

# FireHub: A Space based Fire Management Hub

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Themistocles HEREKAKIS

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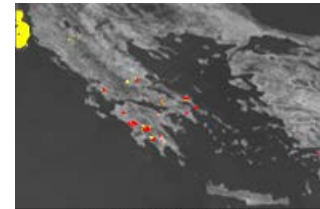
Ioannis PAPOUTSIS

Stavros SOLOMOS

NATIONAL OBSERVATORY OF ATHENS  
INSTITUTE OF ASTRONOMY & ASTROPHYSICS,  
SPACE APPLICATIONS AND REMOTE SENSING



**BEYOND** participated in the  
**Best Service Challenge**  
**Copernicus-Masters competition**  
with the operational EO based fire  
management service, known as:



SEVIRI MIR 070825\_0945 UTC



## “FireHub: A Space Based Fire Management Hub “

**The service consists of three pillars:**

1. The real-time fire detection and monitoring application
2. The large scale Burnt Scar Mapping during and after wildfires and the Diachronic BSM
3. The fire smoke dispersion forecasting tool

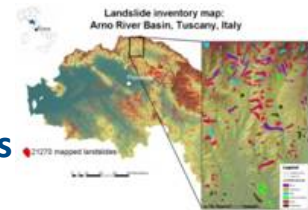
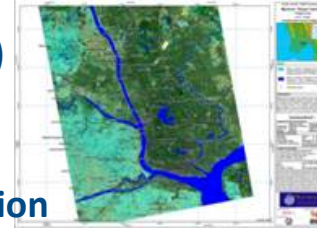
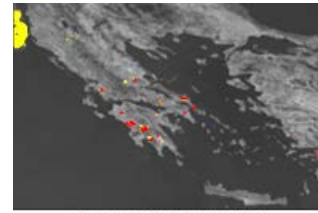


“FireHub: A  
Space Based  
Fire  
Management  
Hub “





Institutional End Users and stakeholders in Greece and Europe receive the fire disaster services:



- The European Copernicus Program (EMS service)
- The Fire Brigades Control Room (199)
- The Ministry of Env. (Directorate for Forests Protection)
- The Gen. Sec. Civil Protection
- The Forestry Services over Greece and Europe
- The National Cadastral Organisation
- The Local Authorities & Environmental Organisations
- The Greek Army
- The Private sector

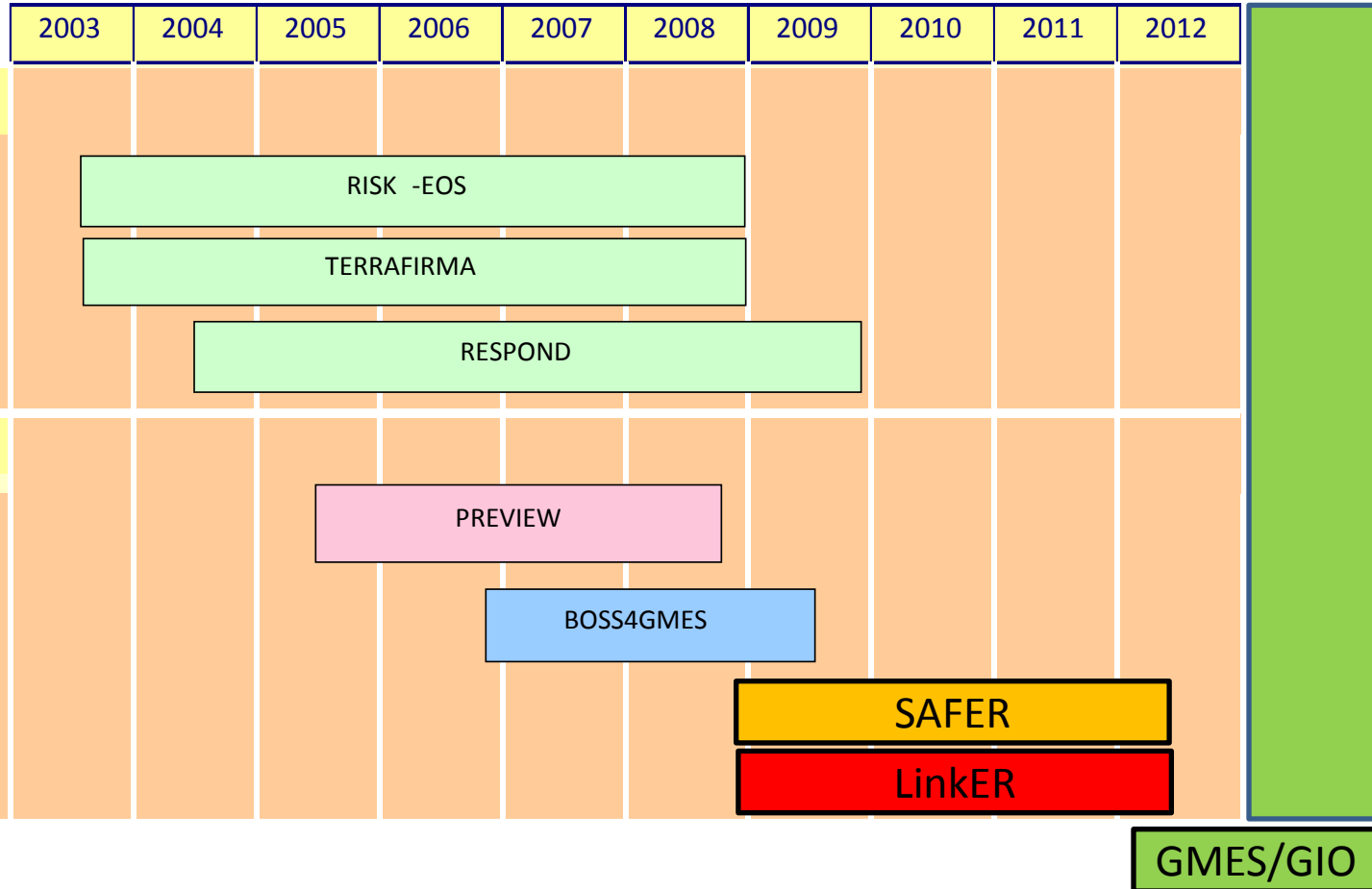


# 2<sup>nd</sup> SOUTH-EASTERN EUROPEAN GEO WORKSHOP

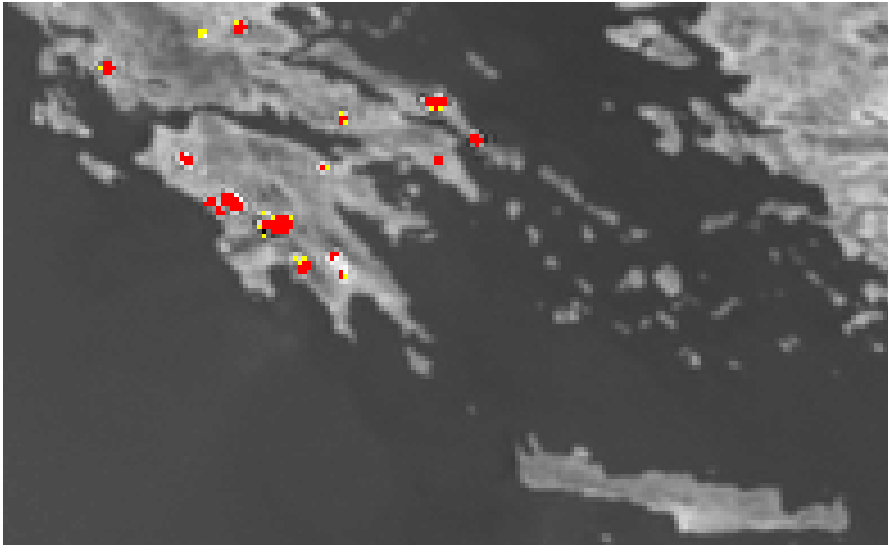


# BEYOND

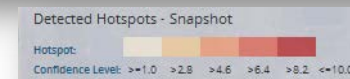
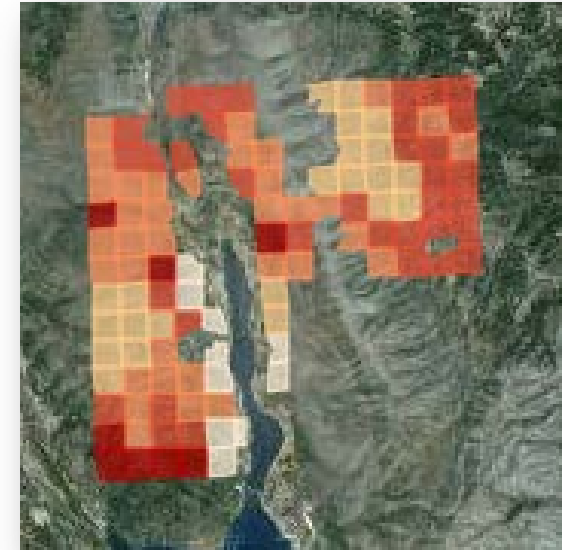
# FireHub



# Regional Real Time Fire Monitoring Service based on EUMETSAT MSG SEVIRI Data Monitoring



Raw resolution: 3.5x3.5 km  
wide pixel over entire

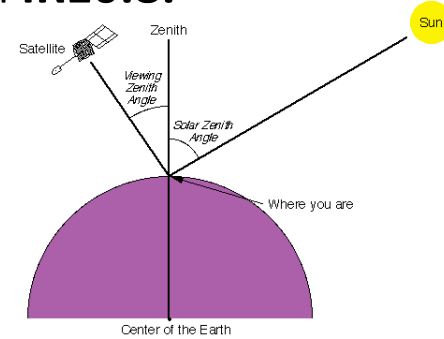


Refined resolution: 0.5x0.5 km  
wide pixel over entire Greece

## CLASSIFICATION PROCESS

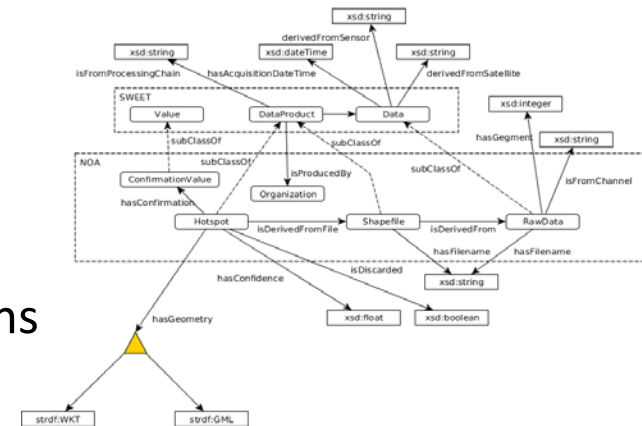
**Classification #1:** The EUMETSAT Fire mapping algorithm (FIR) based on fixed thresholding approach, applied on the spectral bands **IR 3.9** and **IR10.8**.

**Classification enhancement # 1:** The thresholds are dynamically changing calculated for each image and every pixel location on the basis of the seasonally variations and time depended Solar Zenith Angle.



**Classification enhancement # 2 :** Create and integrate classification evidence through geo-spatial ontology schemes and reasoning queries, accounting for the

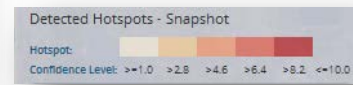
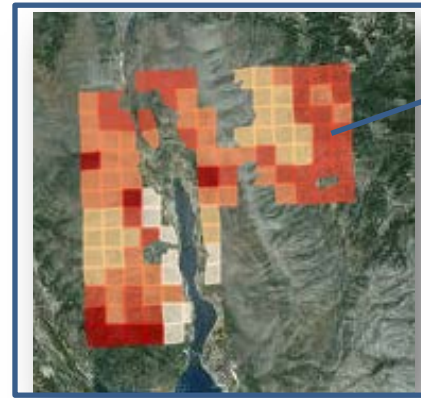
- a) thematic consistency by eliminating false alarms, and
- b) account for the time persistence of the fire observations



## CLASSIFICATION PROCESS

**Classification enhancement # 3:** Downscaling the first classification output and calculate the fire occurrence probability in sub-areas of 500 m x 500 m wide, inside the initial observation area of 3.5km x 3.5 km, accounting for the real meteorological, physical / ecological, and morphological conditions in the affected area such as,

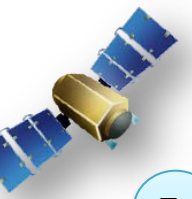
**a)** Wind conditions (speed/direction), **b)** Fuel types and fuel type's proneness to fire, **c)** Altitudinal zone, **d)** Slope and Aspect elements of each of the 500m x500m area.







Eumetsat @ 9.5° East

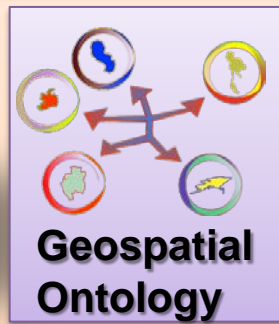


External Sources

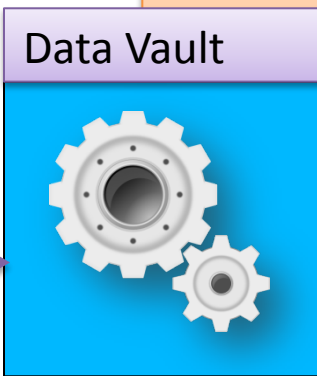


Back End: MonetDB /Strabon/FireHub Models

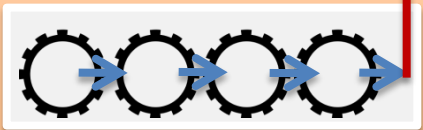
- Corine Landcover
- Admin Boundaries
- POIs
- Meteo
- DTM, Slope, Aspect
- Fuel Maps



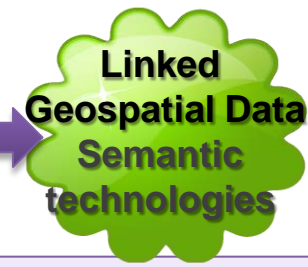
Cataloguing Service & Metadata Creation



Raw Data



Web access based on Semantics



- Search & Display
- Search for raw & Processing
- Real-time Fire Monitoring
- Refinement (Post-Processing)
- Linked Data



# B E Y O N D

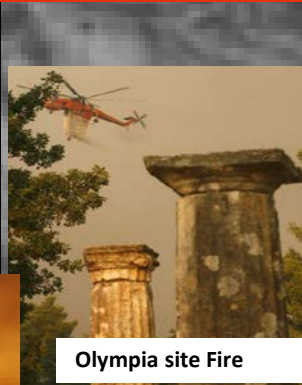
# FireHub



## Regional Real Time Fire Monitoring - NOA's MSG SEVIRI Station – Raw Resolution mode



Zaharo Fire



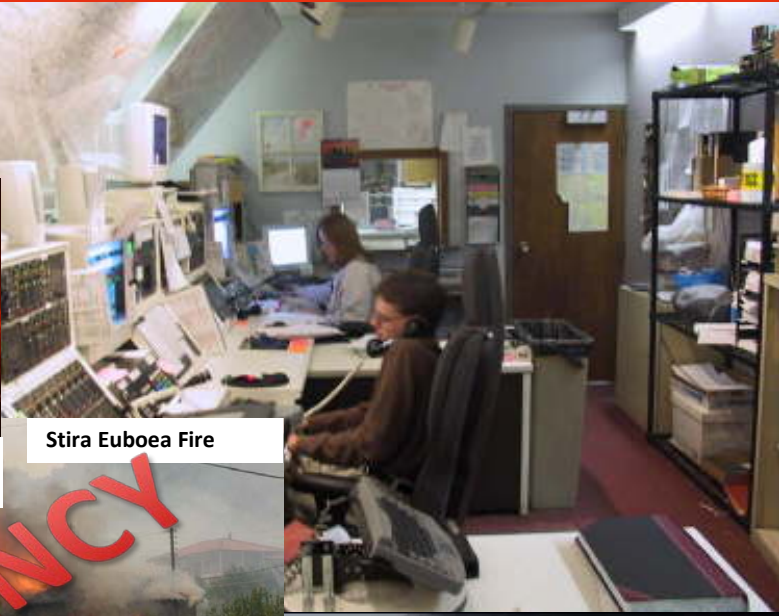
Olympia site Fire



AliveriEuboea Fire



Korinthos Fire



Stira Euboea Fire



Parnon Mt Fire

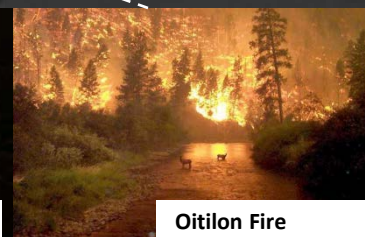
# EMERGENCY



Taygetos Mt Fire



Megalopolis Fire



Otilon Fire



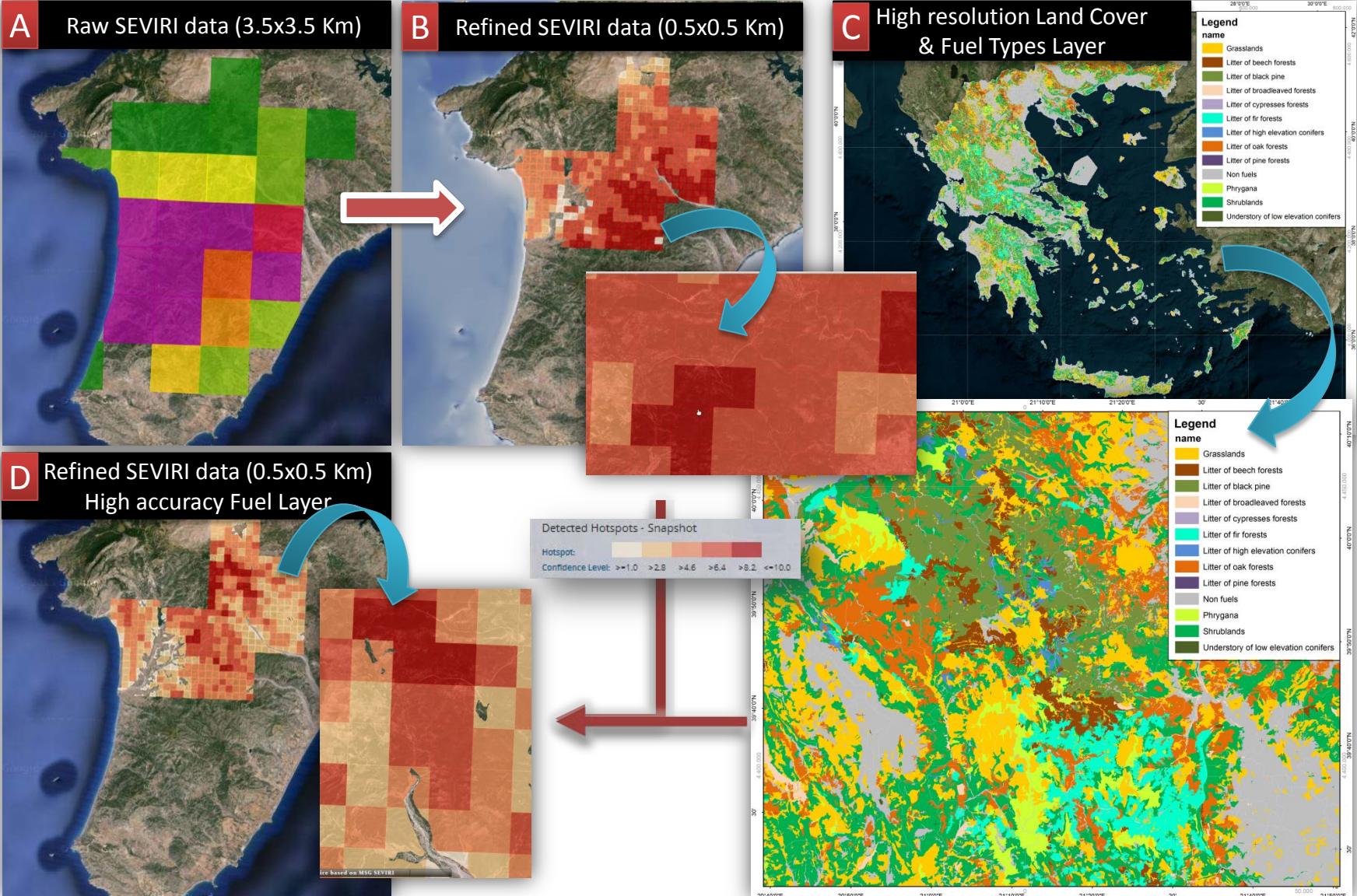
# SEVIRI MIR 070823\_1030 UTC

	POTENTIAL FIRE
	CONFIRMED FIRE

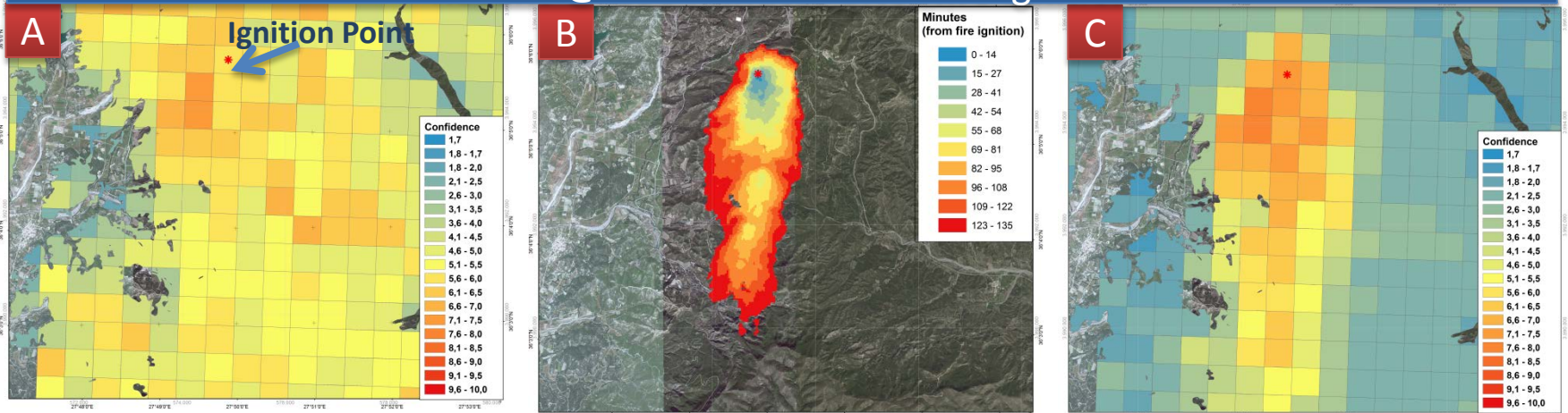
# 2<sup>nd</sup> SOUTH-EASTERN EUROPEAN GEO WORKSHOP



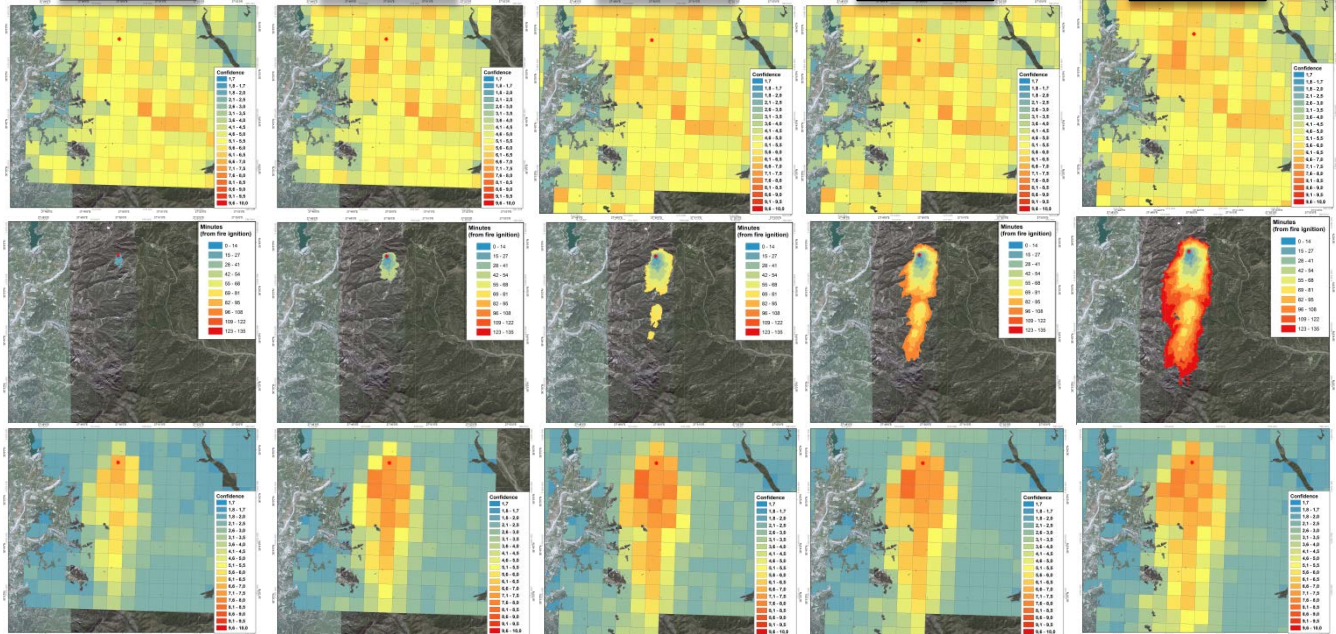
# BEYOND



Results @ 150 minutes after fire ignition



+30m      +60m      +90m      +120m      +150m      → Timeline



Real-time fire monitoring service **A**

FlamMap fire behaviour mapping and analysis software **B**

Enhanced real-time fire monitoring service **C**

# 2<sup>nd</sup> SOUTH-EASTERN EUROPEAN GEO WORKSHOP



# BEYOND

# FireHub



Firefox - SEVIRI Monitor - NOA GIS

papos.space.noa.gr/fend\_static/index.html

Most Visited Getting Started Latest Headlines Γενική Γραμματεία Ερε... TeleiosWiki: Additiona... rts

TELEOS SWoFS gmes strabon EUMETSAT

Status Info:  
 Mode: Archive  
 Beginning Time: 2012-08-21T21:00:00 GMT  
 End Time: 2012-08-27T21:00:00 GMT  
 Total #HotSpots: 2361  
 Latest #HotSpots:

Aggregated Query Data					
ID	RANK	Municipality	Duration	Ignition	End
0	1910	ΔΗΜΟΣ ΚΥΜΗΣ-ΑΛΙΒΕΡΙΟΥ	27.25	2012-08-24T23:10:00	2012-08-26T02:20:00
2	1910	ΔΗΜΟΣ ΚΥΜΗΣ-ΑΛΙΒΕΡΙΟΥ	26.17	2012-08-25T01:45:00	2012-08-26T03:50:00
4	1910	ΔΗΜΟΣ ΚΥΜΗΣ-ΑΛΙΒΕΡΙΟΥ	17.83	2012-08-25T10:15:00	2012-08-26T04:00:00
5	1910	ΔΗΜΟΣ ΚΥΜΗΣ-ΑΛΙΒΕΡΙΟΥ	17.75	2012-08-25T10:15:00	2012-08-26T03:55:00
6	1910	ΔΗΜΟΣ ΚΥΜΗΣ-ΑΛΙΒΕΡΙΟΥ	11.83	2012-08-25T10:10:00	2012-08-25T21:55:00
10	1910	ΔΗΜΟΣ ΚΥΜΗΣ-ΑΛΙΒΕΡΙΟΥ	11.83	2012-08-25T10:10:00	2012-08-25T21:55:00
12	1910	ΔΗΜΟΣ ΚΥΜΗΣ-ΑΛΙΒΕΡΙΟΥ	10	2012-08-25T00:55:00	2012-08-25T10:50:00
13	1910	ΔΗΜΟΣ ΚΥΜΗΣ-ΑΛΙΒΕΡΙΟΥ	16.33	2012-08-25T10:20:00	2012-08-26T02:35:00
14	1910	ΔΗΜΟΣ ΚΥΜΗΣ-ΑΛΙΒΕΡΙΟΥ	10.67	2012-08-25T12:40:00	2012-08-25T23:15:00

Fire Monitoring Service based on MSG SEVIRI

Realtime Archive

Year: 2012 Month of Reference: May Jun Jul Aug Sep

Submit Ignition Fire End Duration

Fire Simulation

All Detected Hotspots End Time (Days | Hours). From 2012-08-27T21:00:00 to 2012-08-21T21:00:00

Geotype: Populated (Population)

- Athens ≥300000
- Larisa ≥100000
- Chania ≥50000
- Tripoli ≥10000
- Epanomi ≥1000
- Arsopolis ≥500
- Kalamos ≥100
- Platania ≥0

Geotype: Mountains (Height (m))

- M. Olympus ≥2500
- M. Pilon ≥1500
- M. Ymittos ≥1000
- Mantavouni ≥0

Geotype: Islands (Area (km2))

- N. Crete ≥3000
- N. Rhodes ≥1000
- N. Andros ≥100
- N. Thira ≥10
- N. Plaireia ≥1
- N. Ploponi ≥0

NOA Implementation Team: Haris Kontoes, Themistoklis Herekakis, Dimitris Michail, Ioannis Papoutsis

Contact Email: malto.kontoes@noa.gr

Powered by Leaflet



## Rapid Mapping During Crisis - Off-line Mapping After Crisis

### Fully Automatic Processing Chain

### Applies to any type of High and Very High Resolution Satellite Data

(Landsat TM, SPOT XS, IKONOS, Formosat-2, Worldview, Quickbird)



### Advanced Informatics Processing Languages

### Array Data Base processing - SciQL

Scientific Python, ontology schemes and ontology based queries for linking open geo-spatial data (e.g. geo-names, administrative boundaries)

## Rapid Mapping During Crisis - Off-line Mapping After Crisis



## BSM\_NOA Pre- Processing

- (1) Separate **clouds** from vegetation – Create masks
- (2) Isolate **water bodies** and **shadows** – Create masks
- (3) Perform **sensor radiometric calibration** and scene **radiometric normalisation** to create compatible time series of satellite image acquisitions for multi-date analysis
- (4) **Geo-reference the input satellite** data using fully automatic image co-registration techniques with appropriate sensor geometric models

## Rapid Mapping During Crisis - Off-line Mapping After Crisis

### BSM\_NOA Processing

- (1) Generate band transformation indices  
Normalised Burn Ratio Index, Albedo, NDVI,  
multi-date NDVI, NDVIdiff, multi-date derived  
Radiometric Change Vectors



- (2) Define **appropriate image /sensor/land use dependent threshold values** and apply to the band transformation indices in order to: a) identify yearly changed from unchanged areas due to fire disasters and other ecosystem disturbances, b) identify burnt spectra on the image plane, and c) resolve for open, urban, and less vegetative areas' confusion



## Rapid Mapping During Crisis - Off-line Mapping After Crisis

### BSM\_NOA Post Processing

- (1) **Clean** from isolated pixels, and small area classification noise using a 3x3 smoothing kernel, and proceed with the join of small disconnected fire pixel clubs to larger segments (>1ha) . Filter out objects smaller than 1ha
- (2) **Convert** raster fire classification layer to vector fire polygons and **smooth** the fire polygon boundaries to resolve from pixel effect

(3) **Apply** a series of expert knowledge and geospatial reasoning queries in GIS to generate refined classifications of Burnt Areas

(4) **Assign** attribute data to the fire vector polygons (administrative data, land cover data, toponyms, area (ha), perimeter, etc )

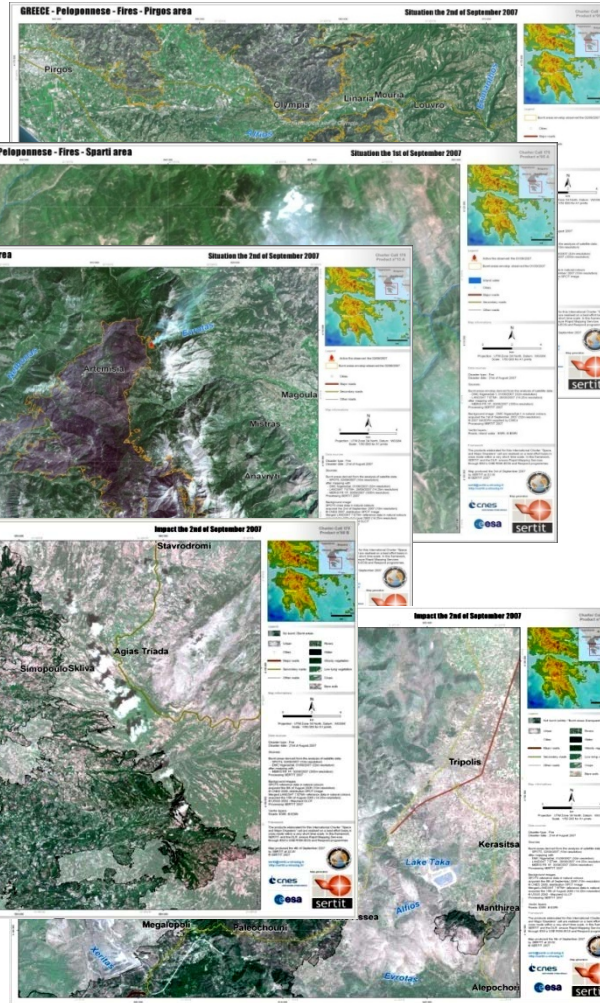


# 2<sup>nd</sup> SOUTH-EASTERN EUROPEAN GEO WORKSHOP



# BEYOND

# FireHub



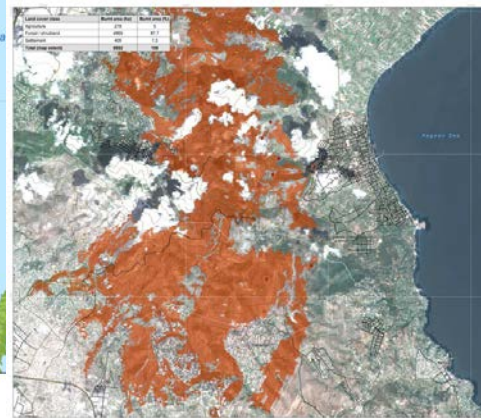
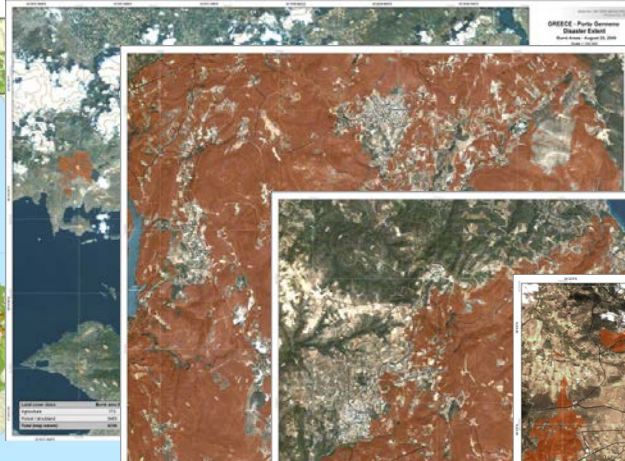
**INTERNATIONAL CHARTER OF MAJOR DISASTERS IS ACTIVATED**



# 2<sup>nd</sup> SOUTH-EASTERN EUROPEAN GEO WORKSHOP



# BEYOND



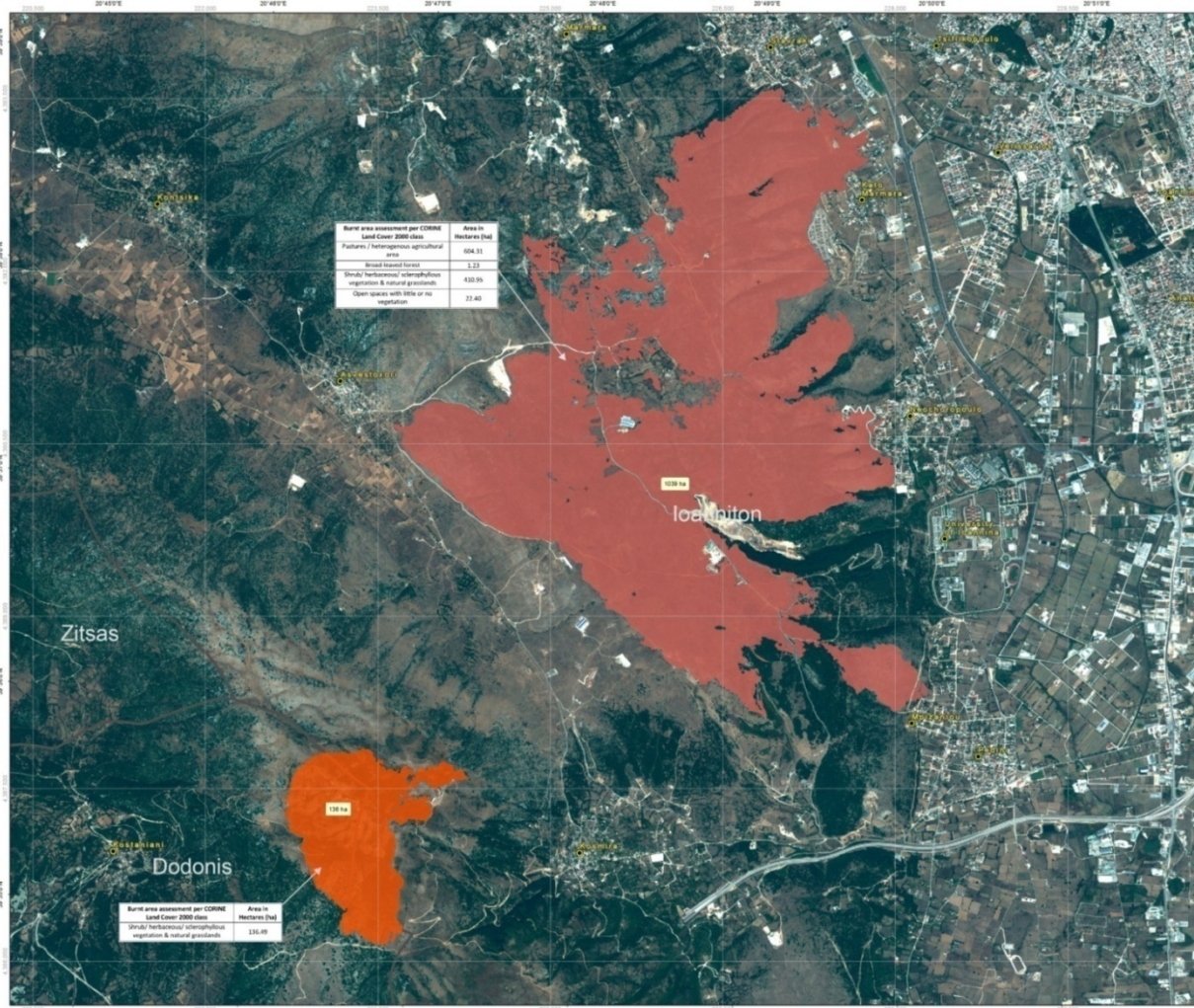
**THE HELLENIC CIVIL PROTECTION INITIATES SAFER RAPID MAPPING & Daily Weekly Fire Products at HR & VHRS (SPOT 5, LANDSAT, IKONOS)**



# 2<sup>nd</sup> SOUTH-EASTERN EUROPEAN GEO WORKSHOP



# BEYOND



SAFER Map ID: SFR20110005\_1 (version: 1.0)

## Greece - Epirus, Ioannina Forest Fires - Burnt Areas Situation Map: Disaster Extent, Summer 2011 Scale 1: 15,000



**Legend**

Symbol	Analysis layer
	Population
	Burnt area (19 July 2011)
	Burnt area (14 August 2011)

Administrative Boundaries - "The Kallikratis Project"

**Photo interpretation keys**

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**Interpretation**

In Summer 2011 forest fires occurred in the Peripheral Unit of Epirus, Greece. The map illustrates the extent of the area burnt on two occasions: 1. Assessment Event - Municipality of Ioannina - 19/07/2011 2. Assessment Event - Municipality of Dodona - 14/08/2011. The map is derived from the analysis of WorldView-2 multi-spectral satellite images with a spatial resolution of 1.85m provided on 07/08/2011. The burnt areas are extracted using the Burnt Map Mapping methodology developed by the National Observatory of Athens (NOA). Administrative units and sites have been digitized on the basis of geospatial data: OpenStreetMap (open source project), Road Editor Maps and IGN11 Google Earth. All information is superimposed on the national colour WorldView-2 image of 07/08/2011.

**Cartographic Information**

Local projection: Greek Geocentric Reference System 1987  
Datum: GGRS\_1987  
Geographic projection: Lat/Lon (GRS), Datum: WGS 84  
Scale: 1:15 000 for A1 print

0 150 300 450 Meters

**Data Sources**

WorldView-2 multi-spectral 1.85m pixel size, 07/08/2011, estimated positional accuracy: unknown  
Vector Data © OpenStreetMap & contributors, CC-BY-SA  
Vector Data © Road Editor Maps  
Vector Data © geodata.gis  
Vector Data ©IGN11 Google, ©IGN11 Digital Globe, ©IGN11 Terra Atlas  
CORINE Land Cover © ESA, Copernicus

**Framework**

SAFER and its partners have endeavored to provide mapping that is as accurate as is possible with the current technology, however all geospatial information has inherent risks due to the nature, resolution, date and interpretation of the original source materials. Accordingly, SAFER does not warrant accuracy, reliability, availability, or uninterrupted use. The entire risk as the result of the use of these data is assumed by the user and the supplier accepts no liability for any loss, damage or inconvenience caused as a result of reliance on the mapping.

Map produced on 19/08/2011 by IAASARS  
© NOA 2011

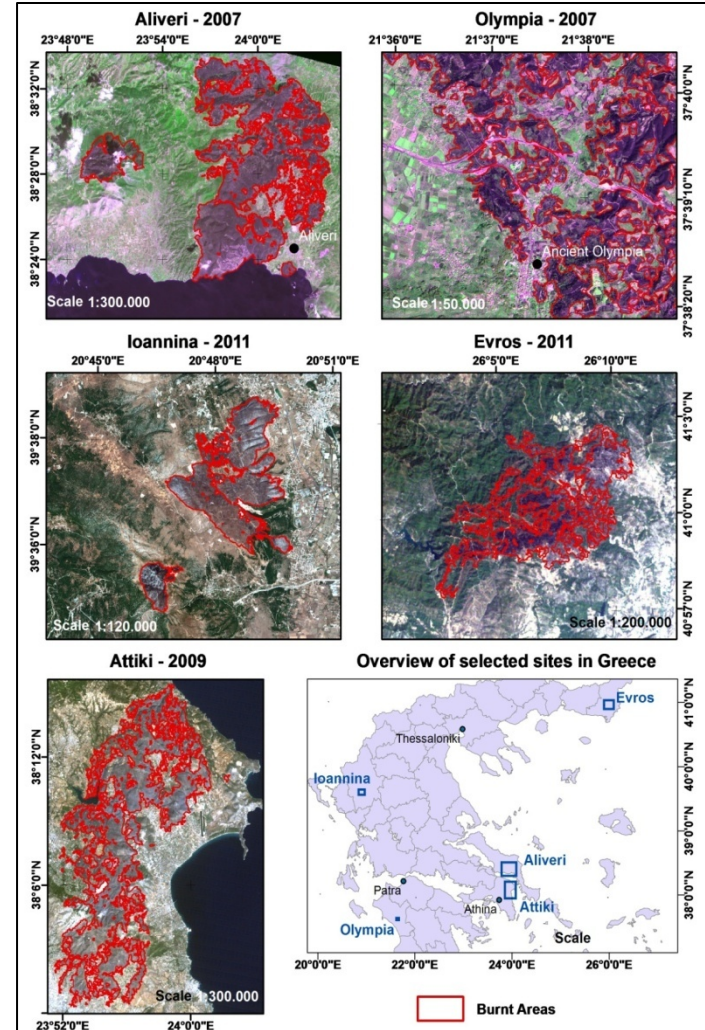
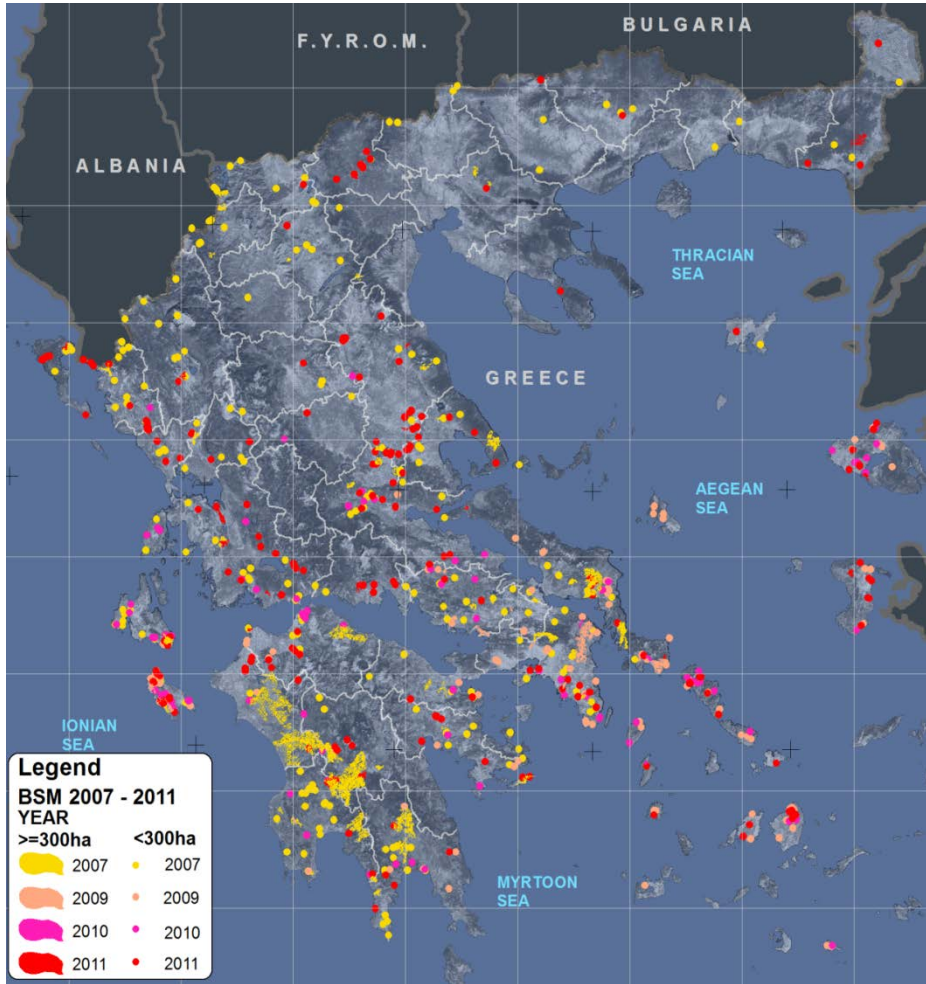



# 2<sup>nd</sup> SOUTH-EASTERN EUROPEAN GEO WORKSHOP



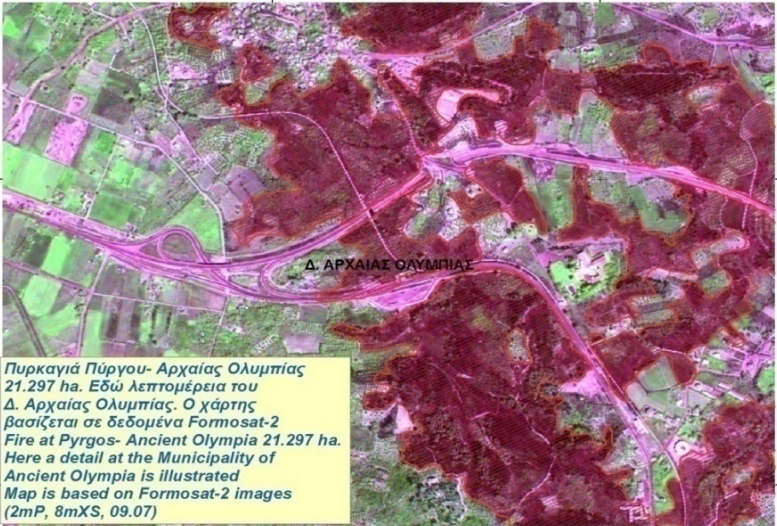
# BEYOND

# FireHub



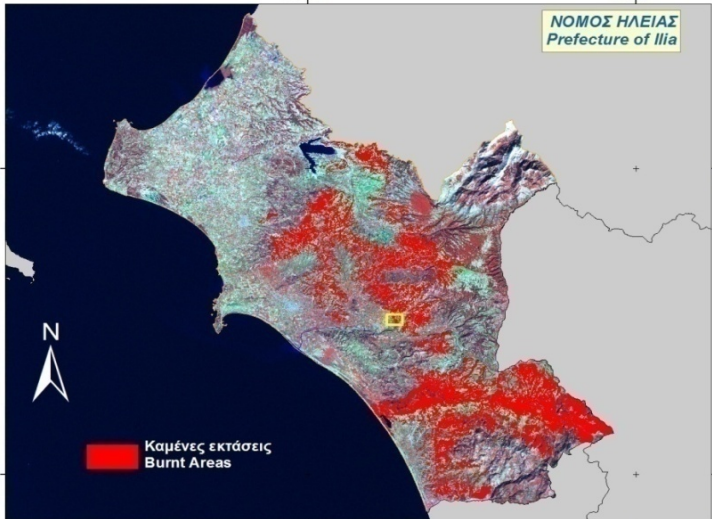


**Αρ. Φύλλου Χάρτη  
Sheet No.  
BSM GR11.1**



**Δ. ΑΡΧΑΙΑΣ ΟΛΥΜΠΙΑΣ**


*Πυρκαγιά Πύργου- Αρχαίας Ολυμπίας 21.297 ha. Εδώ λεπτομέρεια του Δ. Αρχαίας Ολυμπίας. Ο χάρτης βασίζεται σε δεδομένα Formosat-2 Fire at Pyrgos- Ancient Olympia 21.297 ha. Here a detail at the Municipality of Ancient Olympia is illustrated. Map is based on Formosat-2 images (2mP, 8mXS, 09.07)*



**ΝΟΜΟΣ ΗΛΕΙΑΣ  
Prefecture of Iliia**

**Καμένες εκτάσεις  
Burnt Areas**

Scale 1:6.000

 Καμένες εκτάσεις/ Burnt Areas

**ΚΑΜΕΝΕΣ ΕΚΤΑΣΕΙΣ ΣΤΟ ΣΥΝΟΛΟ ΤΟΥ ΝΟΜΟΥ**  
Burnt surfaces in the entire Prefecture


Αποτίμηση καταστροφών ανά κατηγορία Κάλυψης Γης κατά CORINE Land Cover 2000 (Burnt area assessment per CORINE Land Cover 2000 class)	Εκταση σε ha (Area in ha)
Δάσος Πλατύφυλλων (Broad-leaved Forest)	258.92
Δάσος Κωνοφόρων (Coniferous Forest)	3.385.92
Μικτό Δάσος (Mixed Forest)	5.418.52
Φυσιικοί Βοσκότοποι (Natural Grassland)	1.336.53
Θάμνοι και Χερσότοποι (Moors and Heathland)	0.00
Σκληροφυλλική Βλάστηση (Sclerophyllous Vegetation)	9.483.41
Γεωργικές και Λοιπές εκτάσεις (Agricultural and Other Areas)	25.457.61
<b>Συνολική Έκταση (Total Area)</b>	<b>45.340.91</b>

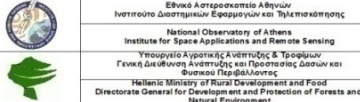
Χαρτογραφική Προβολή: ΕΓΣΑ87  
Ελλειψοειδές: WGS84  
Scale 1:300.000

Cartographic Projection System: EGSA87  
Ellipsoid: Geodetic Reference System 80  
Landsat-5 TM, 28.09.07

Χαρτογράφηση Καμένων Εκτάσεων 2007 με χρήση Δορυφορικών Εικόνων  
Επέκταση του προγράμματος RISK-EOS στην Ελλάδα  
Burn Scar Mapping in Greece for Year 2007  
RISK-EOS, Extension to Greece

**ΝΟΜΟΣ ΗΛΕΙΑΣ**  
Prefecture of Iliia





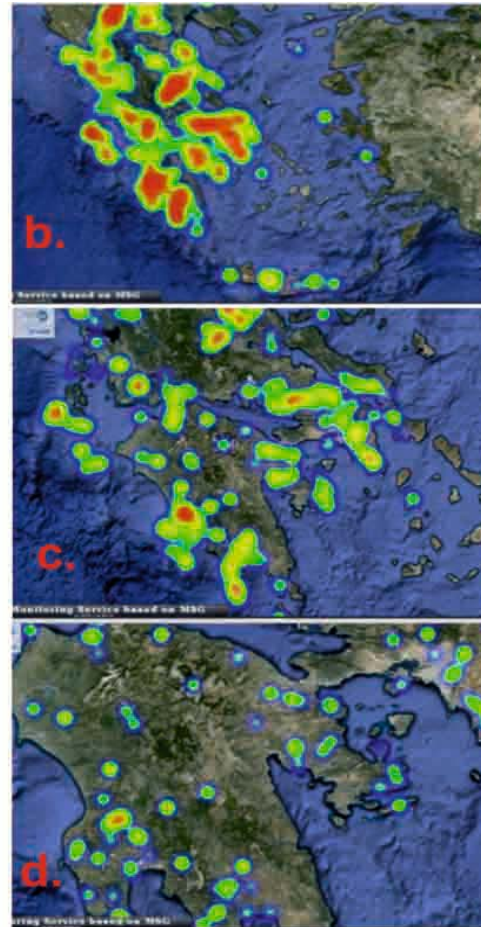
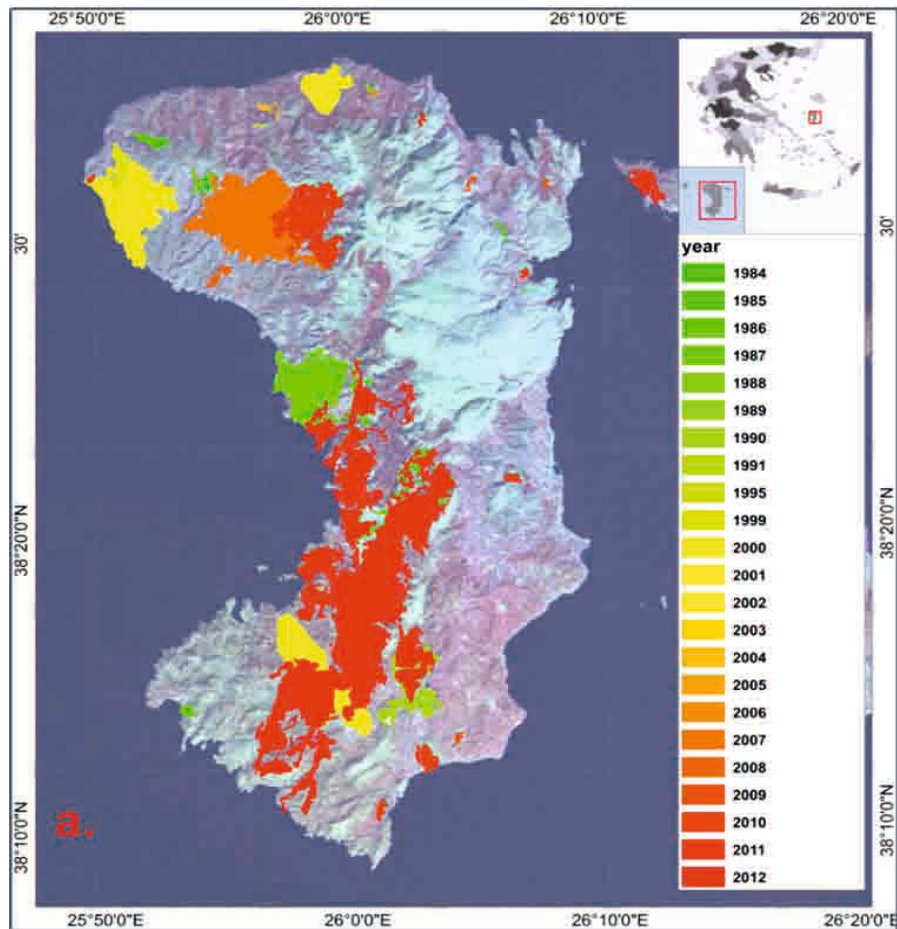
[http://ocean.space.noa.gr/diachronic\\_bsm/index.php](http://ocean.space.noa.gr/diachronic_bsm/index.php)

1) More than 450 Landsat TM images acquired over Greece in the period 1984-2013 residing on USGS archives were downloaded and processed fully automatically using the NOA processing chain.

2) Yearly maps of Burned Areas have been produced

3) Yearly statistics per land cover type and administrative data have been generated

4) On-line dissemination of the produced maps and statistics through the NOA's dedicated web interface





National Observatory of Athens

*Continuous offer to the Scientific Research since 1842*

Greek General Secretariat for Research and Technology

Event  
Logo

<http://ocean.space.noa.gr/bsm>

**DIACHRONIC INVENTORY OF FOREST FIRES OVER  
GREECE FROM 1984 TO PRESENT, WITH USE OF  
LANDSAT 4,5,7 SATELLITE DATA**

URL: <http://www.noa.gr>





Detection efficiency rate =  $\frac{DBA}{DBA+SBA}$

Commission error (False Alarm rate) =  $\frac{FBA}{DBA+FBA}$

Omission error =  $\frac{SBA}{DBA+SBA}$

## Validation Scheme

- DBA: Detected burnt areas
- FBA: False burnt areas
- SBA: Skipped burnt areas



Region	Tolla	Aullène
Commission error	13.10%	5.76%
Omission error	9.22%	12.70%
Producer's accuracy	90.68%	87.30%
User's accuracy	86.90%	94.24%
Fuzzy Kappa	0.843	0.892

# 2<sup>nd</sup> SOUTH-EASTERN EUROPEAN GEO WORKSHOP



# BEYOND

# FireHub

ΚΑΤΑΣΤΑΣΗ ΔΑΣΙΚΩΝ ΠΥΡΚΑΓΙΩΝ

01-08-2013

ΕΛΛΗΝΙΚΗ ΔΗΜΟΚΡΑΤΙΑ  
ΥΠΟΥΡΓΕΙΟ ΔΗΜΟΣΙΑΣ ΤΑΞΗΣ ΚΑΙ  
ΠΡΟΣΤΑΣΙΑΣ ΤΟΥ ΠΟΛΙΤΗ  
ΓΕΝΙΚΗ ΓΡΑΜΜΑΤΕΙΑ ΠΟΛΙΤΙΚΗΣ ΠΡΟΣΤΑΣΙΑΣ  
ΑΡΧΗΓΕΙΟ ΠΥΡΟΣΒΕΣΤΙΚΟΥ ΣΩΜΑΤΟΣ

-199-  
ΣΥΝΤΟΝΙΣΤΙΚΟ ΕΠΙΧΕΙΡΗΣΙΑΚΟ ΚΕΝΤΡΟ  
ΥΠΗΡΕΣΙΩΝ ΠΥΡΟΣΒΕΣΤΙΚΟΥ ΣΩΜΑΤΟΣ

Α/Α Α.ΕΓΓΡ	ΠΥΡ/ΚΗ ΥΠΗΡΕΣΙΑ	ΔΗΜΟΣ - ΚΟΙΝΟΤΗΤΑ	ΧΡΟΝΟΛΟΓΙΑ				ΚΑΜΜΕΝΗ ΕΚΤΑΣΗ (Στρέμματα)						ΠΡΟΣΩΠΙΚΟ				ΜΕΣΑ													
			ΕΝΑΡΞ	Μ.ΕΛ.	ΕΛΓΧ.	ΚΑΤΑ	Δ.ΔΣ.	Δ.Ε.	Α.ΛΣ.	Χ.Ε.	ΚΑΛ.	Γ.Ε.	Υ.Κ.	Π.Υ	ΠΕΖ	ΕΘΕ	ΣΤΡ	Α.Δ.	Π/Ο	ΟΤΑ	ΒΥΤ	ΜΗΧΕΛΙ	ΑΦΣ	ΑΦΡ	ΑΦΓ					
1		Δ. ΣΑΜΟΥ	21-07	23-07	30-07	01-08		600											7	20			1	4						
154504	Π.Υ. ΣΑΜΟΥ	ΑΚΡΩΤΗΡΙ ΣΩΔΟΧΟΥ ΠΗΓΗ	15:15	09:15	09:20	08:00				100		100							20	46	60									
2		Δ. ΧΙΟΥ	25-07	26-07	29-07		1100												6						3					
154682	Π.Υ. ΧΙΟΥ	ΑΓ. ΙΣΙΔΩΡΟΣ-ΠΙΤΥΟΣ	11:25	19:05	20:50														45	22	100	10			15	5	6			
3		Δ. ΣΕΡΙΦΟΥ	25-07	26-07	30-07	01-08				300																				
154696	Π.Υ. ΕΡΜΟΥΠΟΛΗΣ	ΣΚΛΑΒΟΓΙΑΝΝΗ	15:20	11:35	07:30	19:30													2	9							1	2		
4		Δ. ΣΕΡΙΦΟΥ	26-07	28-07	30-07	01-08				1000																				
154772	Π.Υ. ΕΡΜΟΥΠΟΛΗΣ	ΑΓΙΑ ΜΑΡΙΝΑ	21:00	18:10	07:30	19:35													13	9					1	1		1	6	
5		Δ. ΡΟΔΟΥ	27-07	31-07				35000				3000														25				
154797	Π.Υ. ΡΟΔΟΥ	ΙΣΤΡΙΟΣ	16:10	11:30															13	134	7	70			39	7	3	5	5	8
6		Δ. ΠΡΕΣΠΩΝ	29-07	29-07	01-08	01-08				50																				
154896	Π.Υ. ΦΛΩΡΙΝΑΣ	"Μπρέλα Βόδα"	17:15	23:00	07:00	14:00																				8				
7	Π.Υ. ΤΡΙΠΟΛΗΣ	Δ. ΒΟΡΕΙΑΣ ΚΥΝΟΥΡΙΑΣ	30-07	30-07	31-07	01-08		65																						
154921	Π.Κ. ΑΣΤΡΟΥΣ	Ορεινή Μελιγού- Κοδέλες	11:35	21:00	17:00	18:00													34	14					14	2	2		3	2
8		Δ. ΡΗΓΑ ΦΕΡΑΙΟΥ	31-07	31-07	01-08	01-08				150																				
154987	2ος Π.Σ. ΒΟΛΟΥ (ΒΙΠΕ)	Αγ.Αθανάσιος	13:10	18:40	07:00	07:00													16	17					7					
9		Δ. ΚΙΛΕΛΕΡ	31-07		01-08					20			80																	
155032	1ος Π.Σ. ΛΑΡΙΣΑΣ	Δ.Δ. ΜΥΡΩΝ	1-08		01-08								50						2						1					
10		Δ. ΚΙΛΕΛΕΡ	1-08		01-08								50																	
155038	1ος Π.Σ. ΛΑΡΙΣΑΣ		5-08		07:25														2						1					
11	Δ.Π.Υ. ΗΡΑΚΛΕΙΟΥ	Δ. ΧΕΡΣΟΝΗΣΟΥ	01-08	01-08						110									3						1					
155044	Π.Κ. ΧΕΡΣΟΝΗΣΟΥ	Πεδίο του Γουλιανού	12:13	19:30															18	12					7	3			1	
12	Δ.Π.Υ. ΛΑΡΙΣΑΣ	Δ. ΑΓ. ΑΝΤΩΝ	01-08		01-08								30																	
155053	Π.Κ. ΦΑΡΣΑΛΩΝ	ΑΥΡΑΣ	14:05			14:45													2						1					
13		Δ. ΧΑΛΚΗΔΟΝΟΣ	01-08	01-08	01-08					1	0.5		30																	
155055	6ος Π.Σ. ΘΕΣΣΑΛΟΝΙΚΗΣ	ΞΗΡΟΧΩΡΙ	14:20	16:47		19:00													4						2					
14	Π.Υ. ΓΥΘΕΙΟΥ	Δ. ΚΥΘΗΡΩΝ	01-08																28	24					12	2	6			
155060	Π.Κ. ΚΥΘΗΡΩΝ	Κομινιάνικα- Αγία Ελέσα	15:23																28	24					12	2	6			2
15		Δ. ΚΙΑΚΙΣ	01-08	01-08	01-08	01-08				10	5		50																	

Fire Validation Log files



- 1) 22% of the detected by the NOA service fires, were reported 10 -15 minutes earlier in comparison to the Fire Brigades logs
- 2) 58% of the detected by the NOA service fire events, were reported with a delay of less than ~18 minutes in comparison to the Fire Brigade logs
- 3) Fires larger than the 112ha are completely detected by the NOA system
- 4) Smaller fires, that are in the range of [4.7ha - 112 ha] are 50% detected by the NOA system
- 5) The smallest fire detected had the size of 4.7ha. It occurred in the Fourni island on 08.09.2013
- 6) The omitted detections for the entire fire season, were summing up to a surface of 5,8% of the Burned Area Mapped. Omissions were mainly due to, a) cloud cover, b) small burned area size, c) area morphology, and d) fuel characteristics (e.g. less vegetative areas, pasture lands, sparse vegetation)
- 7) More than 82% of the 500mx500m cells located in within the Burned Area Polygons have been assigned by the algorithm a probability of fire occurrence in the range of [6, 10]. The remaining 18% is in the range of [4, 6].



BEYOND

FireHub

# FireHub

## A Space based Fire Management Hub





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**Thank you for your attention!**

**For more information**

**[ocean.space.noa.gr/FireHub](http://ocean.space.noa.gr/FireHub)**

