CIVIL PROTECTION
DISASTER RISK REDUCTION
BIODIVERSITY

Integrating EO data and services in RISICO system to improve the prediction of wildland fires in Lebanon

Osservare per prevedere, prevedere per prevenire

RESEARCH FOUNDATION
cima
OBSERVE TO PREDICT, PREDICT TO PREVENT

FONDAZIONE CIMA
CIMA RESEARCH FOUNDATION

CENTRO INTERNAZIONALE IN MONITORAGGIO AMBIENTALE
INTERNATIONAL CENTRE ON ENVIRONMENTAL MONITORING

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INTERNATIONAL CENTRE ON ENVIRONMENTAL MONITORING

National Council for Scientific Research

Regional Coordination on Improved Water Resources Management and Capacity Building Program – CAPWATER P117170

Establishment of Sustainable Natural Resources Management Platform and Early warning system SuNaR

Osservare per prevedere, prevedere per prevenire

CAPWATER Project

2012
World Bank (WB) & Global Environmental Facility (GEF) launched a program that meets the priorities set by Lebanon, Jordan, Egypt, Morocco and Tunisia

Objective

improve the sustainable water resources management and achieve water and food security

6 Project components:

1. Climate change analysis for examination of impact on water resources
2. Field crop mapping and yield predictions of water-intensive crops
3. Evapotranspiration to assess water demands
4. Drought assessment and Monitoring
5. Flood risk assessment pilot
6. Forest fire early warning system and emergency preparedness pilots

2007 Forest fire season

Republic of Lebanon
Ministry of Environment

AFDC

2008
Lebanon's National Forest Fire Management Strategy

Lebanon is lacking the necessary policy measures and management capacities to address a number of forest protection measures related to fire management including monitoring, prediction (early warning), preparedness, prevention, suppression and restoration.

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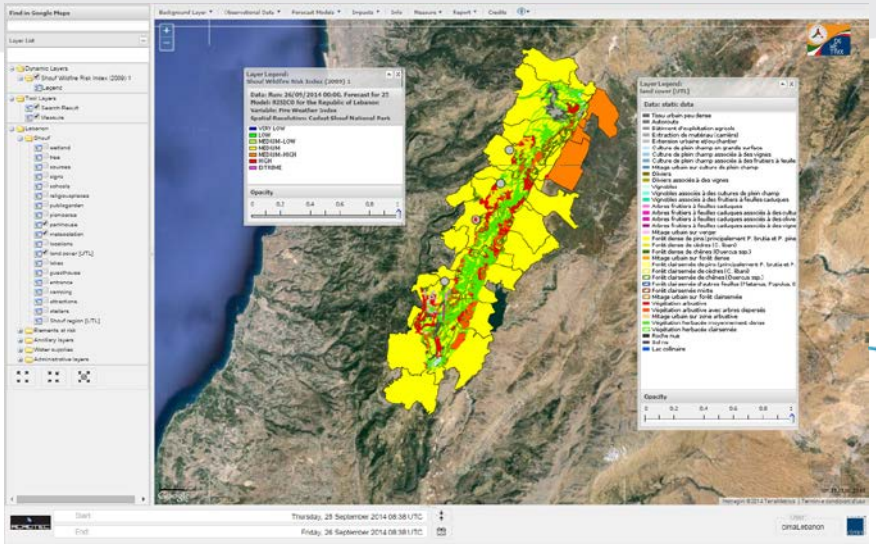
INTERNATIONAL CENTRE ON ENVIRONMENTAL MONITORING

Italian Cooperation Initiatives

2008-2010
Fire Risk prevention and management in the Al-Shouf Cedar Nature Reserve



General Objective:
Support to enhance the conservation and protection of environment

Specific Objective:
Improve fire fighting and fire prevention capacities in the Shouf Natural Reserve

Republic of Lebanon
Ministry of Environment

Shouf Biosphere Reserve
The Largest Natural Cedar Reserve in Lebanon

Osservare per prevedere, prevedere per prevenire

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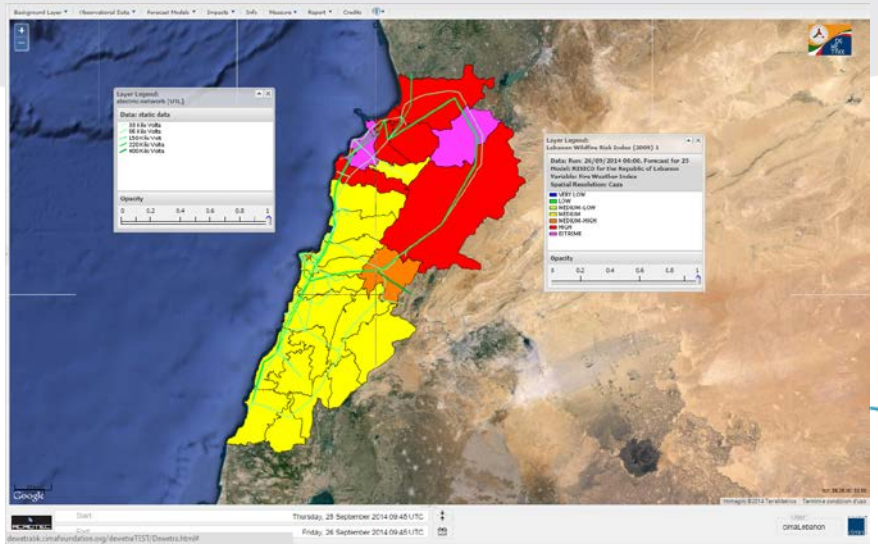
CIMA RESEARCH FOUNDATION

CENTRO INTERNAZIONALE IN MONITORAGGIO AMBIENTALE
INTERNATIONAL CENTRE ON ENVIRONMENTAL MONITORING

Italian Cooperation Initiatives

2011
Strengthening the National Framework to mitigate Rural-Forest Fire Risk

General Objective:
Support to enhance the conservation and protection of environment



Objective:
Improve fire fighting and prevention capacities at national level

Republic of Lebanon
Ministry of Environment

AFDC
Association for Forests, Development & Conservation
جمعية الثروة الحرجية والتنمية

Shouf Biosphere Reserve
The Largest Natural Cedar Reserve in Lebanon

CIVIL DEDEFENCE

Lebanon Fire Risk Bulletin

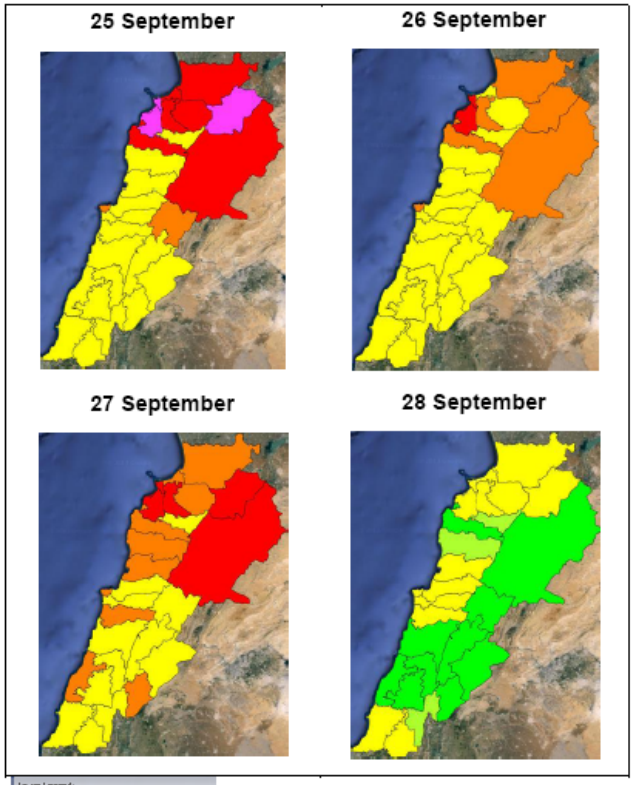
Refer to cadast condition.

General description of potential fire risk situation

Symbol	Level of risk	Meaning and actions
VL	Very low	*Very low fire risk. Controlled burning operations can be hardly executed due to high fuel moisture content. Normally wildfires self-extinguish.*
L	Low	*Low fire risk. Controlled burning operations can be executed with a reasonable degree of safety.*
ML	Medium low	*Medium-low fire risk. Controlled burning operations can be executed in safety conditions. All the fires need to be extinguished.*
M	Medium	*Medium fire risk. Controlled burning operations would be avoided. All the fires need to be very well extinguished.*
M	Medium high	*Controlled burning is not recommended. Open flame will start fires. Cured grasslands and forest litter will burn readily. Spread is moderate in forests and fast in exposed areas. Patrolling and monitoring is suggested. Fight fires with direct attack and all available resources.*
H	High	*Ignition can occur easily with fast spread in grass, shrubs and forests. Fires will be very hot with crowning and short to medium spotting. Direct attack on the head may not be possible requiring indirect methods on flanks. Patrolling and monitoring the territory is highly suggested.*
E	Extreme	*Ignition can occur also from sparks. Fires will be extremely hot with fast rate of spread. Control may not be possible during day due to long range spotting and crowning. Suppression forces should limit efforts to limiting lateral spread. Damage potential total. Patrolling and monitoring the territory is highly suggested.*

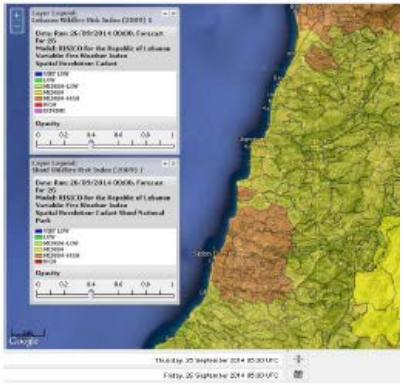
Beirut, 26 September 2014

FIRE RISK INDEX

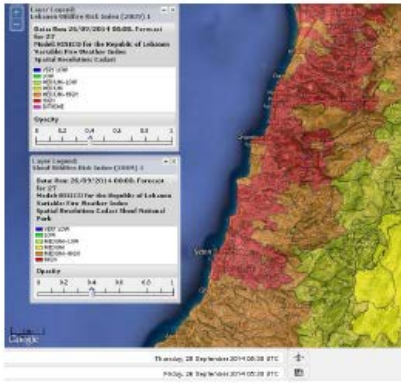


Daily Fire Risk Bullettin – Civil Defence

Shouf Biosphere Reserve Forecast for



Shouf Biosphere Reserve Forecast for



Daily Fire Risk Bullettin – Civil Defence

Nord

Koura

Municipality	25-Sep	26-Sep	27-Sep	Municipality	25-Sep	26-Sep	27-Sep	Municipality	25-Sep	26-Sep	27-Sep
Aaba	E	H	H	Afsaddiq	E	H	H	Ain Ekrine	H	MH	H
Amioun	E	H	H	Anfeh	E	H	E	Badbhoun	E	H	H
Barghoun	E	H	H	Barsa	E	H	H	Batroumine	E	H	H
Bdebba	E	H	H	Bechmizzine	E	H	H	Bednayel El-Koura	E	H	H
Bhabbouch El-Koura	H	H	H	Bleftine	E	MH	H	Bnehran	H	MH	H
Bqaiaa El-Koura	E	MH	H	Bsarma	H	MH	H	Btaaboura	E	H	H
Btermam	E	H	H	Btouratij	E	MH	H	Bziza	H	H	H
Dar Beechtar	H	H	H	Dar Chmezzine	H	H	H	Deddeh	E	H	H
Deir El-Balamand	E	H	H	Fih	E	H	H	Hrakhe	E	H	H
Ijdaebrine	H	H	H	Kaftoun	E	H	H	Kefraya El-Koura	E	H	H
Kfarakka	H	H	H	Kfarhata	E	H	H	Kfarhazir	E	H	H
Kfarkahel	H	MH	H	Kfarsaroun	H	H	H	Kosba	H	MH	H
Majdel el-Koura	H	H	MH	Nakhle	E	H	H	Qalhat	E	H	H
Ras Maska	E	H	H	Rechdibbine	H	MH	H	Zakroun	E	H	H
Zaherta El-Mteoufe	H	MH	MH								

Bcharre

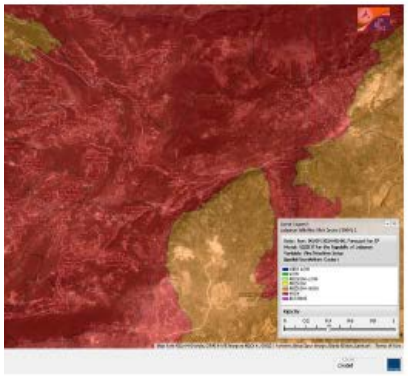
Municipality	25-Sep	26-Sep	27-Sep	Municipality	25-Sep	26-Sep	27-Sep	Municipality	25-Sep	26-Sep	27-Sep
Aabdine	H	MH	MH	Bane	MH	M	MH	Barhelioun	H	MH	H
Bazooune	M	M	M	Becharre	M	M	MH	Belt Menzer	MH	MH	H
Bilia	H	MH	H	Blaouza	MH	MH	MH	Bqaa Kafra	M	M	M
Bqergacha	M	M	M	Breissat	MH	MH	M	Dlmane	MH	MH	M
Hadath El Jobbeh	MH	MH	M	Hadchit	MH	M	MH	Hasroun	M	M	M
Mazraat Aassaf	H	MH	MH	Mazraat Bani Saab	H	MH	M	Mchaa El-Jobbeh	MH	M	M
Metrit	H	H	H	Moghr El-Ahoual	H	MH	H	Ouadi Qannoubine	MH	MH	MH
Qanat	H	MH	M	Qneyouer	MH	MH	MH	Tourza	H	MH	H

Batroun

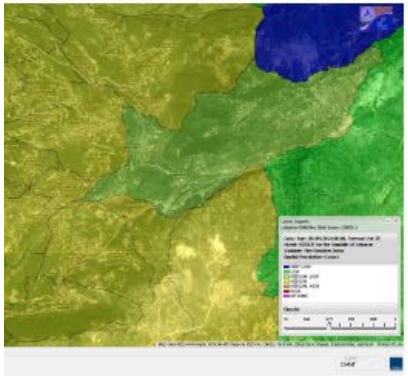
Municipality	25-Sep	26-Sep	27-Sep	Municipality	25-Sep	26-Sep	27-Sep	Municipality	25-Sep	26-Sep	27-Sep
Aabrine	E	H	H	Aalali	H	M	M	Aartiz	H	MH	MH
Abdeli	H	M	H	Ajdabra	H	MH	H	Assia	H	MH	M
Basbina	E	H	H	Batroun	E	H	E	Bcheleh	H	MH	M
Bechtouder	H	MH	M	Beit Chiala	H	MH	M	Beit Kassab	H	MH	M
Bldarfil	E	H	H	Bqesmaya	E	H	MH	Chatine	M	M	M
Chebtin	H	M	M	Chekka	E	H	E	Deaal	H	H	M
Dehr Abi Yaghi	H	M	MH	Daraya El-Batroun	H	MH	MH	Deir Billa	H	H	MH
Deir Kfifane	E	MH	H	Deir Mar Youhanna EL	H	MH	M	Deir Mar Youssef Jra	H	MH	MH
Douma	MH	MH	M	Douq	H	M	MH	Eddeh El-Batroun	H	MH	MH
Ehmet El-Batroun	H	MH	M	Ghouma	H	MH	MH	Hadtoun	H	MH	M
Hemet	E	H	E	Harbouna	H	MH	MH	Herdine	H	MH	M
Helta	H	MH	M	Hery	E	H	E	Jebla	H	H	M
Jrebta El-Batroun	H	MH	MH	Jrane El-Batroun	E	H	H	Kfar Aabida	H	MH	MH
Kfar Halda	H	H	M	Kferb Shleimane	H	MH	M	Kfarhatna	E	H	MH
Kfarhey	H	MH	H	Kfarhelos	H	MH	H	Kfifane	E	H	MH

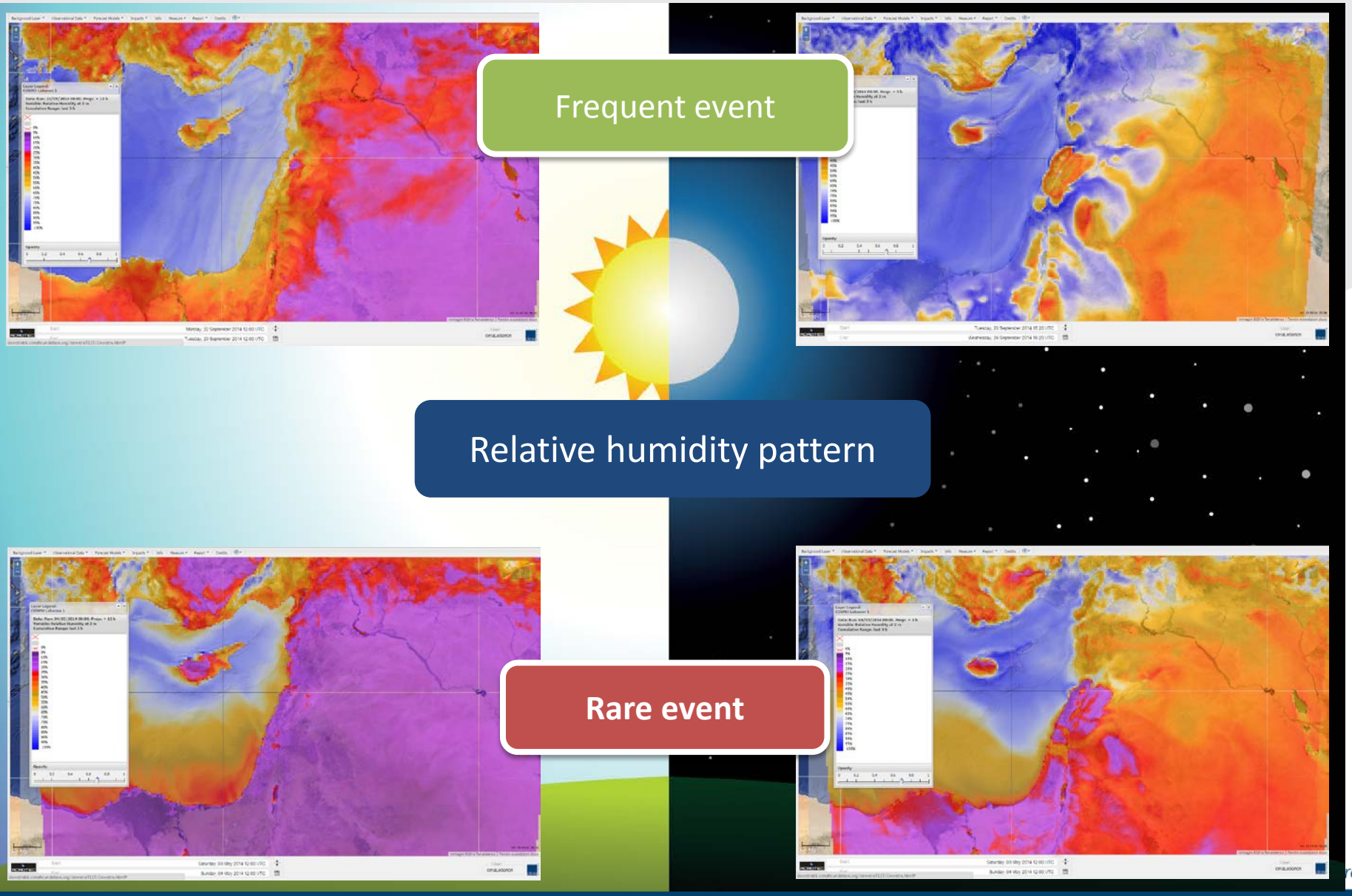
Daily Fire Risk Bullettin – Civil Defence

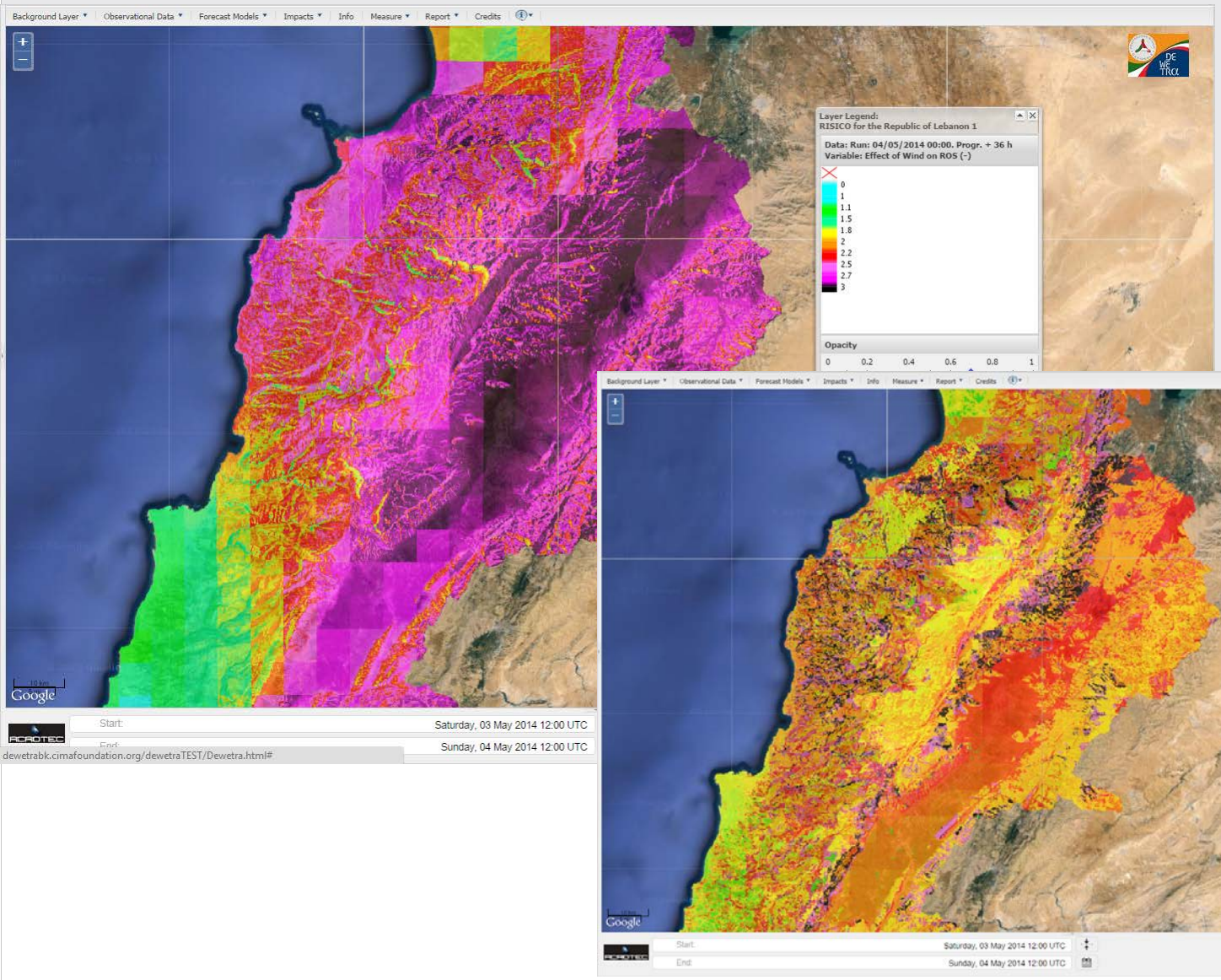
t for 27 September



t for 28 September

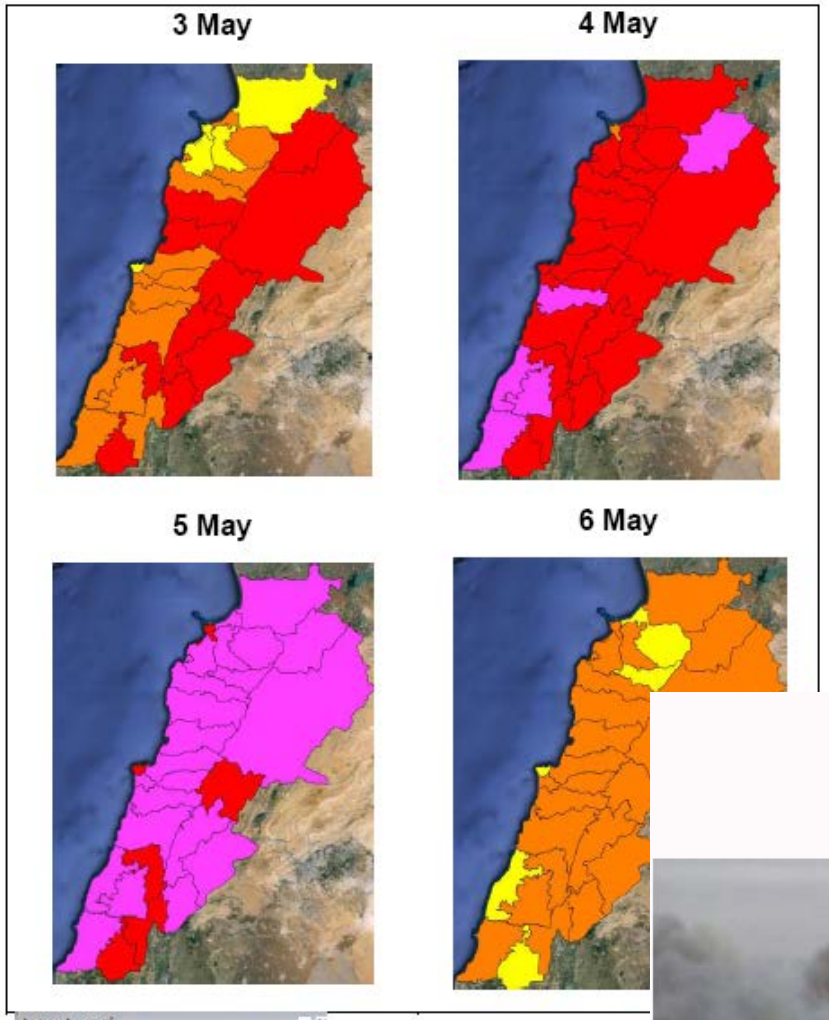



Frequent event
Relative humidity pattern
Rare event


Background Layer
Observational Data
Forecast Models
Impacts
Info
Measure
Report
Credits
Layer Legend:
RISICO for the Republic of Lebanon 1
Data: Run: 04/05/2014 00:00. Progr. + 36 h
Variable: Effect of Wind on ROS (-)
0
1
1.1
1.5
1.8
2
2.2
2.5
2.7
3
Opacity
0 0.2 0.4 0.6 0.8 1
Google
Start:
Saturday, 03 May 2014 12:00 UTC
End:
Sunday, 04 May 2014 12:00 UTC
dewetrabk.cimafoundation.org/dewetraTEST/Dewetra.html#

Background Layer
Observational Data
Forecast Models
Impacts
Info
Measure
Report
Credits
Layer Legend:
RISICO for the Republic of Lebanon 1
Data: Run: 04/05/2014 00:00. Progr. + 36 h
Variable: Rate of Spread (m/h)
0 m/h
20 m/h
50 m/h
150 m/h
250 m/h
300 m/h
400 m/h
500 m/h
Opacity
0 0.2 0.4 0.6 0.8 1
Google
Start:
Saturday, 03 May 2014 12:00 UTC
End:
Sunday, 04 May 2014 12:00 UTC
User:
cimaLebanon

FIRE RISK INDEX



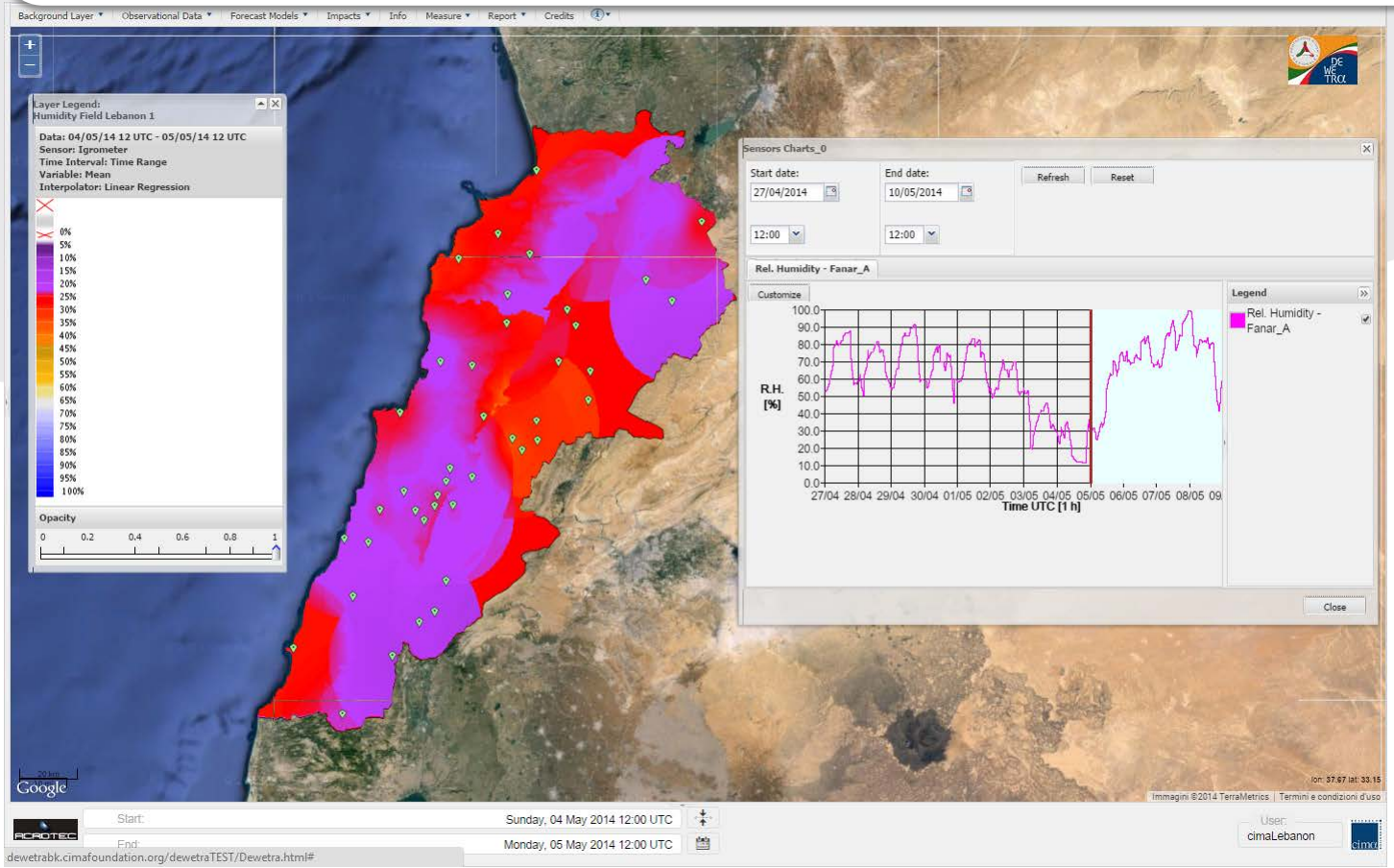
إندلاع حريق كبير في أحراج بطشي في قضاء بعبدا

الإثنين 05 أيار 2014، آخر تحديث 09:39

إدلع حريق كبير في أحراج بلدة بطشي في قضاء بعبدا، وقد ذكرت بعض المعلومات الصحافية إلى أن الحريق وصل إلى الأبنية السكنية والسيارات.

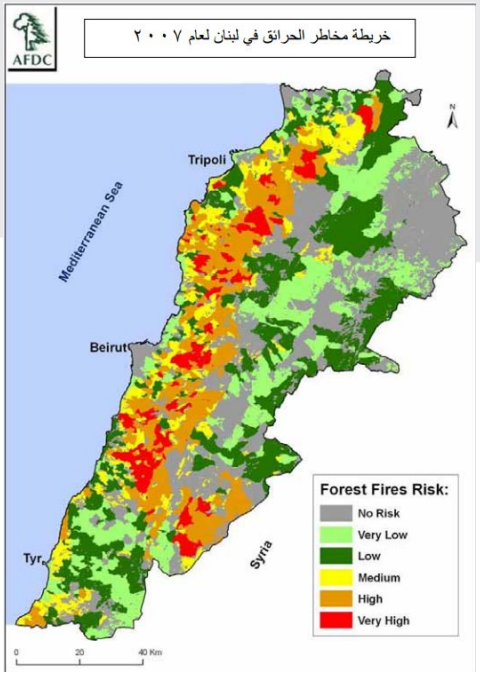
A major fire broke out in the jungles of Betchai town in the district of Baabda, some of the information has said to the press that the fire reached the residential buildings and cars.

The use of meteorological observations is not enough to discriminate highest fire risk areas



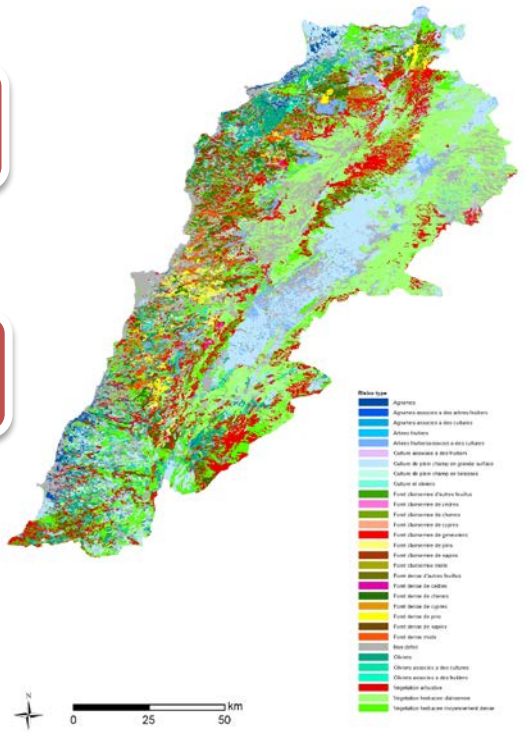
Main activities

Analysis of additional data to be used for the upgrade of RISICO



Update vegetation cover map

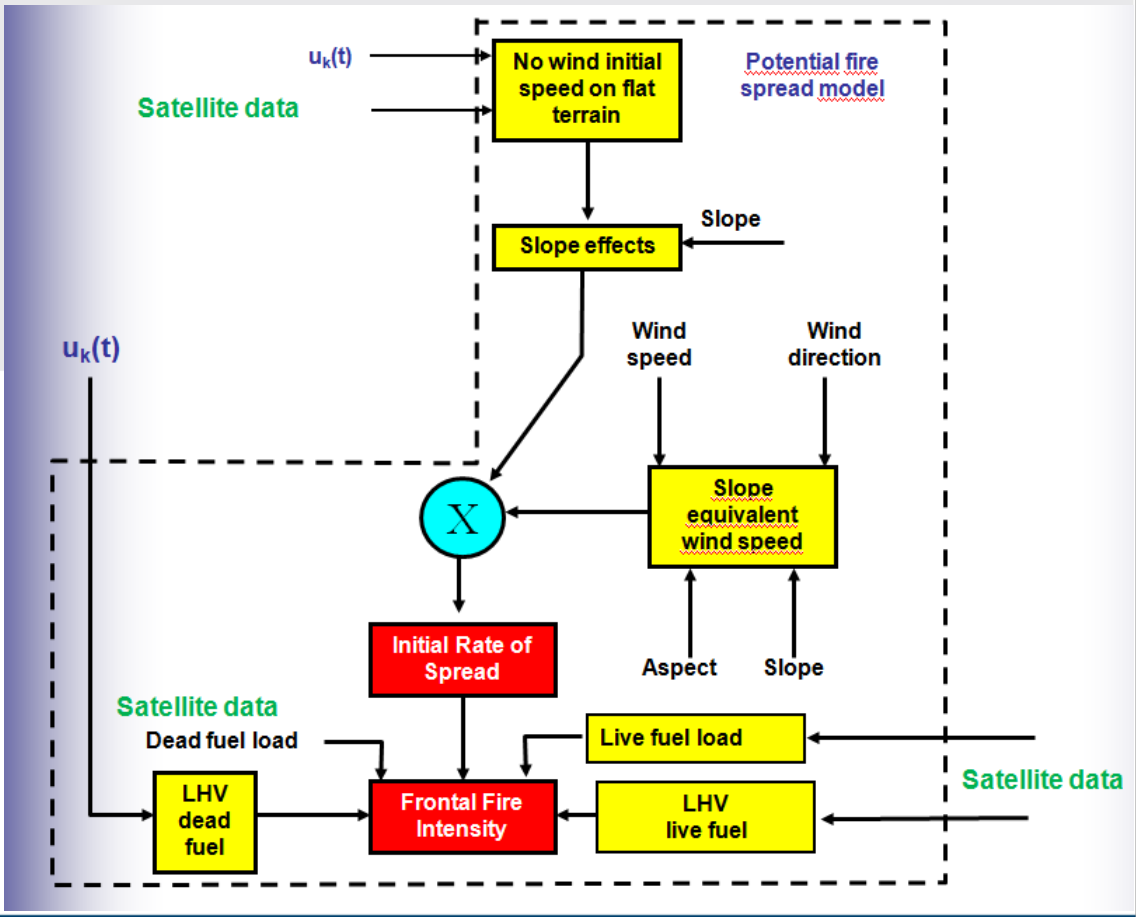
Include satellite data and products in RISICO system



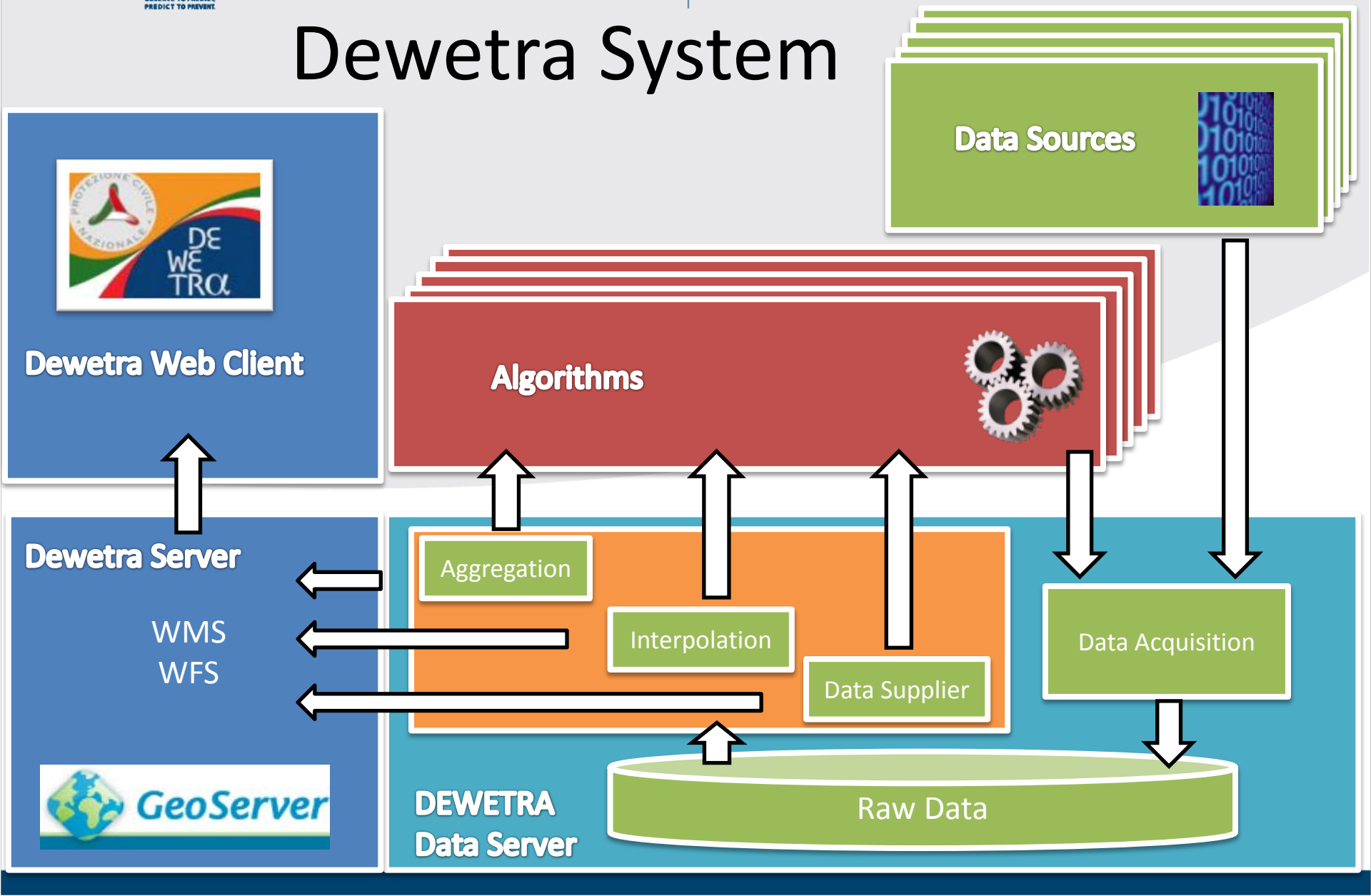
Main activities

Design and implementation of a new algorithms

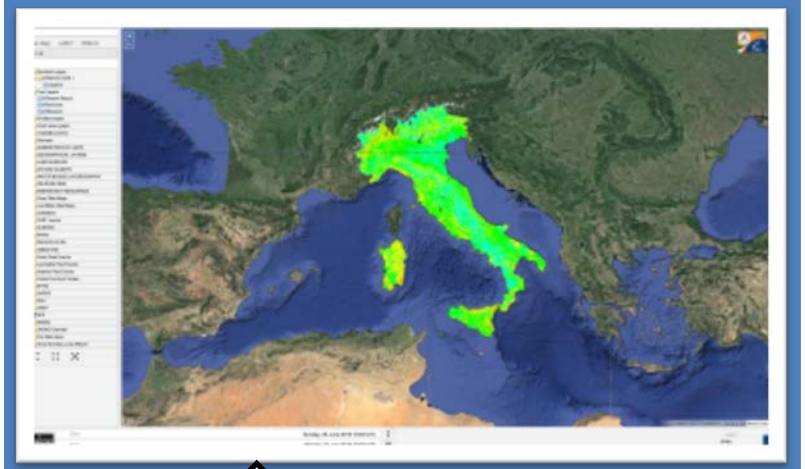
- Defining new fire danger indexes
- Including satellite data and products in RISICO system
- Validation



Dewetra System



Dewetra Web Client



RISICO Software

Cells DB
(static Informations)

Initial state

Cells data manager

RISICO Algorithm
-Dead Fine Fuel Moisture Model
-Potential Fire Spread Model

Input Reader

Output Writer

Input Files

Output Files

Dewetra Server

WMS
WFS

GeoServer

Aggregation

Interpolation

Data Supplier

Data Acquisition

DEWETRA Data Server

Raw Data

EUMETSAT Satellite Application Facility on Support to

Operational Hydrology and Water Management H-SAF

	Soil moisture			Precipitation		Snow
	H07	**H08**	**H14**	**H03**	**H05**	**H10**
Coverage	Globe	H-SAF area	Globe	Limited H-SAF area	H-SAF area	H-SAF area
Cycle	36 hours	36 hours	Daily	15 min	3 hours	Daily
Resolution	25 km	1 km	25 km	Europe: 8 km	Europe: 8 km	1 to 5 km
Dissemination	EUMETCast	EUMETCast	H-SAF ftp site	EUMETCast	EUMETCast	EUMETCast
Formats	BUFR	lat-lon grid - BUFR	GRIB	fixed grid (Meteosat projection)	GRIB	lat-lon grid

Land surface analysis LSA-SAF

Scope	**Monitoring**	**Integration**			
Product	**Fire Radiative Power**	**Fraction of vegetation cover**	**Land Surface Temperature**	**Evapotranspiration**	**NDVI**
Coverage	MSG disk	MSG disk	MSG disk	MSG disk	Global
Cycle	15 min	daily	15 min	30 min	10-daily composite
Resolution	MSG resolution (3-5km)	MSG resolution (3-5km)	MSG resolution (3-5km)	MSG resolution (3-5km)	1 km
Dissemination	EUMETCast	EUMETCast	EUMETCast	EUMETCast	Vito FTP-server
Formats	HDF5	HDF5	HDF5	HDF5	HDR

Main activities

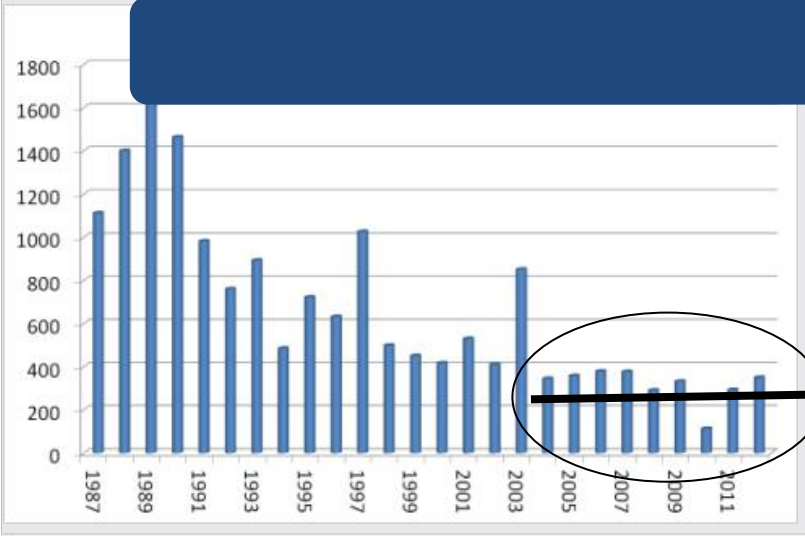
Training

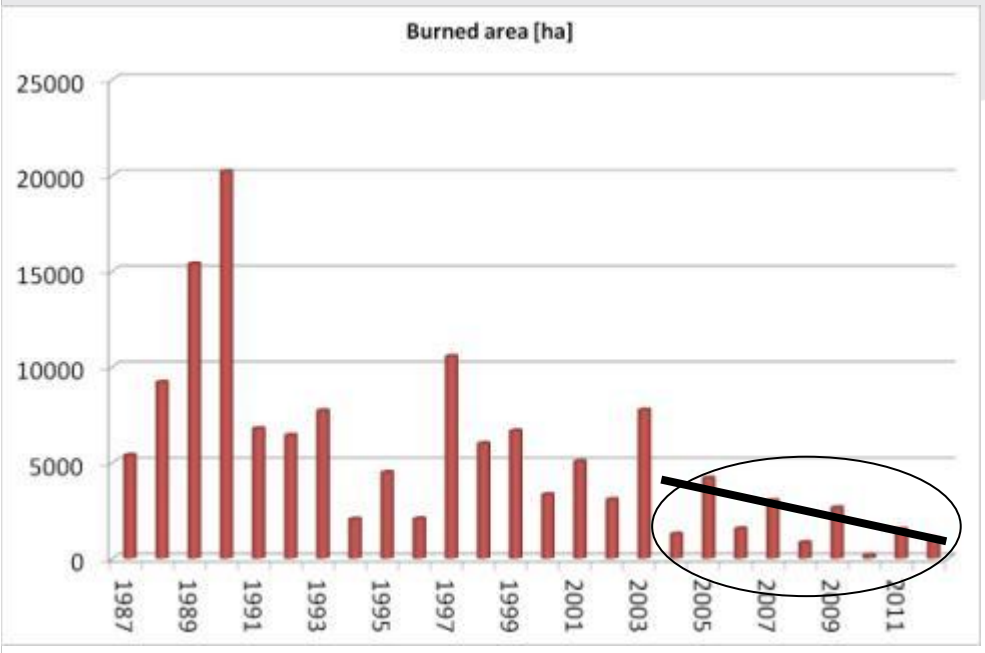
FOREST FIRE FORECAST - Training Program timetable

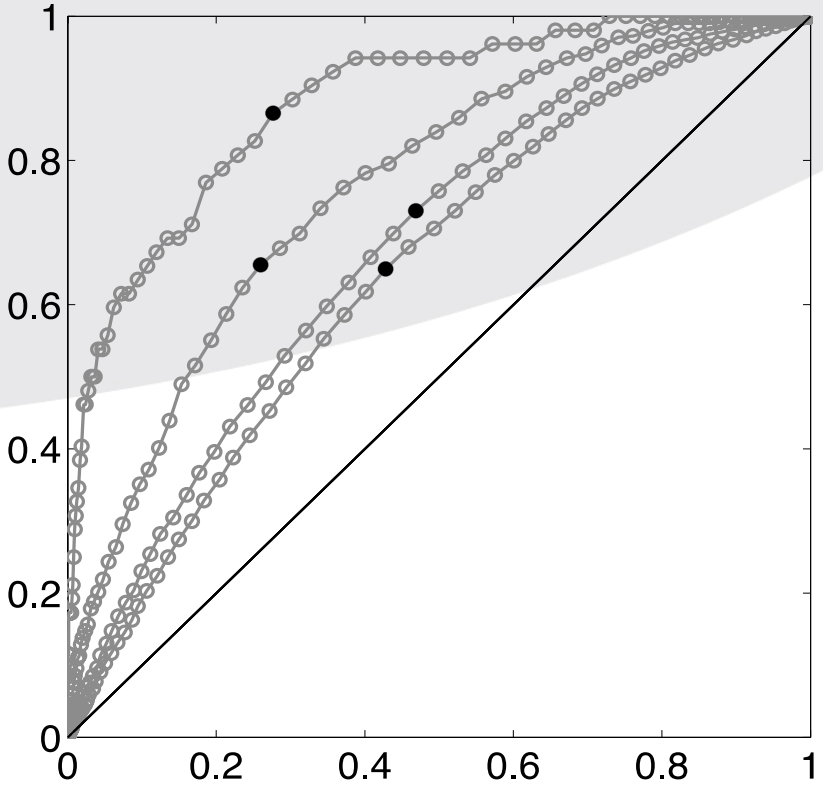
	Monday	Tuesday	Wednesday	Thursday	Friday
9-10	Operational wildfire risk forecasting: the DEWETRA-RISICO system	Introduction to DEWETRA-RISICO model technology	RISICO model architecture	Output data management framework	DEWETRA RISICO configuration
10-11	Operational wildfire risk forecasting: the DEWETRA-RISICO system	Introduction to DEWETRA-RISICO model technology	RISICO model architecture	Output data management framework	DEWETRA RISICO configuration
11-12	Operational wildfire risk forecasting: the DEWETRA-RISICO system	Introduction to DEWETRA-RISICO model technology	RISICO source code analysis	Output data management framework	DEWETRA RISICO configuration
12-13	Operational wildfire risk forecasting: the DEWETRA-	Introduction to DEWETRA-	RISICO source code analysis	Output data management	DEWETRA RISICO
14-15	Excel DE				RISICO
15-16	Excercize: Operational use of DEWETRA RISICO system	Input data management framework	Exercise: RISICO model setup	Excercise: output data management framework	Exercise DEWETRA RISICO configuration
16-17	Excercise: Operational use of DEWETRA RISICO system	Exercise: Input data management framework	Exercise: RISICO model parameters configuration	Excercise: output data management framework	Exercise DEWETRA RISICO configuration
17-18	Excercise: Operational use of DEWETRA RISICO system	Exercise: Input data management framework	Exercise: RISICO model parameters configuration	Excercise: output data management framework	Exercise DEWETRA RISICO configuration

RISICO delivered as open source code

Conclusion


1800
1600
1400
1200
1000
800
600
400
200
0
1987
1989
1991
1993
1995
1997
1999
2001
2003
2005
2007
2009
2011


Burned area [ha]
25000
20000
15000
10000
5000
0
1987
1989
1991
1993
1995
1997
1999
2001
2003
2005
2007
2009
2011


1
0.8
0.6
0.4
0.2
0
0
0.2
0.4
0.6
0.8
1