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EUROPEAN FOREST FIRE MONITORING using INFORMATION SYSTEMS

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EFFMIS: AN INTERREG IV PROJECT DEVOTED TO THE FOREST FIRE MANAGEMENT

GIOVANNI LANEVE[(1)], MUNZER JAHJAH[(1)], MAMMAD HEJAZI[(1)], YIANNIS BAKOUROS[(2)] AND ANASTASIOS KANAVOS[(3)]

(1) Centro di Ricerca Progetto San Marco, Università di Roma "La Sapienza". Via Salaria, 851 00138 Roma, Italy. laneve@psm.uniroma1.it
(2) University of Western Macedonia, Sialvera & Bakola Str., 50100, Kozani, Greece, E-mail
(3) University of Patras, Panepistimioupoli, 26504, Patras, Greece. housos@upatras.gr

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EFFMIS

Name:	European Forest Fire Monitoring using Information Systems
Acronym:	EFFMIS
Programme:	INTERREG IVC (3rd call for proposals)
Type of Intervention:	Capitalization project
Priority:	2 - Environment and risk prevention
Sub-theme:	Natural and technological risks (including climate change)
Approval date:	28 June 2010
Official start date:	1 November 2010
Duration:	24 months
Total Budget:	1,772,030.00
ERDF contribution:	1,453,135.50

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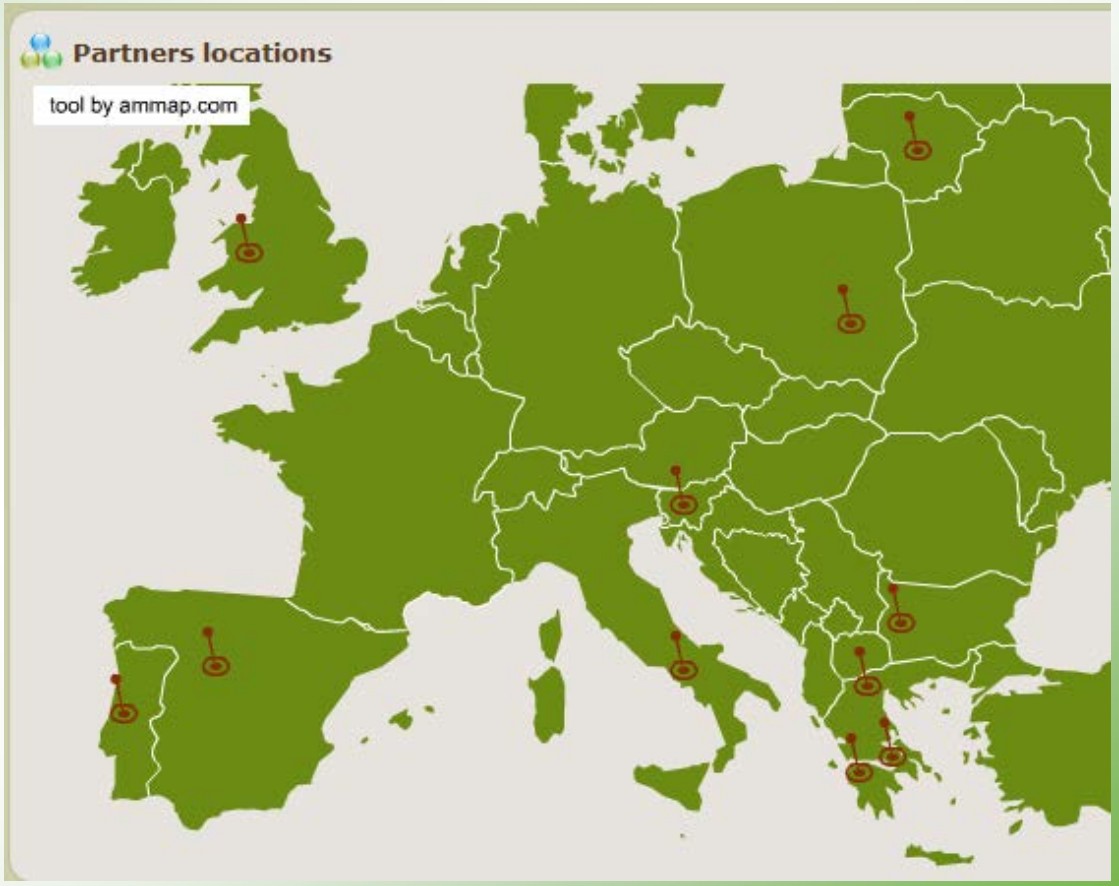
EFFMIS Project Partners

- University of Western Macedonia, Greece
- Hellenic Ministry of Environment, Energy and Climate Change, Greece
- University of Patras, Greece
- San Marco Project Research Centre - University of Rome "La Sapienza", Italy
- Coventry University, United Kingdom
- Executive Forest Agency, Bulgaria
- Forest Research Institute, Poland
- Kaunas Regional Innovation Centre, Lithuania
- Baiao Municipality, Portugal
- Slovenian Forestry Institute, Slovenia
- Castilla and Leon Wood and Forest Services Center, Spain



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EFFMIS Project

- **Project Synthesis**

EFFMIS is an INTERREG IVC Capitalisation project running from 1st November 2010 until 30 October 2012.

The project aims to pool Good Practices (GPs) on exploitation of the usage of information systems in order to early detect, efficiently manage and handle forest fires and assess the damage caused and ways for regeneration.

EFFMIS focuses on the exchange of GPs among the regions and will seek to develop regional action plans for how each region can position itself better in using information systems to protect its natural resources against fire.

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EFFMIS Project

Aims

1. Early detection and visualization of fire propagation;
2. Forecasting of danger zones based on "fire environment" analysis;
3. Risk assessment during panic evacuation;
4. Optimal spatial distribution of service vehicles;
5. Fire suppression services routing;
6. Rule-based knowledge representation and scenario management;
7. Post-fire impact assessment.

objectives

1. The protection of the environment and prevention of the danger of fire;
2. The forest monitoring and early detection systems to increase each region's readiness to respond in the most prompt and efficient manner;
3. Improve the effectiveness of regional development policies in the field of fire forest detection and management, specifically in improving the capacity of the responsible authority;
4. The identification of each region's specific needs;
5. The exchange of experiences and good practices about the regional policies, methods and systems that are used for the early detection and comparison of wildfires in sensitive areas, such as forests.

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Good Practices (GPs) evaluation matrix

No.	Service (name - short description)	Good Practices																													
		GREECE		SPAIN						ITALY		POLAND			SLOVENIA						BULGARIA		UK		LITHUA	PORTUGAL		
		GP1	GP2	GP3	GP4	GP5	GP6	GP7	GP8	GP9	GP10	GP11	GP12	GP13	GP14	GP15	GP16	GP17	GP18	GP19	GP20	GP21	GP22	GP23	GP24	GP25	GP26	GP27
		GR1- INFOFI	GR2 - SAFER	ES1	ES2	ES3 - INFOCA	ES4	ES5	ES6	IT1 - SFIDE	IT2 - CICLOP	PL1 - NFFIS	PL2 - FF RiskFo	PL3 - WildFD	SI1 - KVOS	SI2 - SPATIA MFFD	SI3 - eGIS_U	SI4 - FWI KARST	SI5 - FOREC FB KARST	SI6 - GRADE FF HAZAR	BG1 - FFIS	BG2 - LSS & FRA IS	UK1 - 3D modelli	UK2	LT1 - Firewat	PT1	PT2	PT3
I. Monitoring & Detection																															
I.1	Real-time monitoring of meteorological information (locally collected data)	x	x		x						x		x	x			x		x			x		x	x					
I.2	Real-time automated visual monitoring (video cameras on location, satellite images, etc)	x	x							x	x				x							x			x					
I.3	Real-time sensor network data acquisition and monitoring		x	x	x					x												x		x						
I.4	Fire Detection and Alarm Indication	x	x							x	x			x	x		x							x	x					
I.5	Fire detection based on geostationary satellite									x																					
I.6	Area monitoring on demand for fire detection									x																					
I.7	Pan European observation system capability									x																					
II. Information & Resources Mapping																															
II.1	Development and management of thematic maps (geographic and other information for the support of all fire prevention and confrontation actions)	x	x	x	x	x		x		x	x		x	x			x	x	x	x	x	x			x	x	x	x			
II.2	Detailed land use mapping based on field visits	x																								x					
II.3	Cartographic base used for land management, planning and investment for fire prevention	x																								x	x	x			
III. Modelling & Simulation																															
III.1	Development of GIS platform (combination of High Resolution satellite images and Digital Elevation Models)	x	x		x					x	x						x				x	x					x			
III.2	Model-based creation (daily/weekly/annual) of fire analysis/risk prediction maps - Early warning system	x		x	x		x			x	x	x	x			x	x	x			x	x		x	x	x	x			
III.3	Development of case specific fuel model based on locally collectd material	x	x							x	x								x							x				
III.4	Provision of Fire Spread simulation modeling tool	x	x		x						x												x	x		x				
III.5	Optimization of fire-watch station placement	x								x	x															x				
III.6	Training and educational aid																						x	x						
IV. Fire Incident Management																															
IV.1	Creation of operation Centre for incident management	x	x	x						x	x						x													
IV.2	Call center integration		x											x			x									x				
IV.3	Development of Web application for information diffusion with different levels of access	x	x		x	x		x	x	x	x	x	x	x			x				x	x		x	x		x			
IV.4	End-user collaboration tools for crisis management - GIS-based collaboration environement		x											x			x		x	x	x	x								
IV.5	Real-time mission planning (situation analysis, dispatcher, scenarios handling, etc.)		x	x	x	x			x					x			x						x	x		x	x			
IV.6	Evacuation risk assesment		x		x																										
IV.7	Management, tracking and optimal distribution of fire fleet units & resources (vehicles and pedestrian units)	x	x	x	x		x			x	x			x			x		x							x				
IV.8	Calculation of optimal routes and access time - Emergency Routing	x	x								x			x											x	x				
v. History Recording & Metadata Processing																															
V.1	Recording of Fire History	x	x	x		x			x	x	x	x		x			x				x	x			x	x				
V.2	Production of Metadata & management, file extraction for post processing (EC Directive INSPIRE compatibility)	x	x	x							x	x	x	x			x				x									
V.3	Assessment of Danages after fire incident (flora & fauna, inhabited areas, forest land, etc.)	x				x				x	x	x		x							x	x				x				
V.4	Estimate of the burned biomass			x						x																					

About 30 Good Practices (GPs) have been selected

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Distribution of Good Practices

Prevision/ prevention	Detection/ Monitoring	Damage assessment/ post-event investigation	IT for Support
10 GPs	Visible cameras 4 GPs	1 GP	10 GPs
	Thermal cameras 1 GP		
	Satellite images 1 GP		

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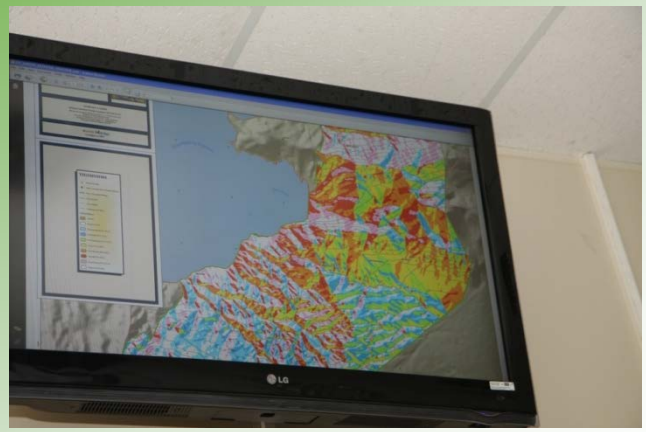
From Greece



	GP characteristics
INFOFIRE	**Detection by smoke image) – fire alarm indication. System calibration with time to improve performances**
SAFER	**Supporting data from meteorological sensors, cameras, fire spread simulation**

Advanced technologies used (GR1):

- satellite images
- orthophotomaps
- geographic information system applications
- fire simulation models
- meteorological data and digital network for supervision of fire forests connected to the Geographic System

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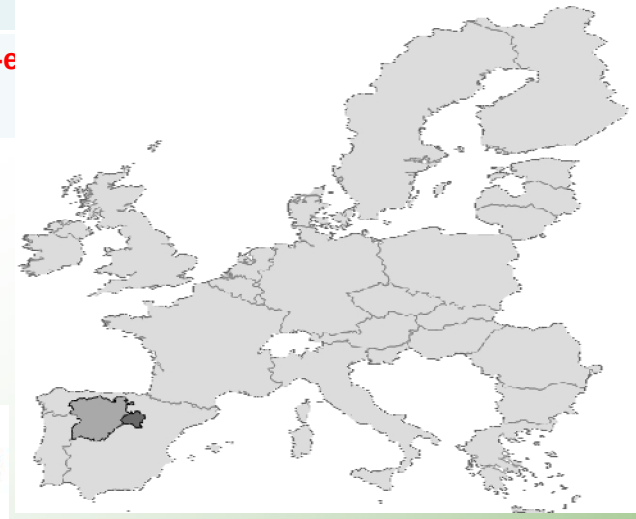
From Spain

	GP characteristics
ES1 - NOMO	**GPS tracking data for vehicles and other resources.**
ES2	**Weather station for real-time information, identification of greater risk areas, extinction resources management.**
ES3 - INFOCAL	**Web-based application for real-time and stastic information diffusion among the engineers, fire brigades, helicopter, pilot, command centre.**
ES4	**Model for daily fire prediction map.**
ES5	**Brush-out subventions maps for decision making about prevention. Information System for correct subvention.**
ES6	**Post-e**



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From Spain

	GP characteristics
ES1 - NOMO	**GPS tracking data for vehicles and other resources.**

cesefor

EMERCARTO Project
Control of 301 vehicules and teams' position every minute.
Alarm button.

NOMO Project
Positive experience with 50 GPS locator equipment to measure wildfire surfaces.
NOMO sends perimeter- polygon straight to the Province Operation Room.

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From Spain

	GP characteristics
ES2	**Weather station for real-time information, identification of greater risk areas, extinction resources management.**

Surveillance tower(1), 24h/day working. 13 cameras are available
Captured images (2 y 4) are sent using radio system (3) to the command center.

Conventional image

Thermal image

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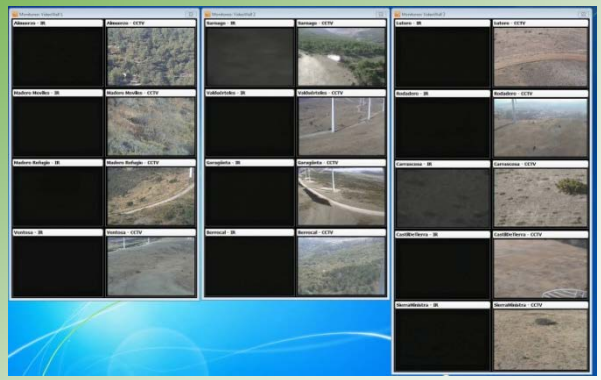
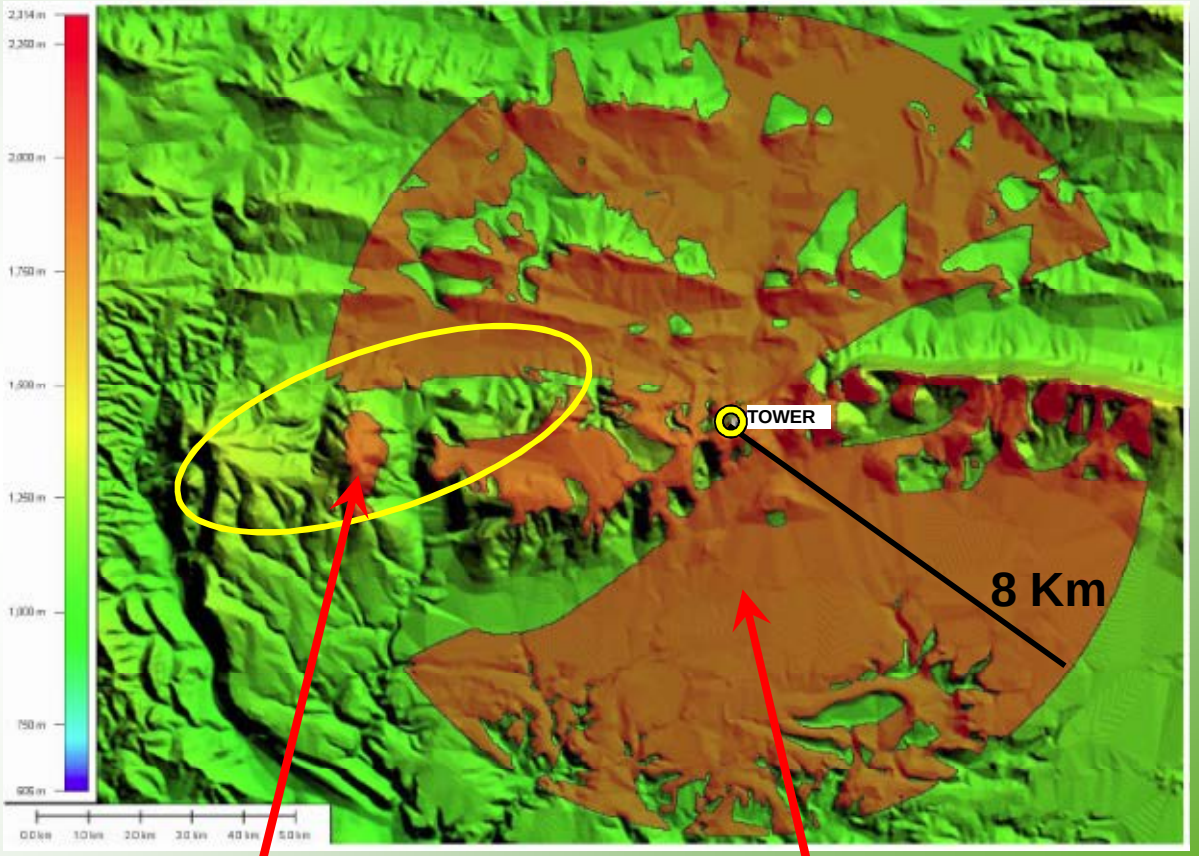
From Spain

	GP characteristics
ES2	**Weather station for real-time information, identification of greater risk areas, extinction resources management.**



Video-wall at the Command Center, with information from 13 cameras

HANDICAP:
The system needs real visibility to detect hot spots. Smoke can be undetected.



Shadow area

Real coverage area

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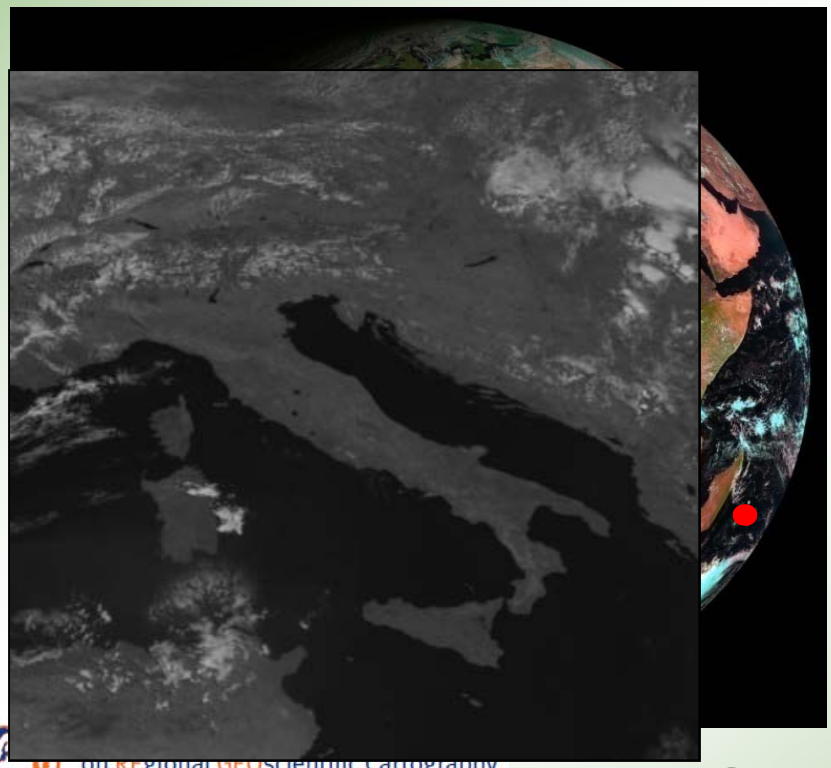
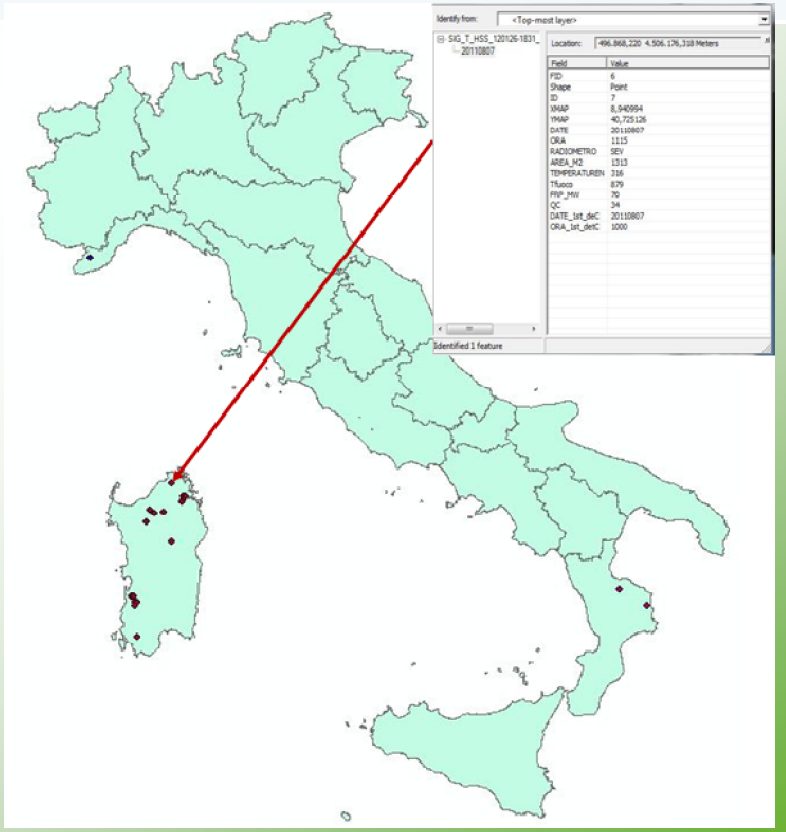
From Italy

	GP characteristics
IT1 - SFIDE	Fire detection and monitoring system based on geostationary satellite (SEVIRI sensor)
IT2 - CICLOPE	Automatic real-time monitoring system based on visible cameras.





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SFIDE acquisition and processing system

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From Poland

	GP characteristics
PL1 - NFFIS	**National Forest Fire Information System. A software for annual updating of the number of forest fires, burned areas, other detailed info.**
PL2 - WildFDS	**Wild fire detection system based on cameras on tower.**
PL3 – FF RiskforeSys	**Meteorological information collection (temp., wind, humidity, precipitation, etc.) for fire risk forecast**

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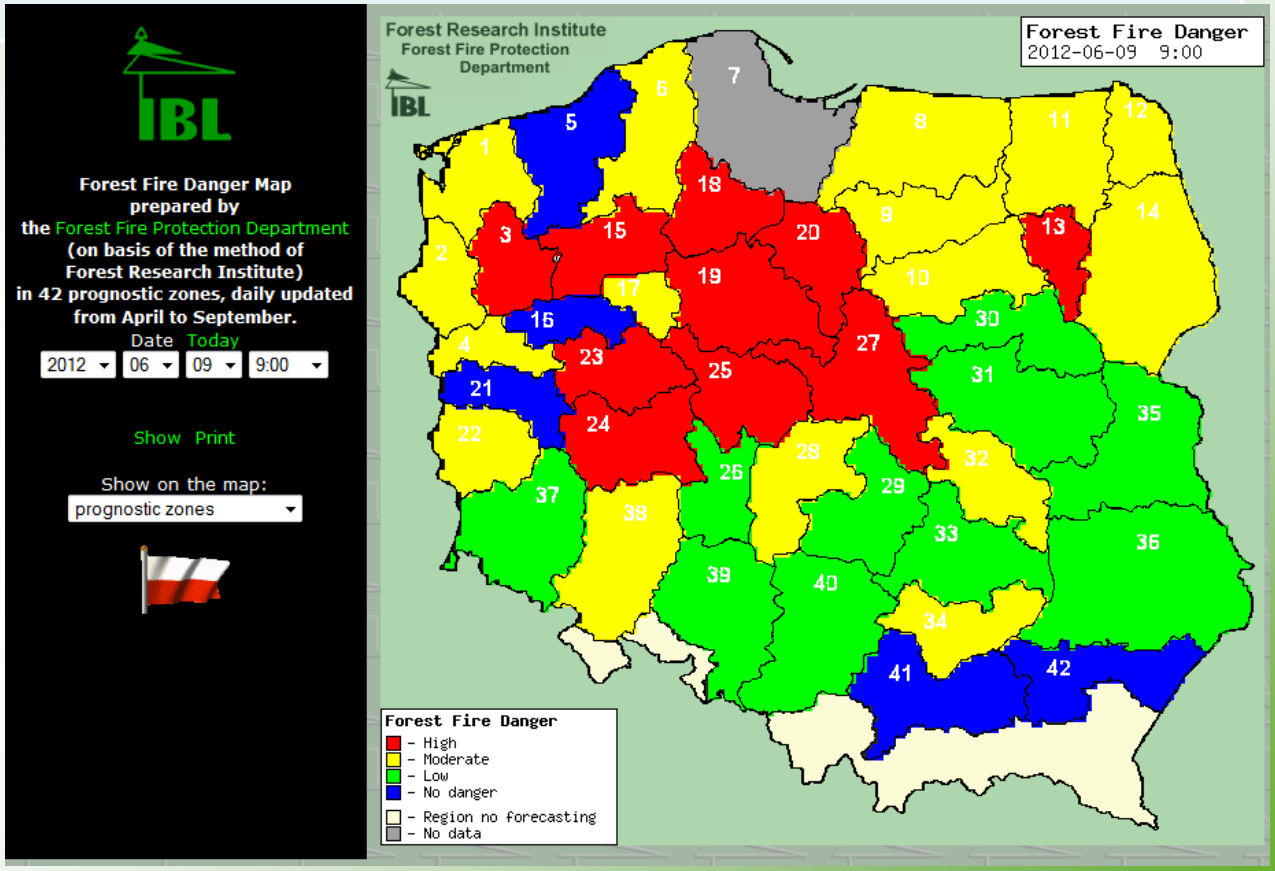
From Poland

	GP characteristics
PL3 – FF RiskforeSys	**Meteorological information collection (temp., wind, humidity, precipitation, etc.) for fire risk forecast**

Data collection: daily at 9:00 and 13:00 measurements of the following parameters: combustible material humidity (the index material is a sample of the upper layer of pine litter taken from pine stand aged 40-60, growing on the fresh forest site), air relative humidity (measurement at the height of 0.5 m in a specific measuring point), diurnal precipitation, wind speed, temperature at different ground levels.

The maps of forest fire risk forecast are accessible on the internet site: http://bazapozarow.ibles.pl/zagrozenie.



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From Slovenia

	GP characteristics
SL1 - KARST	**Video observation system. Under operator control**
SL2	**Spatial model of forest fire danger. Daily map of fire danger based on empirical model.**
SL3 – eGIS_UJME	**Collection of meteo data for fire prediction**
SL4 - FWI	**Development of Fire Weather Index.**
SL5	**Forecasting fire behaviour. Development of fire spreading maps.**
SL6	**Methodology for defining the grade of forest fire hazard**

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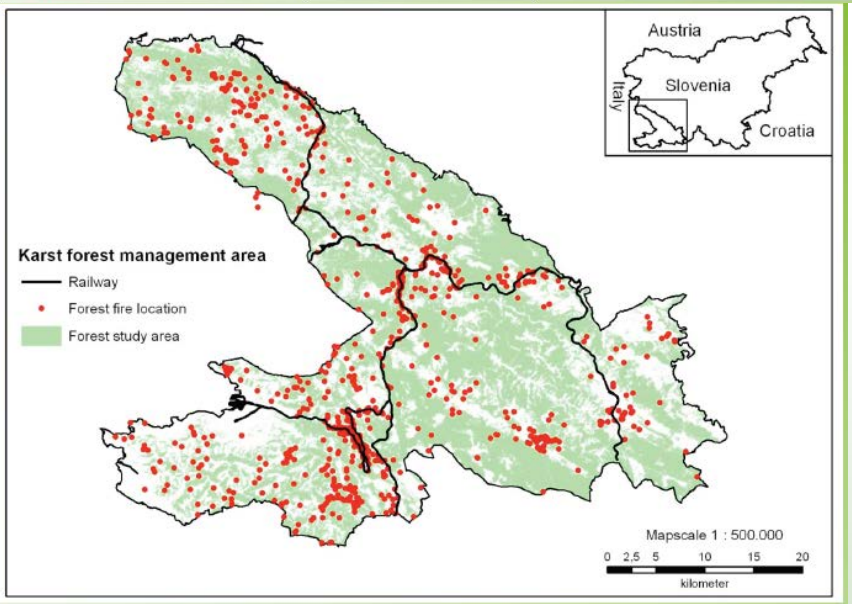
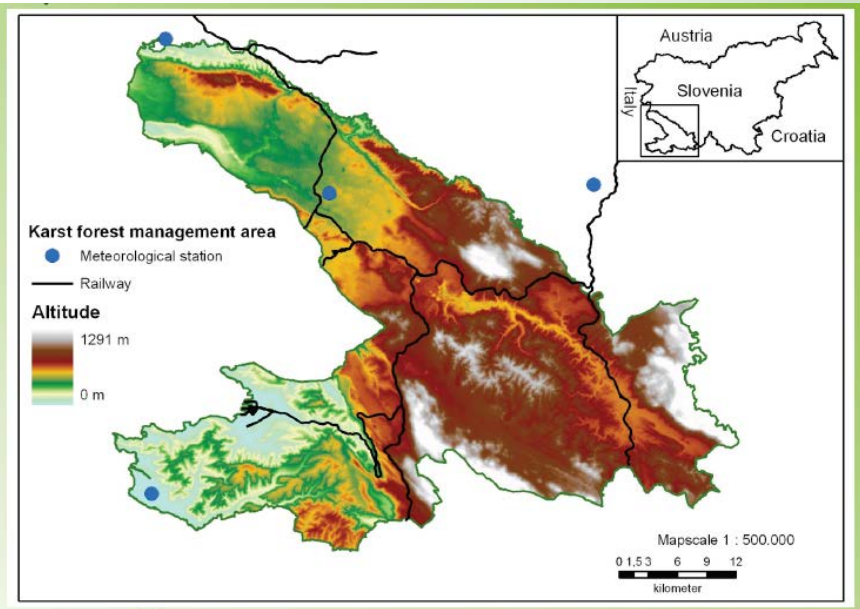
From Slovenia

Fuel classification system	Number of fuel types	Country of application
NFDRS fuel types	20	USA
NFFL fuel types	13	USA
FCCS	216	USA
McArthur fuel types	3	Australia
FBP fuel types	16	Canada
Prometheus fuel types	7	Europe - Mediterranean countries
Standard fire behaviour fuel models	40	USA

	GP characteristics
SL2	**Spatial model of forest fire danger. Daily map of fire danger based on empirical model.**
SL4 - FWI	**Development of Fire Weather Index.**
SL5	**Forecasting fire behaviour. Development of fire spreading maps.**





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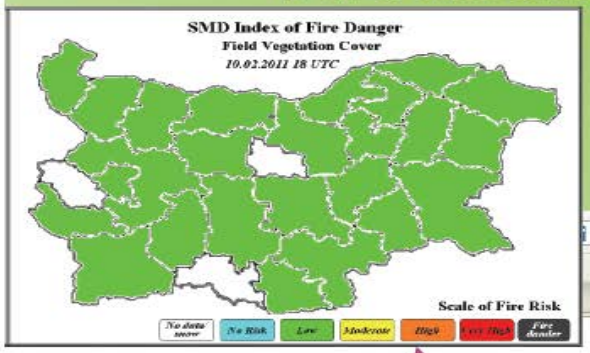
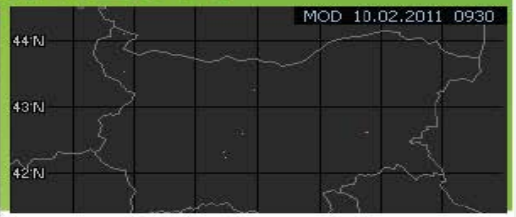
From Bulgary

Fire Information System, NIMH 2011





Data from EUMETSAT, Satellite: MET08,
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42.236,24.488,312.2,1.0,1.0,10.02.2011,0930,T,53

10 February 2011

Land Surface Status

Maps of Soil Moisture Deficit Index for Fire Danger

Satellite Information

Maps of Canadian Fire Weather Index *Analysis and Forecasts*

Weather Forecasts for today/tomorrow

Weather Forecasts for 7 days

	GP characteristics
BG1	Forest Fire information System
BG2	Information system for the land surface status and fire risk assessment.

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From UK

	Funzione
UK1 – 3D Modelling	**Simulation of fire spread and application of serious games as a training aid to fire services**
UK2	**Mobile application development lab. Sensor network for collecting data on current temperature, humidity, wind speed. Early warning system**

ONE-ON-ONE TRAINING. Train a specific role during an incident.
CLASSROOM TRAINING. An instructor and multiple trainees participate. One trainee is assigned the leadership role and takes the controls during the scenario.
MULTI-USER TRAINING. This training method allows multiple users to participate in joint training exercises simultaneously.

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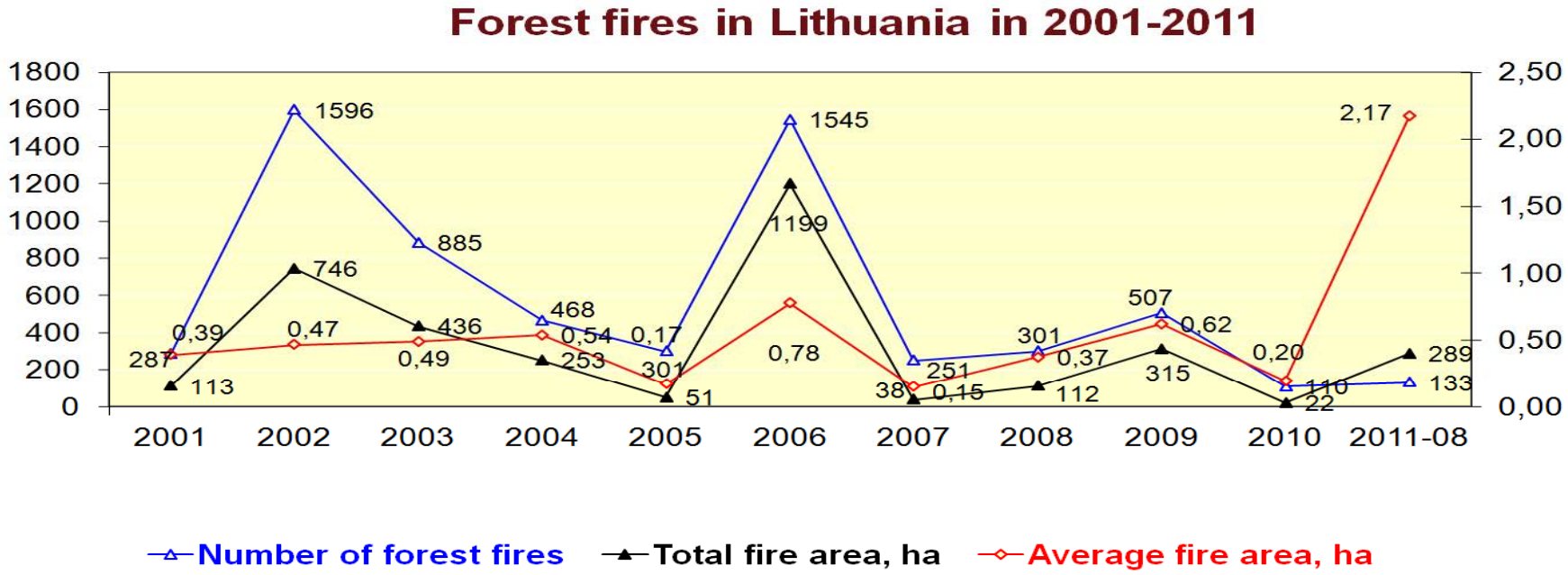
From Lithuania

	GP characteristics
LT1 – Firewatch	**Meteorological sensors and cameras for automatic surveillance system.**



The average fire area in 2011 had increased dramatically because of 1 forest fire in Šilutė state forest enterprise in 06/06/2011 (nearby Traksėdžiai peat bog 268 ha of forest land was burnt, mainly peat land).

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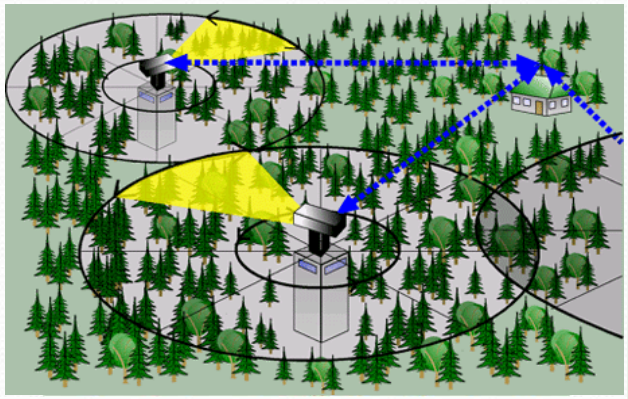
From Lithuania

	GP characteristics
LT1 – Firewatch	**Meteorological sensors and cameras for automatic surveillance system.**

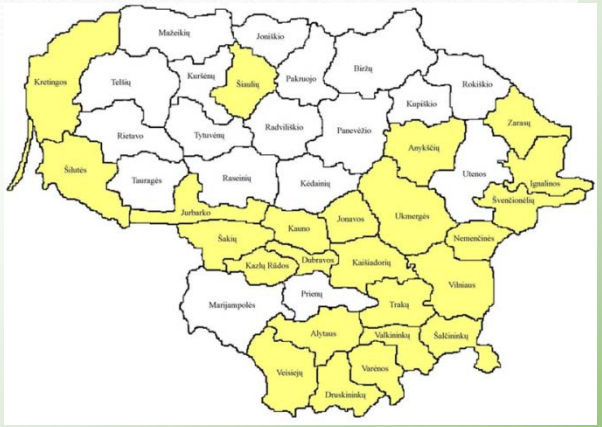
Installation of forest fires detection systems

Firewatch final installation within 2013

- In 2008 Directorate General of State Forests has organized the preparation of the study concerning forest fire detection system model in Lithuania.
- On the basis of this study, technical work group analyzed the situation and recommended to implement over ground automatic forest fire detection systems in Lithuania's forests.
- Technical work group and experts in 2009 had created technical specification for the system after demonstration – experimentation of several over ground fire detection systems in Varėna state forest enterprise.



10 km distance – clouds of smoke 10*10m should be detected in any weather conditions
15 km distance – maximum distance when the clouds of smoke 10*10m should be detected in most usual Lithuanian conditions.
40km – the clouds of smoke can be detected in very good weather conditions.



SFE / NP	Towers	SFE / NP	Towers
Alytaus	2	Šakių	3
Anykščių	3	Šalčininkų	4
Druskininkų	3	Šiaulių	3
Dubravos	2	Šilutės	4
Ignalinos	4	Švenčionėlių	4
Jonavos	3	Trakų	3
Jurbarko	3	Ukmergės	5
Kaišiadorių	4	Valkininkų	3
Kauno	3	Varėnos	3
Kazlų Rūdos	2	Veisiejų	3
Kretingos	3	Vilniaus	6
Kuršių nerijos NP	4	Zarasų	3
Nemenčinės	4	**Iš viso**	**84**

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From Portugal

	GP characteristics
PT1	**Mapping of land for multiple use. Very detailed description of the land occupation**
PT2	**GIS webmap application. Development of Webmaps with different level of information for fire prevention (land use, water tanks, watchtower, forest roads, buldozers, auotbombas, risk cartography, buned areas, etc.)**
PT3	**Investment on prevention fire with GIS Planning (new forest roads and water tanks, preventive silviculture, cleaning forest, position vehicles to early detection). GIS based.**

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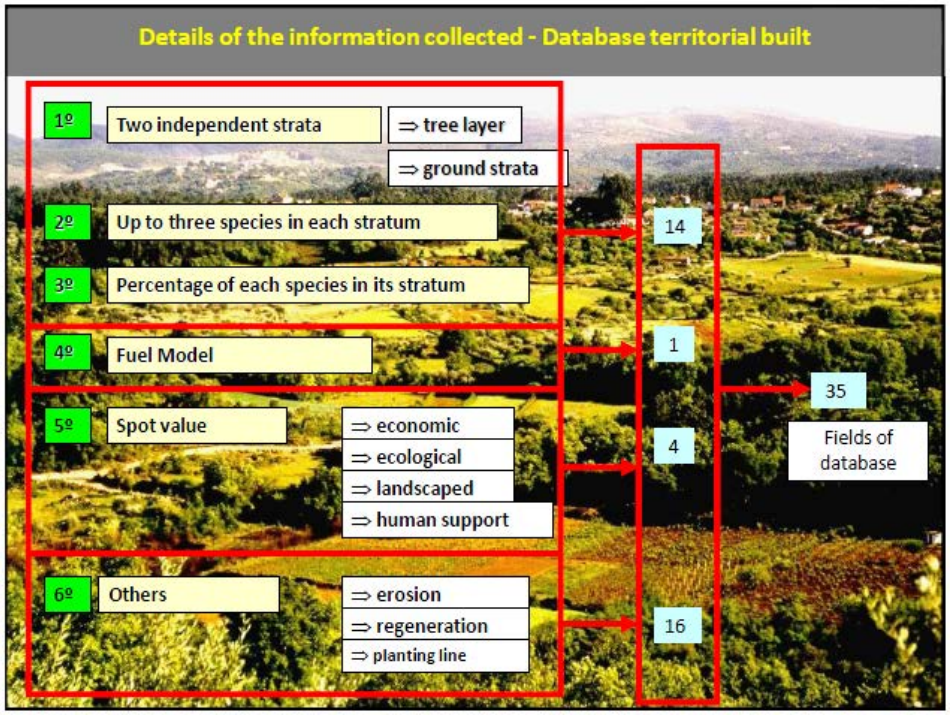

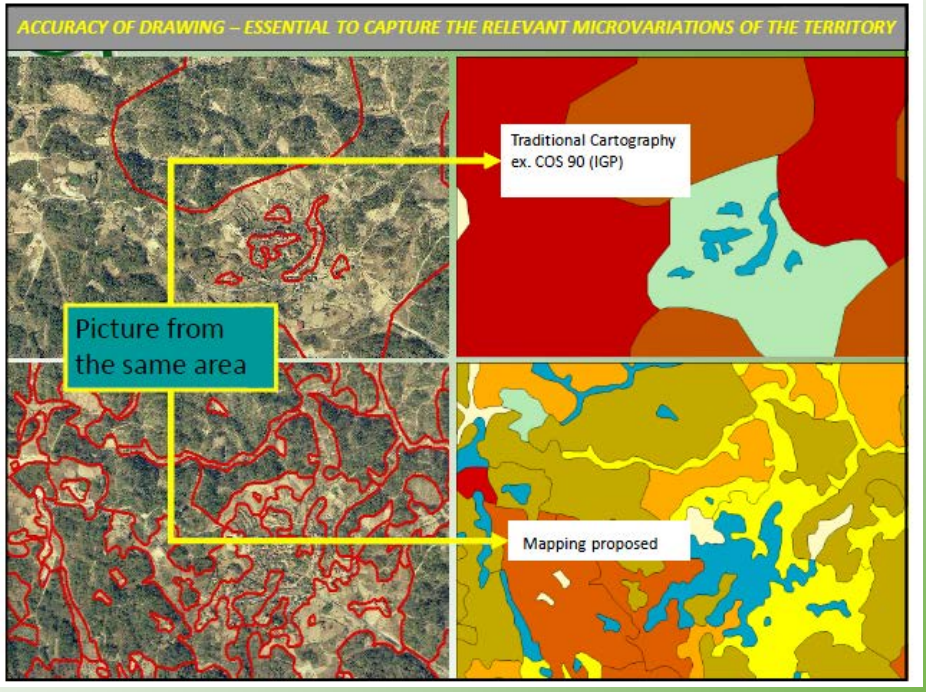

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Thanks for your attention