

The deadly supercell storm in Halkidiki in July 2019

Stardust team

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Claude Joseph Vernet (1714–1789), A Storm on a Mediterranean Coast (1767)

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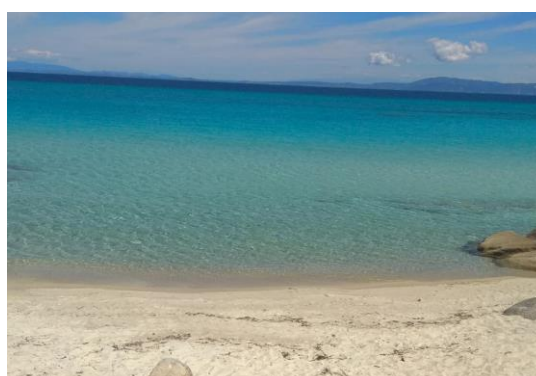
Contents	Page
1. Introduction	3
2. Description and scientific explanation	4
3. Consequences	8
4. Conclusions	10



Andreas Devetzis - exhibition LANDSCAPE IN A STORM - tribute to El Greco, 2014

1. Introduction

Thessaloniki is the second largest city in Greece with a population that, including suburbs, approaches one million inhabitants. The neighboring prefecture of Halkidiki is the tourist resort par excellence of Thessaloniki. Thousands of residents spend their summer holidays there and thousands of children go to the organized camps. Halkidiki is one of the most popular tourist destinations for Greek and European tourists. Especially in 2019, tourist arrivals soared to record heights.



Beaches of Halkidiki: Sani, Platanitsi, Furka, Kavurotripes (team members photos)

The extreme storm that hit Halkidiki in 2019 shocked the people of Thessaloniki. Never in their lives did they expect to experience in Greece phenomena that resemble "tropical cyclones". All team members have personal memories. Two of them were there and experienced the phenomenon up close, while the rest were in Thessaloniki which was also quite affected, in addition they had friends and relatives in Halkidiki.



Map of Halkidiki

2 Description and scientific explanation

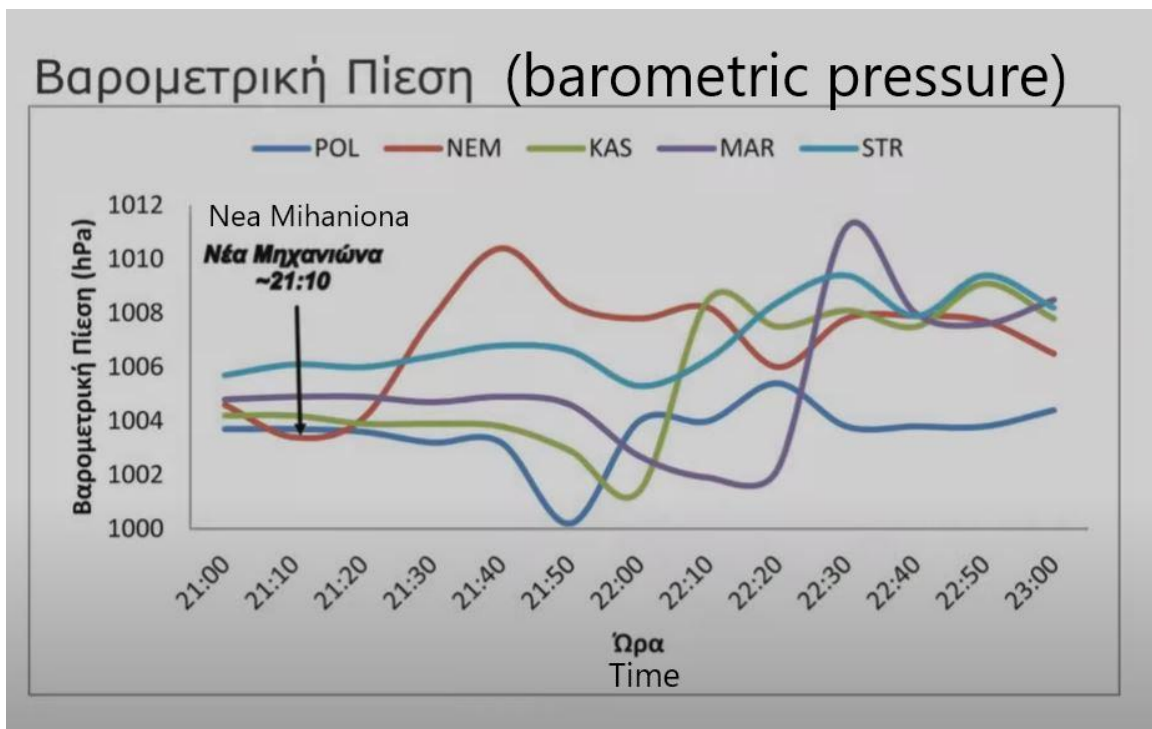
On July 10, 2019, a severe storm accompanied by gusty winds, and extremely strong lightning activity, rainfall and hailstorm, hit Halkidiki at night. Although summer storms are common in northern parts, this particular storm can be classified as an extreme episode.



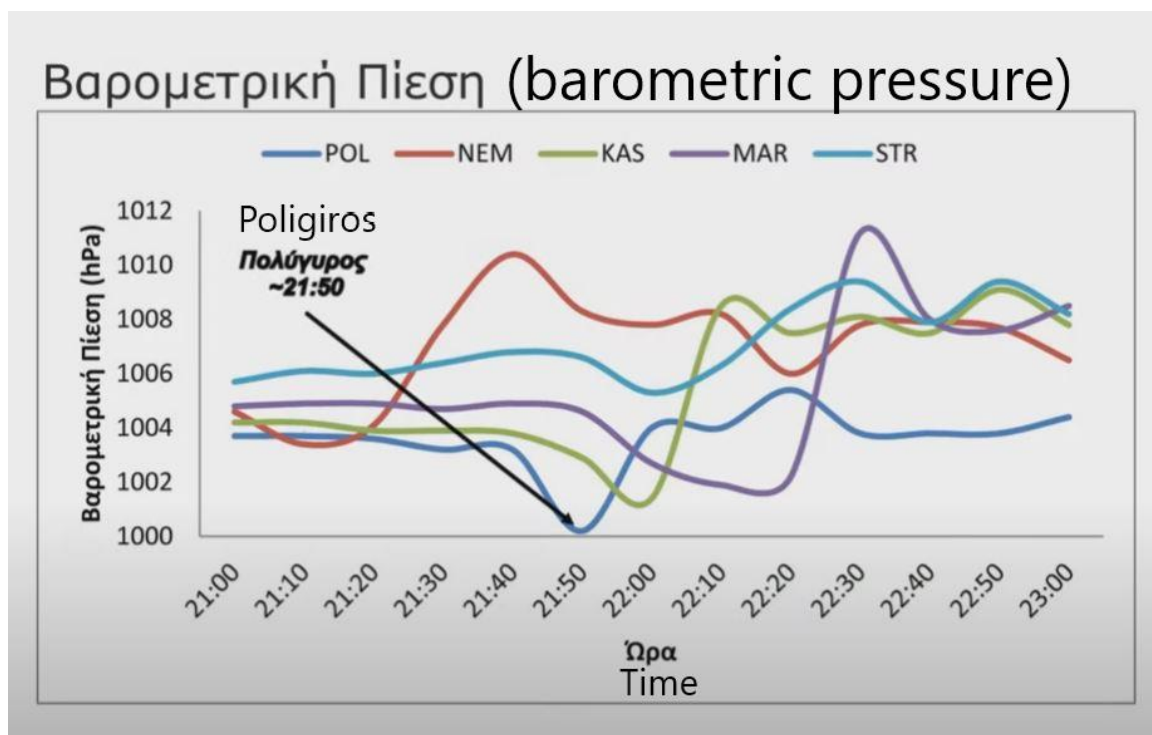
CONSTANTINE EMMANOULIDI A LOCAL PHOTOGRAPHER AND STORM CHASER CAUGHT THE DRAMATIC LIGHTNING

On July 9, the National Meteorological Service issued a Red Alert for extreme weather phenomena in Central and Eastern Macedonia

The minimum value of the barometric pressure is an indication of the arrival of the cell



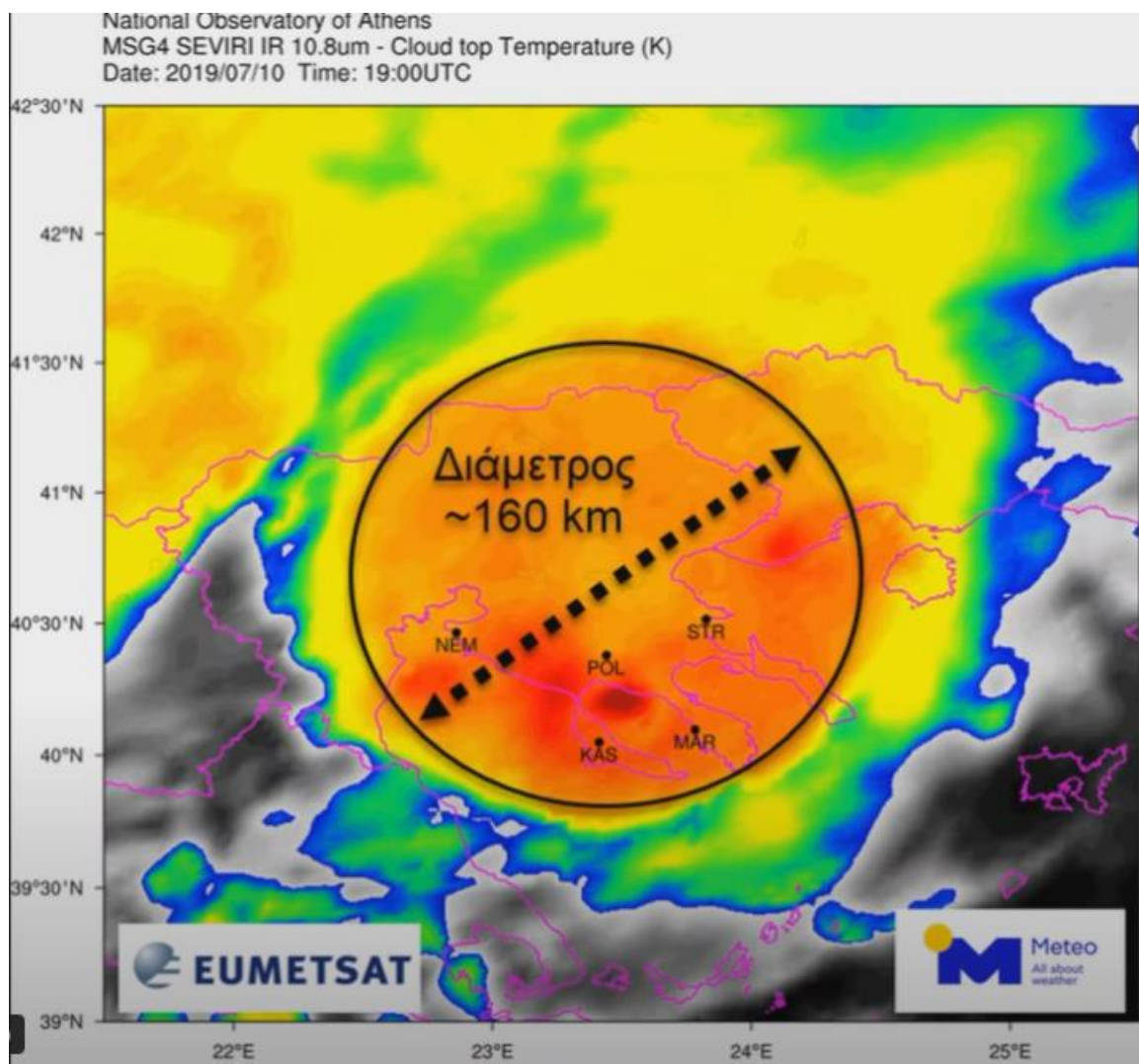
Nea Mihaniona-barometric pressure



Poligiros- barometric pressure

On the morning of July 10th, the arrival of a barometric low from the Adriatic and storms originating from the Western Balkans, passed through Lake Prespa and moved towards the Thermaikos Gulf, where they developed into a supercell. All storms are associated with the massive, vertical transport of air masses into the lower atmosphere. Supercell thunderstorms are the most violent storm category. The rotating updraft of a supercell helps it produce extreme weather events such as giant hail (more than 5 cm in diameter), strong gusts of about 80 miles per hour or more, and strong tornadoes. The environment around a supercell is characterized by high instability, i.e. by strong winds that change direction and speed very quickly.

The passage of this cold front over northern Greece and the transport of colder and drier gas masses produced strong dynamical instability. The downward movement of the cold gas masses caused the rapid upward movement of the moist and warm gas masses located in the Thermaikos Gulf region, resulting in further strengthening of the downdrafts within the storm clouds, which violently impacting the ground strengthened the surface winds. From July 7 to 10, warm air masses originating from Africa prevailed in Greece, and the existence of warm and potentially unstable gas masses is a critical factor in the development of extreme weather phenomena. At 18:15, the superstorm reached the western coast of Thermaikos Gulf, while at 21:30 to 22:00 it strengthened even more, developing with great intensity in the wider area of Potidea.



Storm diameter

The phenomenon developed extremely quickly. There was an impressive temperature drop of 7°C within half an hour (9°C drop within an hour) recorded at Thessaloniki airport station. Precipitation intensity was greater than 200 mm/h. A sudden increase in wind speed to 10 or 11 Beaufort was observed in a short time. In fact, in some places the instantaneous wind gusts reached 132 km/h, while locally in Potidea they approached 200 km/h, i.e. 12 Beaufort, the maximum degree on the scale. The horizontal diameter of the storm was extremely large, at 160 kilometers (the huge "ball" of the supercell with the large size of the cell nucleus). The system then moved towards the northern Aegean Sea and gradually weakened.



Φωτογραφία CNN Greece

3 Consequences

Unfortunately 7 people lost their lives and over 100 were injured

The victims:

- A Romanian mother and her 8-year-old son were killed in Nea Plagia when a tavern canopy collapsed. The mother was overwhelmed and the child was hurled through the air and landed on the glass.
- A father from Russia and his two-year-old child were killed in Potidea, when a tree fell on them.
- An elderly couple from the Czech Republic were killed in Sozopoli when their caravan parked on the beach was thrown and spun in the air.
- A fisherman drowned in Nea Kalikratia



The material damage was serious. Roofs, electricity poles and trees fell, shops, cars, boats were destroyed, electricity and water infrastructures were badly damaged.

The following videos capture typical moments

a) BBC

https://www.youtube.com/watch?v=n3ie4_rMua8

b) Guardian

<https://www.youtube.com/watch?v=bWSW92p3sTE>

c) SKAI

<https://www.youtube.com/watch?v=ipkerrF1tYw>



4 Conclusions

1. 6 out of 7 victims were foreign tourists. They probably had not been informed by anyone, nor could they follow the emergency weather reports in Greek. After this tragedy, the European emergency number 112 was put into operation in Greece, through which citizens are notified on their mobile phones in cases of danger.
2. In the tourist areas there are many sloppy and not well fixed constructions, some possibly illegal. Perhaps some of the victims could have been saved if the structures were more stable. The state has an obligation to carry out the necessary checks, but citizens must also take their own measures, e.g. to secure falling objects.
3. Our team is unable to conclude whether this extreme phenomenon, which is so rare for Greece, is related to global warming and climate change, due to anthropogenic activities or is simply a "random" statistical extreme. However, severe meteorological phenomena have been observed more and more frequently in Greece in recent years and scientists monitor and study them carefully.

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