

Climate Detectives school project 2018-2019 – Scientist feedback

Team name: **Climate magicians**

Country: Romania

Age: 12-13



Scientist:

Hello, my name is Dr Natalie Douglas and I am a mathematician. I am a Teaching and Research Fellow at the University of Surrey in England and I am currently funded by the National Centre for Earth Observation to conduct some research in Data Assimilation that has implications in Climate Change.

In our project we will investigate...

Describe here the climate problem/issue that you want to investigate.

Scientist feedback

tornadoes in Romania, causes and consequences. We start the investigation with the tornado from Făcăieni (Ialomița County), the most powerful tornado in Romania, F3 grade on Fujita scale, happened in August 12, 2002, with a wind speed of 252 - 330 km/h. The effects of this tornado in the area of Făcăieni during 2 minutes were: 33 completely destroyed houses, 395 partially destroyed houses, 14 seriously injured persons, 2 dead people, 1,000 people affected, a 120 ha acacia forest destroyed by breaking the trees to about 1 m from the surface of the soil. We think that global warming and CO2 emissions may be the cause of tornadoes in Romania. That's why we will analyze the level of global warming in our area.

Great! This is a very interesting and potentially upsetting project. Having said that, upsetting is not always a bad thing as it can have the greatest impact – its gets people's attention. Read on for some more information and suggestions for your project. Good luck!

Some wider context:

The Intergovernmental Panel on Climate Change (IPCC) is an intergovernmental body of the United Nations dedicated to providing objective reports on climate change, based on scientific evidence, and its associated political and economical impacts.

According to the IPCC our global climate is approximately 1°C warmer than pre-industrial (late 1880s) temperatures. It is important to understand that climate change is not a new thing and that climate variability is as old as our planet itself – the historical climate of our planet is known as palaeoclimate. However, as the IPCC states, the relatively recent sharp increase is attributed to increases in greenhouse gases caused by anthropogenic activity (human activity).

By global warming, we mean the increase in the global average of surface temperature. The IPCC have concluded that the increase in global temperatures is caused by the increase in greenhouse gases, such as carbon dioxide and methane, in the atmosphere as a result of the burning of fossil fuels. Climate change deniers tend to be those people that question whether climate change is caused by anthropogenic activity rather than denying that the climate is actually changing.

The Paris Agreement, signed by many countries all over the world, is an agreement to work together to mitigate greenhouse gas emissions and takes effect in the year 2020. The main goal of the agreement is to keep global warming below 2°C above pre- industrial levels, with an aim to keep it as low as 1.5°C as this will substantially reduce the drastic risks and effects of the 2°C changes. Although the exact effects of climate change are difficult to quantify, there are mathematics models that are able to simulate it and quantify its impacts. The impacts of climate change, if they are not mitigated, are potentially catastrophic: heatwaves will increase in frequency, declines in river flows will effect fresh water resources in some areas, increased rainfall will cause flooding in others as well vulnerability to food insecurity and many other natural disasters. Even though the effects are much less drastic at the 1.5°C level, some scientists argue that there are tipping points in global temperature beyond which damage to our planet becomes irrevocable.

To investigate our problem, we will... Describe how you plan to investigate the identified climate problem and which data (satellite/ground measurements) you plan to collect/ analyse.	Scientist feedback
work in a team of 8 members, as following: 1. Two of the team members will coordinate each 3 other members and will ask them to calculate their carbon emissions per family over a year based on current and gas bills. 2. The coordinators will use the obtained results for the calculation of CO₂ emissions at the level of the population of our school or the city Galati. 3. The analysis of the obtained results will lead to formulating a set of measures to reduce carbon footprint in our area (economic bulbs, low energy appliances, use of electric cars, etc.)	I assume that these calculations are in addition to your investigation into the extreme weather events. The following list represents just a few sources of information that you could use to help you: • Google Earth – obtain 3D representations of your local area based on satellite imagery • European Space Agency (ESA) Education – information and classroom resources at https://www.esa.int/Education • ESA Climate Change Initiative (CCI) toolbox – analysis and visualisation of climate data at http://cci.esa.int/ • IPCC website – reports and policy information at www.ipcc.ch • Earth observation datasets at https://apps.sentinel-hub.com/eo-browser/ and earth.esa.int • National weather service – in the UK this is https://www.metoffice.gov.uk/; and here you can find a list of national meteorological services: en.wikipedia.org/wiki/List_of_meteorology_institutions • University sources – where possible get in contact with scientists at universities in your country that can tell you more Don't forget to investigate data quality and cite any references when displaying your data.
To make a difference we will... Identify minimum one and maximum three possible actions to help reduce the identified climate problem.	Scientist feedback
have the following activities: 1. Extreme phenomena in Romania – causes and consequences A presentation of causes of appearance of extreme phenomenon like tornadoes, examples. 2. Photosynthesis equilibrates carbon footprint? - Calculus of carbon footprint per team member, analysis of results and reporting at district, city, country; - Calculus of the number of trees needed to reduce the carbon footprint. Since a tree can absorb 1 tonne of CO₂ per year, which forest area would be needed? 3. Set of measures to reduce CO₂ emissions. This set of measures may include: planting of trees, using bikes, avoiding food waste, isolating the dwelling, buying Energy Efficient Household Appliances (Label A and A +), opting for a low fuel economy car, making the most of the means of public transport,	There are some very good ideas here. We should all be doing our part to mitigate climate change like you! What about spreading your message? Some more context and suggestions: It can be argued that the climate and trade negotiations of the early nineties closely paralleled one another without any consideration of how one affected the other and ultimately trade trumped climate. Perhaps it is for the same reasons that many politicians appear to be resisting rapid action towards alleviating climate change and favouring 'going green' over 'cutting out'. With technological advancements in an era of social media, the general public is becoming more and more aware of the issues and impacts surrounding a changing climate and we're responding at a much faster than government. We are witnessing protests in France, the planting of ecosystems in efforts to create negative emissions locally and the invention of innovative ways of creating clean energy. Much of the general public are reducing their own carbon footprints in creative ways and perhaps, banding together in this way, we'll drastically reduce emissions as a collective. I really love the idea that you are calculating your carbon footprint and planning ways to offset it.

using as much natural light as possible, setting the thermostat less than usual, etc.

Do you have plans to become a zero-emissions school like one of the other schools participating in this project?
Are you, like some of the Climate Scientist project groups, creating a Facebook page, a YouTube channel and/or a website? How will you increase hits or encourage more flow of traffic to them? Do you think your story would go viral? Will you present your findings to your parents and the rest of your school, will you present to your local community, your local MP or even to the wider world? Can you think of any public figures that you could interview or even get involved with your project? The message is clear and the more people hear it the better so how will you ensure that more people hear your story?

General comments

I am really thrilled to see so many of mother nature's younger generation coming to her rescue with such enthusiasm and determinations. In the face of global scale threats to humanity, it has never been more important for us to take the not-so-distant future into own our hands. Now it's up to you to do your part....

... and don't forget it's Earth Day on April 22nd!



Comments from ESA Education

This is a very nice project. You can also investigate the conditions that lead to a tornado (as the collision of contrasting air masses) and see if these conditions have become more frequent in your region. The classroom resource 'After the Storm' contains information that could be helpful for you:
https://www.esa.int/Education/Teachers_Corner/After_the_storm_Tracking_Hurricane_Matthew_and_analysing_its_impact_Teach_with_space_G05

When working with satellite images, please keep in mind the spatial resolution. It describes how big the area on the ground represented in one pixel of the satellite image is. Most freely available satellite images have a resolution from about 10m x 10m up to 30m x 30m. When you want to investigate the track of a tornado, please have in mind that with these resolutions you might not be able to identify the track easily.

We are looking forward to your results and how you will make a difference. Good luck!