

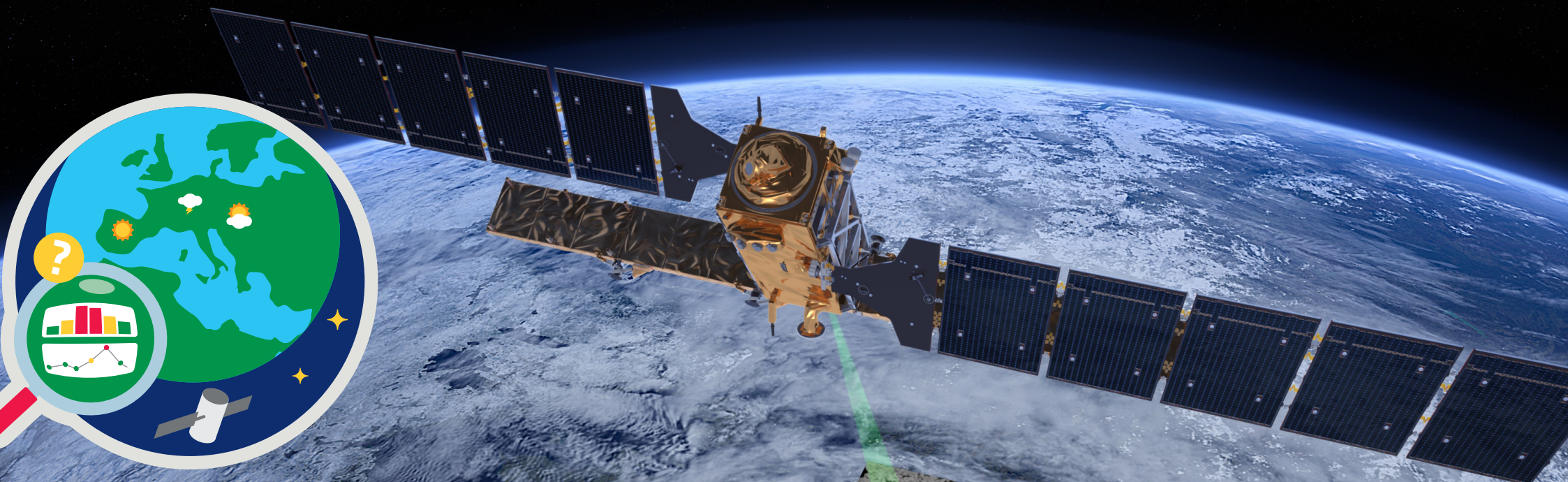
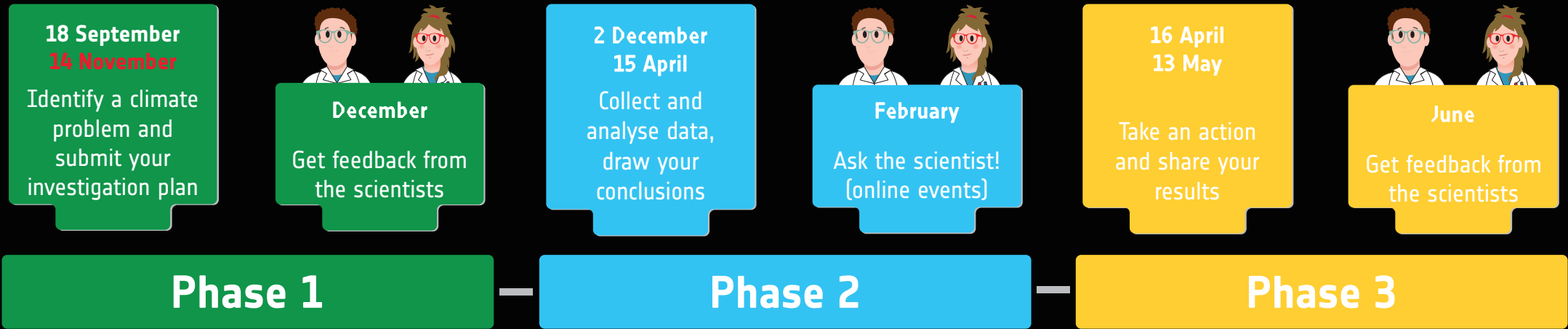
CLIMATE DETECTIVES

GUIDELINES 2019-2020

→ INTRODUCTION

ESA invites school teachers and students between the ages of 8 and 15 to team up and join the ESA Climate Detectives school project, kicking off in September 2019 and running throughout the school year. Teams of students, supported by their teacher, are called to 'make a difference': identify a climate problem by observing their local environment, investigate it by using available Earth Observation data or taking measurements on the ground, and then propose a way to help reduce the problem.

The students will learn about climate on Earth as a complex and changing system and the importance of respecting our environment. At key phases of the project, scientists in the field of Earth observation and climate will support the teams. They will give feedback on teams' investigation plan and during an online 'ask the scientist' event. At the end, all participating teams will share their research findings on the project's [sharing platform](#)



→ Phase 1 - Identify a climate problem

18 September 2019 – 31 October 2019

In this phase, students will be asked to identify a climate problem that they would like to investigate as ‘Climate Detectives’. Students should define a problem that has a connection to the global climate based on questions that arise from their school studies and from observations in their local environment.

Teams have until 31 October 2019 to identify a climate problem and submit their investigation plan online (maximum 450 words) (see section 2, “How to enter the project”). Scientists in the field of Earth observation and climate will review the investigation plans from all teams participating in the project. Teams will receive feedback and recommendations about their investigation plan in December 2019.

In their investigation plan, the teams must give the following information:

1. Project title (max. 20 words)

2. What is your research question? (Max. 30 words)

The first step of the scientific method is to develop a research question. Your investigation is centred around this question. It should be clear, concise and focused. A research question should be about an issue that students are curious about.

3. Describe the local climate problem/issue you want to investigate. (max. 150 words)

Teams can explore different problems or their causes/effects but they have to make sure the relation with climate is worked out as well as the relation with their local environment.

Examples of climate problems could be “how might increased rainfall in the last years affect flooding in my area?” or “due to low precipitation, our local river has less water; what are the consequences for biodiversity and for the local community?”. Do you need some inspiration?

Find out what some teams have investigated in the past edition by visiting the [sharing platform](https://climatedetectives.esa.int/) (<https://climatedetectives.esa.int/>)

4. What kind of Earth observation data will you use? (Checkboxes)

- Ground measurements
- Satellite images
- Other data

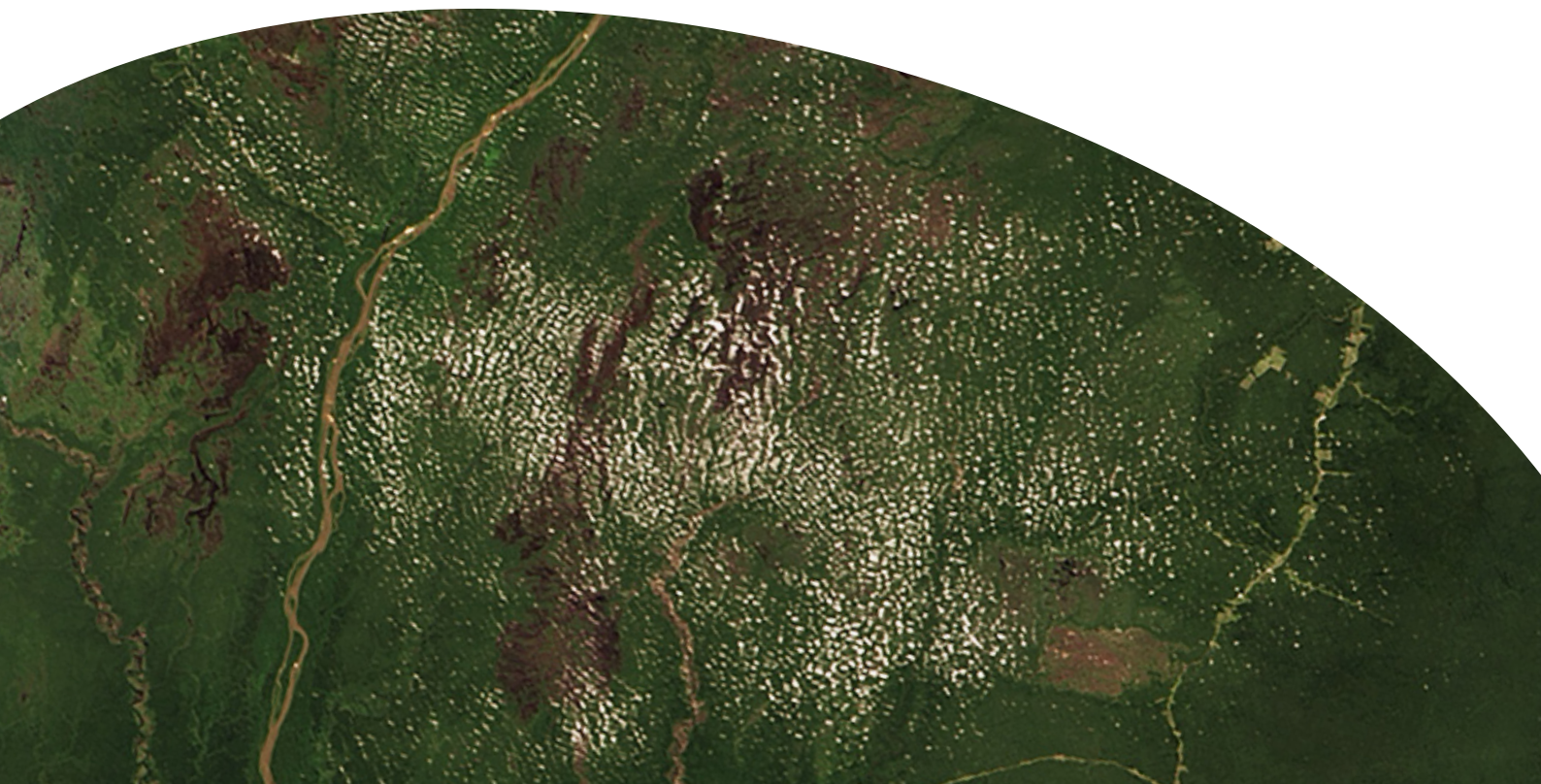
Earth observation (EO) is the collection, analysis and presentation of data to better understand our planet. EO data is mostly acquired from remote sensing platforms such as satellites and is supplemented by ground measurements.

Earth observations may include:

- a birdwatcher's notes on bird sightings;*
- measurements taken by a thermometer, wind gauge, ocean buoy, altimeter or seismometer;*
- photographs taken on the ground or from airplanes;*
- radar or sonar images from land- or ocean-based instruments;*
- images taken from remote-sensing satellites;*
- processed information such as maps or weather forecasts*

5. Describe how you plan to investigate the climate problem and which data you plan to analyse. Also, describe how you plan to access/collect the data. (max. 250 words)

In section 'Supporting resources and tools', you can find some online tools that provide access to Earth observation satellite imagery and data.

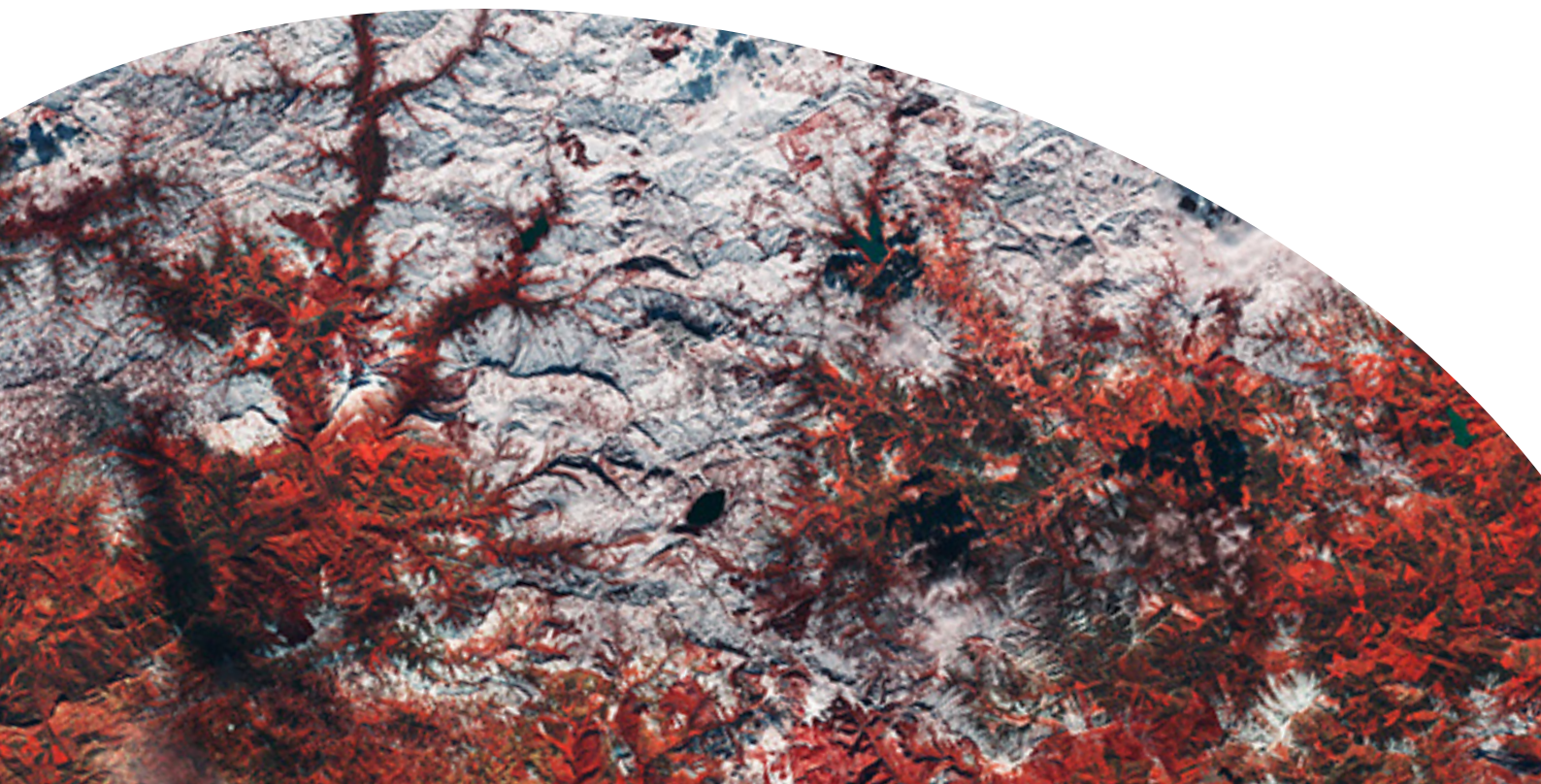


→ Phase 2 - Investigate the climate problem

2 December 2019 – 15 April 2020

In this phase, students will collect, analyse and compare data to draw a conclusion about the problem they are investigating. **The use of data is mandatory to complete the project.** This can be either satellite or ground-based data retrieved from professional sources, or data obtained from measurements by students, or a combination of them. For example, teams can make weather observations and compare them with historical climate data.

During Phase 2, ESA or, where applicable, the national coordinator will organize online events in which teams can “ask a scientist” questions related to their investigations.



→ Phase 3 - Make a difference

16 April 2020- 13 May 2020

We can all make a difference! Based on the results of their investigations, students should decide on the actions they want to take - as individuals and as citizens – to help reduce the problem. Actions do not need to be limited to the school time; for example, students could take home ideas and involve their families to put them into practice in their everyday lives, or give a presentation or host a campaign at their school or local community to raise awareness.

Teams should record and provide evidence of their actions to share with the ESA Climate Detectives community. Teams will be able to share their main results and actions from 16 April 2020 until 13 May 2020 on the project's [sharing platform](#). By the end of the project (June 2020) teams who shared their projects will receive final written feedback from scientists. All teams who share their project will receive a certificate of participation by email in June 2020.



→ How to enter the project?

In Phase 1, teams have to submit their investigation plan online. **The deadline is 31 October 2019.**

In the cases where ESA has identified a national coordinator, teams shall register for Phase 1 through their national coordinator. They can choose to submit their investigation plan either in English or their national language:

- If you are a team from Austria, you should register through ESERO Austria.
Find more information on www.aec.at/esero
- If you are a team from Belgium, you should register through ESERO Belgium.
Find more information on www.esero.be
- If you are a team from Czech Republic, you should register through ESERO Czech Republic.
Find more information on www.esero.sciencein.cz/detective
- If you are a team from Denmark, you should register through ESERO Denmark.
Find more information on www.esero.dk
- If you are a team from Luxembourg, you should register through ESERO Luxembourg.
Find more information on www.esero.lu
- If you are a team from Finland, Norway and Sweden, you should register through Nordic ESERO.
Find more information on www.esero.no/prosjekter/klimadetektiv/
- If you are a team from Portugal you should register through ESERO Portugal.
Find more information on www.esero.pt
- If you are a team from Spain you should register through ESERO Spain.
Find more information on www.esero.es
- If you are a team from United Kingdom you should register through ESERO UK.
Find more information on www.stem.org.uk/esero

In all other cases, such as teams from Estonia, France, Germany, Greece, Hungary, Ireland, Italy, Malta, the Netherlands, Poland, Romania, Switzerland, Slovenia and Canada, registration is completed through the ESA Education office and **the entries must be submitted in English.**

Find more information on www.esa.int/ClimateDetectives

→ Who can participate?

All the following eligibility conditions have to be fulfilled to participate in the Climate Detectives project:

- Participation is open to teams from 8 up to (and including) 15 years old.
- Each student team must consist of a minimum of six students up to the whole class.
- One teacher can sign up maximum three student teams.
- At least 50% of the team members must have the nationality of an **ESA Member State***.
Based on their agreements with ESA, Canada and Slovenia are qualified to fully participate in ESA Education office programmes. In the framework of the current collaboration agreement between ESA and the Republic of Malta, teams from Malta can also participate in the Climate Detectives project.
- Team members must meet one of the following requirements:
 - ▶ Be enrolled full-time in a primary or secondary school located in an ESA Member State, Canada, Malta and Slovenia; ESA will also accept entries from primary or secondary schools located outside an ESA Member State, Canada, Malta and Slovenia only if such schools are officially authorised and/or certified by the official Education authorities of an ESA Member State, Canada, Malta and Slovenia (for instance, a French school outside Europe officially recognised by French Ministry of Education or delegated authority).
 - ▶ Be home schooled (certified by the National Ministry of Education or delegated authority in an ESA Member State, Canada, Malta and Slovenia).
 - ▶ Be a member of a science or environment club, enrolled full-time in a primary or secondary school in an ESA Member State, Canada, Malta and Slovenia.
- Each team must be supervised by a teacher or mentor acting as the team's point of contact with ESA's Education office and, where applicable, with the respective National Coordinator.
- Each team can submit one entry only and each student can only be a member of one team.

Teams not respecting the conditions above will be rejected.

*ESA Member States: Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Luxembourg, the Netherlands, Norway, Poland, Portugal, Romania, Spain, Sweden, Switzerland and the United Kingdom.

→ Project requirements and constraints

When planning their investigation, teams must take the following into consideration:

- Each team has to register and submit their investigation plan online (in total a maximum of 450 words).
- The project must include the use of data (from Earth Observation satellites or ground measurements) and be related to the topic 'climate'.

Entries that do not meet the above requirements will be rejected.

By entering the Climate Detectives project, teams certify that their submission is their original work and that they have full legal right to use any portion that is not their original work. ESA bears no responsibility for verifying the authenticity of the proposals.

The interaction with scientists from the European climate and Earth observation community is a key element to connecting students to real science research and reinforcing their motivation and knowledge. In order for organizers to be able to manage and provide scientific feedback for all the teams, the number of teams per country that can participate in the project may be limited. ESA Education and the national coordinators will make every possible effort to give formal feedback to all entries. However, in the event of exceeding participation, ESA and the national coordinators reserve the right to close applications earlier or to run a selection of the entries that can be admitted based on quality.

→ Supporting resources and tools

ESA provides a set of resources for primary and secondary school teachers:

- **Classroom resources** - These cover weather and climate, seasons, Earth and atmosphere as well as natural and human-made disasters. ESA suggests the use of these resources to encourage student participation and motivation and to improve their understanding of Earth's climate as a complex and changing system.

www.esa.int/Education/Climate_detectives/Classroom_resources_for_Climate_Detectives

- **What is Climate (Change)?** - Learn more about Earth's climate in this engaging webinar by Dr Natalie Douglas as she explains the basics of Earth's climate in simple terms. She discusses the difference between weather and climate as well as between global warming and climate change. She explains how scientists investigate climate change and offers some impressive ideas about what we can all do to protect our planet's climate.

www.esa.int/Education/Climate_detectives/Watch_the_Climate_Detectives_webinar

Students can access Earth Observation satellite data by making use of these tools:

- **Sentinel Playground** – This online tool provides easy access to satellite images and is updated daily. Sentinel-2 satellite data is available from 2015. To see images prior to this date, you can choose NASA's Landsat-8 as a data source. apps.sentinel-hub.com/sentinel-playground/
- **EO Browser** – EO Browser combines an archive of different Earth observation satellites and is also updated daily. The EO Browser can be used to research satellite images covering any area of interest. Images can be downloaded in different formats. Changes on Earth that took place in the past 30 years can be analysed with the 'compare' function, and students can also create their own time-lapse. ESA has developed a quick starter guide to exploring EO Browser: esamultimedia.esa.int/docs/edu/EO_Browser_guide.pdf
apps.sentinel-hub.com/eo-browser/
- **Climate from Space** - This app, developed by the ESA Climate Office, shows more than 30 years of global satellite observations on climate. Background information on different climate variables such as ocean temperature, sea level and carbon dioxide is provided. Using the interactive data viewer, students can analyse and compare different phenomena related to climate and investigate how they change over time.

<http://cci.esa.int/content/tablet-app>

→ Questions

For any questions, consult the ESA Climate Detectives website www.esa.int/ClimateDetectives and the national coordinators websites, or send an email to climate.detectives@esa.int.

→ Useful links

ESA Climate Detectives
esa.int/ClimateDetectives

Climate Detectives sharing platform
<https://climatedetectives.esa.int/>

ESA's Climate Change Initiative
<http://cci.esa.int/>

ESA's Earth Observation missions
https://www.esa.int/Our_Activities/Observing_the_Earth/ESA_for_Earth

ESA Earth Observation Image of the Week
http://www.esa.int/spaceinimages/Sets/Earth_observation_image_of_the_week

Sentinel hub Education page
<https://www.sentinel-hub.com/explore/education>

Virtual platform to view satellite observations interactively
<https://ovl.oceandatalab.com/>

Online platform to access satellite information about surface water levels of waterbodies
<https://www.blue-dot-observatory.com/>