

Flash Floods' Children-Greece

LPS 2022 Climate Detectives School Award Ceremony



Our team consists of 21 children aged 13-15 years old. The students who came to Bonn to represent our team are:

Boutsis Georgios
Moudilou Ioli
Psoni Dimitra
Revisiou Agapi
Tsigalos Kyriakos
Vasileiou Melina

and our physics teacher
Anastasia Evangelopoulou

Investigating the floods of Ilioupoli (Athens- Greece) (1/4)

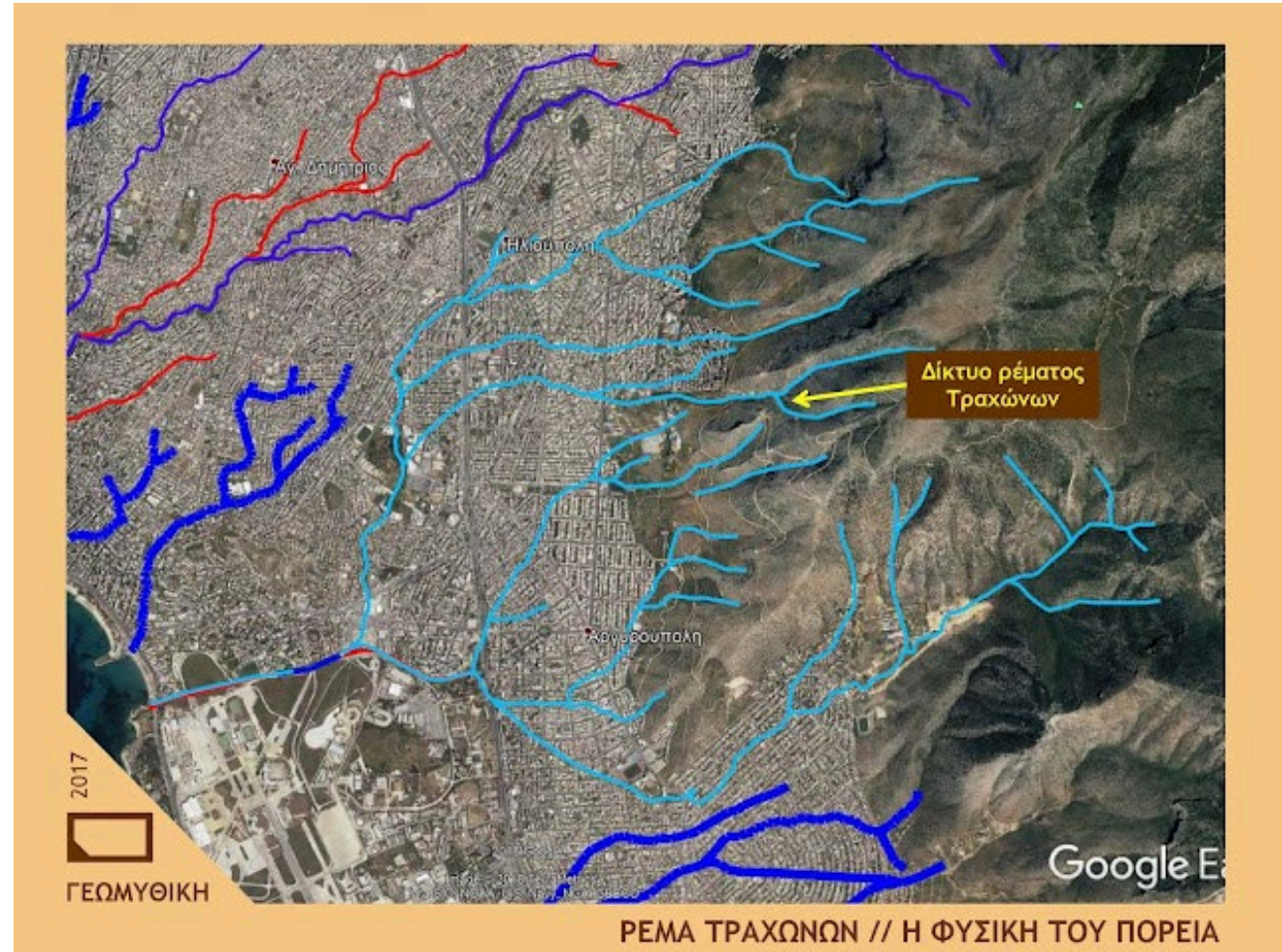
Research question : How are floods created and what are their effects on the local community of Ilioupoli? What can we do to deal with this issue?



The Municipality of Ilioupoli is located on the southwestern slopes of Mount Ymittos in Athens.

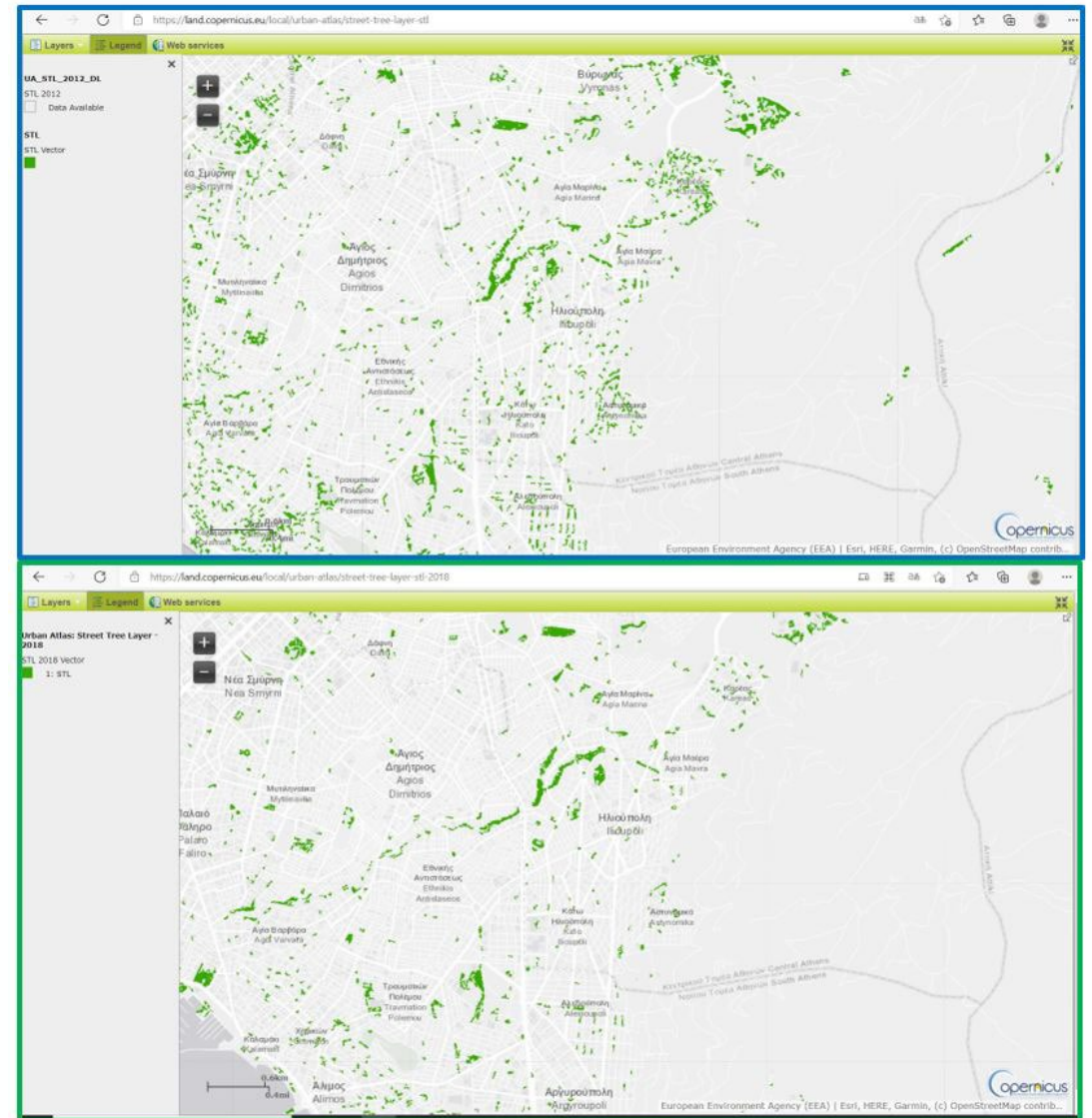


The Pikrodafni and the Trachonon stream are flowing our city and are the ultimate rainwater receivers.



Our climate issue is **urban flash floods** and the following factors contribute to this:

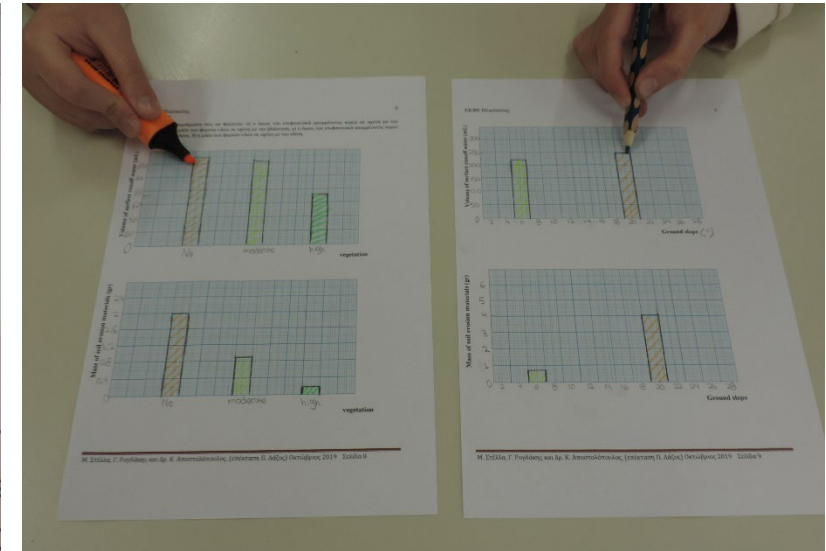
1. The steep slope of the ground.
2. The change of land use and of **Pikrodafni stream**, which is in favor of the urban area at the expense of the environment.



- 3. The small forest cover compared to previous years, due to the fire in the forest of Ymittos (2015).
- 4. Sudden heavy rains, that occurs more often the latest years due to climate change.



Our team performed **laboratory experiments** in order to demonstrate how the suburban forests protect cities from floods.



We studied the data from the **Technical Service of the Municipality of Ilioupoli** and local media, we did **an autopsy in the Pikrodafni stream** and found out:

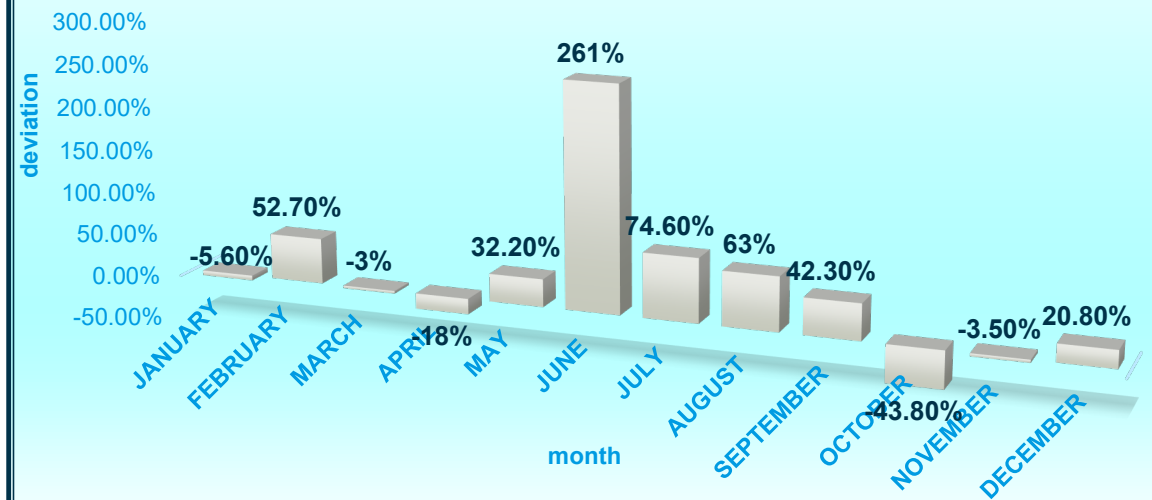
- the entire length of the Trahonon stream that crosses Ilioupoli has been coated,
- many blocks of flats have been built in the historic riverbed of Pikrodafni stream and its natural slopes and vegetation have been destructed.
- many parts of Pikrodafni stream have either clogged, boxed or grounded. The surfaces are smooth, the friction is reduced and the rainwater flows fast before being absorbed!



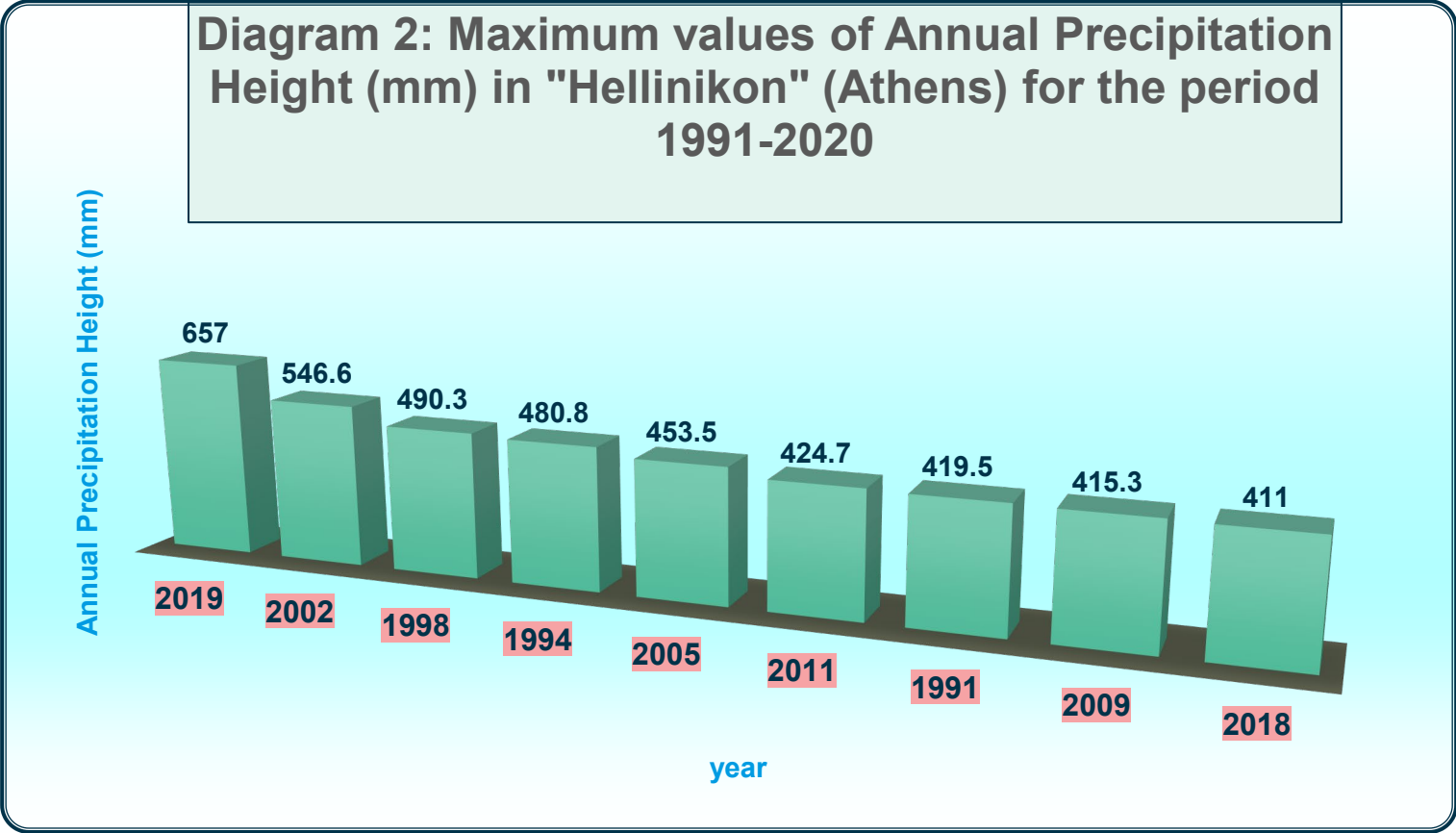
Processing the data from the **Hellenic National Meteorological Service** (H.N.M.S), for the meteorological station in “Hellinikon”, an area very close to Ilioupoli, and for a thirty years period (1991-2020) we come up with the conclusions:

I. There are significant deviations for the mean monthly precipitation height between the decade 2011-2020 and the normal values of the period 1955-2010.

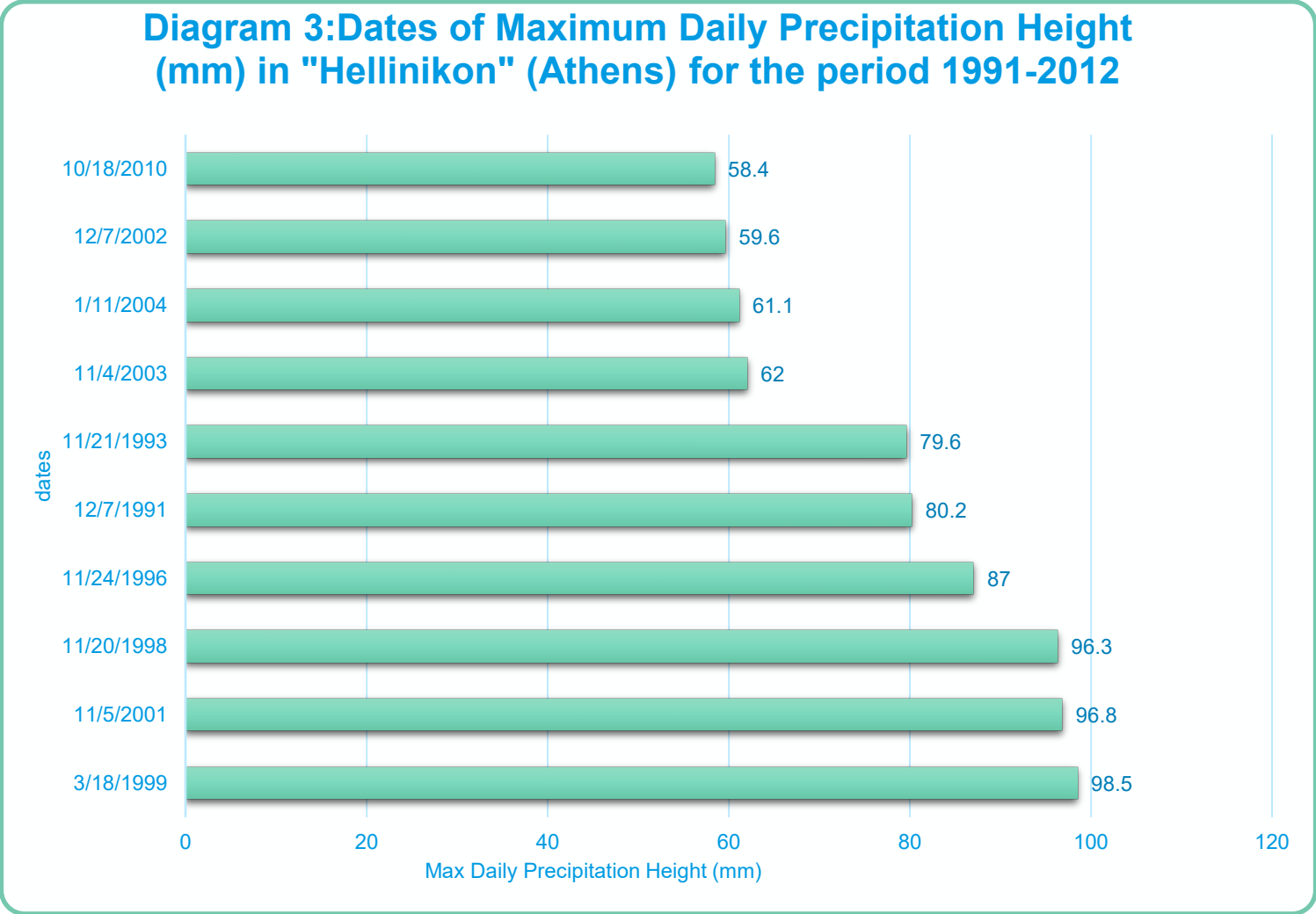
Diagram 1: Deviations of Mean Monthly Precipitation Height in "Hellinikon" (Athens) between periods 1955-2010 and 2011-2020



II. There are 9 positive deviations from the mean annual precipitation height (400 mm) during the period 1991-2020. The majority of the years with such an increase in rainfall is after the year 2000.



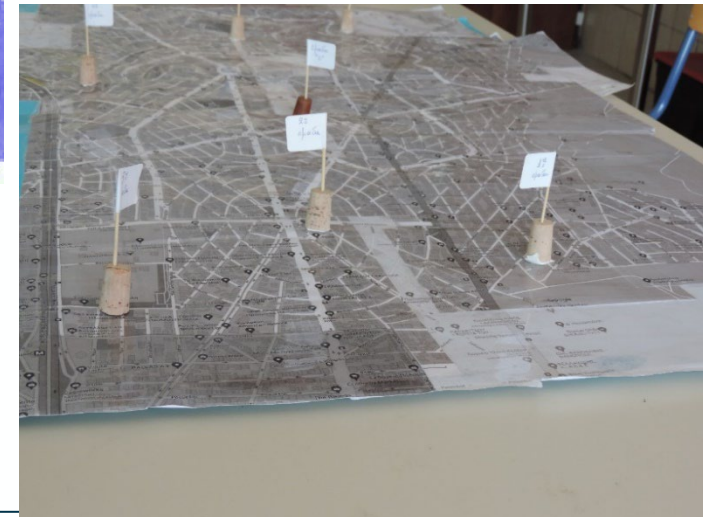
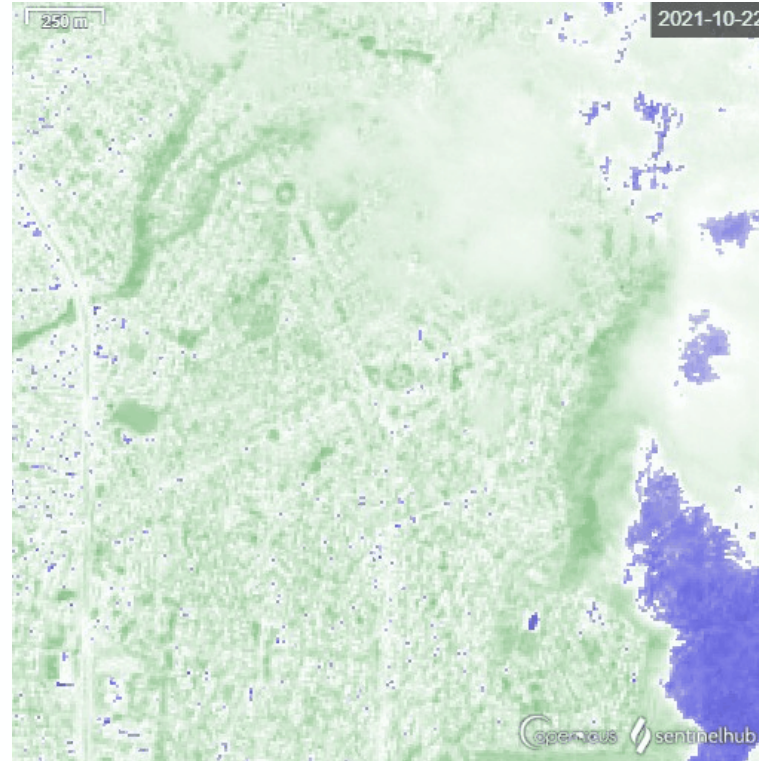
III. The 10 bigger values of the maximum daily precipitation height. Most of them exceed the mean monthly precipitation height!



- Analyzing data from the meteorological station of Ilioupoli, we conclude that the annual precipitation height for the year 2021 in Ilioupoli (335.2 mm) was below average (360 - 400 mm).
- There were months with no or minimum rainfall.
- However, the large amount of rainfall was concentrated in one single month and especially in one day (14th October with rain height **94mm!**) , indicating the consequences of climate change in our town!

Conclusions (1/2)

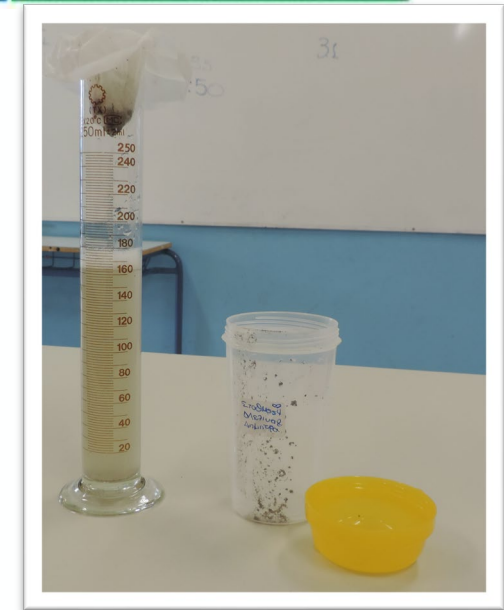
- We studied the Normalized Difference Water Index (NDWI) using the **EO Browser**, for several rainy days of the autumn 2021 and found out the areas where large volumes of rainy water is accumulated.
- This helped us to choose the locations where we set up our 7 “meteorological stations”.



Conclusions (2/2)

Our **in-situ experiments** took place a day with low rain intensity (17th of April 2022), so:

- ✓ the improvised rain gauges proved to be of little accuracy compared to the electronic one.
- ✓ only 2 out of the 7 stations, managed to collect surface runoff water and took laboratory measurements.



Measurements of the 17th April 2022 in Ilioupoli



Meteo rological station	Experiment execution time	Duration of rain height measurement	Rain height (mm)	Rain intensity $= \frac{\text{Rain height}}{\text{time}}$	Duration of surface runoff measurement	Volume of surface runoff	Surfa ce runoff $Q = \frac{V}{t}$
Control station	10:35 a.m.	75 min=1.25h	3,1 mm (with the electronic rain gauge) < 1mm (with the improvised rain gauge)	2.48 mm/h	2min 35 s = 155 s	378 mL	2.44 mL/s
Station 1	10:15 a.m.	0.5 h	< 1mm			-	
Station 2	10:15 a.m.	1.5 h	< 1mm			-	
Station 3	10:15 a.m.	0.5 h	< 1mm			-	
Station 4	10:50 a.m.	24 min= 0.4h	3mm	7.5 mm/h	2 min= 120 s	166 mL	1.38 mL/s
Station 5	10:15 a.m.	0.5 h	< 1mm			-	
Station 6	10:35 a.m.	0.5 h	< 1mm			-	



Make a difference (1/5)

1. We informed our students about the sustainable development (especially for the goal 12 & 13). We hung a poster on an external wall of our school and shared leaflets in order our students to inform friends and family about the climate change and raise awareness.



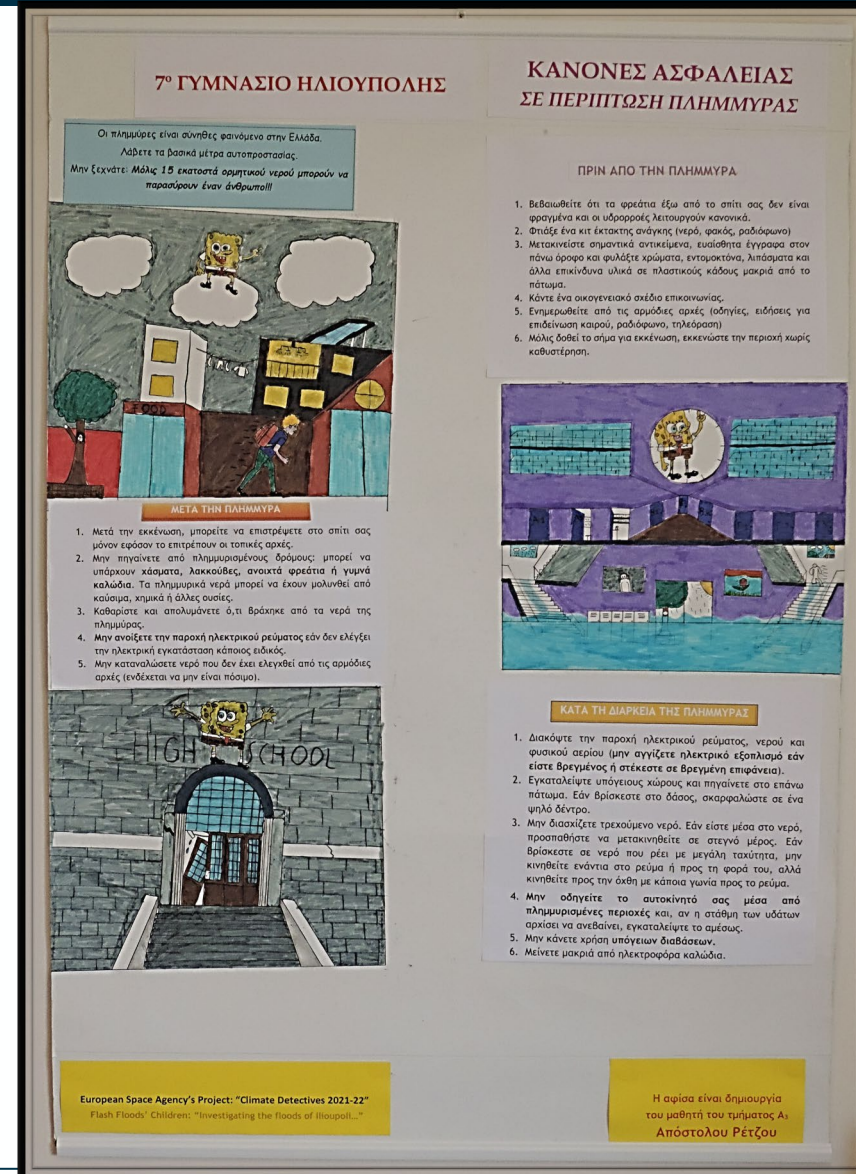
Make a difference (2/5)

2. For the recycling goals, we made art from trash.



3. Drew a poster with flood instructions.

4. Our team participated to the 1st Youth Assembly for Climate Change (ARSINOE project), organized by Hellenic Foundation for European and Foreign Policy (ELIAMEP) in 12 and 13 May 2022.



5. We participated to the voluntary reforestation of Ymittos, organized by the Municipality of Ilioupoli (3rd of April 2022).



Make a difference (5/5)

6. We are having a day-event at our school on the 27th of May 2022. We shall present to our mayor a written proposal:
- a) Teachers training by experts agronomists how to plant trees,
 - b) Organize specific days for each school to plant trees in specific area of Ymittos, so that there would be a fair “competition” between schools,
 - c) Put more experimental “meteorological stations” in different locations in Ilioupoli, maintained by school teams, which will process the data and give them to our official meteorological station,
 - d) **Consider the option to construct pavements that absorb rain water,**
 - e) **Create pocket-parks and rain gardens.**



*Flash
flood
children*



Thank you for your attention