

Team members





Topography

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Context

The European Space Agency (ESA) is developing a family of satellites called Sentinel to observe the Earth and study the environment. Sentinel satellites have instruments or devices that take special pictures of the terrain, called **topographic maps**.



Representación del satélite Sentinel 1A. Source: esa.int







A **topographic map** is a representation of the ground that shows the Earth's relief and allows us to know the height of a terrain. Let's see how it works:

In order to make a **topographic map** it is necessary to make some horizontal imaginary cuts and draw the cutting lines, which we call **contours** (it would be like cutting a mountain into slices, painting each slice a different colour, and re-glueing them together). Thus, each line that we draw will indicate a height. For instance, look at the curves drawn on the volcano below: each contour represents a different height. This way, we can better see how the mountain rises from sea level to the top of the volcano.



View of the Etna volcano from above with contours www.esa.int/spaceinimages/Images/2014/08/Etna_slopes

Satellite view of Etna. www.maps.google.com

Sentinel satellites also allow us to make **3D topographic maps**. See how the pictures below taken by Sentinel 1A, showing the contours of a group of Norwegian islands in different colors:









Source: www.esa.int/spaceinvideos/Videos/2014/08/Norwegian_fringes







More educational resources:

Resources

Useful information about Sentinel: http://www.esa.int/esaKIDSes/SEM1TJB2GKH_Earth_0.html http://www.esa.int/esaKIDSes/SEMHG22AKAI_Earth_0.html

See the launching of Sentinel-2A: http://www.esa.int/esaKIDSes/SEMX6X7A4BI_Earth_0.html

ESA's educational resources about Earth and the environment: http://www.esa.int/Education/Teachers_Corner/Earth_and_Environment

Sentinel's official website: https://sentinel.esa.int/web/sentinel/home http://copernicus.eu/main/services

CESAR project: http://www.cosmos.esa.int/web/cesar

ESA Kids: http://www.esa.int/esaKIDSes







Scientific case 1: River course identification on a topographic

<u>map¹</u>

Hypothesis:

Draw on this mountain the path that you think the water would follow after heavy rain.



Tindaya Mountain in Fuerteventura. Source: <u>www.goo.gl/Vwk2l8</u>

Research equipment

Pencil Rubber Topographic map

¹ Activity based on the contents of REAL DECRETO 126/2014, February 28th, under which the basic curriculum of Educación Primaria (BOE March 1st) and DECRETO 89/2014, July 24th, from Consejo de Gobierno, under which Comunidad de Madrid establishes the curriculum for Educación Primaria (BOCM July 25).







Procedure.

Let's see how a **topographic map** is made. Joining with a line the dots that are the same height (880 metres, 860 metres, 840 metres and 820 metres in this case) we'll draw the **contours**. In this image, each color line always represents the same height.



Source: https://2gradoprimaria.wikispaces.com/MAPA+TOPOGR%C3%81FICO+ANDREAALBA



On the left side image there is a river drawn, as in your hypothesis. The river stems from the top of the mountain and falls downhill.

Can you see where the river is drawn between the contours in the image (C)?







Research

Next, we will provide a topographic map with which we will work.

- Look at the data on the map and look for the highest mountain or mountains.
- Trace the course of one or more rivers, from these highest points, to wherever we believe the river gets.







Conclusion and new questions

Can there be a lake on the map?

Do you think in there are affluents or more than one river?

Where would these affluents stem from?

Do you think the river water will always flow down at the same speed?

What to you think it means when contours are closer together? And further apart?







Research equipment



eesa





Case 2: Dams and reservoirs².

Dams are walls built in order to stop the flow of rivers and form reservoirs.



Hoover dam in Colorado, US <u>http://destinosa1.com/estados-unidos/arizona/presa-hoover/</u>

Find out where lakes could form on this terrain. Where would you put a dam to increase the size of the lake? Could you redraw the lake (now called reservoir)?



² The map used here shows the topography surrounding the Pinilla reservoir in the province of Madrid. The altimetric reservoir scale has been designed for the exercise, it is not real.