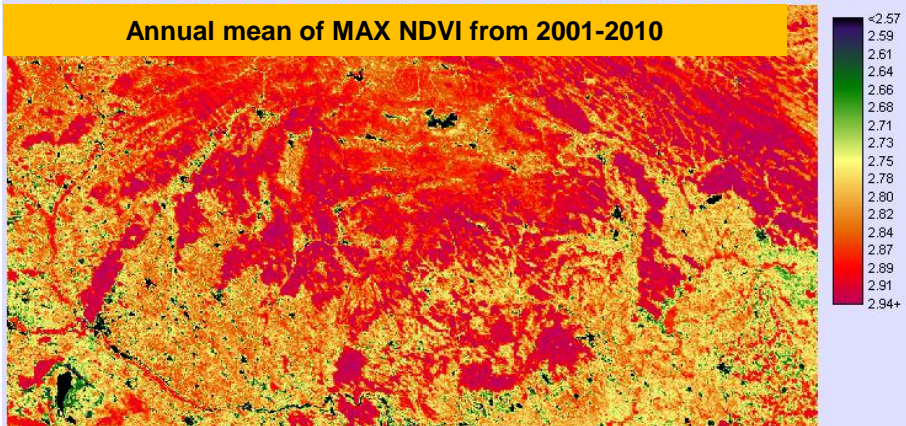
- Response to increasing availability of SI
- Increasing temporal resolution (LDCM, Sentinel2,...)

## Result:

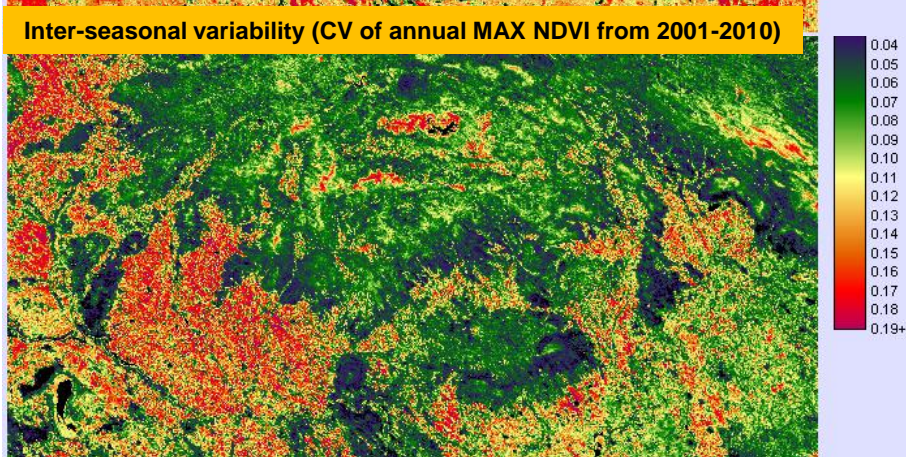
- multitemporal and time series based land cover classification and land cover dynamics analysis
- time series analysis of vegetation greenness (NDVI)

*Andrej Halabuk, SAS, Slovakia*

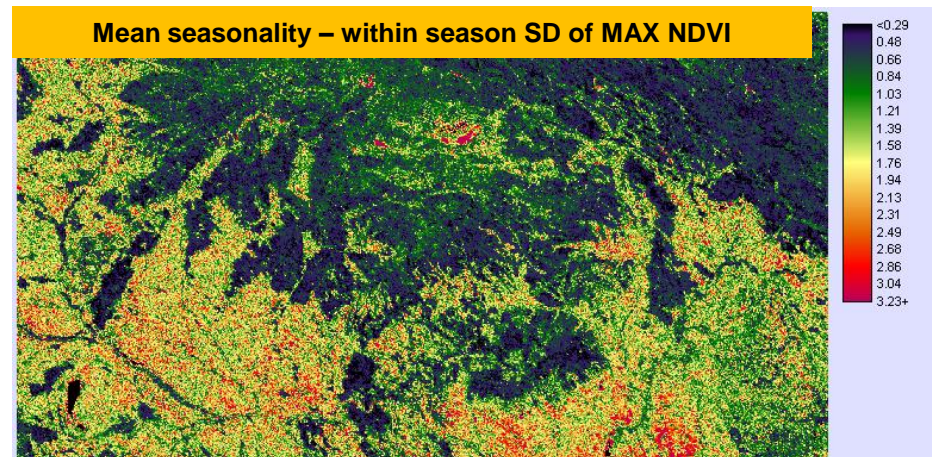
Annual mean of MAX NDVI from 2001-2010



Inter-seasonal variability (CV of annual MAX NDVI from 2001-2010)



Mean seasonality – within season SD of MAX NDVI



# Need for SCERIN Validation Group and Sites

Massive increase of EO based products (higher level of preprocessing) is expected in near future

- Are we prepared for retroactive data products development (e.g. models calibration, validation sets...)?
- SCERINs motivation
  - Common knowledge (scientific publications)
  - Common requirements
  - Funding (proposal writing)

**SCERIN-2 identified the need for:** 1) new collaborative research projects; 2) development of applications and capacity building initiatives to focus on the key regional issues; and 3) capacity building meetings and trainings. The goals of the current capacity building workshop SCERIN-3 were outlined.

# SCERIN-3 Workshop, July 2015

*Host: Prof. Ioan Abrudan, Dept. of Forestry and the Transilvania University of Brashov, Romania*

Day	Sun	Mon	Tue	Wed	Thu	Fri	Sat
Date	12-Jul-15	13-Jul-15	14-Jul-15	15-Jul-15	16-Jul-15	17-Jul-15	18-Jul-15
Event	Arrival	SCERIN-3 CBW	LCLUC Trip	SCERIN-3 CBW		Training	Departure

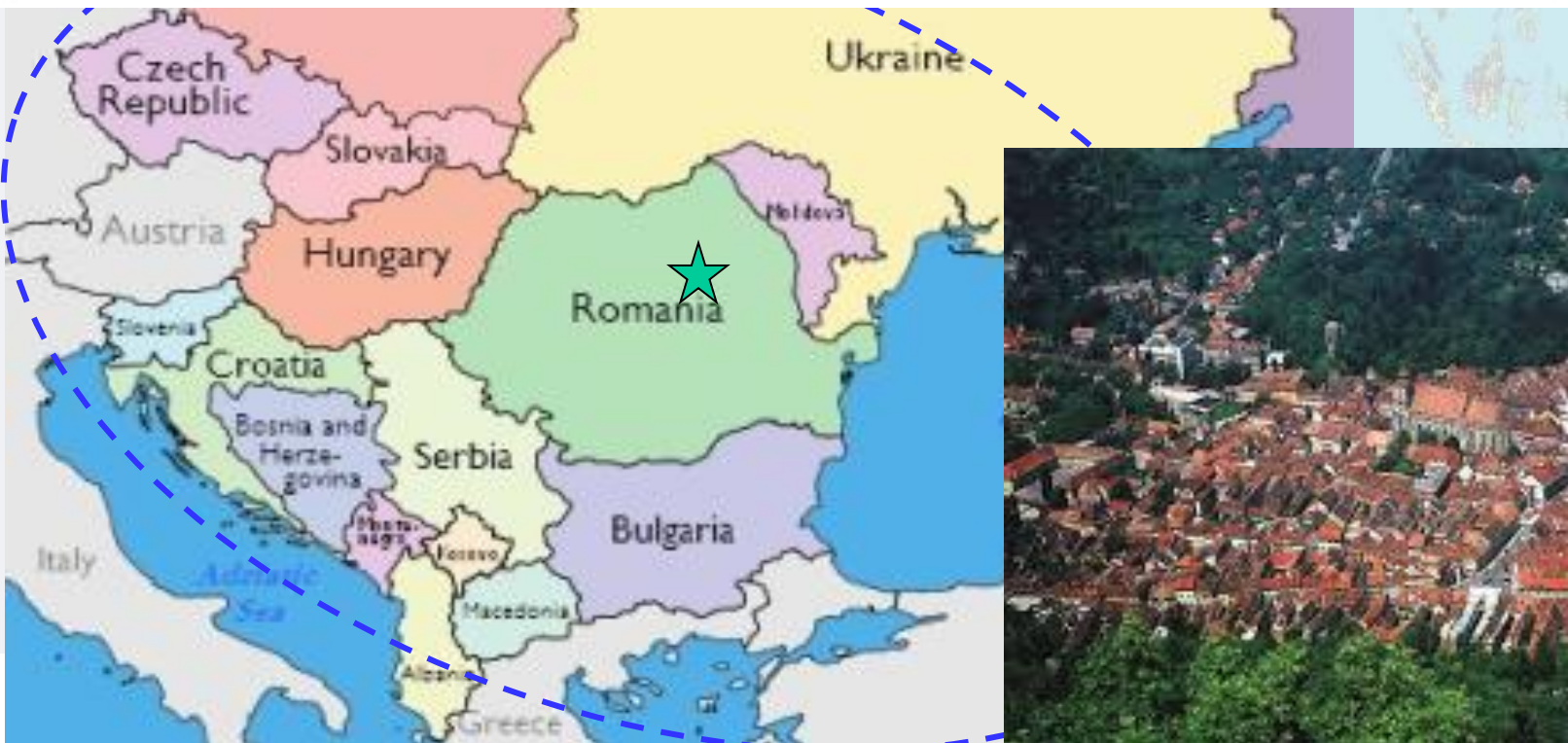
START

Global Change System for Analysis, Research & Training

LCLUC  
Land-Cover / Land-Use Change  
Program

GOCF-GOLD  
Global Observation of Forest  
and Land Cover Dynamics

esa



# ***SCERIN-3 Workshop Goals***

**Theme:** LCLUC Specifics and Challenges in SCERIN and RS Requirements for Sustainable Management

SCERIN-3 Capacity Building Workshop (CBW) is designed to facilitate discussions and collaborative work of the SCERIN Focus Groups.

**The objectives of SCERIN-3 CBW are to:**

- 1) provide a forum for FG collaboration and drafting of SCERIN overview papers to address specific issues (list next slide), for capacity building in the region;
- 2) address SCEE priority topics, focusing on remote sensing in forest management and administration, monitoring of protected areas, and assessment of forest disturbance;
- 3) discuss availability of satellite data, products, and approaches for regional land-cover monitoring;
- 4) inform participants about ongoing major scientific efforts and projects, with possible contributions and follow-up activities for SCERIN participants.

The SCERIN-3 CBW will include a day of training for graduate students and early career professionals.

# SCERIN-3 FGs Discussion Topics

- ✓ *Main regional land cover processes: presently are identified suburbanization, land abandonment, grassing over, afforestation, loss of agricultural and especially arable land*
- ✓ *Driving land cover forces include: transitional processes, EU accession and open market, changes in land preservation and restitutions, private land ownership, nature preservation*

To facilitate the comparative assessments of the main land cover processes and their driving forces in the region, the FGs will discuss:

- International cooperation for sharing of data and experience, and for comparative studies
- Selection of field validation sites for VISWIR optical data
- Availability of land management data at regional SCERIN scales
- Techniques for up-scaling between sites, and networks of sites for detecting and interpreting key indicators of land use and land cover change
- Consider the design of a regional system for a cost effective monitoring that enable frequent, repeated, regionally coordinated assessment of landscape and ecosystem distribution, status and trends of change



# SCERIN-3 CBW Agenda



Time	7/13/2015 Monday	Presenters Name	
	<u>SCERIN-3 Day 1</u>	First	Last
8:30	<i>Registration &amp; Logistics</i>		
8:50	<b>Plenary Session</b> (Session Chair: Jana Albrechtova, Records: Mihai Nita and Géza Király)		
9:00	Host Introduction and Opening, Formal Welcome	Ioan	Abrudan
9:20	Key note: Introduction to the forest and land use in Romania: Past and Present	Ioan	Abrudan
9:50	Key note: NASA/LCLUC support of SCERIN	Garik	Gutman
<b>10:30</b>	<i>Coffee Break (Group photo)</i>		
	<b>Plenary Session</b> (Session Chair: Garik Gutman, Records: Gregory Taff and Mihai Nita)		
11:00	SCERIN Report, Workshop Goals and Agenda	Petya	Campbell
11:20	Overview of EARSEL activities, as relevant to SCERIN	Ioannis	Manakos
11:40	Overview of LCLU changes in Central and Eastern Europe	Premysl	Stych
<b>12:00</b>	<i>Lunch</i>		
	<b>Plenary Session</b> (Session Chair: Petya Campbell, Records: Catalina Munteanu and Mihai Nita)		
1:00	Satellite data use for severe meteo-hydrological events monitoring and related risks in Romania	Anisoara	Irimescu
1:20	Briefing of SCERIN group of the book on Eastern Europe	Volker	Radeloff
1:30	<b>SCERIN overview papers (OPs):</b> topics, outline, leader, team, participants and deadlines	Jana	Albrechtova
<b>2:00</b>	<i>Questions &amp; Discussion</i>	Petya	Campbell
2:30	<i>Coffee Break</i>		

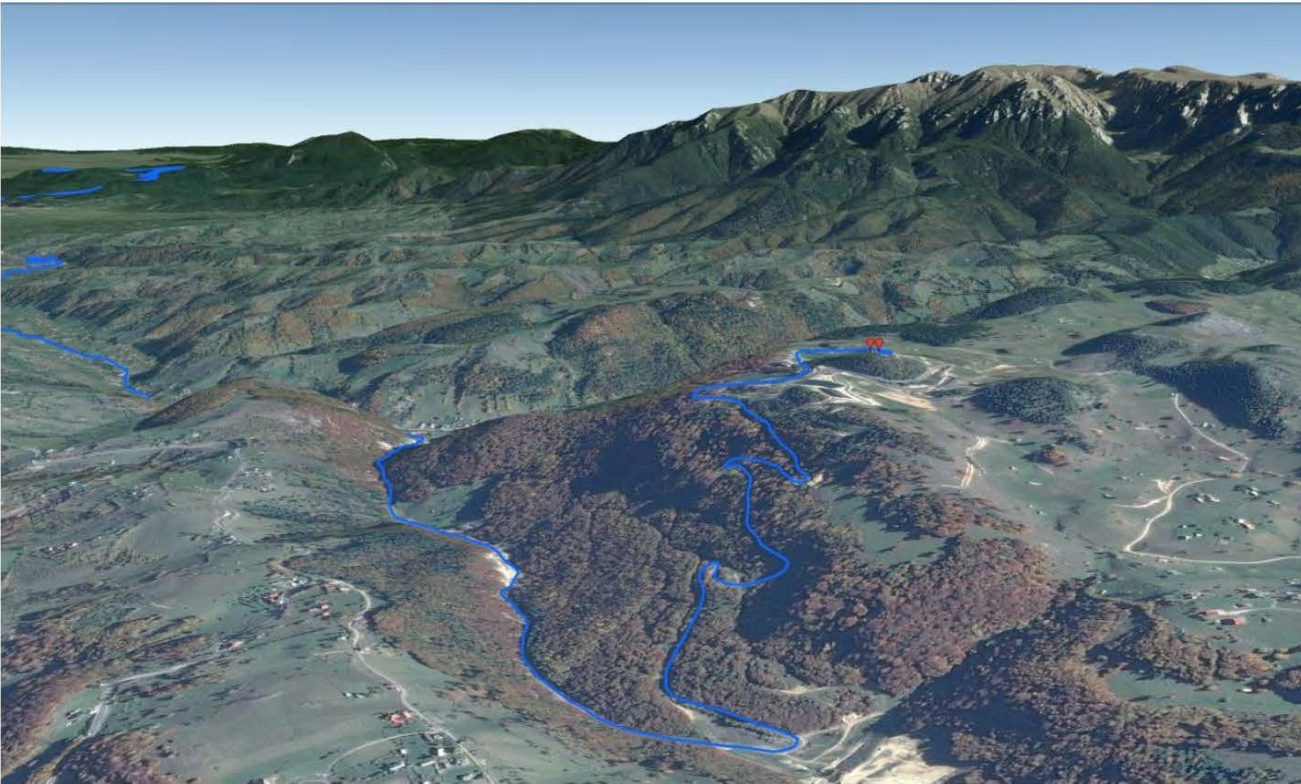
# SCERIN-3 CBW Agenda



Time	7/13/2015 Monday	Presenters Name	
	<u>SCERIN-3 Day 1</u>	First	Last
2:30	<i>Coffee Break</i>		
	<b>Research highlights</b> (Session Chair: Mihai Nita, Records: Frantisek Zemek and Piotr Wezyk)		
3:00	Greek National Forest Observatory	Thomas	Katagis
3:15	Forest monitoring on the Danube floodplain area by different remote sensing methods	Géza	Király
3:25	Utilizing SAR data for land monitoring	Levente	Ronczyk
3:50	Sentinel -1 Validation System by IGIK	Monika	Tomaszewska
4:00	<b>Questions &amp; Discussion</b>		
	<b>Research highlights</b> (Session Chair: Levent Genc, Records: Levente Ronczyk and Thomas Katagis)		
4:30	Quantitative assessment of forest ecosystems from airborne data	Frantisek	Zemek
4:40	Monitoring Phenology Changes and Grassland Productivity in Poland and northern Norway	Gregory	Taff
5:00	Legacies of 19h century affect contemporary land cover	Catalina	Munteanu
5:10	Airborne Laser Scanning versus Stereomatching of aerial photos based approach	Piotr	Wezyk
5:20	Hyperspectral data based monitoring of forest health status	Jana	Albrechtova
5:30	<b>Questions &amp; Discussion</b>		
5:45	<i>Adjourn</i>		
7:00	<b>Concert at Aula of The University of Transilvania: G. Enescu (Romanian compositor), A. Vivaldi, Mauro Giuliani, F Mendelssohn Bartholdy, Ludwig van Beethoven, Georg Friedrich Haendel</b>		
8:30	<b>Group Dinner and Social at ARO Hotel Restaurant</b>		

# July 14 2015, Tuesday LCLUC Trip

The field trip will cover a transect through Carpathian Mountains



## Goals:

- inform on regional LCLUC examples
- provide time and opportunities for discussions

We are going to leave by university bus from the Aro Hotel at 9:00. The return will be around 17:00.

How to dress: in a sport wear, walking shoes, rain coats.

The LCLUC field trip will provide a view of the landuse around Brasov, right in the heart of Carpathian Mountains. A retrospective of historical changes in land use will be discussed. On the way to a beautiful plateau, from where one can observe the landscape changes in the area, the participants will also have an opportunity to visit the [Rasnov Citadel](#) and [Bran Castle](#).

In the mountainous region of Brasov, the heart of Carpathian Mountains the major LC changes represent forest conversion, including both deforestation and afforestation, and associated with various forestry practices and social and economic factors.

# SCERIN-3 CBW Agenda



7/15/2015 Wednesday	
SCERIN-3 Day 3	
9:00	<b>SCERIN Programmatic Panel*</b> - Regional and National Priorities ( <i>Chair : Petya Campbell, Records : Gregory Taff</i> ) Bulgaria, Macedonia, Slovenia, Romania, Poland, Czech Republic, Slovakia, Hungary, Croatia, Ukraine, Greece, Turkey
10:00	<i>Questions &amp; Discussion</i>
10:30	<i>Break</i>
11:00	<b>FG1: Poster Speed Talks</b> ( <i>See FG1: Posters below, Session Chair: Petya Campbell</i> )
11:30	<i>Questions &amp; Discussion</i>
12:00	<i>Lunch</i>
1:00	<b>Parallel working sessions of FG1 and FG2 on the overview papers</b> <b>FG1. Chairs: Albrechtova, Zemek and Wezyk ; Records: Géza Király ; FG2. Chairs: Taff, Premysl Stych; Records: Catalina Munteanu</b>
3:30	<i>Break</i>
4:00	<b>FG2: Poster Speed Talks</b> ( <i>See FG2: Posters below, Session Chair: Jana Albrechtova</i> ) <b>Interactive Poster Session, Questions and Discussions</b>
6:00	<i>Adjourn</i>

## Posters and Speed-talk presentations (4 minutes per speed-talk)

FG1: Posters	FG1. Forest LCLUC and biomass production ( <i>Session Chair: Petya Campbell</i> )	Presenters Name
1	Correlation of Norway spruce biometric stand parameters based on airborne LiDAR and terrestrial methods	Bogdan Apostol
2	Forest monitoring in South-Western Hungary based on Landsat time-series	Ivan Barton
3	Monitoring of the forest cover dynamics in the Tatra National Park using remote sensing and GEOBIA approach – the case study of the windstorm of December 2013 in the Western Polish Tatra	Paweł Hawryło
4	Preliminary results of AFORENSA project	Luka Rumora
5	TLS inventory of single tree "Oak "Bartek" in Zagnansk	Piotr Rysiak
6	Using of GIS and Remote Sensing for forest mapping and monitoring in Slovakia	Ivan Sačkov
7	Mapping of the garbage along tourist routes in Polish National Parks using geomatic technologies	Michał Usień
8	The detection of windfall and windbreak in Norway spruce stands using GEOBIA, LiDAR and aerial photo based 3D point clouds – a case of study in Koscieliska Valley (Tatra National Park, Poland)	Piotr Wezyk
9	A change vector analysis technique for monitoring land cover changes in Copsa Mica, Romania, in the period 1985-2011.	Iosif Vorovencii
Time (min)	40	

FG2: Posters	FG2. Anthropogenic LCC: agricultural land abandonment, urban expansion and climate change ( <i>Session Chair: Greg Taff</i> )	Presenters Name
1	Change detection approaches used by Earth Observation Group in CBK PAN	Sebastian Aleksandrowicz
2	Automatic monitoring system of the Earth's surface based on MODIS data in relation SCERIN	Sebastian Aleksandrowicz
3	Use of Landsat images and topographic data for characterization of agricultural lands in Znojmo region, Czech Republic	Olga Brovkina
4	EO-1 Hyperion spectral time series for ecosystem function and satellite data comparison	Petya Campbell
5	Linking Land use land cover change and population around IDA mountain using historical photographs and Landsat 8 data	Levent Genc
6	Next Generation UAS Based Spectral Systems for Environmental Monitoring	Petya Campbell
7	Land cover mapping with use of satellite data in regional scale: a case study from the Carpathians	Agnieszka Gajda
8	Land cover changes related with gas and oil extraction	Volodymyr Starodubtsev
9	The landscape decomposition of the of Festung Krakau - a new approach based on Aerial Laser Scanning point cloud processing and GIS spatial analyses	Karolina Zięba
Time (min)	40	

# SCERIN-3 CBW Agenda



Time	7/16/2015 Thursday	Presenters Name	
	<u>SCERIN-3 Day 4</u>	First	Last
9:00	<b>Observers Programatic Panel: Armenia, Georgia, Norway</b> ( <i>Chair: Jana Albrechtova</i> )		
9:30	<i>Questions &amp; Discussion</i>		
9:45	Forest change monitoring from remote-sensing time-series	Loïc	Dutrieux
10:00	Use of ArcGIS Online to share validation data	Vladimir	Gancz
10:15	<i>Break</i>		
10:45	<b>SCERIN Overview papers status: action items and deadlines</b> ( <i>Report from the working sessions of FG1 and FG2</i> )		
11:30	<i>Questions &amp; Discussion</i>		
12:30	<i>Lunch</i>		
1:30	<b>SCERIN-3 Workshop outcomes, action and deadlines</b> ( <i>Petya Campbell and Jana Albrechtova</i> )		
2:30	<i>Questions &amp; Discussion</i>		
3:30	<i>Break</i>		
4:00	<b>SCERIN Future plans, activities and potential venues</b> ( <i>Petya Campbell and Jana Albrechtova</i> )		
4:30	Presentation of proposals for SCERIN 2016 (location, facility, venue)		
5:00	<i>Questions &amp; Discussion</i>		
5:30			
6:00	Host Concluding Remarks		
	<i>Adjourn</i>		
	<i>Group dinner in a convenient location</i>		

# SCERIN-3 Training

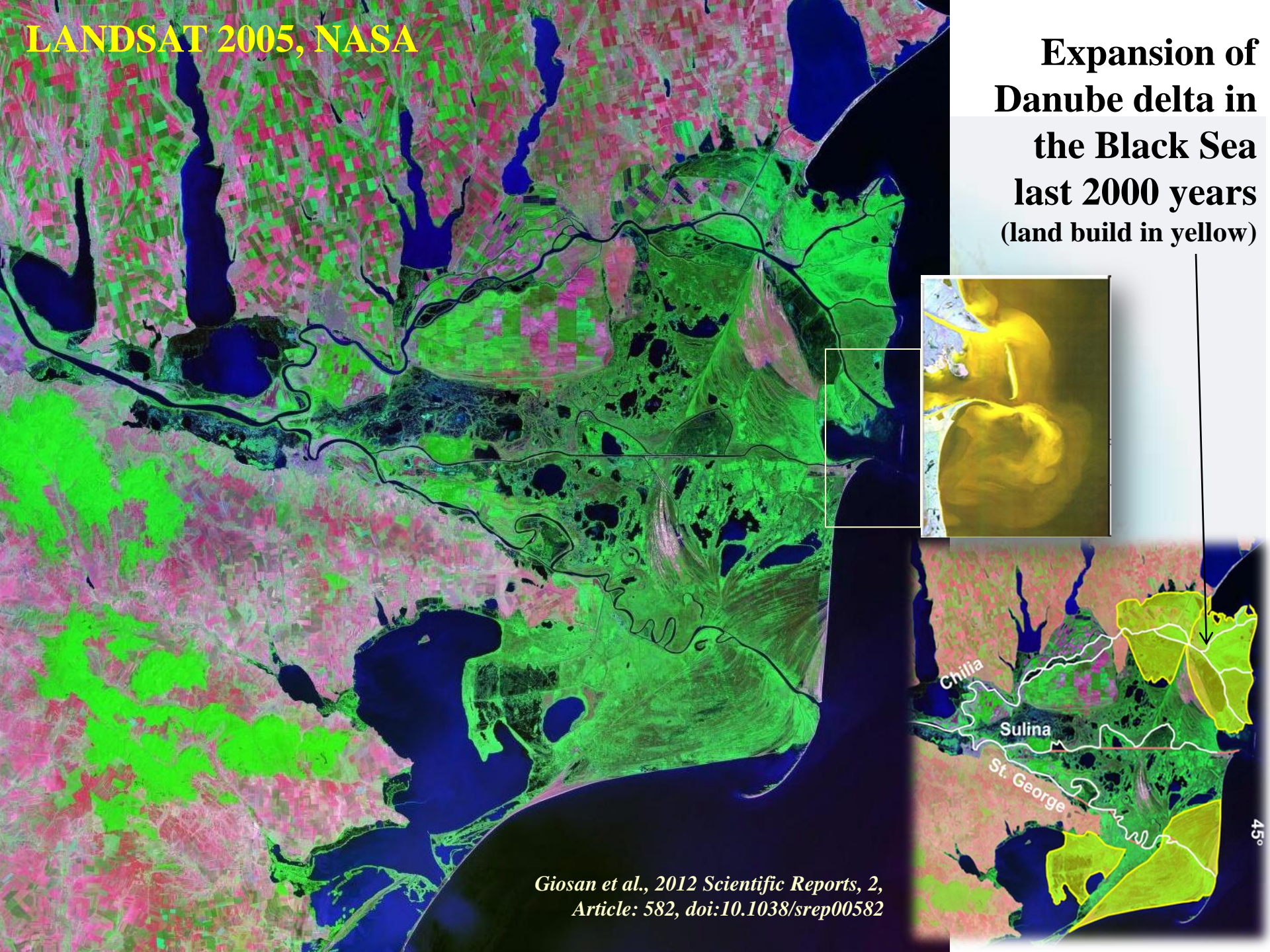


<i>Time</i>	<i>7/17/2015 Friday</i>		
	<i>Training at SCERIN - 3</i>	<i>Person</i>	<i>Duration</i>
8:30	<i>Registration, Opening &amp; Logistics</i>		
9:00	Global monitoring - LCLUC overview	Garik Gutman	1 hr
10:00	<i>Break</i>		15 min
10:15	bfastSpatial: An R package for remote-sensing change detection	Loic Dutrieux	45 min
11:00	Mapping of soil clay substrates from airborne hyperspectral images	Frantisek Zamek and Olga Brovkina	45 min
12:00	<i>Lunch</i>		1 hr
1:00	Forest mapping and retrieving stand parameters with LiDAR (ALS or TLS)	Piotr Wezyk	1hr 30 min
2:30	<i>Break</i>		15 min
2:45	Land cover change analysis and social aspects	Greg Taff	1:30 hr
4:15	<i>Break</i>		15 min
4:30	Writing LCLUC scientific papers'	Catalina Monteanu	1hr 30 min
6:00	<i>Adjourn</i>		



**LANDSAT 2005, NASA**

**Expansion of  
Danube delta in  
the Black Sea  
last 2000 years  
(land build in yellow)**



*Giosan et al., 2012 Scientific Reports, 2,  
Article: 582, doi:10.1038/srep00582*





# Extra Slides

- Examples of regional projects and data

# RS DATA for Turkey

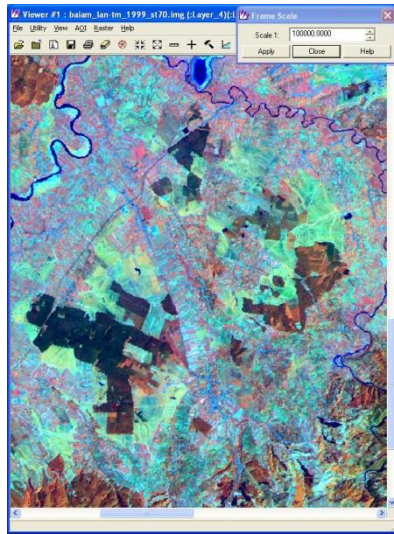
- ❑ HR: IKONOS, QB, SPOT, GeoEye
- ❑ MS: Landsat, SPOT
- ❑ Radar (ERS, RADARSAT)
- ❑ Aerial photographs-Orthophotos
- ❑ Terrestrial laser scanning (TLS)
- ❑ LIDAR (new)



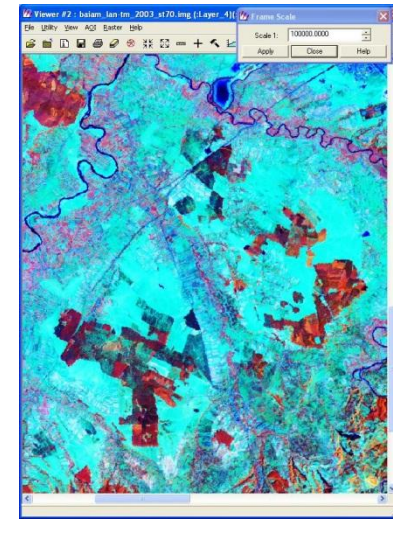
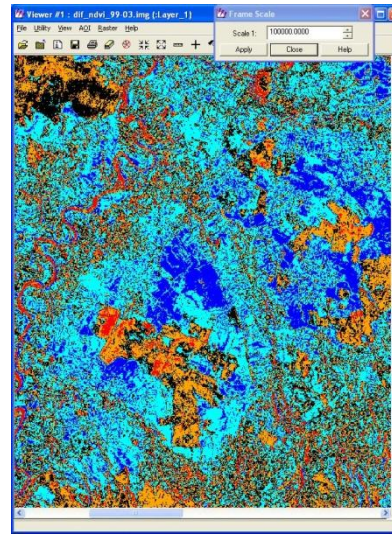
*D. Maktav, Istanbul Technical University, Turkey*

# Forest Cover Change Monitoring in Romania

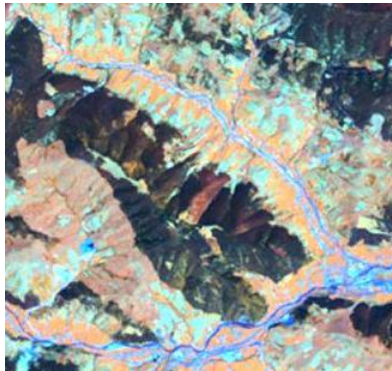
Automatic change detection



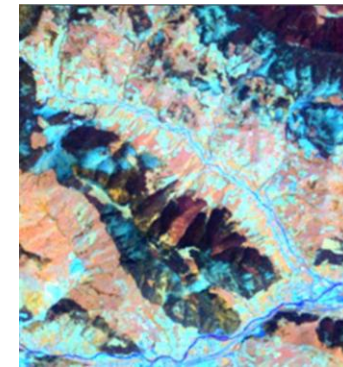
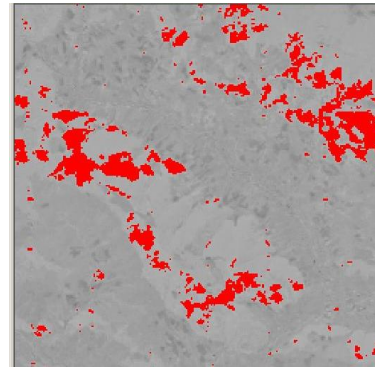
1999



2003



2001

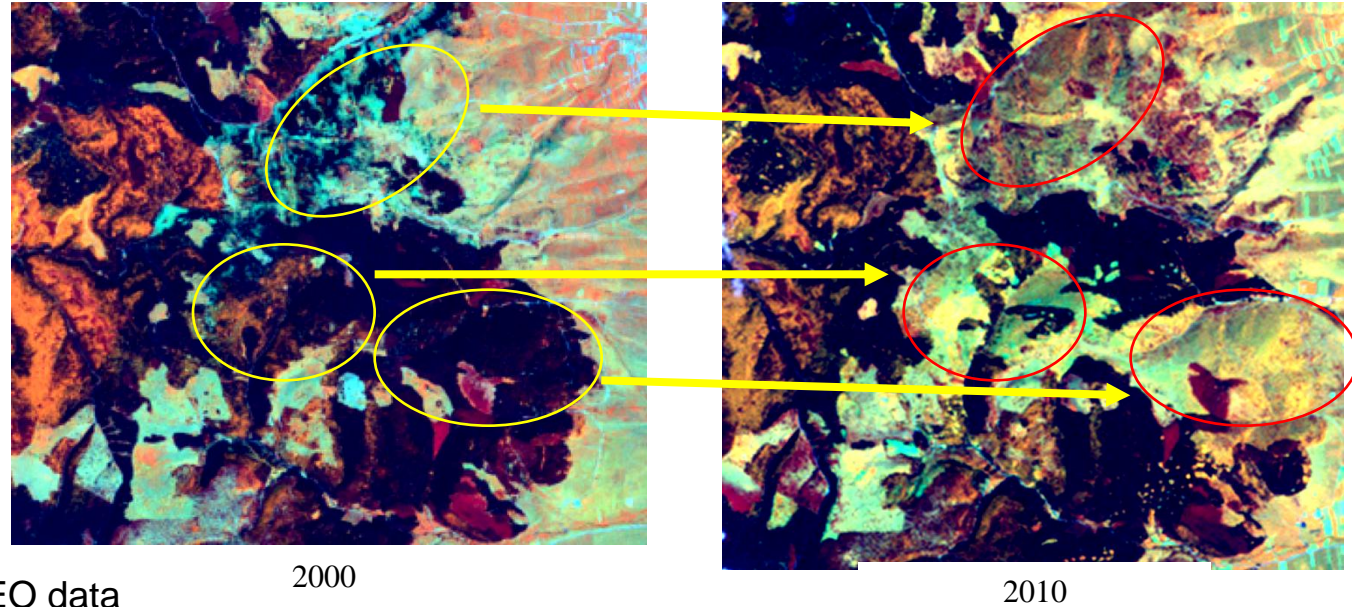


2002

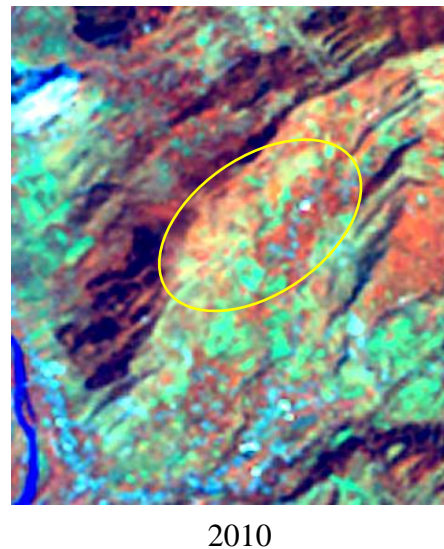
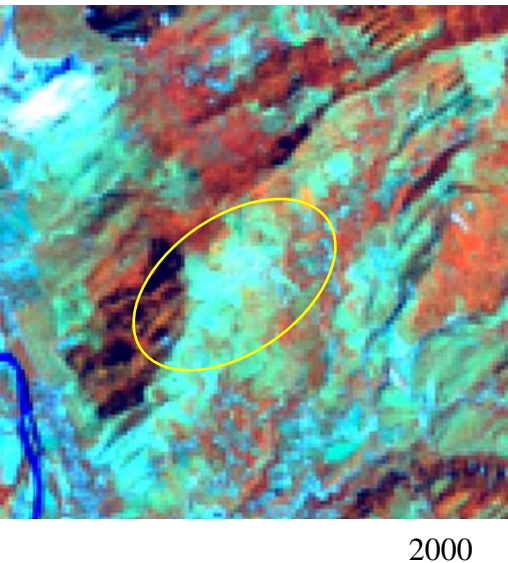
*Dr.ing. Vladimir Gancz*

# Forest Cover Change Monitoring in Romania

Aims:  
to provide a tool for systematic automatic forest cover change detection  
to publish the results on Internet geoportal on a regular basis (annually / 6 months)



Based on medium resolution EO data  
(i.e. Landsat)

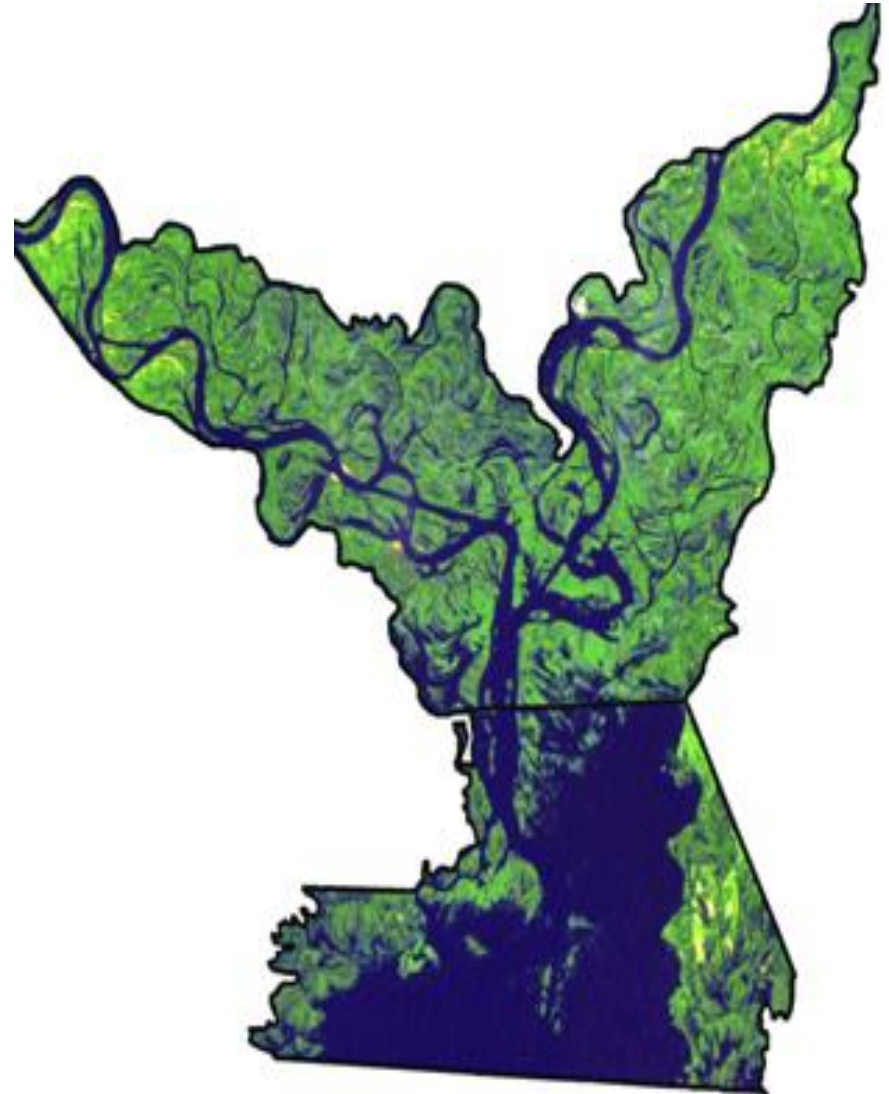
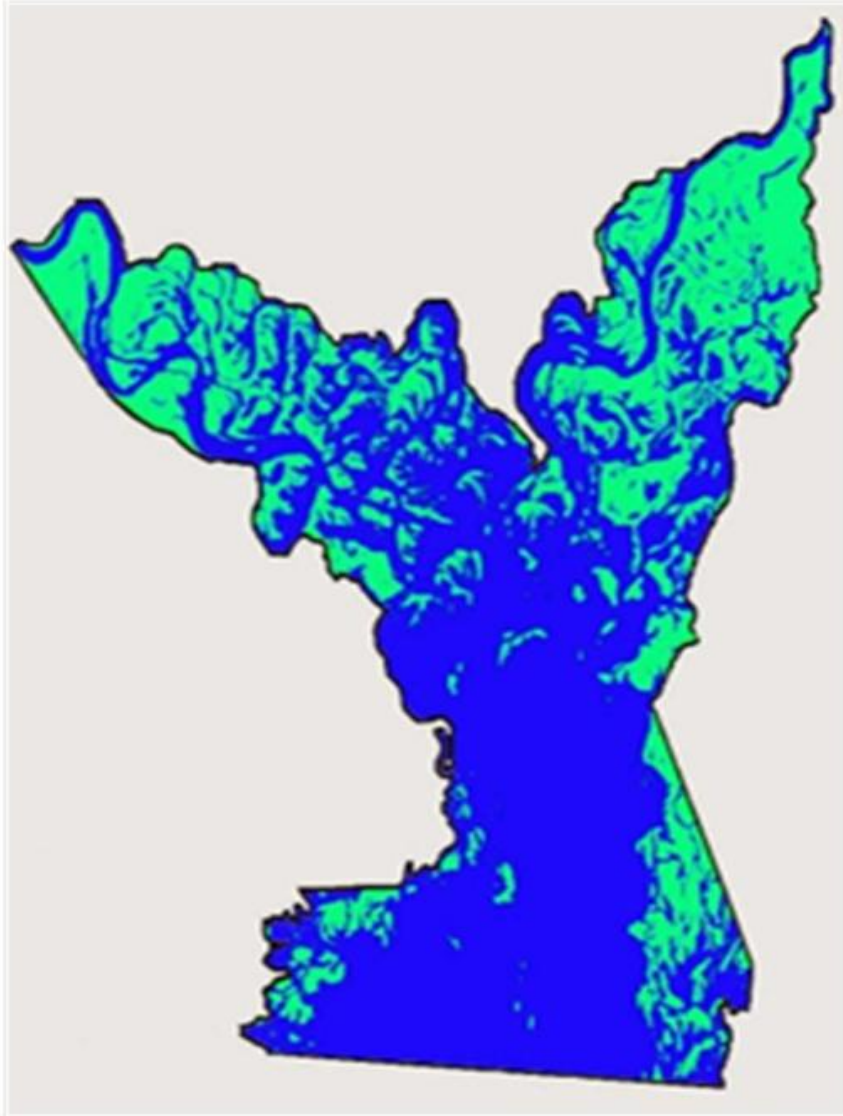


## Illegal clear cutting

Natural spreading of forest vegetation  
on abandoned agriculture  
(orchards/vineyards)

*Dr.ing. Vladimir Gancz*

# New wetlands formation in the Kiev reservoir from 1985 till 2009 (Landsat-5)



*Vladimir M. STARODUBTSEV, Ukraine*

# Terrestrial investigation of new wetlands in the Kiev reservoir in 2010-2011



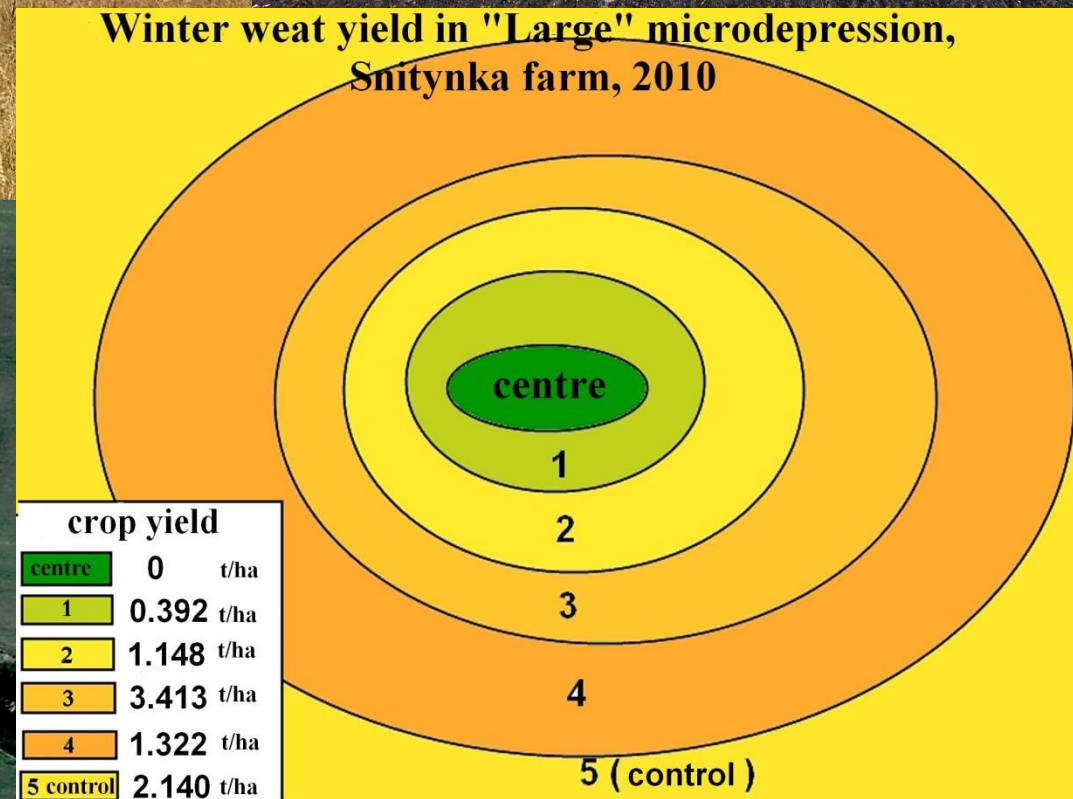
*Vladimir M. STARODUBTSEV, Ukraine*

# Monitoring of land productivity heterogeneity in plains with microdepressions

*Vladimir M. STARODUBTSEV, Ukraine*

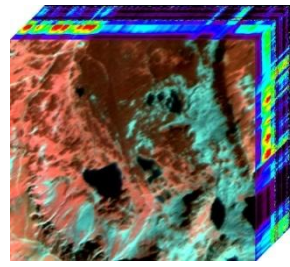


Winter wheat yield in "Large" microdepression, Snitynka farm, 2010



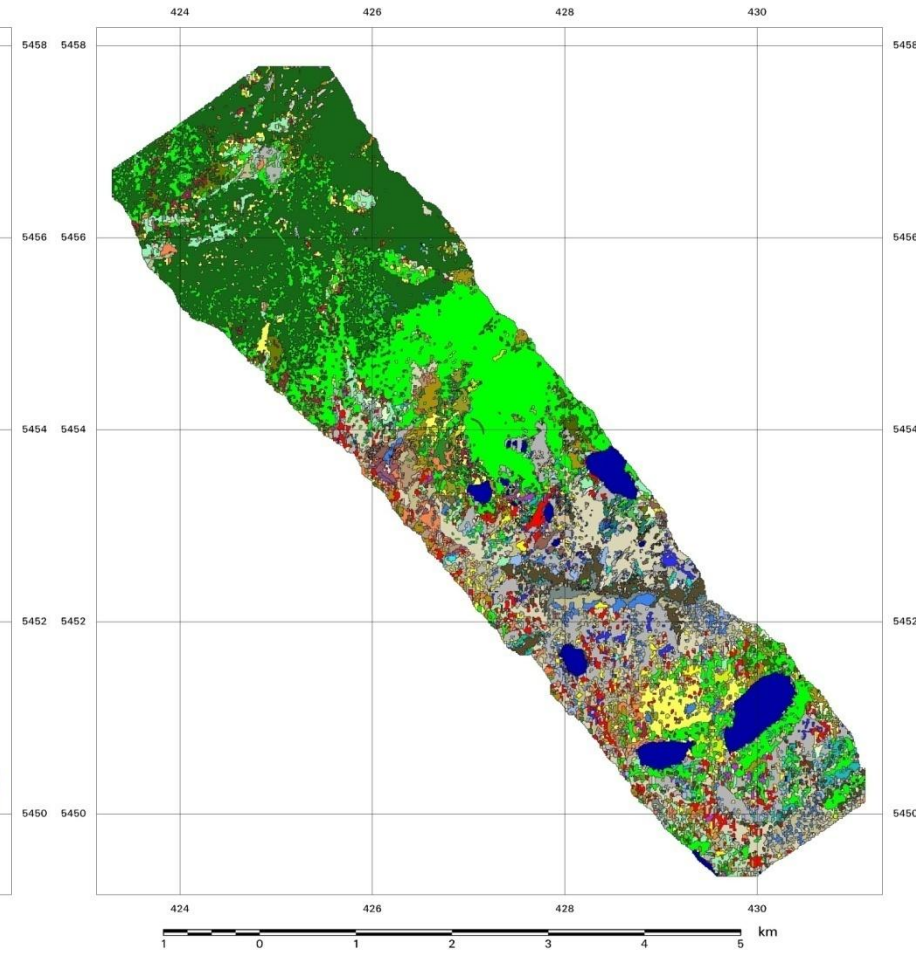
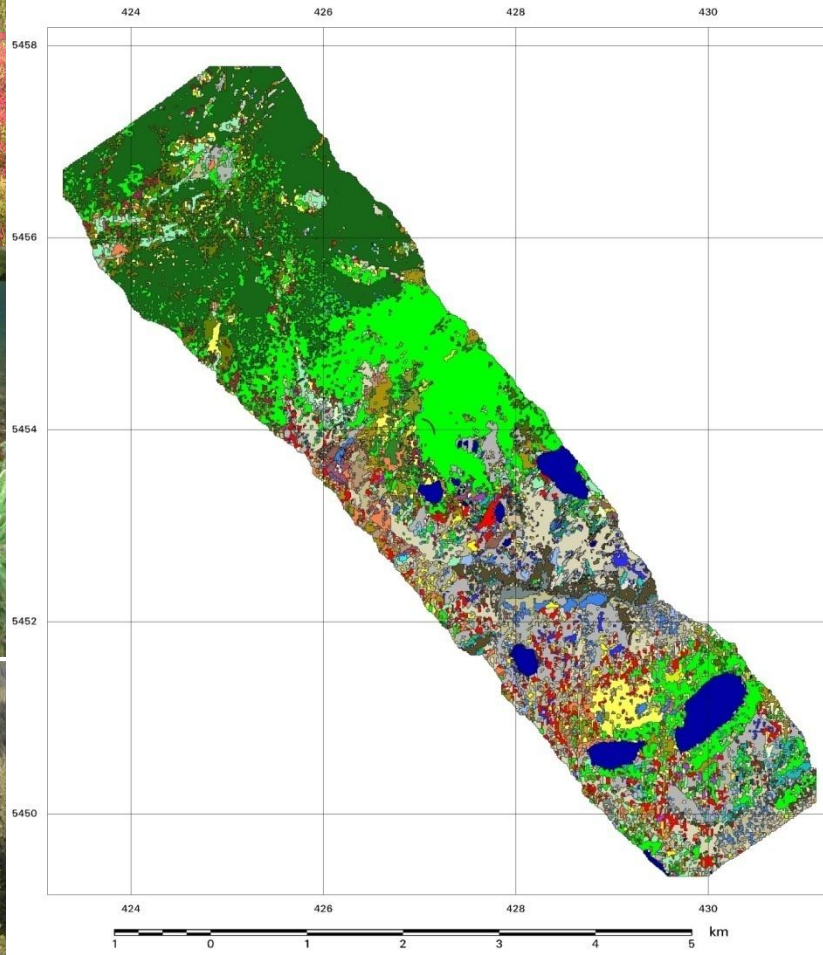
# Land cover mapping of mountains areas

*Bogdan ZAGAJEWSKI, Poland*



*40 bands*

*20 MNF bands*



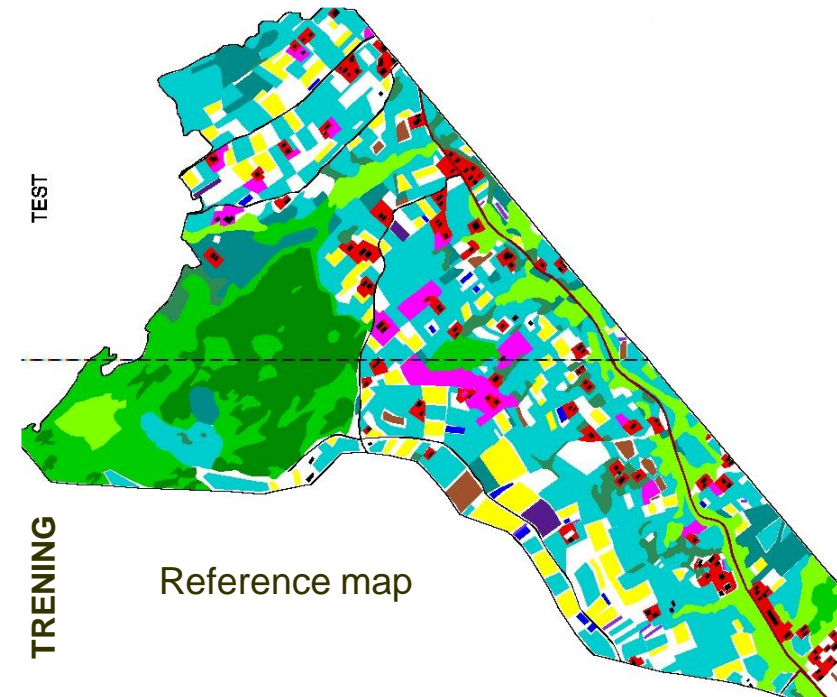
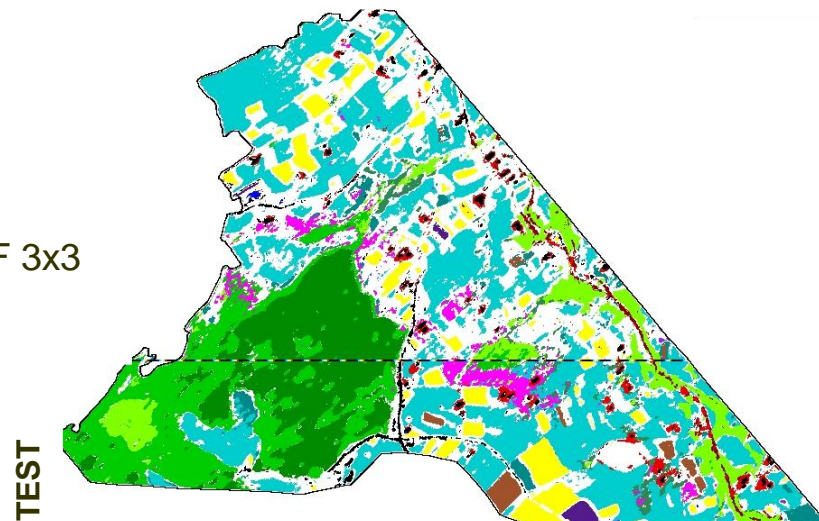


# Land cover mapping of mountains areas

*Bogdan ZAGAJEWSKI, Poland*

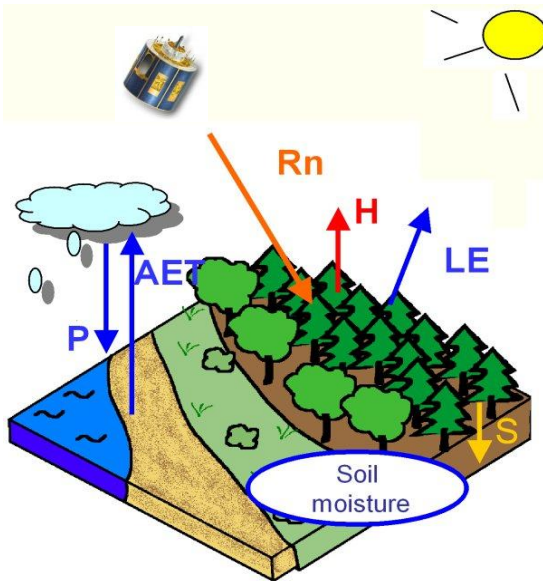
-  grasslands
-  wastelands
-  coniferous forest
-  mixed forest
-  deciduous forest
-  tree clumps
-  orchards
-  beet crops
-  potato crops
-  oat crops
-  stubbles
-  arable areas
-  asphalt roads
-  side roads
-  built-up areas
-  buildings

13 bands MNF 3x3



# Interdisciplinary Approach for studying Land Surface

**NIMH**, The National Institute of Meteorology of Bulgaria implements a Land Surface Project (2011-2014, partially funded by EUMETSAT) aimed to combine knowledge from site-scale ground measurements & modeling of land surface processes and operationally disseminated satellite datasets.



- **Biogeophysical cycling**  
at different land cover types

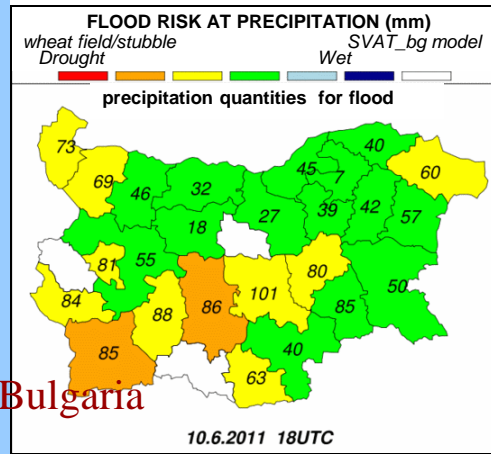
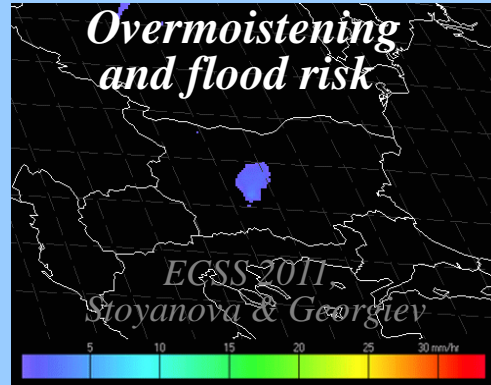
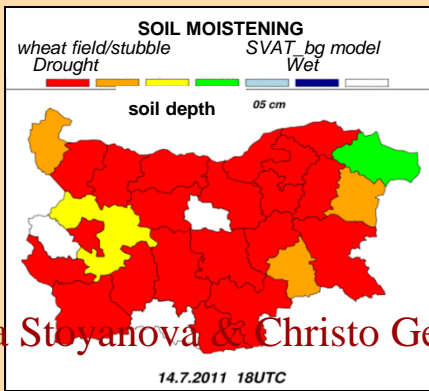
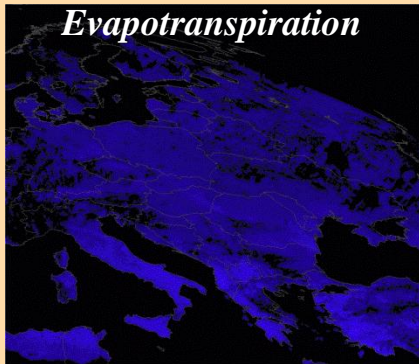
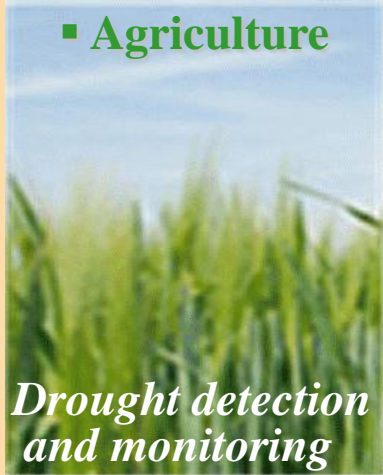
## Weather – Climate – Land Cover Relations

Activities are focused on the use of:

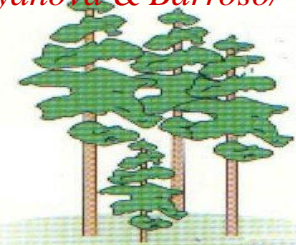
- ✓ Satellite observations as a tool for monitoring of **dynamic processes at the Earth surface**.
- ✓ **SVAT modeling** of dynamic processes at the Earth surface **related to the functioning of vegetation**.
- ✓ Development and introduction in operation of products for assessing key variables of land-biosphere interactions that are more directly related to vegetation status and processes.

# NIMH Applications: Monitoring Vegetation from Space in combination with ground measurements & meteorological products

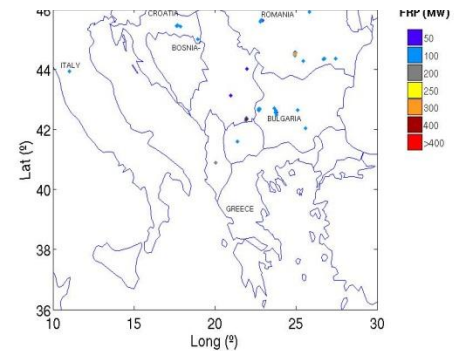
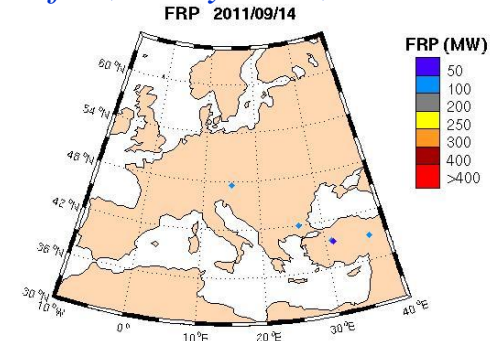
## ■ Agriculture



- **Active Fire**  
*/detection & monitoring/*
- **Fire carbon emissions**  
*/collaboration with IM Portugal 2011, Stoyanova & Barroso/*



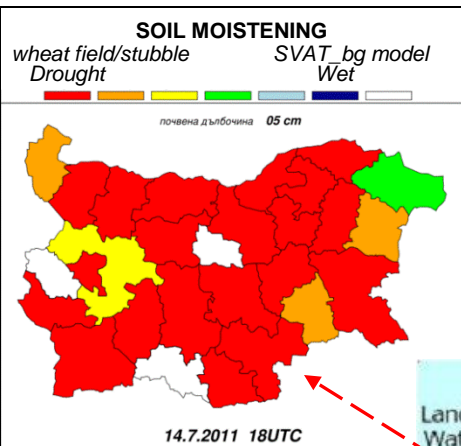
*Wildfire, ecosystems, and climate*



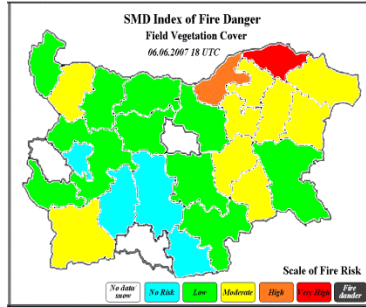
# Multifunctional risk assessment

- Application of this integrated interdisciplinary approach is a basis for multifunctional risk assessment at NIMH of Bulgaria

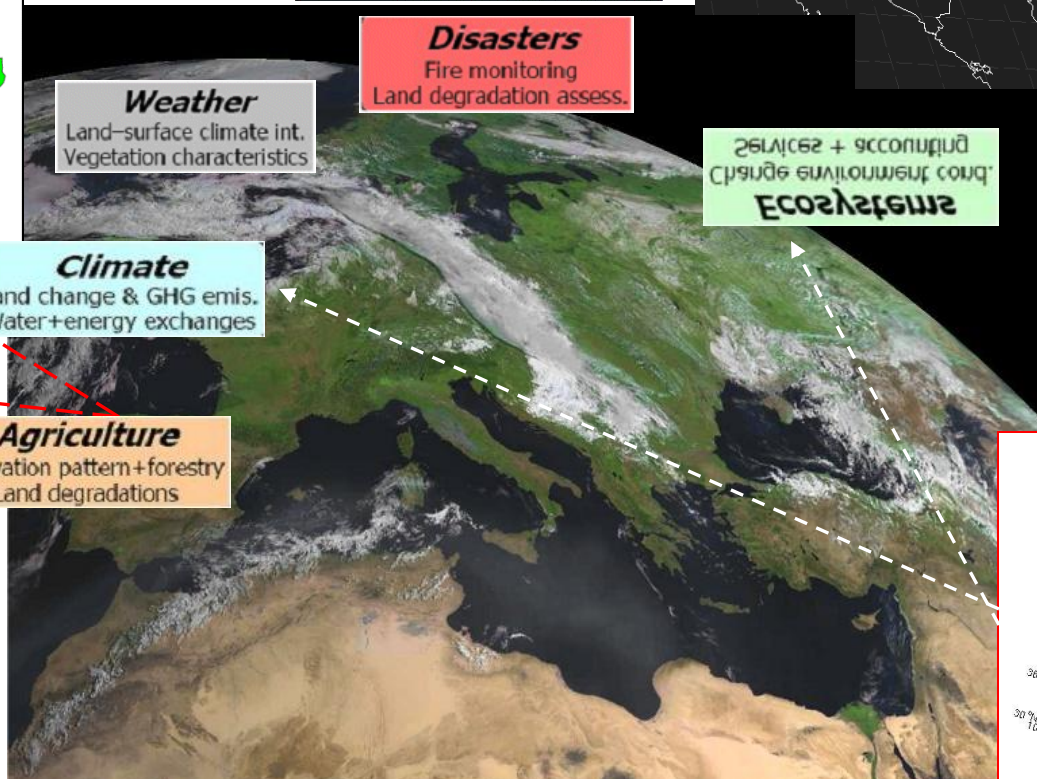
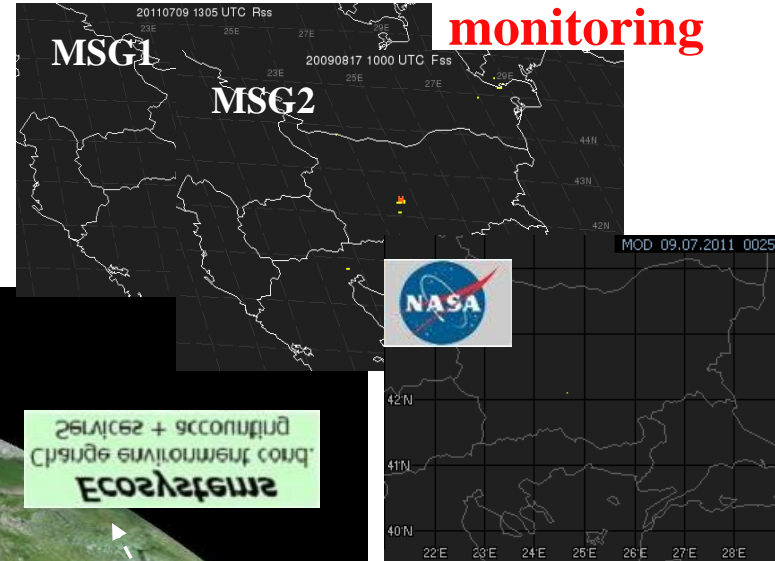
**Drought**  
at wheat field



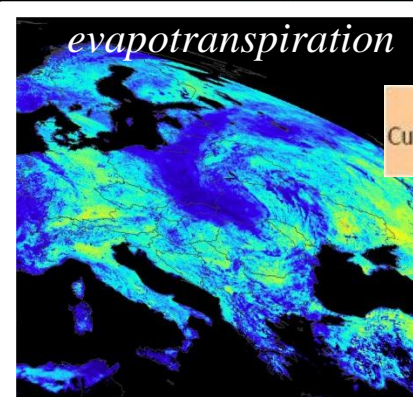
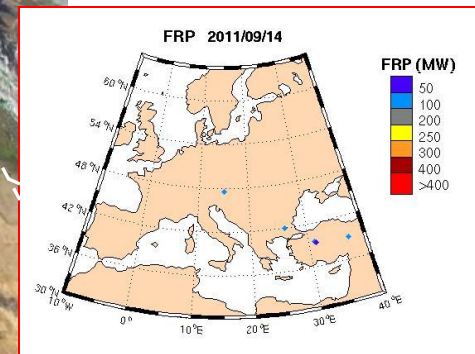
**Risk of wild fire**



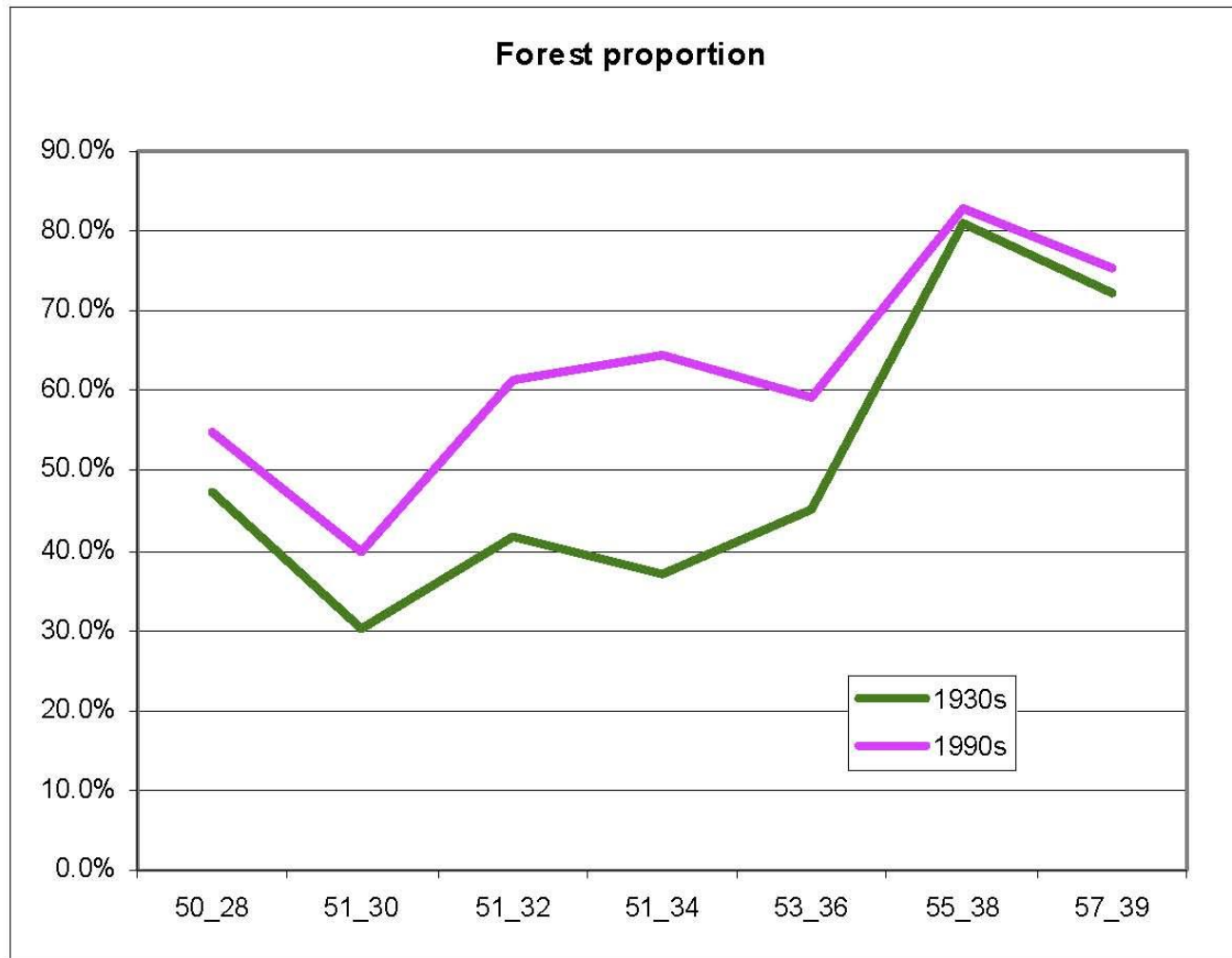
**Active fire monitoring**



**Fire carbon emissions**

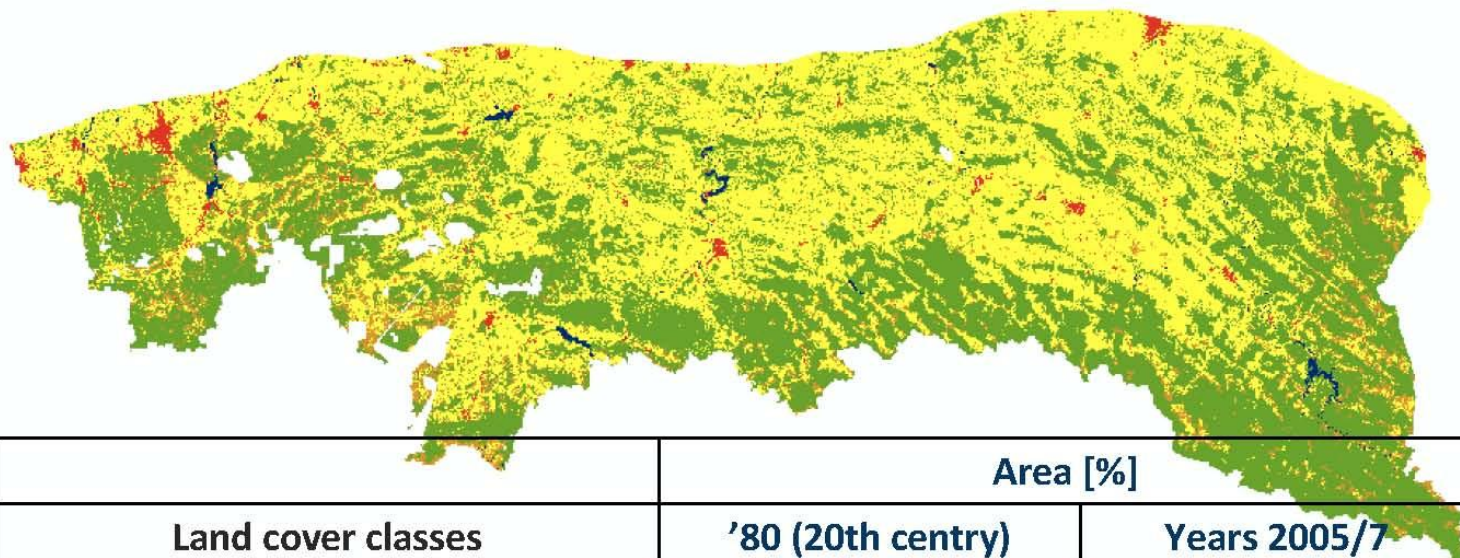


*Forest cover change, 1930 – 1990s; Kozak, Estreguil, Troll 2007  
1930s – topographic maps; 1990s – satellite data (Landsat)*



*Forest cover change, 1930 – 1990s; Kozak, Estreguil, Troll 2007  
1930s – topographic maps; 1990s – satellite data (Landsat)*

Land cover change in the Polish Carpathians '80-2006



Land cover classes	Area [%]	
	'80 (20th centry)	Years 2005/7
Artificial areas	2.43	3.11
Agricultural areas	50.10	48.16
Forest areas	42.43	43.03
Non-wooded semi-natural areas	4.64	5.19
Water areas	0.40	0.51

Ostapowicz, Kozak 2011



# MACEDONIA: THE MAIN CONSTRAINTS AND GAPS

**! 1993: as independent country, Republic of Macedonia became a permanent member of the WMO**

- **FINANCIAL CONSTRAINTS**
- **PRESENT STATUS OF SERVICE**
- **INADEQUATE METEO OBSERVING SYSTEM**
- **INADEQUATE MAINTENANCE AND INSTRUMENT CALIBRATION;**
- **OLDER AVERAGED AGE OF THE PERSONNEL STAFF**
- **NEED FOR EMPLOYEMENT OF YOUNG STAFF**
- **LACK OF EQUIPMENTS AND SOFTWARE**
- **LACK OF EXPERT STAFF ESPECIALLY IT-EXPERTS**

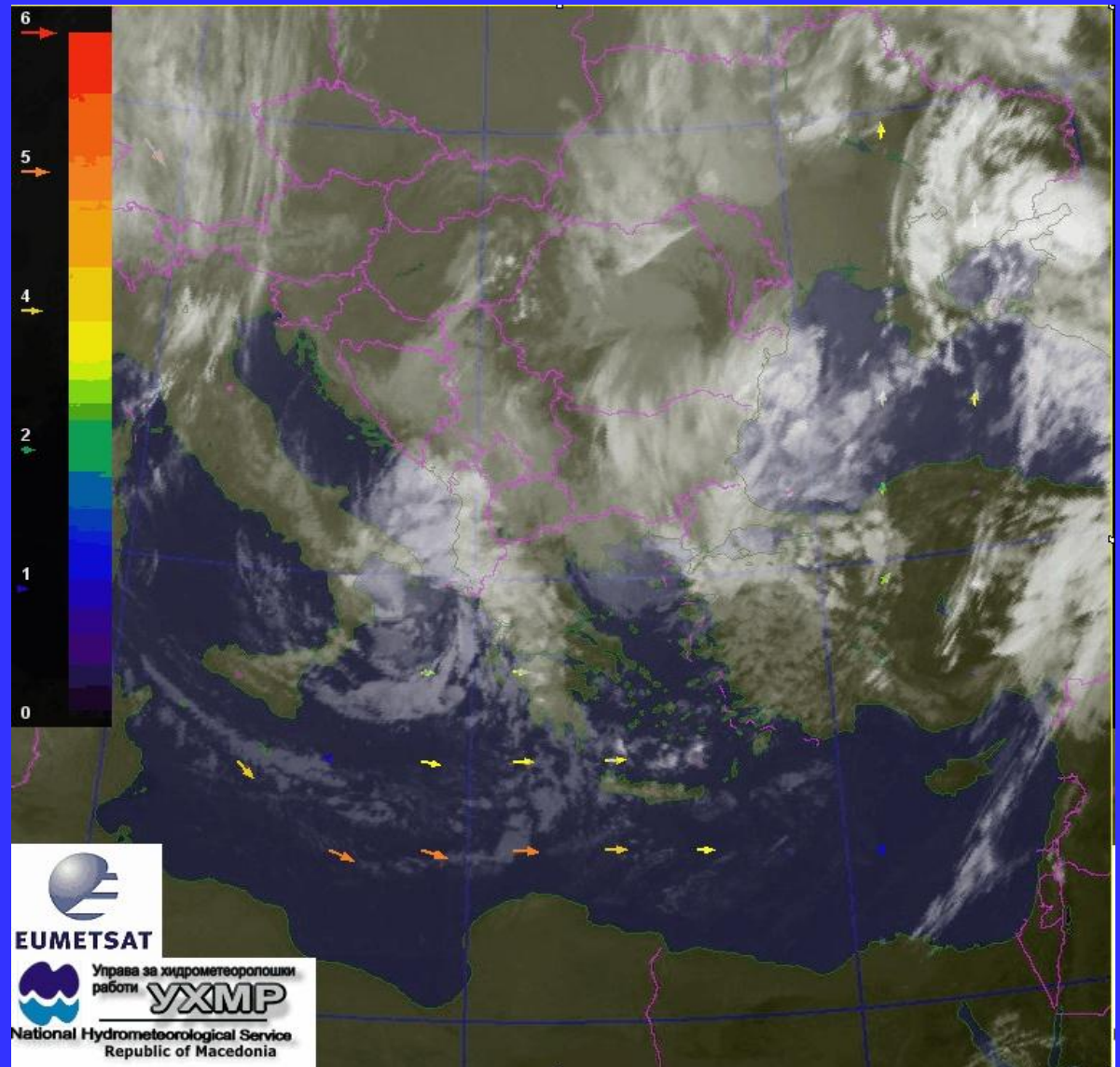
*Vlado Spiridonov, Zoran Dimitrovski,  
Hidrometeorological Service, Macedonia*

# REMOTE SENSING MEASUREMENTS

EUMETSAT  
DATA  
RECEPTION  
FROM 2005

DAWBEE  
EUMETSAT  
MSG2

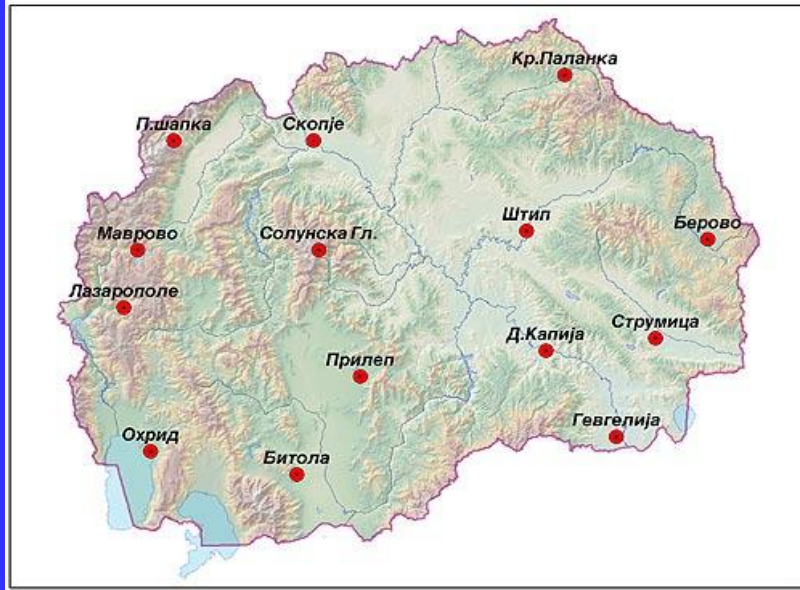
Data products  
from 2010



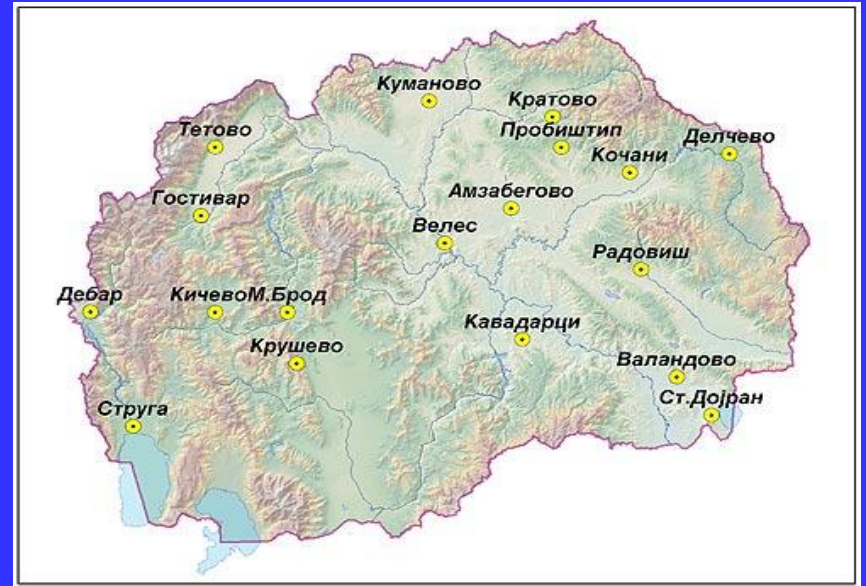
*Vlado Spiridonov, Zoran Dimitrovski,  
Hydrometeorological Service, Macedonia*



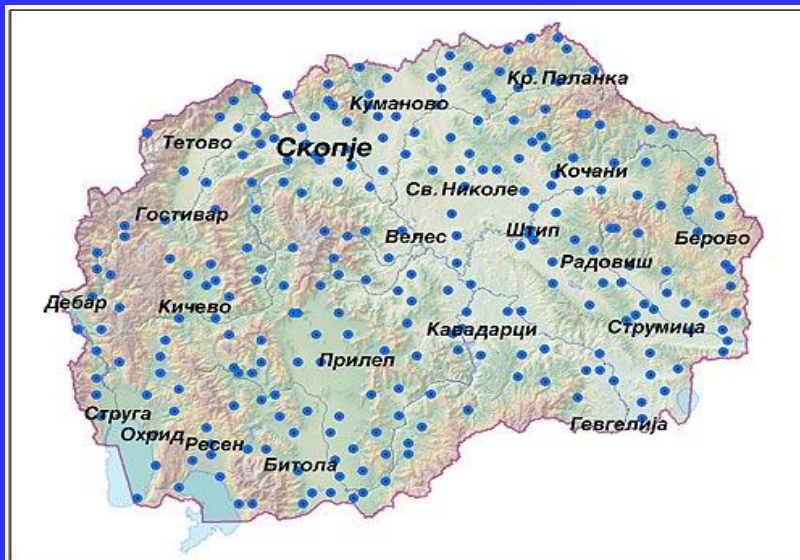
# METEOROLOGICAL OBSERVATION NETWORK



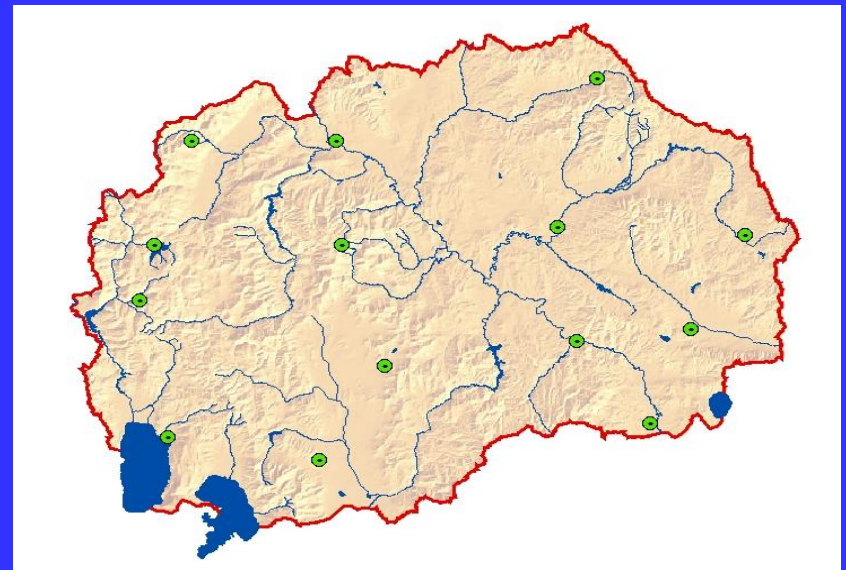
Main meteorological stations



Regular meteorological stations



Rainfall stations



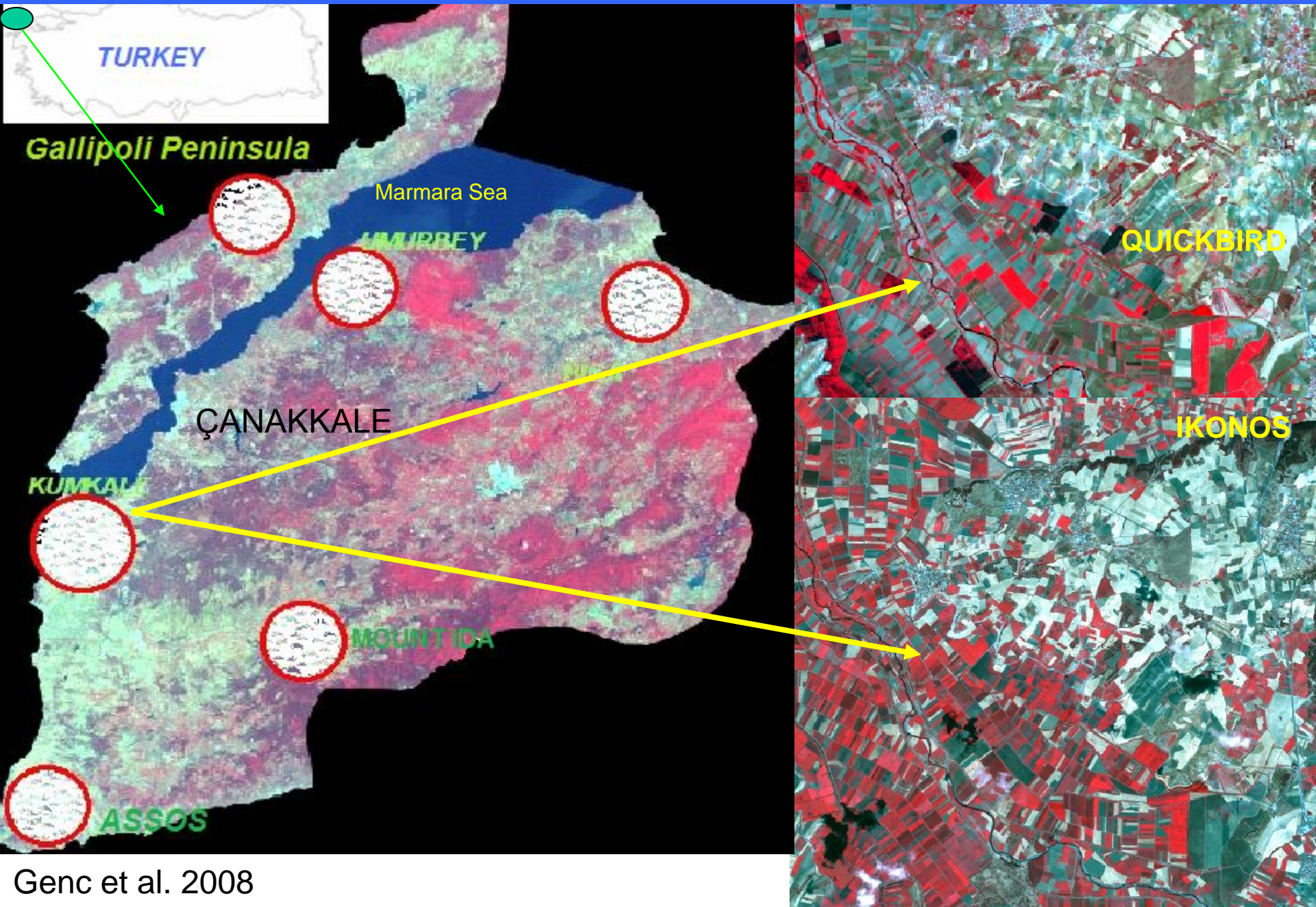
Phenological stations

# PERSPECTIVES REGARDING THE REMOTE SENSING MONITORING

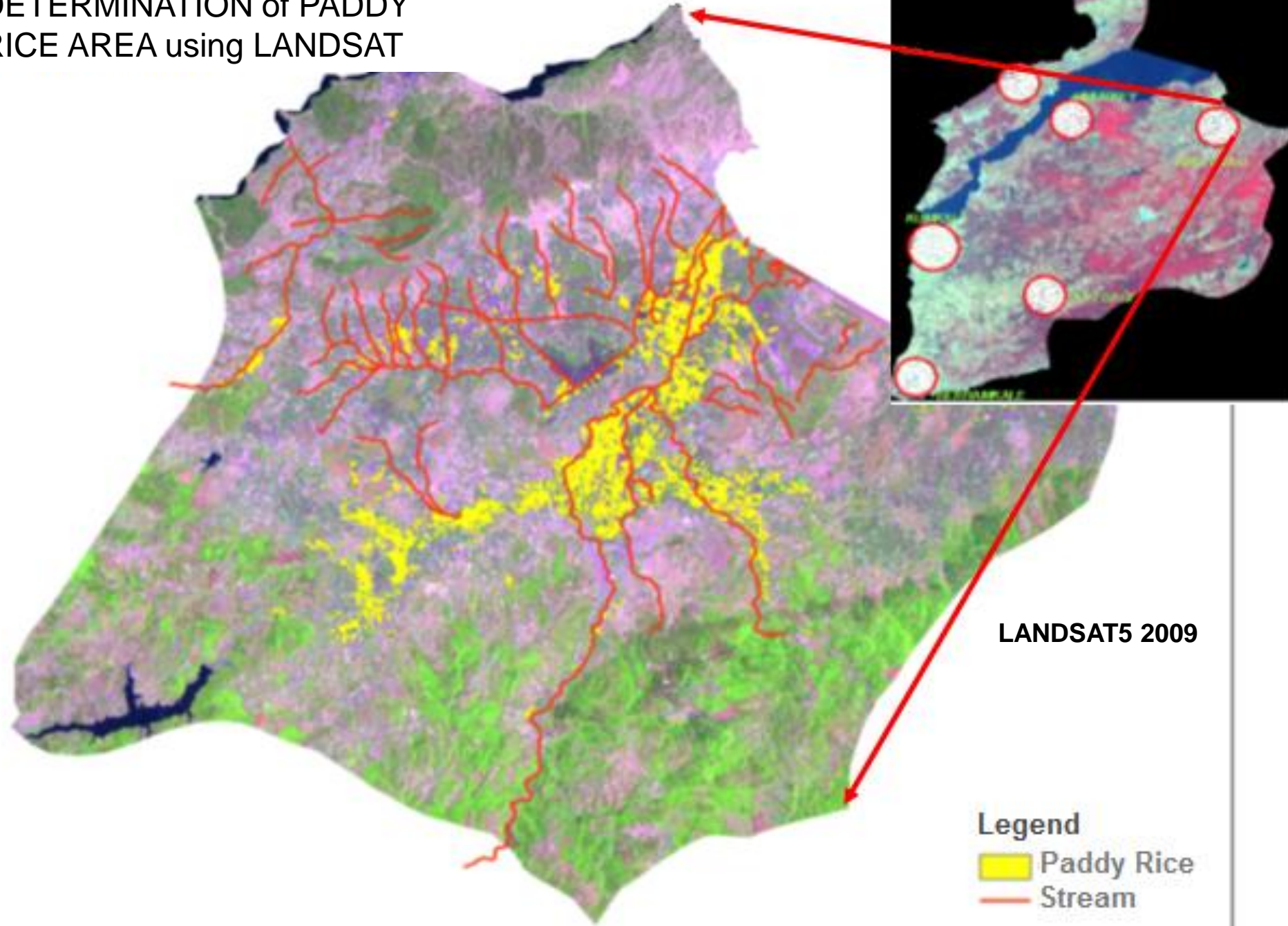
- AUTOMATISATION OF METEOROLOGICAL SURFACE NETWORK; UPGRADE OF UPPER OBSERVATION NETWORKS AND FILL THE GAPS
- PROVISION OF UPPER AIR SOUNDING OBSERVATION
- LAND, SNOW COVER AND FOREST MONITORING
- REMOTE SENSING SNOW COVER AND DEPTH MONITORING
- PROMOTE SATELLITE MONITORING
- ESTABLISHMENT OF JOIN REGIONAL RADAR NETWORK
- IMPROVED LAND COVER OBSERVATION FOR BETTER ASSESMENT ON WEATHER, WATER, CLIMATE, ENERGY, ECOSYSTEM, AGRICULTURE, HEALTH, DISASTERS AND BIODIVERSITY

*Vlado Spiridonov, Zoran Dimitrovski,  
Hidrometeorological Service, Macedonia*

# Remote Sensing for Agricultural Applications

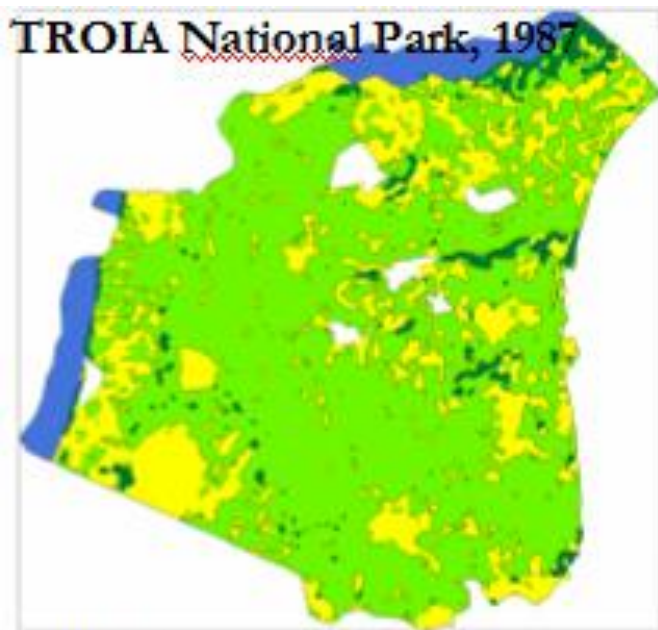


# DETERMINATION of PADDY RICE AREA using LANDSAT



LANDSAT5 2009

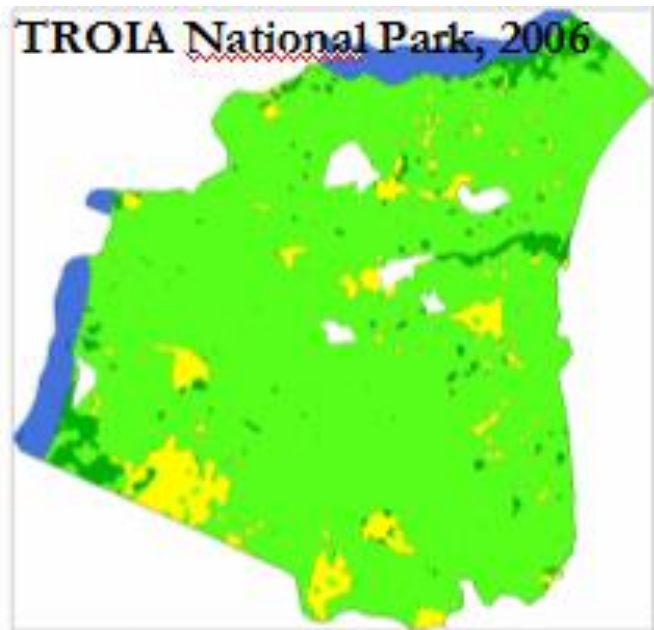
- Legend
- Yellow square: Paddy Rice
  - Red line: Stream



# LCLUC DETECTION of TROIA



Change Map



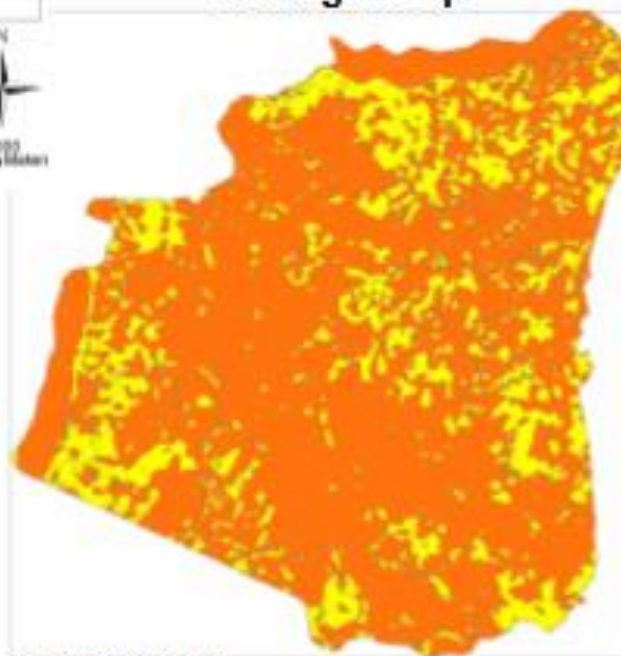
**LULC Classes**

- Not-Classified
- Agriculture
- Grazing Land
- Forest
- Water



**LULC Classes**

- Not-Classified
- Agriculture
- Grazing Land
- Forest
- Water



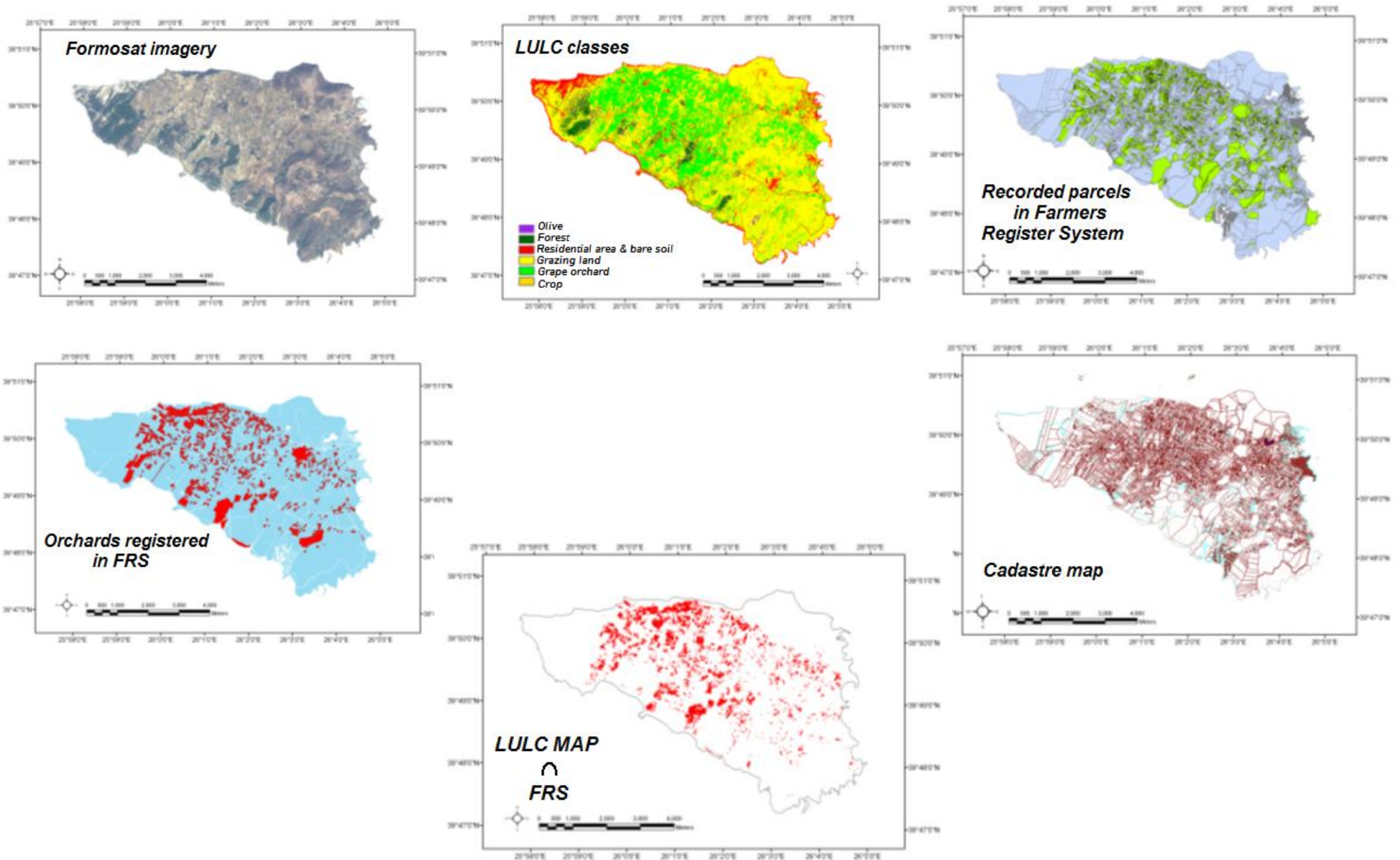
**CHANGING STATUS**

- Not changed
- Changed



37% OF LAND HAVE BEEN CHANGED DUE TO THE LAND CONSOLIDATION

# DETERMINATION of VINEYARD AREA using FARMER REGISTRATION SYSTEM and FORMASAT II IMAGERY in TENEDOS (BOZCAADA)

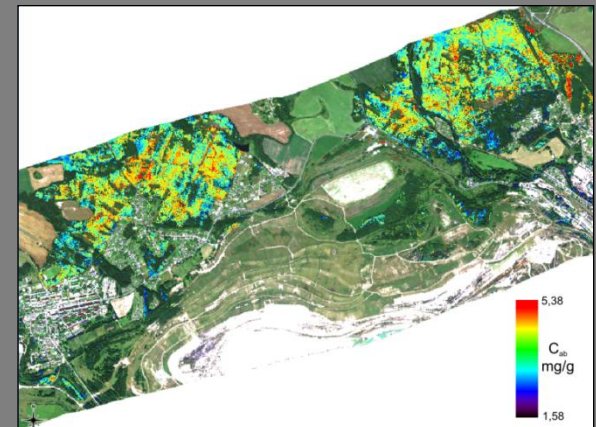
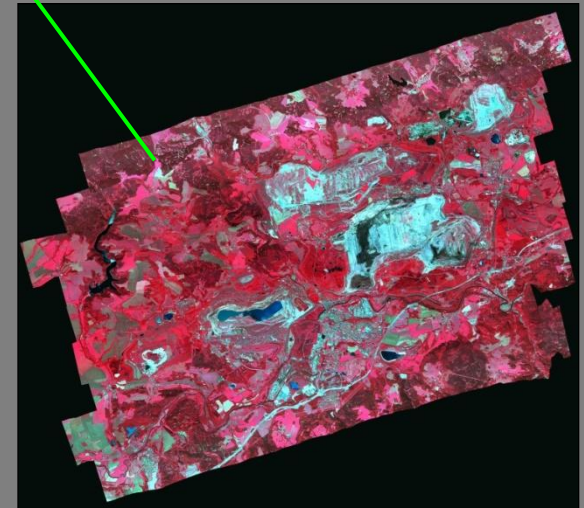


# HypSO - Assessment of Mining Related Impacts Based on Utilization of Airborne Hyperspectral Sensor



- **Project goals**

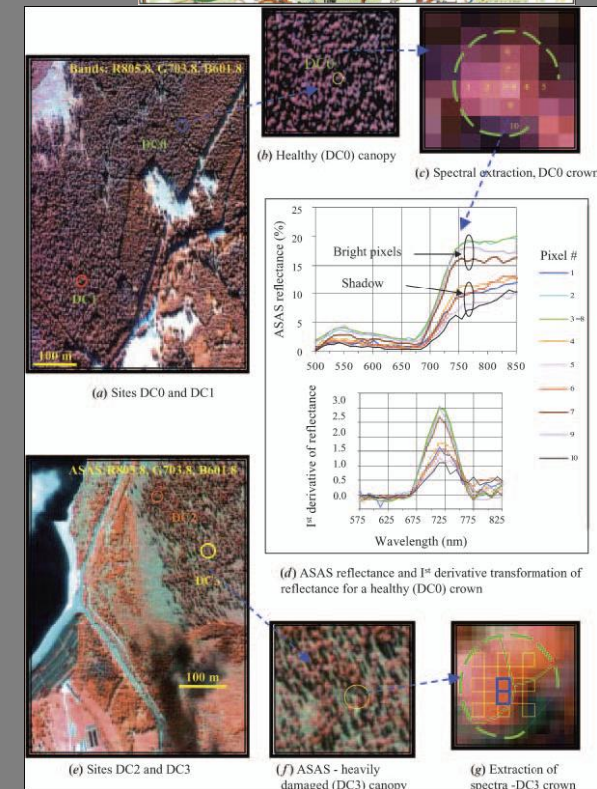
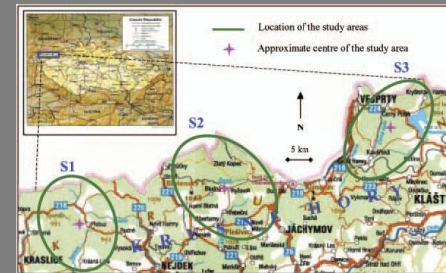
- To assess the current extent of the area affected by mining activities (tailing ponds, acid and heavy metal polluted zones, irritated vegetation, and changes in protection zones of water).
- To find relationships between irritation originator and consequential environmental disturbances of vegetation.
- Faculty of Science is focused on evaluation of trees physiological status - specifically Norway spruce and pioneer vegetation status of silver Birch and Scots Pine
  - chemical determination of biochemical compounds (chlorophylls, lignin) in foliage
  - laboratory spectral measurements of foliage spectral properties
  - Chlorophyll, lignin map construction based on aerial hyperspectral data



# INMON - Innovation of methods for monitoring of health status of Norway spruce stands in the Krusne hory Mts. with the use of hyperspectral data

## Project goals

- Evaluation of current health status of selected Norway spruce stands in the Krusne hory Mts. using biochemical foliage composition, spectral property (mainly reflectance) and aerial hyperspectral data.
- Linking foliage chemical composition and spectral properties with soil chemical properties (basic cations, heavy metals, pH, C/N, DOC, DON, etc.).
- Adjustment of methodology for processing of hyperspectral data to allow comparison of health status of Norway spruce stands in the Krusne hory Mts. in the end of the 1990's (data obtained by sensor ASAS from Goddard Space Flight Center and processed by Dr. Entcheva-Campbell) and in the present.





# HyMountEcos - Hyperspectral Remote Sensing for Mountain Ecosystems

- The research is focused on other area in so called black triangle - Giant Mountains, aims to prepare processing chain for mountain ecosystem analysis and monitoring using aerial hyperspectral data
- Project team: Warsaw University, Faculty of Science Charles University in Prague
- Duration: 2012
- Data: APEX, 2 - 3 m resolution
- Project goals
  - Mountain ecosystems mapping and inventarization.
  - Analyses of ecosystems species composition and invasive species introduction.
  - Analyses and evaluation of forest ecosystems conditions/health (biophysical parameters like chlorophyll content, LAI, water content).
  - Proposal of the processing chain for mountain ecosystems monitoring using hyperspectral technologies and potential/feasibility assessment of hyperspectral data/technologies for the mountain ecosystems analysis and monitoring.

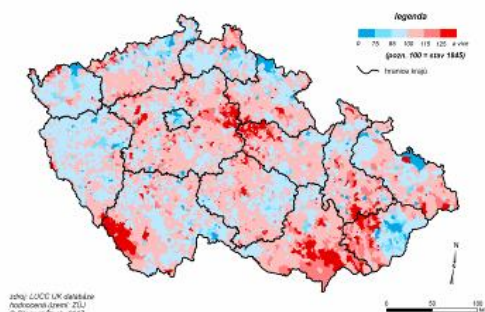


# Current issues and needs for remote sensing

- **Project: Driving forces of land use differentiation changes in the Czech Republic and neighbor countries. Perspectives after EU accession**
- **Unique long-term data sources** – cadastral records - LUC database for years 1845, 1896, 1948, 1990, 2000, 2010 – 10 LUC categories (about 9,000 units) – free available <http://lucc.ic.cz/>
- Well worked-out **methodology for long-term changes evaluation** (index of change, typology of changes, coefficient of anthropogenic pressure, etc.)
- **Complex approach** – driving forces evaluation

## Changes of arable land 1845-1948

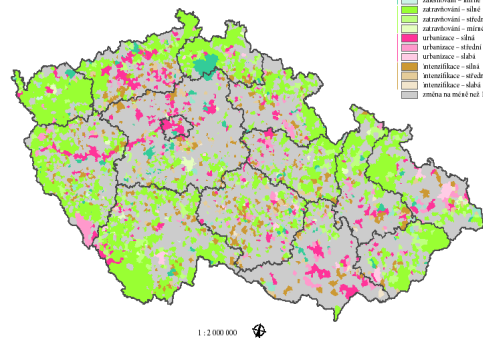
Vývoj rozlohy orné půdy v Česku v období 1845 - 1948 (v %)



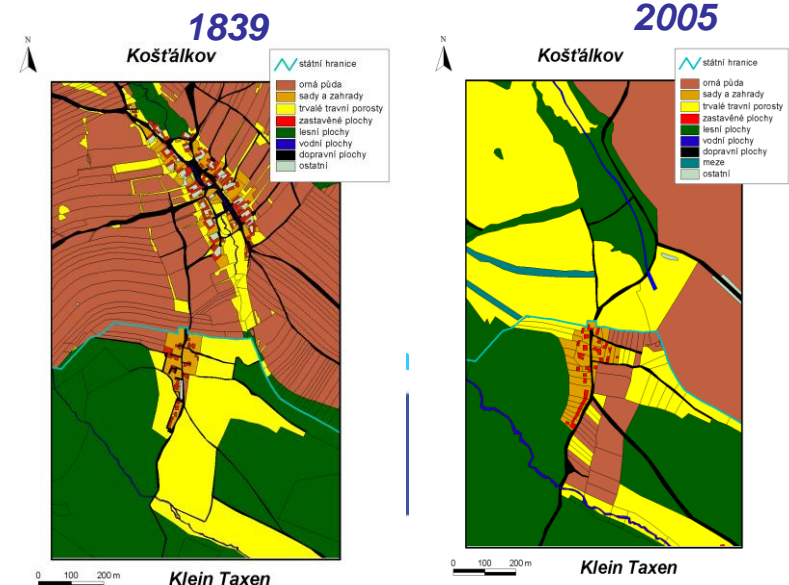
zdroj: LUCD UK databáze  
Národní územní úřad  
© Přemysl Štych, 2007

## Main processes 1990 - 2000

Hlavní procesy přeměny krajiny v období 1990-2000



## Cross-border Case studies



*Earthquake Based Urban Transformation Project (Zeytinburnu Pilo  
Fatih Earthquake Based Transformation Project  
Küçükçekmece Urban Renewal Project (Kentsel Yenileme Projesi)*

- To protect and improve the cultural, historical and natural heritage of the districts Fatih, Zeytinburnu, K.Çekmece.
- To provide durable, safe and livable urban spaces.
- To improve the social and economical status throughout the project time line.
- To obtain LU maps: middle & HR sat. data were used: LANDSAT (30 m), IKONOS (1m).**
- Duration: Sept 2005-Dec. 2010

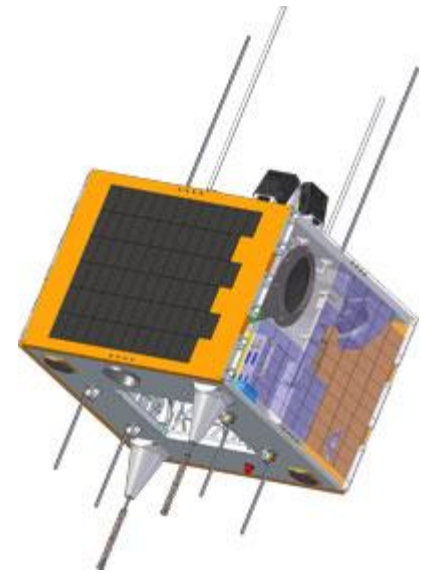
*D. Maktav, Istanbul Technical University, Turkey*



# RASAT: Technical specifications

## Turkish sats for earth observations

- ❑ **First RS satellite designed and built in TR (2. RS: BİLSAT !)**
- ❑ **Developed by TÜBITAK.**
- ❑ **Has been put into operation on 17 August 2011.**
- ❑ **Weight: 93 kg.**
- ❑ **Orbit: 689 km circular, sun synchronous.**
- ❑ **Orbital cycle: 98.8 min.**
- ❑ **Spatial res: Pan-7.5 m, ms-15 m.**
- ❑ **Spectral res ( $\mu\text{m}$ )**
  - 0.42 – 0.73 (Pan)**
  - Band 1: 0.42 – 0.55 (Blue)**
  - Band 2: 0.55 – 0.58 (Green)**
  - Band 3: 0.58 – 0.73 (Red)**
- ❑ **Rad. res: 8 bit.**
- ❑ **Temp. res: 4 days.**
- ❑ **Swath width: 30 km.**
- ❑ **Data (2011 and future) available for research projects (free...)**
- ❑ **<http://www.uzay.tubitak.gov.tr/tubitakUzay/en/projects/spaceApplications.php#rasat>**



*D. Maktav, Istanbul Technical University, Turkey*

TÜBITAK: the Scientific and Technological Research Council of Turkey

WORKSHOP SEERIN/ April 17, 2012  
Sofia, Bulgaria

# RASAT image applications

## MAPPING

- Mapping and updating of 1:25.000 scaled maps
- DEM and orthophoto generation
- LU mapping
- Land resources cadastre

## ENVIRONMENT

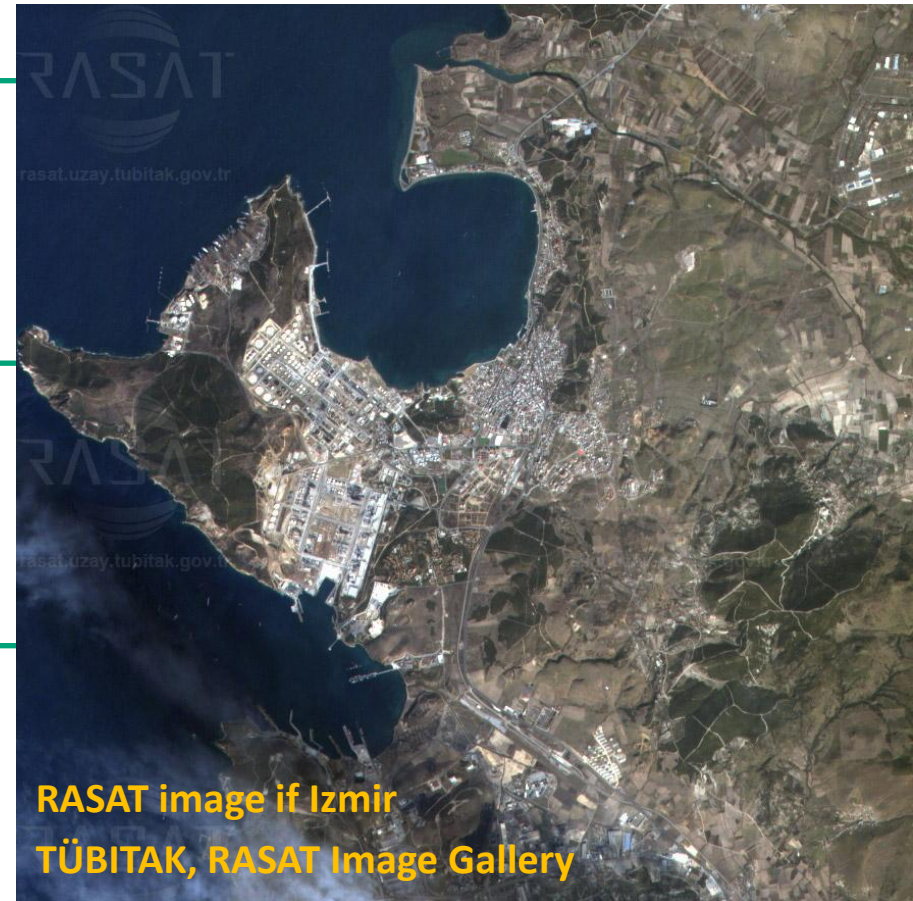
- Identification of deforestation/reforestation areas
- Change detection of coastlines
- Oil spill detection and pollution mapping

## DISASTER MONITORING

- Forest fire monitoring and burnt area mapping
- Flood mapping and forecasting
- Landslide area mapping
- Building destruction and damage assessment after earthquake
- Making up-to-date thematic maps for disaster management

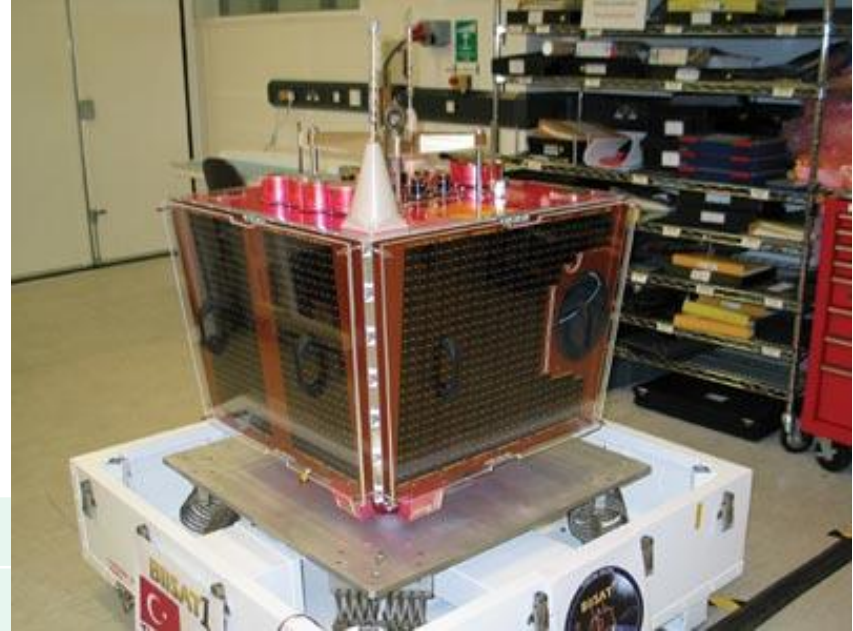
## URBAN AND REGIONAL PLANNING

- Monitoring of urban development
- Detection of illegal settlement sites
- 3D simulation



**RASAT image of Izmir**  
**TÜBİTAK, RASAT Image Gallery**

# BILSAT



Weight	129 kg
Orbit	686 km, circular, sun synchronous
	This is a technology transfer project aimed at acquiring small satellite technologies. The project is conducted with Surrey Satellite Technology Ltd of Surrey Univ., UK.
Cameras	4 Bands MS: Ground resolution: 27,6 m <b>Band 1: 0.45 - 0.52 (blue)</b> <b>Band 2: 0.52 - 0.60 (green)</b> <b>Band 3: 0.63 - 0.69 (red)</b> <b>Band 4: 0.76 - 0.90 (NIR)</b> B/W camera: 12.6 m



TUBITAK SPACE [2003-2006](#) (Data available for research projects.)

# Calendar of Upcoming Events

Event	Date	Venue	Information
Sentinel-3 for Science Workshop	June 2-5 2015	Venice, Italy	<a href="http://seom.esa.int/S3forScience2015/">http://seom.esa.int/S3forScience2015/</a>
ISPRS/GEO/ICA Workshop on Trust in Spatial Data and Validation of Global Land Cover Products	June 5-7 2015	Shanghai, China	<a href="http://celiang.tongji.edu.cn/trust2015/Home.html">http://celiang.tongji.edu.cn/trust2015/Home.html</a>
GOFC-GOLD / ESA / World-bank side event at UNFCCC SBSTA: "REDD+ training materials and support for forest monitoring and MRV"	June 8 2015	Bonn, Germany	<a href="https://seors.unfccc.int/seors/reports/events_list.html?session_id=SB42">https://seors.unfccc.int/seors/reports/events_list.html?session_id=SB42</a>
International Workshop on Supporting Future Earth with Global Geo-information	June 9-10 2015	Beijing, China	<a href="http://ngcc.sbsm.gov.cn/article/en/GLC2015/">http://ngcc.sbsm.gov.cn/article/en/GLC2015/</a>
Our Common Future Under Climate Change Conference	July 7-10 2015	Paris, France	<a href="http://www.commonfuture-paris2015.org/">http://www.commonfuture-paris2015.org/</a>
SCERIN-3 Capacity Building Workshop	July 13-17 2015	Brasov, Romania	<a href="http://www.csebr.cz/scer-in2015/">http://www.csebr.cz/scer-in2015/</a>
IEEE IGARSS Conference	July 26-31 2015	Milano, Italy	<a href="http://www.igarss2015.org/">http://www.igarss2015.org/</a>
ESA Workshop on Mapping Urban Areas from Space	November 4-5 2015	Frascati, Italy	<a href="http://due.esrin.esa.int/muas2015/">http://due.esrin.esa.int/muas2015/</a>
UNFCCC COP 21	Nov. 30 - Dec. 11 2015	Paris, France	<a href="http://www.cop21paris.org/">http://www.cop21paris.org/</a>

Table 1: Upcoming events

1<sup>st</sup> 32<sup>nd</sup> May 2015

## LAND COVER AND CHANGE

Director of the GOFC-GOLD Land Cover Project Office

**GOFC-GOLD / World Bank FCPF training monitoring and reporting**

A SOURCEBOOK of methods and procedures for monitoring and reporting anthropogenic greenhouse gas emissions and removals associated with deforestation, forest land use change and forest degradation, forest fires, and land-use change.

### Content

- 1 Forest degradation monitoring workshop for REDD+
- 2 REDD+ training materials
- 3 Survey on data needs for AFOLU GHG monitoring and reporting
- 3 Earth Observation Monitor
- 4 Forest Monitoring activities in Ethiopia
- 4 FCMC REDD+ MRV manual Version 2 released
- 5 Calendar

## GOFC-GOLD R&D Expert Workshop on approaches to degradation for REDD+

work-er-the-ns-ber-th-col-and-da-re:om D+ eg-:es as-



Address different types of degradation for REDD+ monitoring using earth observations, ground-based surveys and proxies;

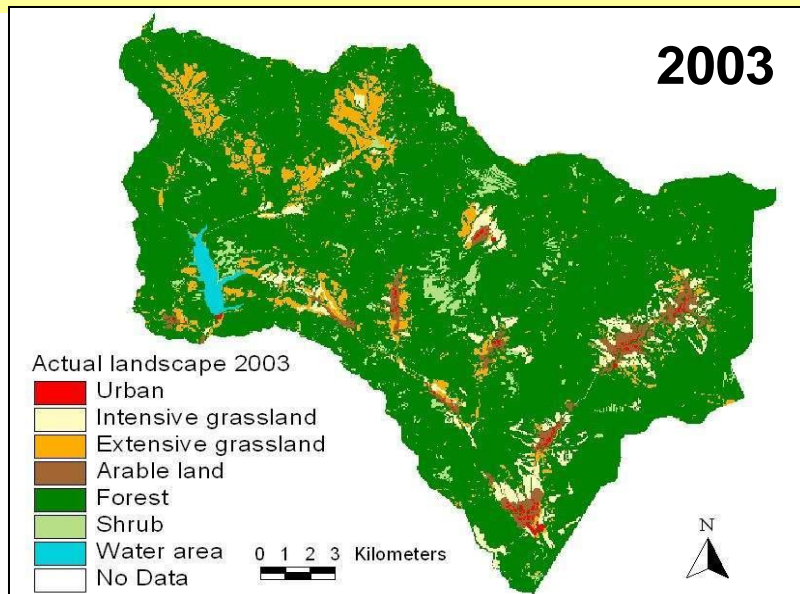
- Discuss important gaps and obstacles and opportunities for future improvements, documented in an action plan for further R&D and demonstration activities;

- Synthesize the findings towards improved guidance to countries and REDD+ practitioners.

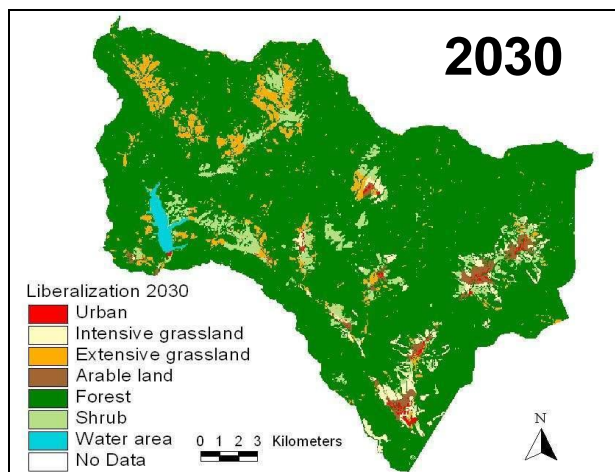
A synthesis on evolving requirements for forest degradation monitoring has been made considering key questions including country circumstances, financial aspects, capacity building priorities, timeframe, and priority targets (e.g., drivers, stratification, and quantitative indicators). Monitoring needs (ground and remote sensing approaches) to tackle activity data and emission factors are discussed, along with mapping approaches. Operational readiness of different Earth Observation sensors are

# Predictive land cover change modelling

*Andrej Halabuk, SAS, Slovakia*



**Liberalization**



**Biodiversity**

