

LIGHT POLLUTION

Light pollution prevents the enjoyment of starry skies even in favorable weather conditions. It diminishes the visibility of stars and other celestial objects, and the perception of the Universe on a large scale. The light pollution of a place on our planet is measured by the radiance of the light at night. Let's take a look at our planet.

Task 1. Getting geographic coordinates of a place.

The geographic coordinates of a place are a set of numbers that show the location of that place on Earth. The coordinates we are going to use are latitude and longitude.

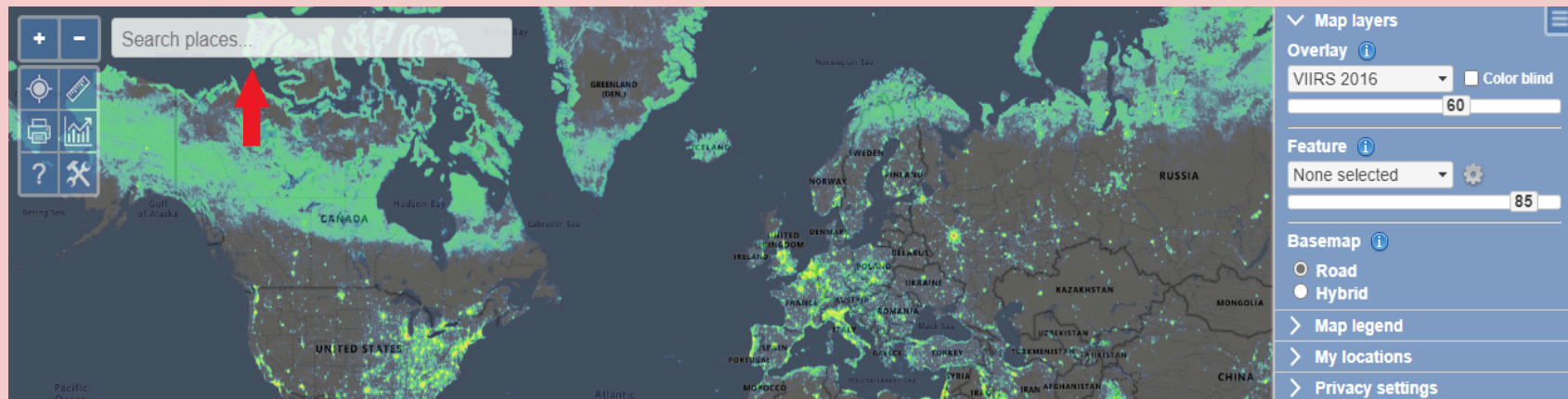
1. Google the school for which you want to get the geographical coordinates. Copy the name of the school from the table and paste it into the search engine. When you find it, click on Maps in the toolbar.
2. Right-click on the map site. A pop-up window will open. You can see the latitude and longitude in decimal format at the top.
3. To copy the coordinates automatically, left-click on the latitude and longitude. Paste the coordinates into the table.

SCHOOLS	Geographic Coordinates
CEIP Ciudad de Ceuta	35,887569,-5,323223
IES Vega de Atarfe	37,219582,-3,688444
Budapest II. Kerületi II. Rákóczi Ferenc Gimnázium	47.51324, 19.02519

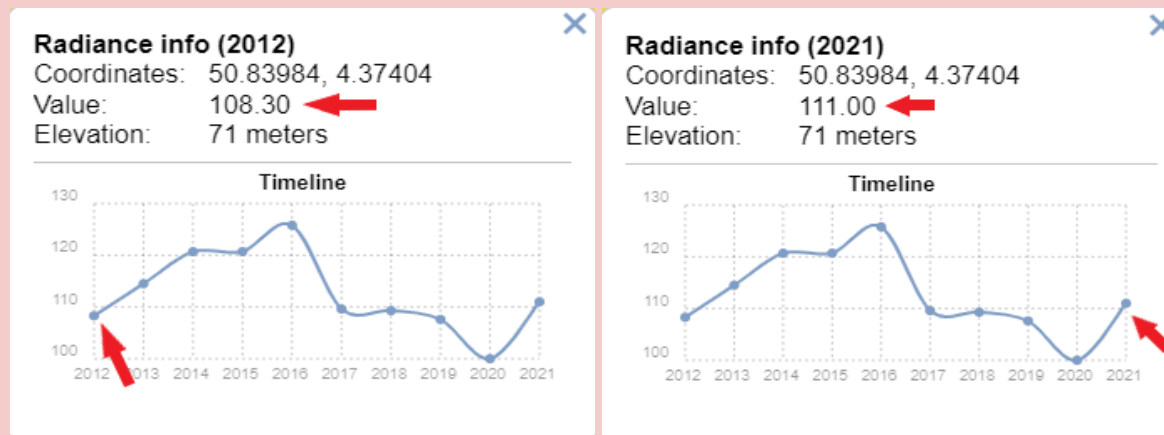
Task 2. Getting radiance of a place

To measure light pollution we need to measure the glare of night-time light in a place. The higher the radiance, the higher the light pollution.

1. Open [Light Pollution Map](#) on your computer.
2. Paste the geographic coordinates of the school in the search engine.



3. Radiance (value). Find the value of the night light radiance of that school on the Timeline. Move the mouse over the points on the Timeline to find the value in 2012 and 2021. Write it on the table.



4. Trend. Calculate by how many points the Radiance has changed between 2021 and 2012 (Radiance 2021 - Radiance 2012). Write the result on the table.

SCHOOLS	Radiance 2021(value)	Radiance 2012(value)	Trend
CEIP Ciudad de Ceuta	160	70	90
IES Vega de Atarfe	71,7	65,3	6,5
Budapest II. Kerületi II. Rákóczi Ferenc Gimnázium	38	33,6	5,6
SUGS Gimnazija Josip Broz Tito	48	38	10

QUESTIONS:

Which school are the stars best observed from?

From Hungary

Which school has light pollution decreased in?

It has decreased in all

Which school has light pollution worsened the most in?

In none

Task 3. Astronomical Observatories.

Light pollution diminishes and distorts the brightness of stars or any other stellar object, and affects the work of observatories and astronomers. This pollution is especially present in cities and for this reason astronomical observatories are located in regions far away from cities. Do you know which astronomical observatories are closest to your school?

As a class, write the name of two astronomical observatories you would like to visit in your country.

Sierra Nevada

Task 4. Obtain the CO₂ emissions of a country.

Another problem of light pollution is its effect on the environment. To light our streets at night we need electricity and when electricity is produced CO₂ is emitted. An increase in CO₂ emissions leads to an increase in environmental pollution.

The United Nations was created after the Second World War with the mission to promote peace and security in the world, promote sustainable and inclusive development, and protect human rights. It is part of the UN's mission to serve as a global data hub to make information available to the world.

1. Open [UNdata](#) on your computer.
2. Click on the country you are searching for information.
3. Click on the different sections to find the information you need. Write the data in the table.
4. Trend. Calculate by how many points CO2 emissions per person have changed between 2021 and 2015 (CO2 emission per capita 2021 - CO2 emission per capita 2015). Write the result in the table.

SCHOOL (Country)	Population (thousands of people)	CO2 emission (million tons) 2021	CO2 emission (tons per capita) 2021	CO2 emission (tons per capita) 2015	Trend
CEIP Ciudad de Ceuta (Spain)	46 745 ^{a,b}	229.9	4.9 ^c	5.3	-193,355
IES Vega de Atarfe (Spain)					
Budapest II. Kerületi II. Rákóczi Ferenc Gimnázium (Hungary)	9 634 ^a	45.7	4.7	4.3	9579,3
SUGS Gimnazija Josip Broz Tito (North Macedonia)	2 083 ^a	6.9	3.3	3.4	2069,4

QUESTIONS:

Which country is the most populated?

The most populated country is Spain

Which country is the least populated?

The least populated country is North Macedonia

Which country emits the most million tons of CO₂?

The country that emits the most tons of CO₂ is Spain

Which country emits the least tonnes of CO₂ per capita?

North macedonia

In which country have CO₂ emissions per capita increased?

In North macedonia and Hungary

In which country have CO₂ emissions per capita decreased the most?

In Spain