



**Performing observations and delivering  
services from academic sector to public and  
private entities**

**Dr. Vassiliki KOTRONI**  
**Research Director**  
**National Observatory of Athens**



**MISSION:** High-impact meteorological and wildfire **research** & development and provision of **tools, services** and policies to the community and stakeholders in Greece and abroad.

**RESEARCH FOCUS:** Develop new **scientific knowledge** on **Severe & Extreme Weather and Fire Weather events and their Impacts**

**SCIENTIFIC DIRECTIONS:**

- Improve the scientific understanding, monitoring & forecasting
- Develop early warning systems
- Contribute to knowledge dissemination & education

<https://www.meteo.gr/meteogroup/>



**Weather monitoring**

**Weather nowcasting**

**High impact weather forecasting**

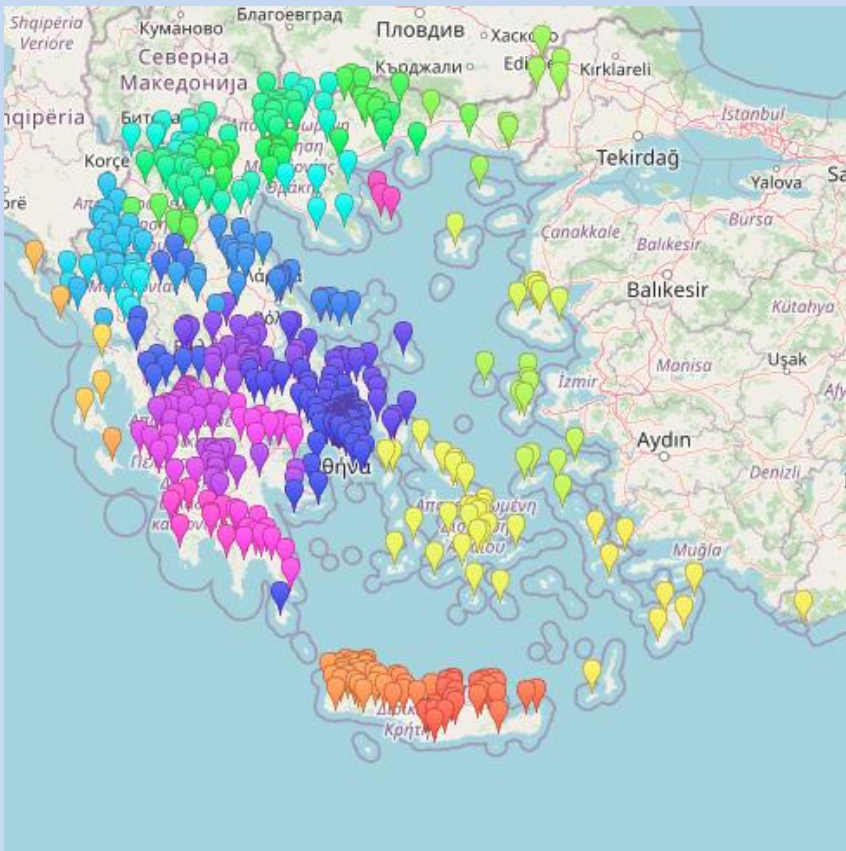
**Societal analysis of severe weather events impacts**

**Early warning systems tailored to the needs of the society**

# WEATHER MONITORING

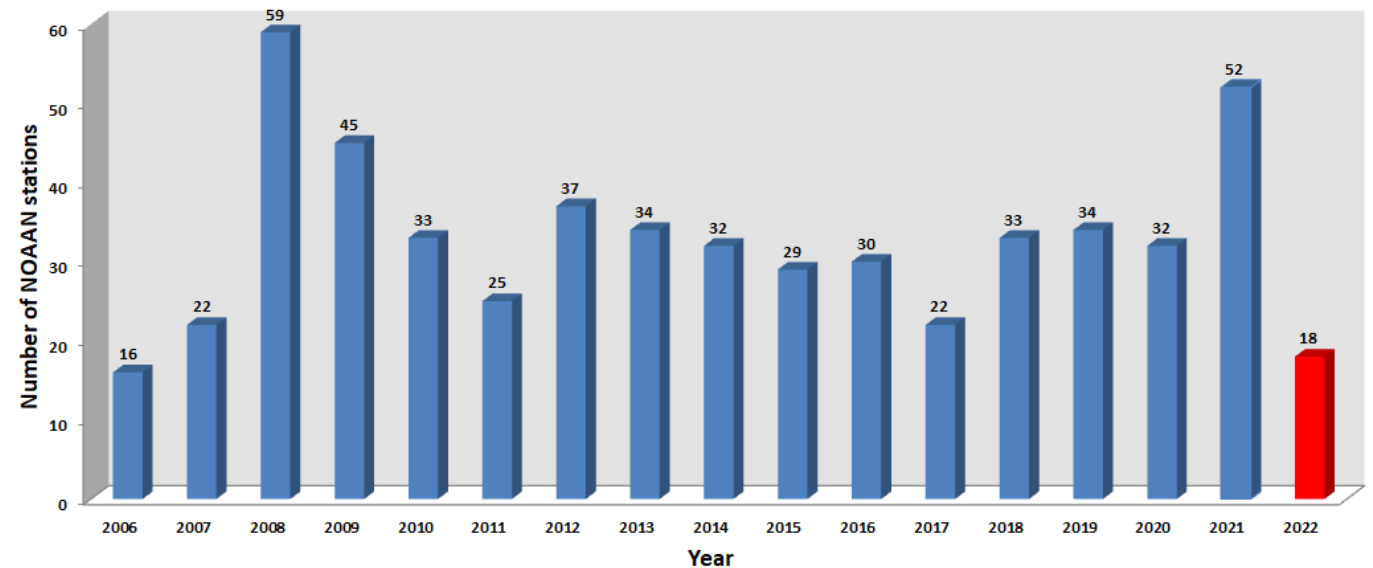


**511** surface weather stations,  
the densest network in Greece

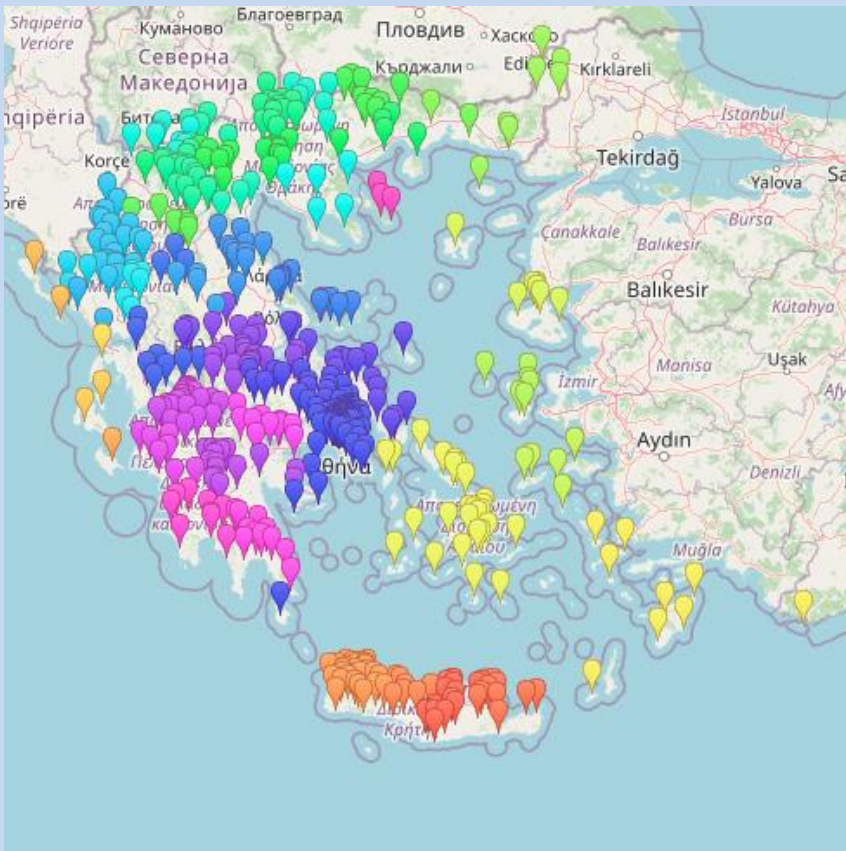


<http://stratus.meteo.noa.gr/front>

Annual integrations/installations of meteorological stations  
at National Observatory of Athens Automated Network



**511** surface weather stations,  
the densest network in Greece



**Input to national & international databases**

**2019: Operational Feed to the Hellenic National Meteorological Service**

**2020: Operational Feed to Hellenic Fire Corps operating system**

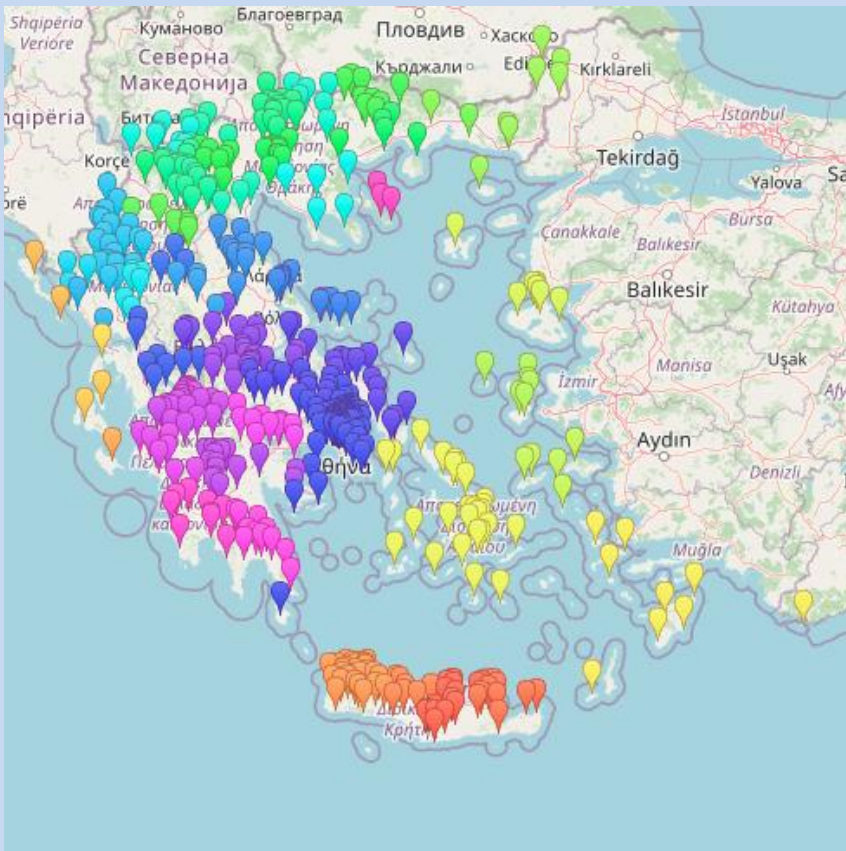
**2021: Included in the Observing Systems Capability Analysis and Review Tool (OSCAR) of WMO**



**2022: Feed to ECMWF to test the impact of their assimilation on forecast**



**511** surface weather stations,  
the densest network in Greece



**Support research & needs  
of various sectors**

**680** requests for data provision  
during the last 10 years (90 in 2022)

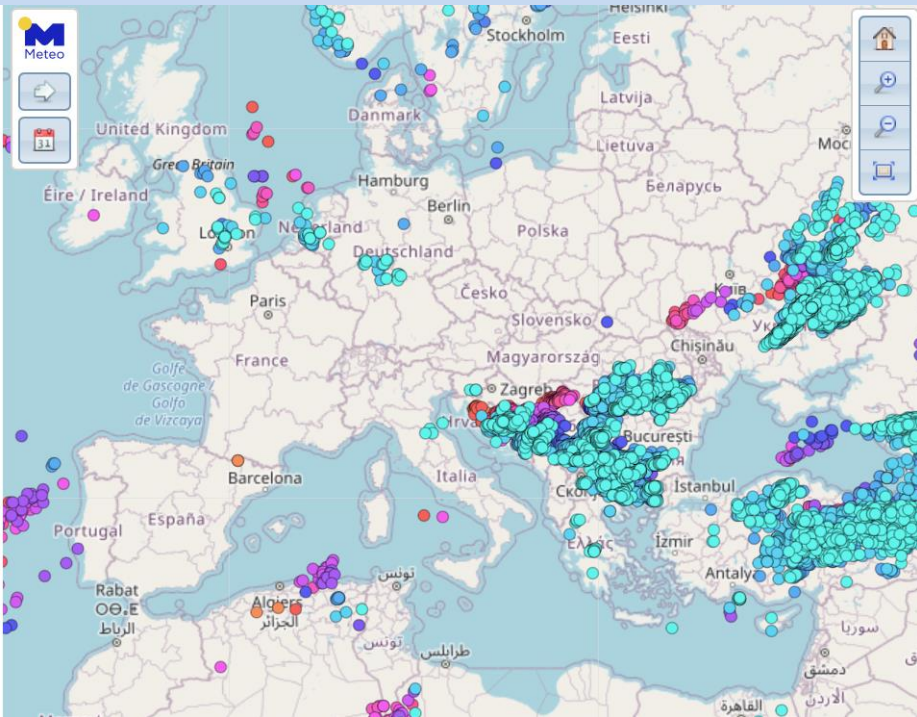
**4400** station years

- ✓ Universities
- ✓ Research Centers
- ✓ Private Sector (constructions, agriculture, ...)

**2** snow  
meters in  
Crete, the  
southernmost  
European  
snow  
observatory



## ZEUS VLF lightning detection network



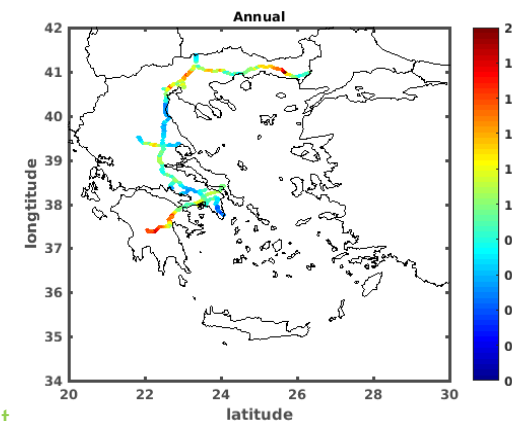
### Network Details

- 6 sensors
- operational since 2005



### Contribution to scientific knowledge & service development

- Contribution to European Experiments (HYMEX)
- 30 publications on lightning related subjects
- Risk analyses related to lightning :
  - ✓ agriculture (World Bank) and
  - ✓ energy distribution networks

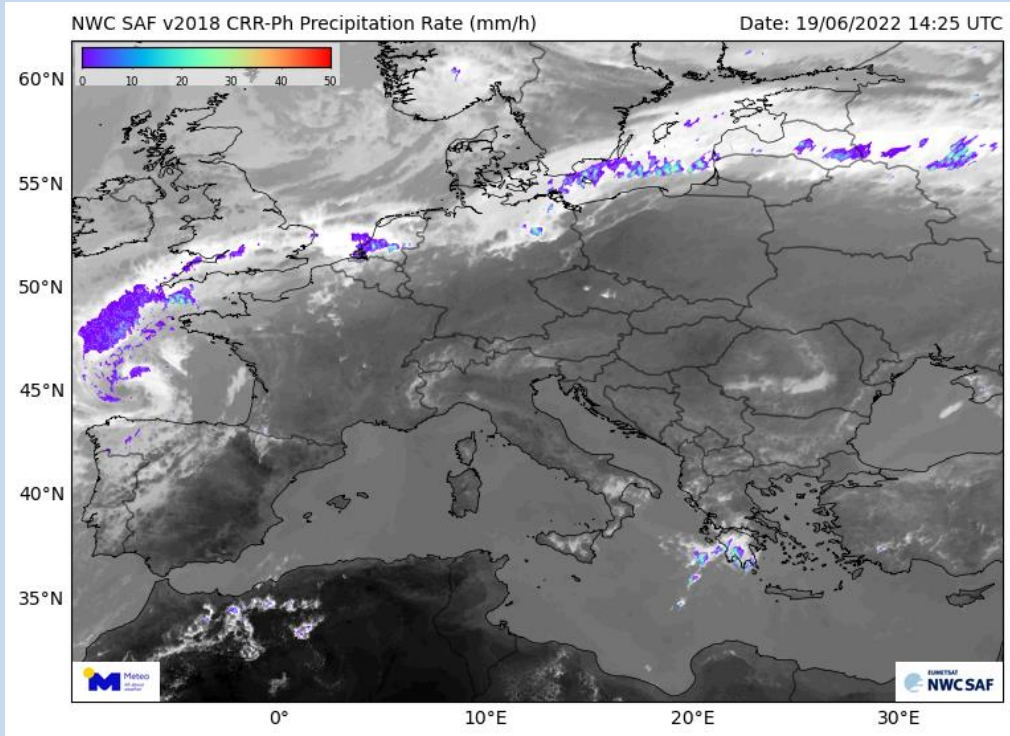


<https://www.meteo.gr/talos/en/>

# SATELLITE BASED MONITORING & NOWCASTING



**METEOSAT** data receiving antenna :



## Nowcasting & monitoring tools & services

### NWC-SAF products

The screenshot shows a web interface for NWC-SAF products. At the top, there are navigation tabs: SATELLITES, BULLETINS, and GLOBAL MODELS. The SATELLITES tab is active, and a dropdown menu is open, showing 'Satellites Europe' and 'Satellites Greece'. The 'Satellites Greece' option is highlighted. Below the menu, there are two arrows for navigation. On the right side, a list of products is displayed:

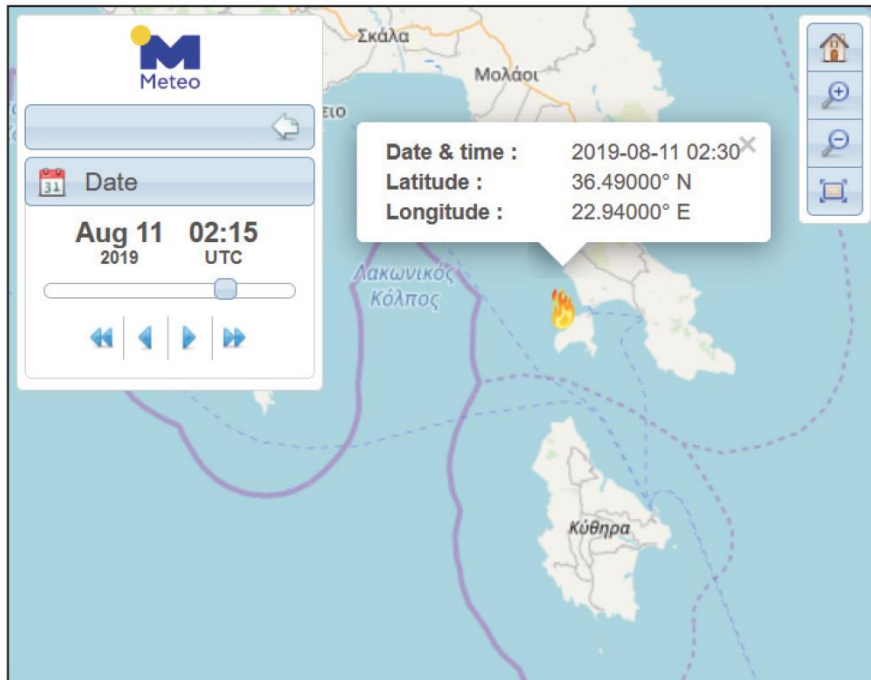
- Convective rainfall
- Total convective rainfall from the start of the day, version 1
- Total convective rainfall from the start of the day, version 2
- Cloud top height
- Precipitation Probability Level
- Tropopause penetrating clouds
- Cloud tops & lightning
- Cloud tops and stations recording precipitation

At the bottom of the screenshot, there is a map showing NWC SAF v2018 Cloud Top Height (Km) for the same date and time as the precipitation map. The map covers the region from 35°N to 41°N and 19°E to 29°E. A color bar at the top left indicates the cloud top height in km, with a scale from 0.0 to 15.0. The map shows cloud tops ranging from 0.0 to 15.0 km, with higher cloud tops (yellow and red) indicating convective clouds. The Meteo logo and NWC SAF logo are visible in the bottom left and right corners respectively.



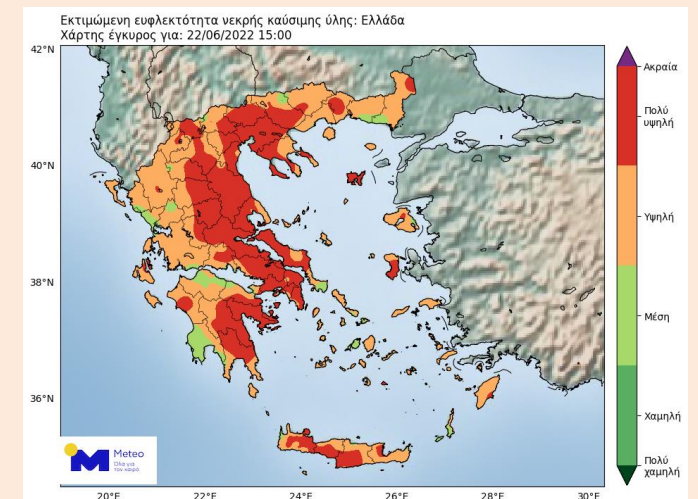
## LAND-SAF Products

### Fire detection & monitoring



## Wildfires Fire Weather Monitoring

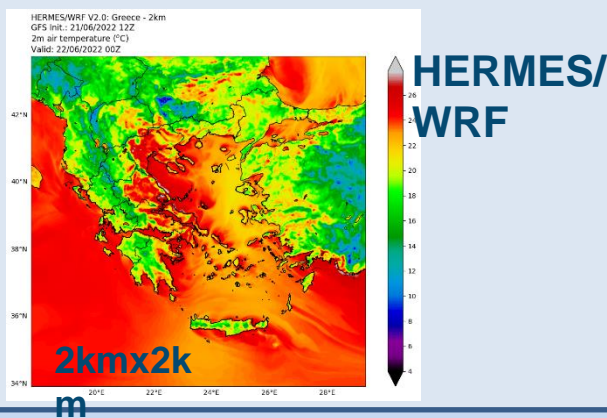
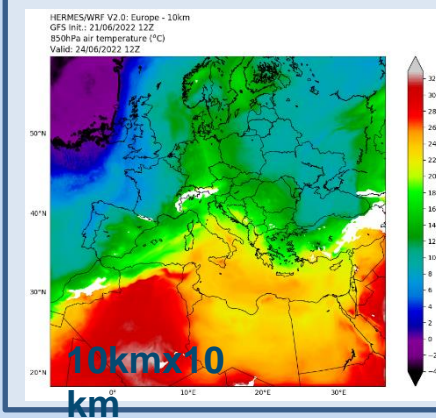
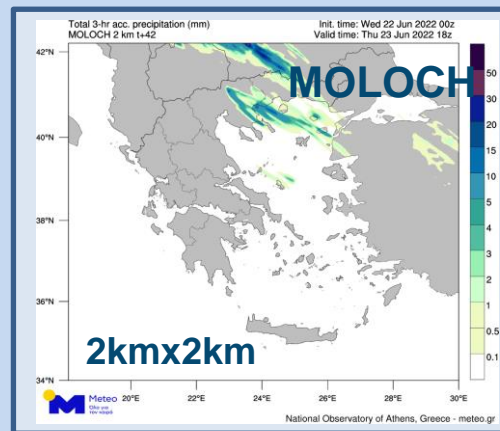
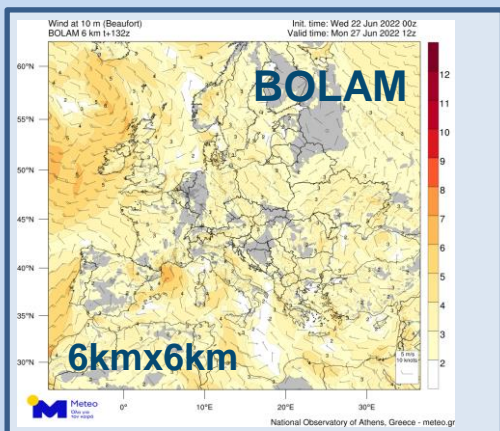
- 511 **surface weather** stations (provided also to the Hellenic Fire Service )
- ZEUS **lightning** detection network
- Daily estimate of the **degree of flammability of dead fuel moisture**



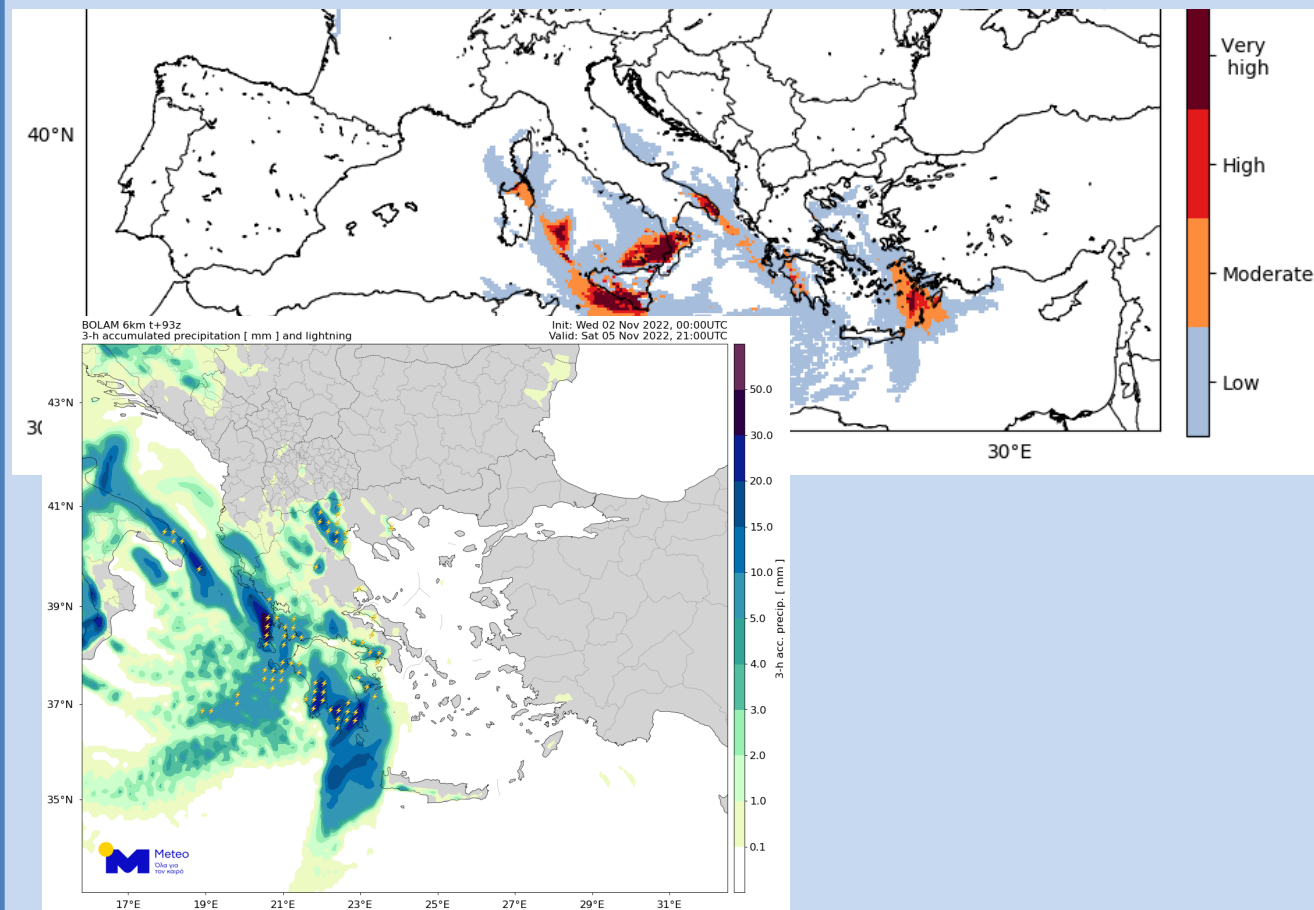
# HIGH IMPACT WEATHER FORECASTING



## Numerical Weather Prediction Multi-model, 2 cycles/day



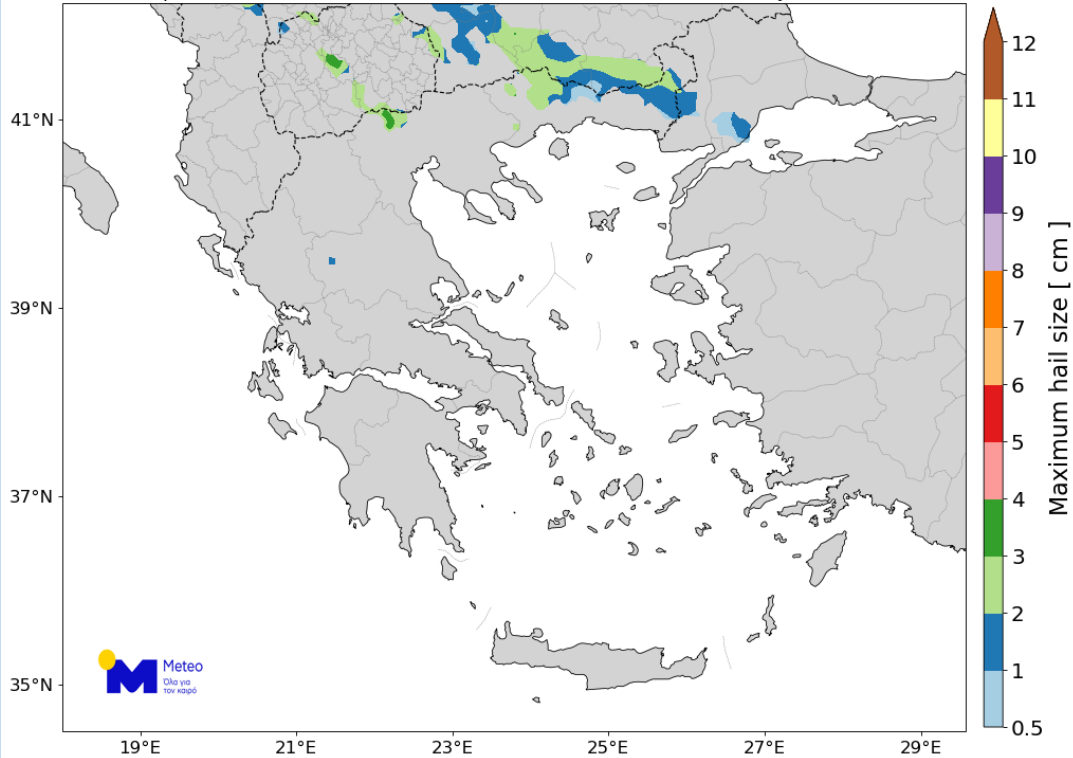
## Tailor made forecasts: Lightning activity



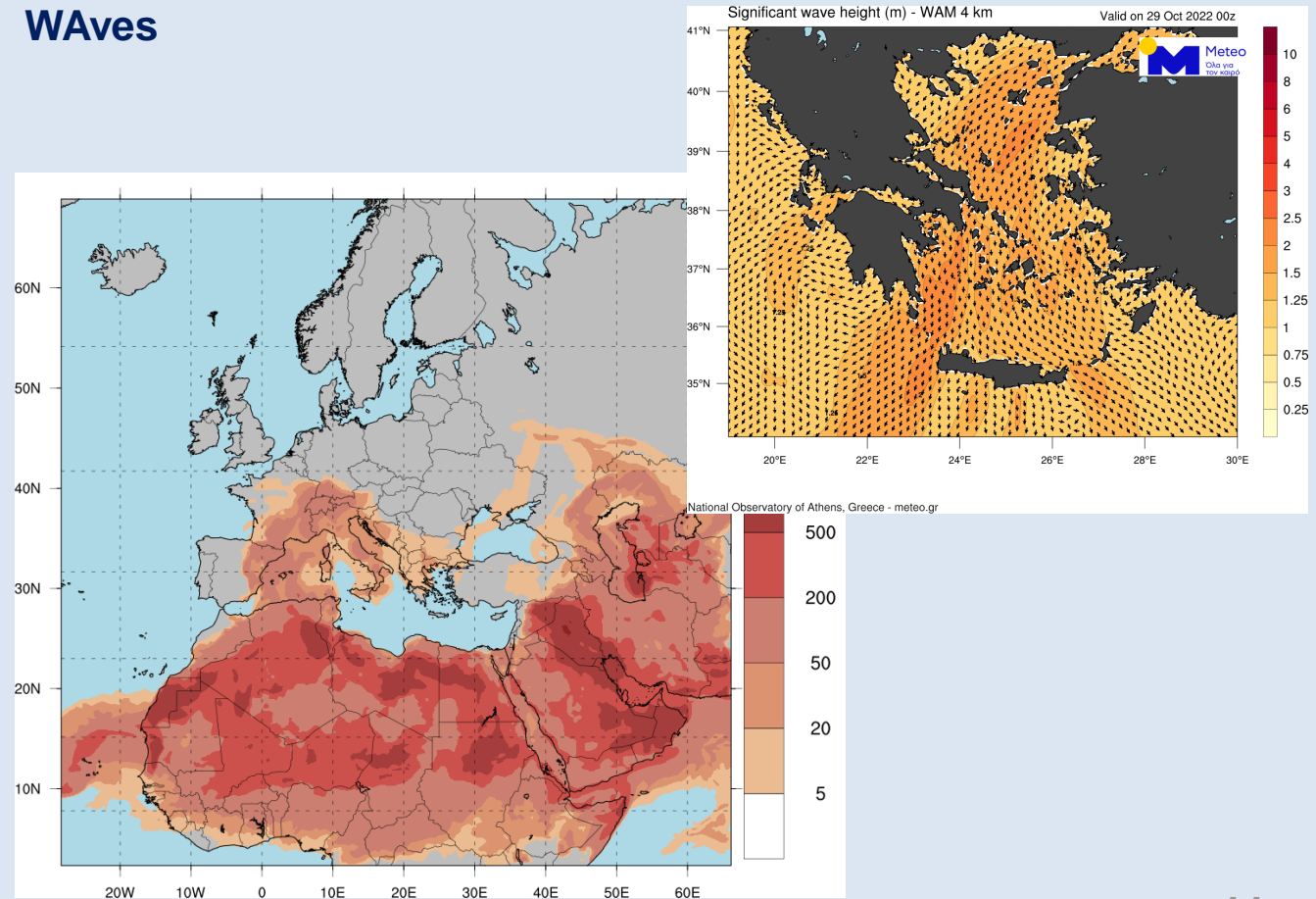
## Tailor made forecasts: Hail

BOLAM 6km  
HAIL SIZE INDEX (experimental)  
maximum possible hail diameter = 3.7cm

Init. time: Wed 22 Jun 2022, 00:00UTC  
Valid time: Wed 22 Jun 2022, 15:00UTC



## Tailor made forecasts: Dust (contribution to WMO/ SDS-WAS) WAVes



## Fire Weather & Fire Spread Forecasting

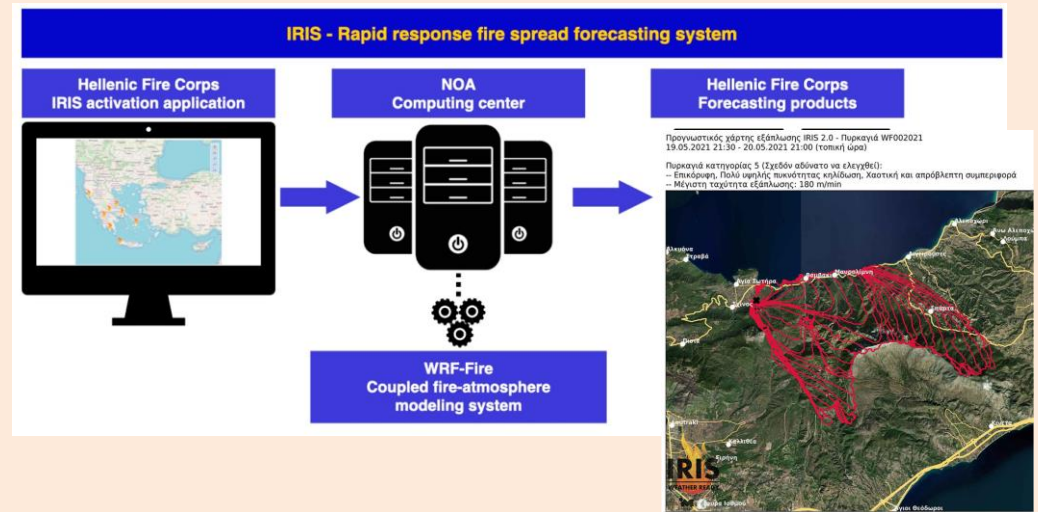
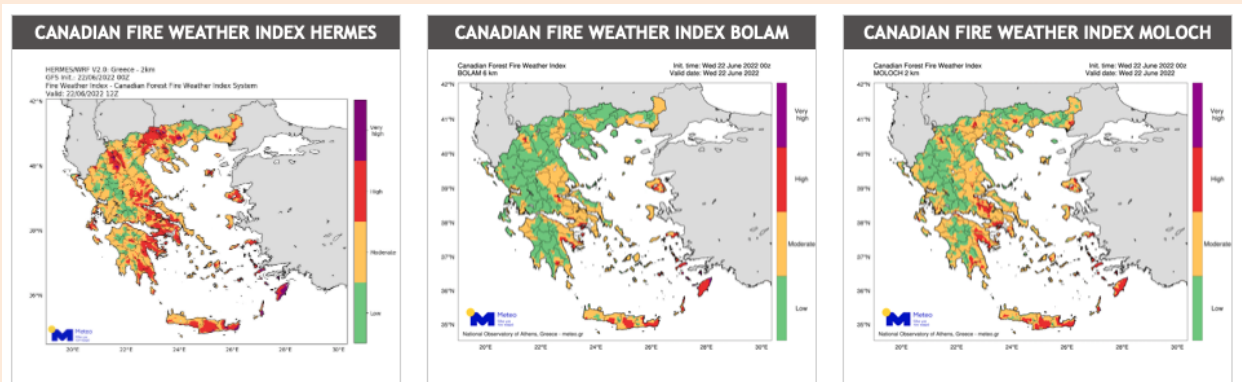
**Multi-model** approach (BOLAM, HERMES/WRF, MOLOCH

**Multi-indices** approach

- Canadian Fire Weather Index (CFWI)
- Nesterov Index (and the modified Nesterov index),
- Fosberg Fire Weather Index (FFWI)

**IRIS** : On-demand, operational deployment of a rapid-response **fire spread forecasting system**

- **coupled fire-atmosphere** modeling system (WRF-Fire 4.3.3) adapted for the pyric environment of Greece.
- **fully operational** since 2019, has been called to provide fire spread forecasts for >40 wildfire events

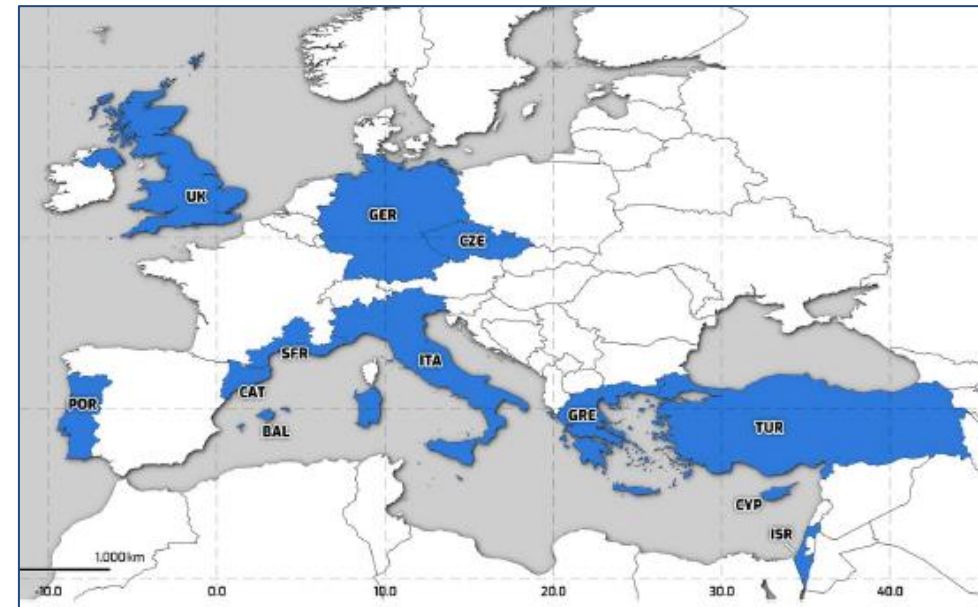
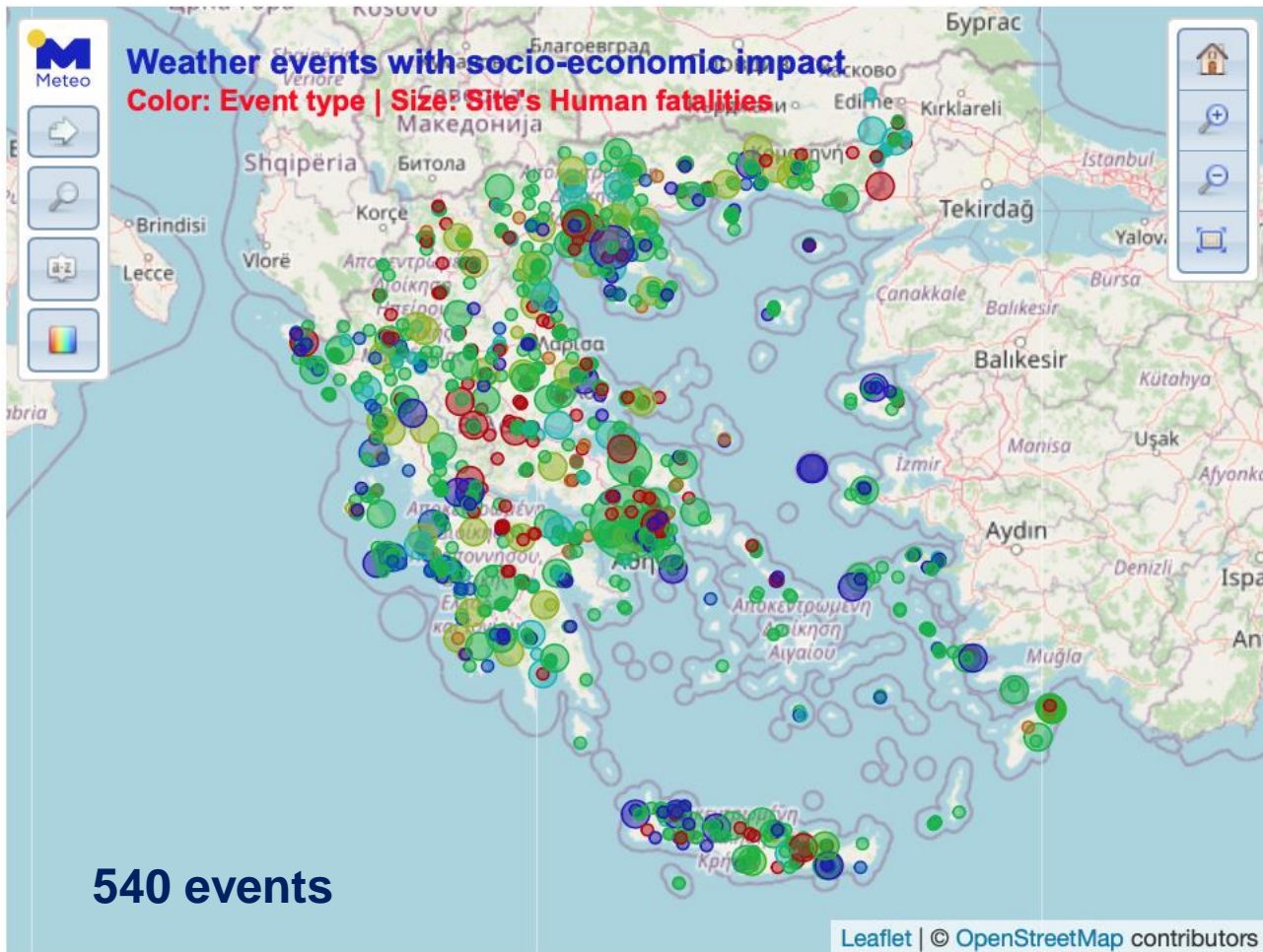


# SOCIO-ECONOMIC ANALYSIS OF HIGH IMPACT WEATHER EVENTS



## Data base of HIWE in Greece (2000–now)

## Flood Fatalities 1980-2020

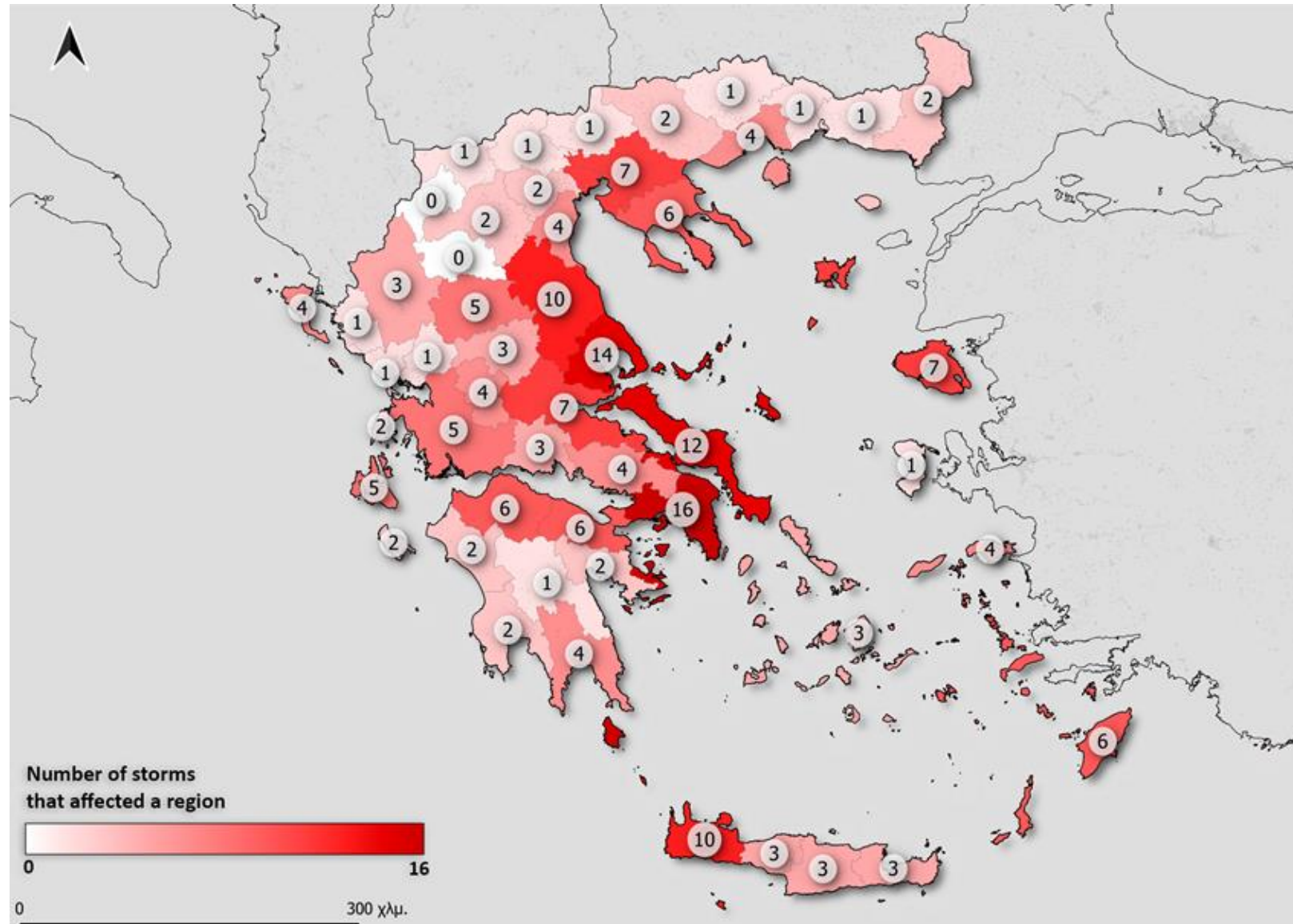


Perform **behavioural surveys** on the weather-related hazards and risk perceptions, preparedness, adaptability, and emergency response

## Storm naming in Greece

Jan 2017 - Sep 2021  
named 35 storms

Sep 21: embraced as an initiative by the National Meteorological Services of Greece, Cyprus and Israel.

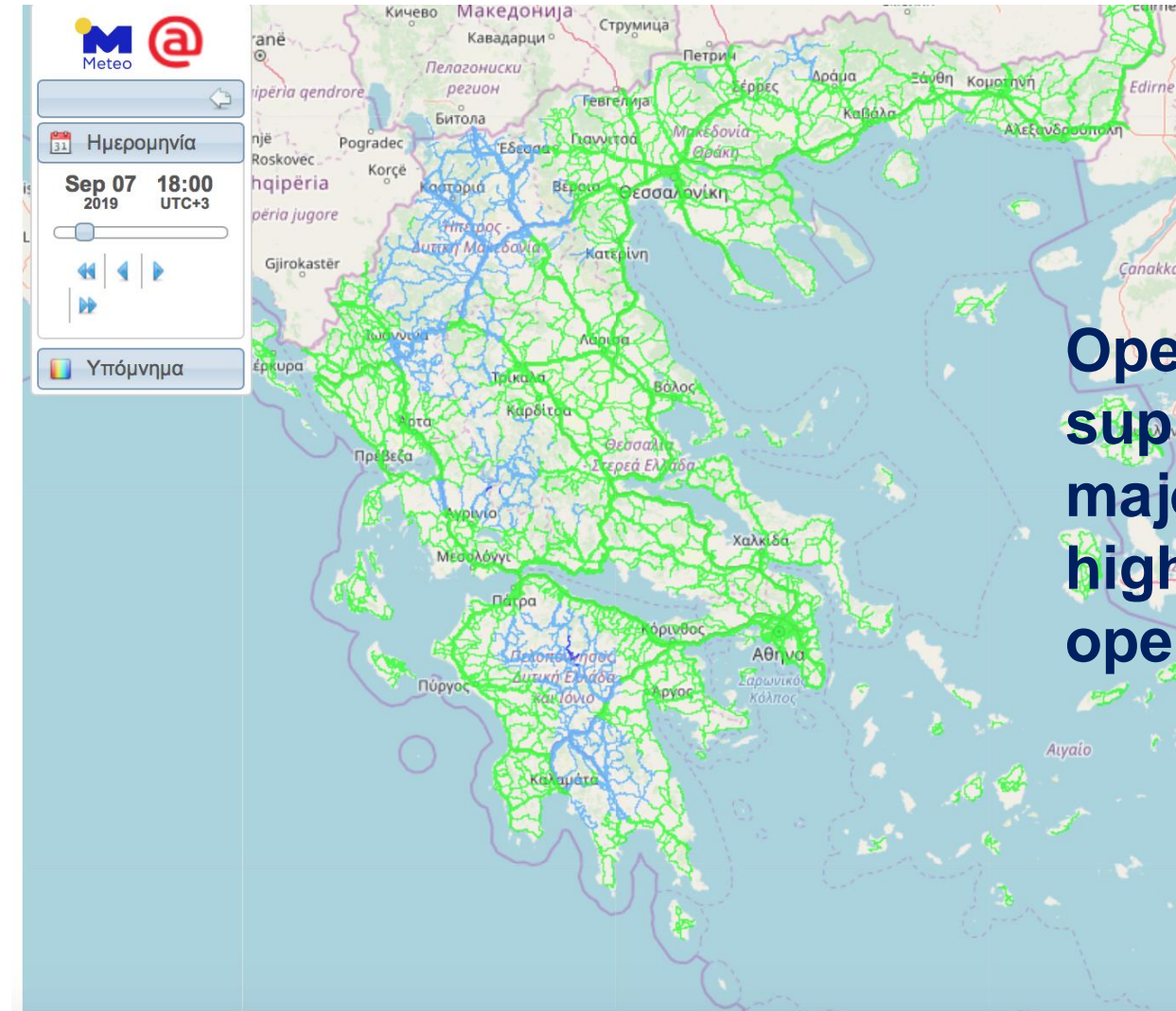


# EARLY WARNING SYSTEM FOCUSED ON HIGH IMPACT EVENTS



## Smart Warnings

- Road conditions



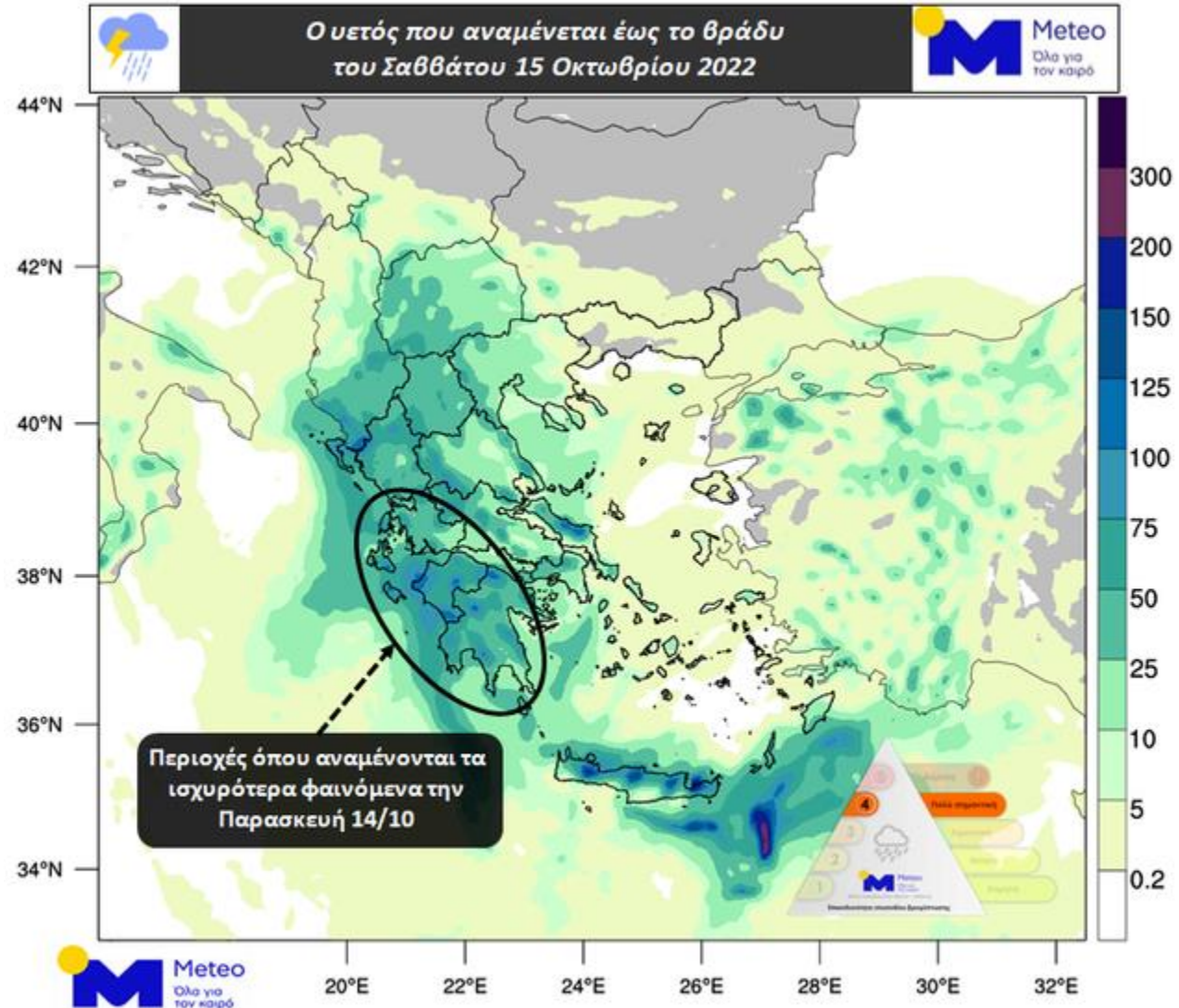
Operational support of 2 major highway operators

# HIGH IMPACT WEATHER MONITORING & FORECASTING



## Smart Warnings

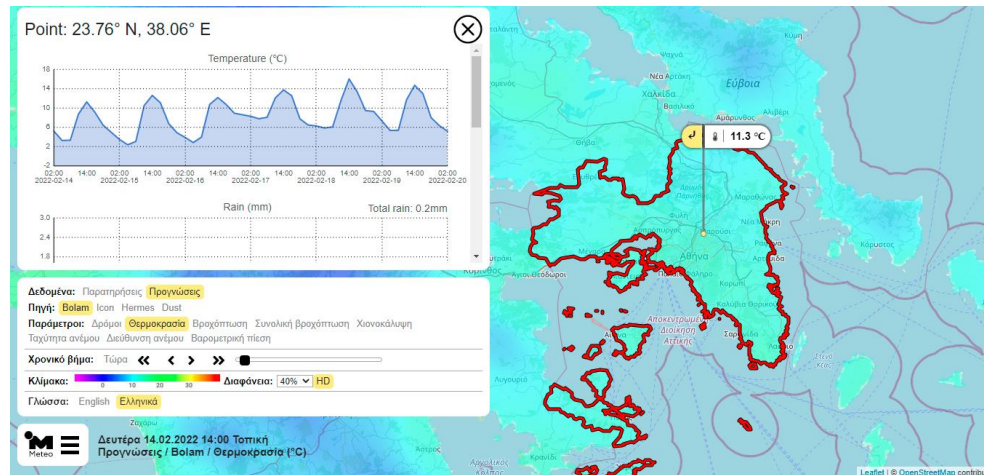
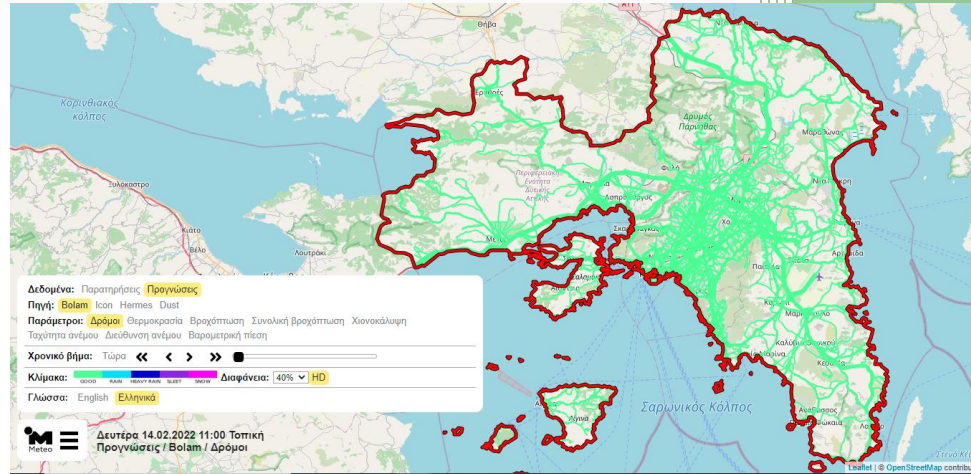
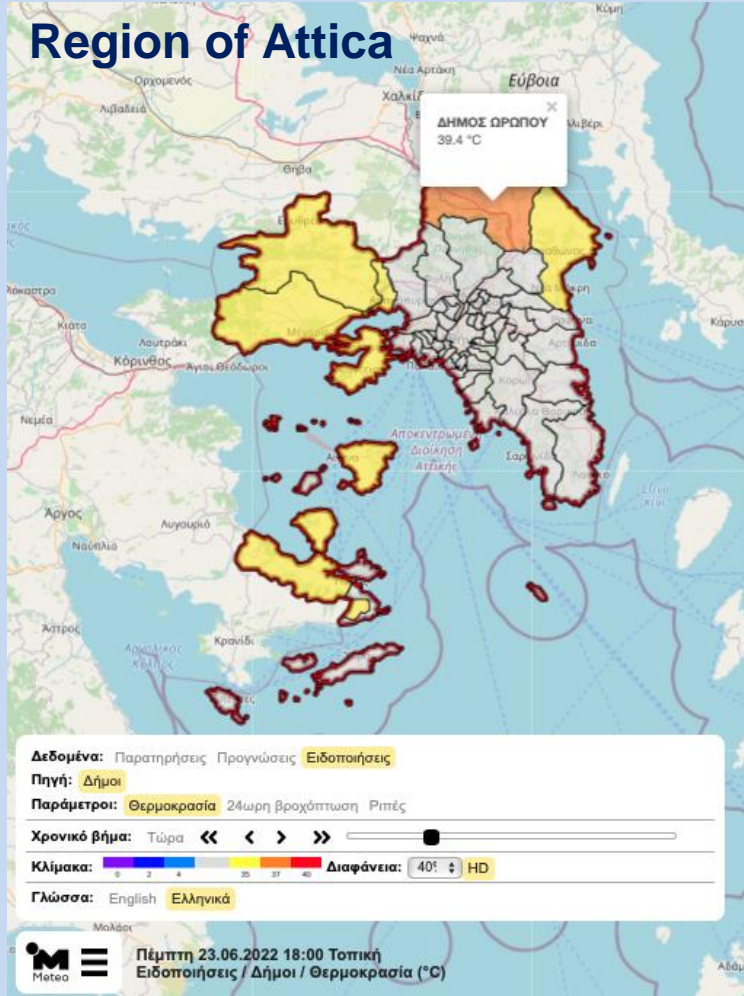
- Road conditions
- Regional Precipitation Index (RPI, since Jan22 )





## Early Warning Systems

### Region of Attica





## Operation of [www.meteo.gr](http://www.meteo.gr)

- **350.000** daily visitors & **>750.000** in case of severe weather events
- **2<sup>nd</sup>** website among public organisations  
**10** most visited sites in Greece
- **>125.000** facebook follows
- **>200.000** subscribers in viber
- **Major source** for weather related information & events analysis & forecasts for the Greek Media



**Meteo**  
Όλα για τον καιρό

ΕΛΛΑΔΑ | ΑΤΤΙΚΗ | ΘΕΣΣΑΛΟΝΙΚΗ | ΚΑΤΗΓΟΡΙΕΣ | ΘΑΛΑΣΣΕΣ | ΚΑΙΡΟΣ ΤΩΡΑ

**ΑΘΗΝΑ - ΚΕΝΤΡΟ** ΑΝΑΚΟΙΝΩΣΗ

ΕΚΤΥΠΩΣΗ | ENGLISH VERSION

ΠΡΟΓΝΩΣΗ	ΓΥΡΗ	ΣΚΟΝΗ	ΡΥΠΟΙ	ΓΡΑΦΗΜΑΤΑ	ΣΤΑΘΜΟΙ [4]	ΕΙΚΟΝΙΔΙΑ
<b>ΤΕΤΑΡΤΗ 22 ΙΟΥΝΙΟΥ</b> Ανατολή: 06:02 - Δύση 20:51						
18:00	34°C	29% υγρ.	2 Μπφ Ν 9 Km/h	↑	ΚΑΘΑΡΟΣ	☀
21:00	30°C	38% υγρ.	ΑΠΝΟΙΑ	☀	ΚΑΘΑΡΟΣ	🌙
00:00	29°C	43% υγρ.	2 Μπφ ΒΔ 9 Km/h	↓	ΚΑΘΑΡΟΣ	🌙
<b>ΠΕΜΠΤΗ 23 ΙΟΥΝΙΟΥ</b> Ανατολή: 06:02 - Δύση 20:51						
03:00	29°C	43% υγρ.	2 Μπφ Β 9 Km/h	↓	ΚΑΘΑΡΟΣ	🌙
06:00	29°C	39% υγρ.	3 Μπφ Β 16 Km/h	↓	ΚΑΘΑΡΟΣ	🌙
09:00	32°C	34% υγρ.	2 Μπφ Β 9 Km/h	↓	ΚΑΘΑΡΟΣ	☀
12:00	37°C	28% υγρ.	1 Μπφ Ν 3 Km/h	↑	ΑΡΑΙΗ ΣΥΝΝΕΦΙΑ	☁
15:00	37°C	27% υγρ.	3 Μπφ Ν 16 Km/h	↑	ΚΑΘΑΡΟΣ	☀
18:00	34°C	33% υγρ.	2 Μπφ Ν 9 Km/h	↑	ΚΑΘΑΡΟΣ	☀
21:00	31°C	44% υγρ.	2 Μπφ ΝΔ 9 Km/h	↗	ΑΡΑΙΗ ΣΥΝΝΕΦΙΑ	☁

iefimerida

Meteo: Υποχωρεί σταδιακά η κακοκαιρία «Ελπίδα» - Πού θα συνεχίσει το χιόνι

ΕΛΛΑΔΑ

Η ΚΑΘΗΜΕΡΙΝΗ

ΚΟΙΝΩΝΙΑ

Κακοκαιρία Ελπίδα – Meteo: Από το 2008 είχε να πέσει τόσο χιόνι στην Αθήνα

iEidiseis

Ελλάδα

Καύσωνας: Heat Alert SMS από τον Δήμο Αθηναίων μέσω του meteo

Heat Alert μέσω SMS από τον Δήμο Αθηναίων για προειδοποίηση κα

BREAKING NEWS: ΑΑ 2022: Τι απαντά το κανάλι για το

Ελλάδα | 09.08.2021 19:45

Newsroom

Οι καμμένες εκτάσεις γης ξεπερνούν τα 900.000 στρέμματα, ενώ η αύξηση ξεπερνά το 336%

Φωτιές – meteo: Τρίτη χώρα με τα περισσότερα καμμένα σε Νοτιοανατολική Ευρώπη η Ελλάδα



## Educational Activities



“About Winds ..” Educational Program  
2016-2022: >**10.000** students



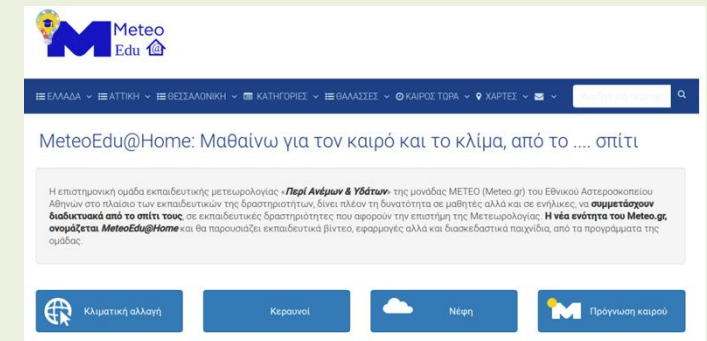
Educational Programs at Stavros Niarchos  
Cultural Centre  
2016-2022: > **5.700** students



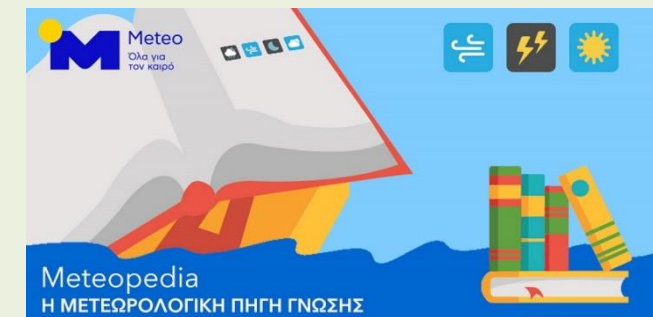
Interactive Meteo-Expo:  
“The weather secrets”  
2018-2020: >**20.000** students



Digital Platform for pupils :  
MeteoEdu@Home  
(<https://meteo.gr/meteoedu/>)



Meteopedia  
(<https://wiki.meteo.gr>)





## FINAL REMARKS

### Good practice of Research & Academia Sector :

- ✓ the exploitation of research funds can support the **development & sustainable operation of monitoring networks**
- ✓ the added-value of the use of research results for the **development of innovative tools and services** for the public & private sector
- ✓ can contribute /develop **early warning systems** that meet the needs of civil protection at local & regional level.
- ✓ can **support the increasing and diverse needs of the stakeholders** leveraging the more flexible & innovative character of the research & academia.

**Research & Academia Sector can also contribute to initiatives such as SEE-MHEWS-A**



## FINAL REMARKS

### Proposals & Prospects:

- ✓ data collection & processing and earth system forecasts can be improved with the contribution of **multiple-sector partners**
- ✓ NMS's, Research Institutions and Academia should collaborate & merge resources.
- ✓ National, European & International Organizations (e.g. WMO, EUMETNET, ECMWF) should endorse collaboration of Research Institutions and Academia with NMS's in domains that were initially only addressed by NMS's **through inclusive initiatives**.

**WE CANNOT AFFORD** not to use all available data/tools/services that contribute to the **safety of the society**.