CLIMATE DETECTIVES 2020 – 2021

SINKING IN THE RAIN

WWW - Weather Watch Wings
Liceo Scientifico Statale "A.Tassoni"

RESEARCH QUESTION

In our region, Emilia-Romagna, in the last decade many extreme weather events have been reported, that caused damages to buildings, cars, properties. The Pianura Padana, where our region is located, is

SUMMARY OF PROJECT

Since we want to understand whether any connection exists between air pollution, climate changes and extreme weather events, we decided to investigate 4 circumstances we can still remember, and are still alive in the minds of some of us, because many families in the towns and villages surrounding Modena suffered losses and damages: the floods that took place on a) Jan. 19th 2014, b) May 12th 2019, c) Dec. 6th 2020, the d) hailstorm of June 22nd 2019. Moreover, we documented the e) record-level high temperatures in the summer 2017. All the data have been collected either through the ARPA Emilia Romagna System, or downloaded by the ESA satellite services Copernicus and EO Sentinel Hub Browser, or using the Edumed French website. Our teacher taught us how to downlad data from these websites, how to plot and to analyse them, to get hints on our questions and need of combining climate and air pollution.
We used: Copernicus Climate Data Store to get info on temperature, atmospheric pressure and winds during these events and in the previous and next days; Edumed to get the animation on these data and on rainstorms, radar data, wind direction; Sentinel Hub EO browser to get animations and satellite maps on NO2 Nitrogen Dioxide Atmospheric Pollution (an air pollution coming from human activities and fossils burning); ARPA Emilia Romagna to get local data on air pollution. All the data have been acquired cost-free.

Ref.:
Sentinel Browser: https://apps.sentinel-hub.com/
Copernicus : https://cds.climate.copernicus.eu/#!/home
Arpa : https://www.arpae.it/it (regional Agency for the Environment)

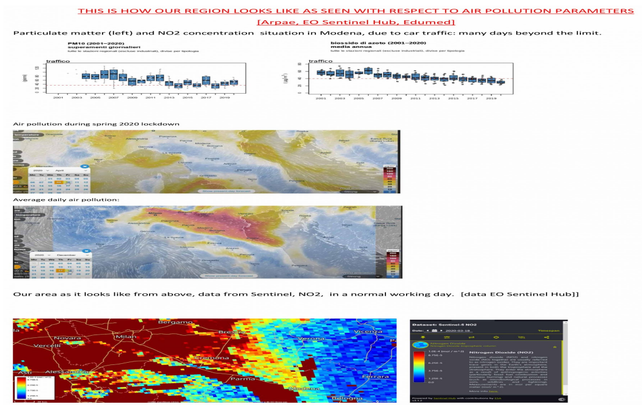

Figure 1: PM10 and NO2 yearly average concentration in Modena (Italy), air pollution maps from Sentinel EO

MAIN RESULTS

We completed 4 case studies.
We got hints from maps and animations on how the investigated events built-up, and how a combination of winds, temperatures, and atmospheric pressure could lead to floods and river problems. In 2 out of three events a fair snow-coverage in the close by Appennini, followed by a sudden increase in temperatures and winds from south brought to a snow fast melting that increased the water stream. The 2019 hailstorm and the extreme temperatures during the summer 2017 have been documented as well. quality, scientists told us. You can find any data of our research in the youtube videos and in the attached files that we prepared. Though the events and the air pollution could be fully documented, according to the scientists we consulted the connections between these facts and the events and the climate changes cannot be fully proved, since the climate is evolving much more slowly than the events remembered by the human mind.
We decided to explore the air pollution during the lockdown and found out that between March 2020 and June 2020 the air quality in Modena (NO2) was surprisingly good, which lead us to jump to the conclusion that fossils combustion is crucial to air pollution in Modena neighbourhoods. The absence of extreme weather events last months cannot be connected to better air quality, scientists told us.
You find the reports of our case studies here as attached files. In these reports the simultaneous atmospheric conditions that contributed to cause the events are visible.

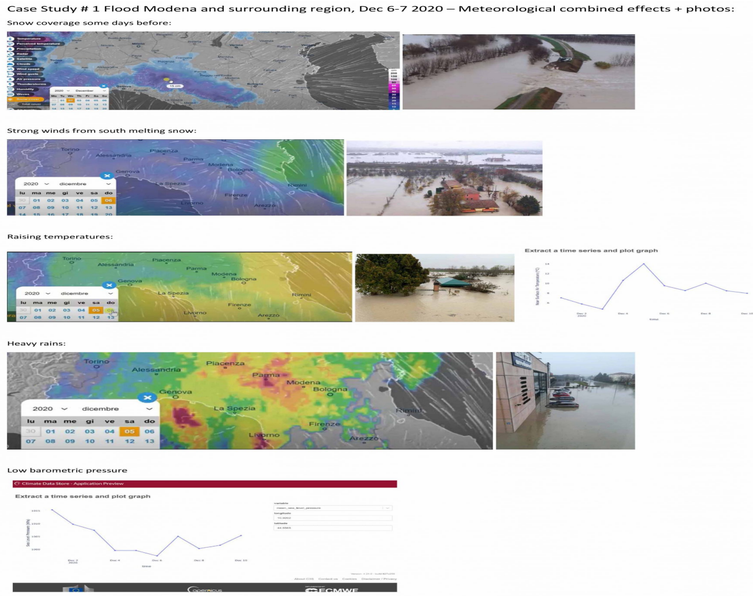

Figure 2: Case study n.1 - The floods in Modena and surrounding region on Dec. 4-5-6-7 2020 - Data from Copernicus EU System, Edumed, Photos.

ACTIONS TO HELP LESSEN TO THE PROBLEM

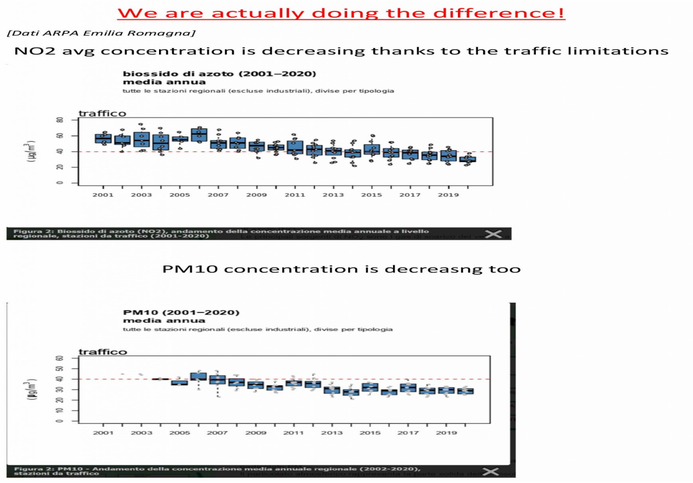

Figure 3: slowly decreasing NO2 and PM10 concentrations, thanks to regional measures

The video and graphs documentation are now fully accessible on youtube and thanks to our school in the website of the Liceo Tassoni Modena. To make the difference we will show this research to all the school pupils and will invite reporters of local media on the last school day to show the data we collected, to help to increase the local awareness of the problem.
We will continue to make case studies on local events during our study years by Liceo Tassoni, in order to build a case studies database and report periodically on climate, weather and pollution, using local media to increase local awareness. The regular updating of our reports will help the community to better understand what's happening and why.
We will inform the local media of the ESA event at the conclusion of this Climate Detectives Project.
To help to make a difference we will organize events for other schools and lower secondary schools, to show the case studies we've done and help to increase the pupils awareness.
Our region, anyway, is already taking measures to limit the traffic and other atmospheric emission to avoid high concentrations of pollutants.
Though the events and the air pollution could be fully documented, according to the scientists we consulted, the connections between these facts and the events and the climate changes cannot be fully proved, since the climate is evolving much more slowly than the events remembered by the human mind.