PLANET
CHANGE

Climate change:
Space Survey of Wildfires

Teachers manual

Planet change is the short name of an EU Erasmus+ project aimed at VET teachers and their students. With small activities, the idea is to create awareness about sustainability and acquire 21st century skills. All this is done in a technical context, mostly from space technology.

www.planetchange.eu

https://www.planetchange.eu

Co-funded by the
Erasmus+ Programme
of the European Union

Contents:

https://www.planetchange.eu

Co-funded by the
Erasmus+ Programme
of the European Union

1. General information

Duration: 2 sessions of 45 minutes each.

Target group: 16-20 y.o.

European qualifications framework level: 1-4

Teacher preparation: No need for previous background on the topic (just knowing how to use an internet browser).

Topic

Theme: Space survey of Wildfires

Keywords: sustainability, wildfires, Earth Observation, Satellites, revisit, swath, orbit

Activity

Goals
The student will get better knowledge and training about:

1) The negative (and positive) consequences of wildfires in the open nature (the negative effect in inhabited areas does not need an explanation).
2) Why in this open nature wildfires cases, the use of satellite imaging can be helpful. And what are the limitations (revisit time, resolution, cost, visibility through clouds).
3) How to use the two main free access Earth Observation browsers (NASA´s and ESA´s) in the particular case of wildfires.
4) How to measure and compare the relative size of the wildfires that have affected their surroundings (town, city, region, country) in recent times.
5) Training of 21st Century skills including:
    a) Media literacy: find and gather relevant information
    b) Critical thinking
    c) Collaboration
    d) Communication

Summary

Students will be given the chore of measuring the size of a harmful wildfire by using a Sentinel Hub Browser. Firstly they need to understand what is a harmful wildfire. Secondly they need to learn how satellite Earth Observation works. Then they will learn how to use free access browsers. Finally they will measure a concise wildfire translating the size

https://www.planetchange.eu

Co-funded by the
Erasmus+ Programme
of the European Union

of the affected area into units of measure that can be easily understood (up to the teacher to choose: an example could be a football pitch size will be the reference they first need to calculate the equivalent area).

2. Introduction

Wildfires can be good or bad. Good wildfires are those who help reducing the amount of accumulated fuel (dead vegetation) converting (burning) it into nutrients that come back to the soil helping surviving and new plants to grow. Bad wildfires are those which happen when an excess of fuel was left to accumulate, and then these fires become so strong that propagate fast and destroy everything (small plants as well as all trees) expanding in an uncontrolled manner.

https://askabiologist.asu.edu/explore/wildfires

Description of the activity

Part 1: Introduction: what is wrong with wildfires?

→ Preparations: The classroom needs a screen or a projector to visualize the media content, and needs computers/tablets with internet connection, at least for ⅓ of the pupils (they will join groups of 3).

→ Activity 1 (15 min): The teacher explains the introduction, and then pupils need to find out examples of wildfires that went bad, and the reasons for them to be bad (using the internet).

Part 2: Earth Observation: what can we see and how often?

→ Activity 2 (30 min): The teacher shows a video explaining Earth Observation with Satellites.

Questions that students must answer:

What is better for fire observation over a certain point? Geostationary or LEO? What is the drawback of each of them? (Answer: distance therefore resolution for geostationary, closeness therefore shifting of the view in LEO)

What is the revisit time of satellites, i.e. how many times per day a LEO satellite will fly over a certain position in the planet? How does that affect the use of satellites for fire propagation detection? Would a revisit time of 24h mean the satellite imagery is useless? (not in remote areas)

How do we decrease revisit time? Would it help having more satellites? By what rate we can decrease revisit time?

Are there other effects from fires we are tracking (yes, the ashes dispersed into the air must be tracked to prevent their effects, for example for aerial transport management, of to prevent dangers by breathing generating alerts to sensitive population).

Are there other important facts of fires apart from live tracking (of fire and fumes) (yes assessment of recovery rates)

https://www.planetchange.eu

Co-funded by the
Erasmus+ Programme
of the European Union

Then **work in groups**. Design one person of the group to take notes of your discussion and answers

Part 3: Are there satellite images for free where we can see past fires?

→ Activity 3 (10 min): the teacher explains the two major sources of EO info, ESODIS Worldview (NASA) and Copernicus Browser (ESA).

Part 4: How much area was burnt?

→ Activity 4 (35 min): The teacher uses Copernicus Browser to show a wildfire, and then using the measuring tool, defines the area of affected terrain. Then ask the class to define how many football pitches are there in that area. Another possible comparison is against the size of a well known city (for example the city where the school is).

As an example: first we select the date (2023-08-18) and locate the map over the island of Tenerife, then select the Theme "Monitoring Earth from Space" and select LAYER "SWIR" to show the following image, finally using the measurement tool to define a polygon and obtain the burnt area.
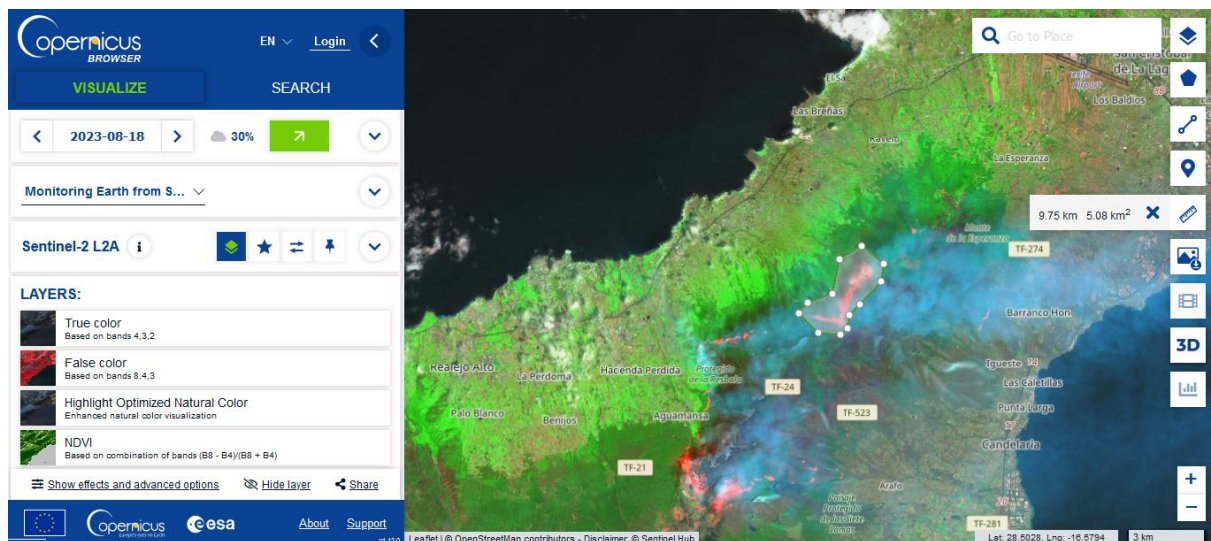
3.   Annex I:

Information to the teachers

The European Forest Fire Information System (EFFIS) has valuable statistics regarding the effects of fires in Europe: https://effis.jrc.ec.europa.eu/

Wildfires in the Amazon Rainforest https://www.greenpeace.org/international/story/55533/amazon-rainforest-fires-2022-brazil-causes-climate/

VET Schools

All kinds of VET schools could do this activity.