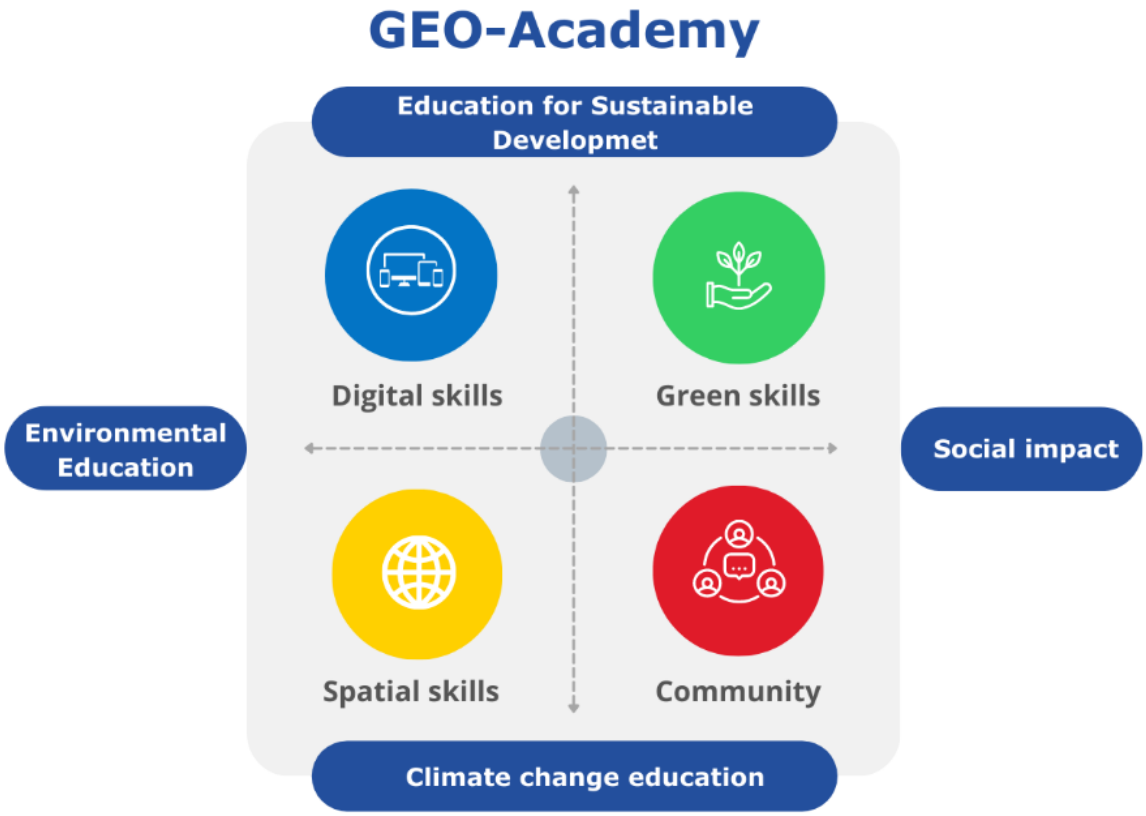


My name is

Klaus Albrecht

I am working for

University College of Teacher Education Tyrol

Innsbruck, Austria

Today, we will cover the following topics together:

FIRSTLY

This brings us to the topic of **communication in the classroom**.

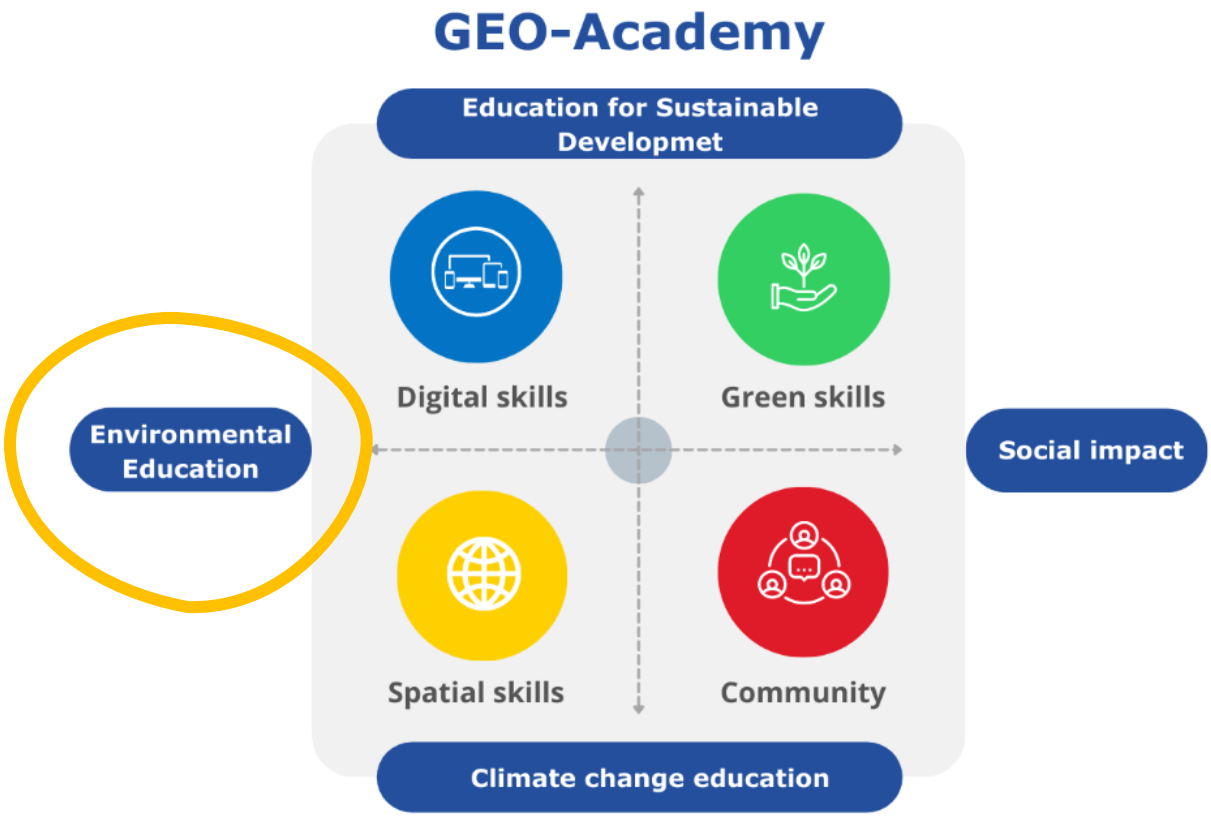
This will give us an insight into **formative assessment**.

GEO-ACADEMY
GEO-Hub for teachers in Europe

https://portal.geoacademy.eu/

Today, we will cover the following topics together:

SECONDLY

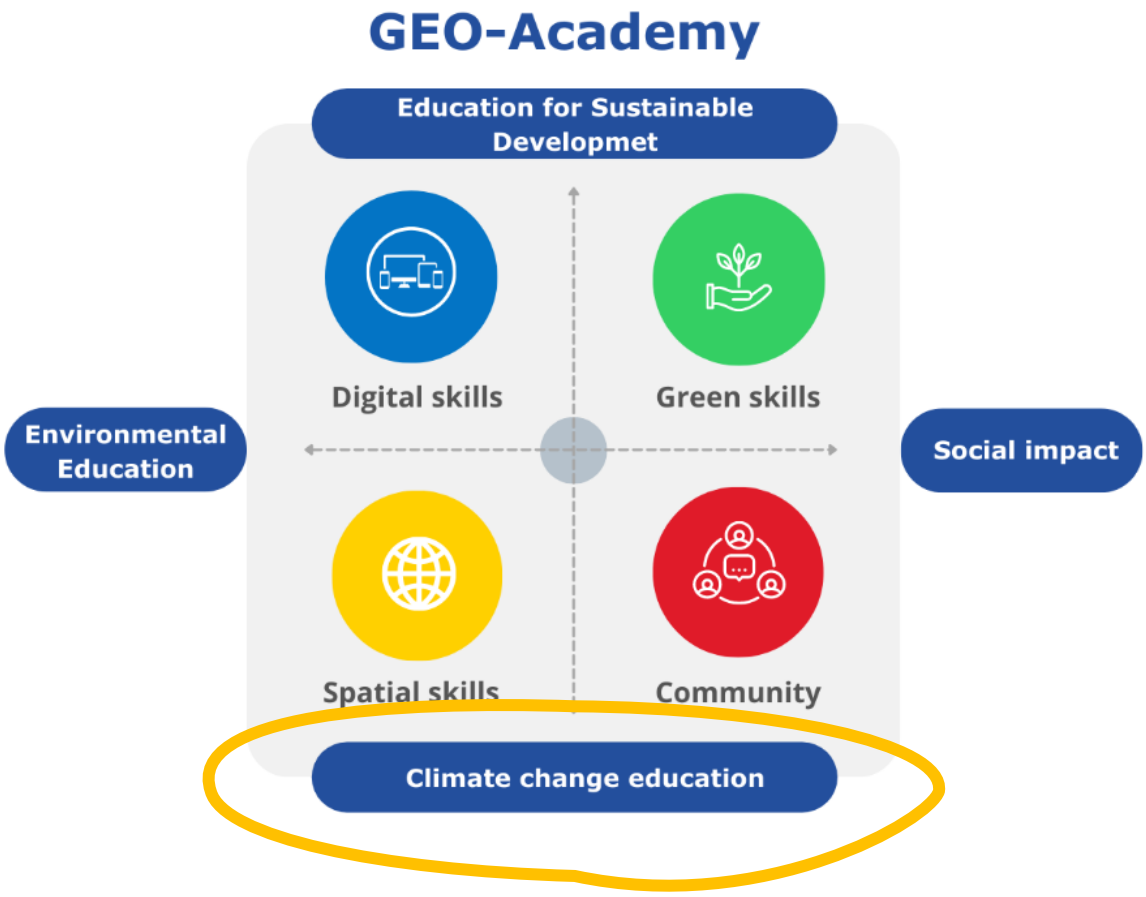


GEO-ACADEMY
GEO-Hub for teachers in Europe

https://portal.geoacademy.eu/

Today, we will cover the following topics together:

THIRDLY



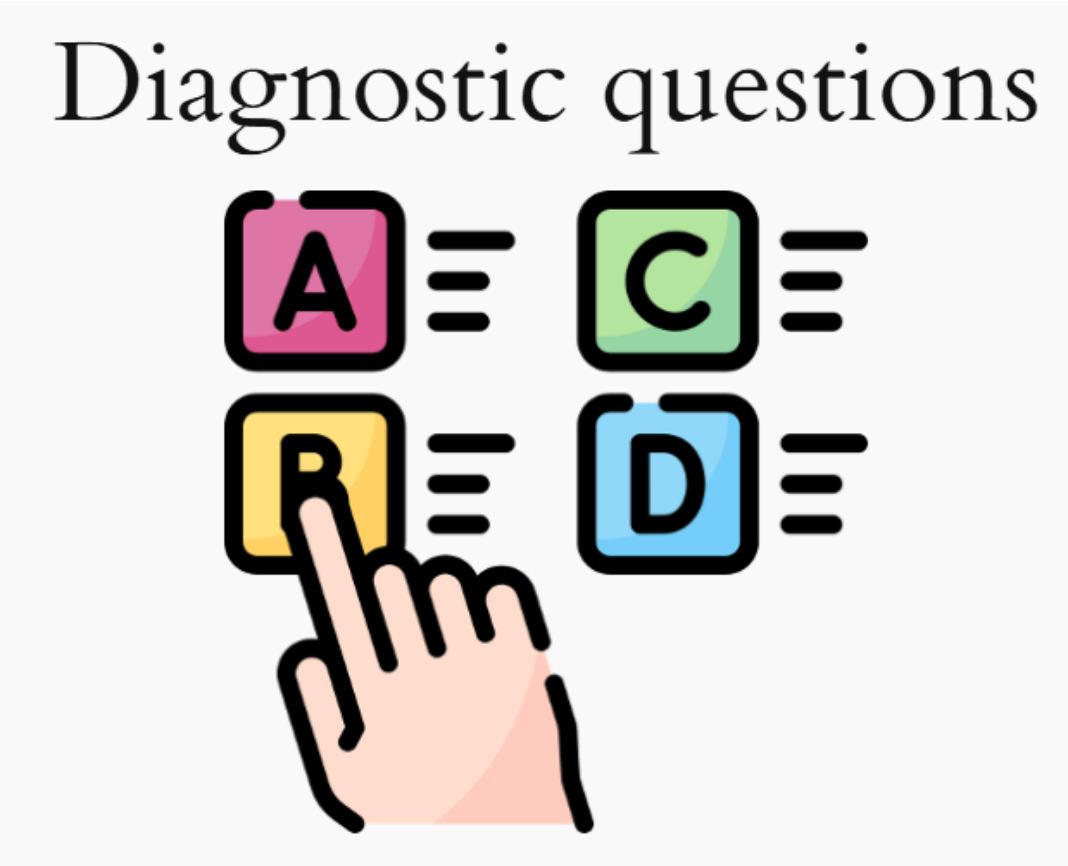
GEO-ACADEMY
GEO-Hub for teachers in Europe

https://portal.geoacademy.eu/

So today we will look at three topics.

But there is, of course, **much more to discover** on the Geo-Academy platform...

So, let's start with the first topic...



There is a lot of good background information on diagnostic questions:

Tips for Teachers website:

Tips for Teachers

https://tipsforteachers.co.uk/diagnostic-questions/

https://diagnosticquestions.com/

And for formative assessment purposes, you can create your own diagnostic questions:

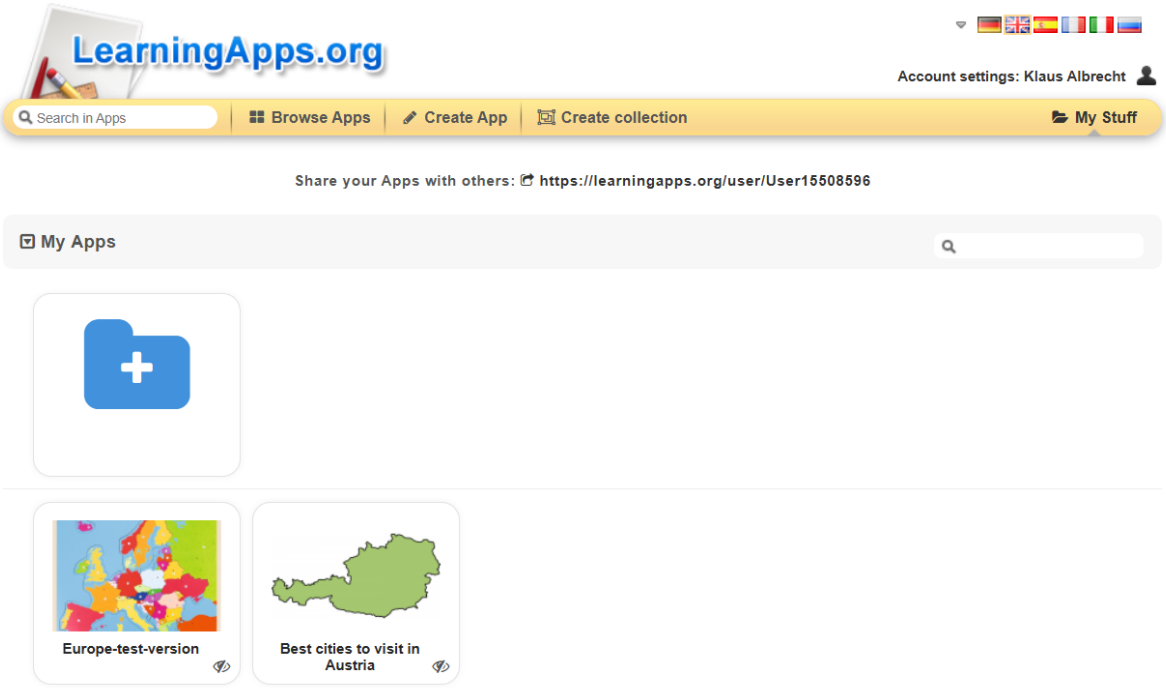
https://learningapps.org/

1) I will show you an **example** of a diagnostic question.
2) I will show you how to **create** a diagnostic question.
3) We all try to **make** a diagnostic question
   (first part of the workshop)

1) I will show you an **example** of a diagnostic question.

https://learningapps.org/watch?v=pse6371o525

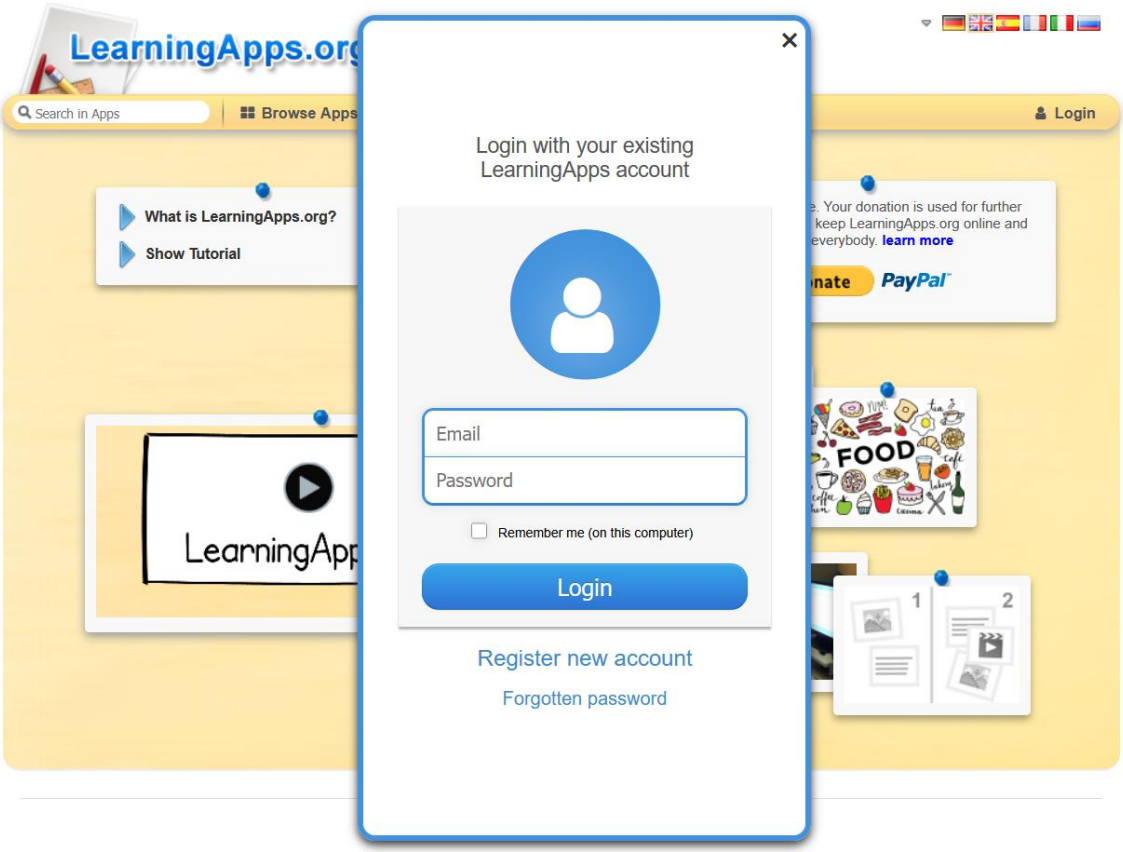
2) I will show you how to **create** a diagnostic question.



3) We all try to **make** a diagnostic question

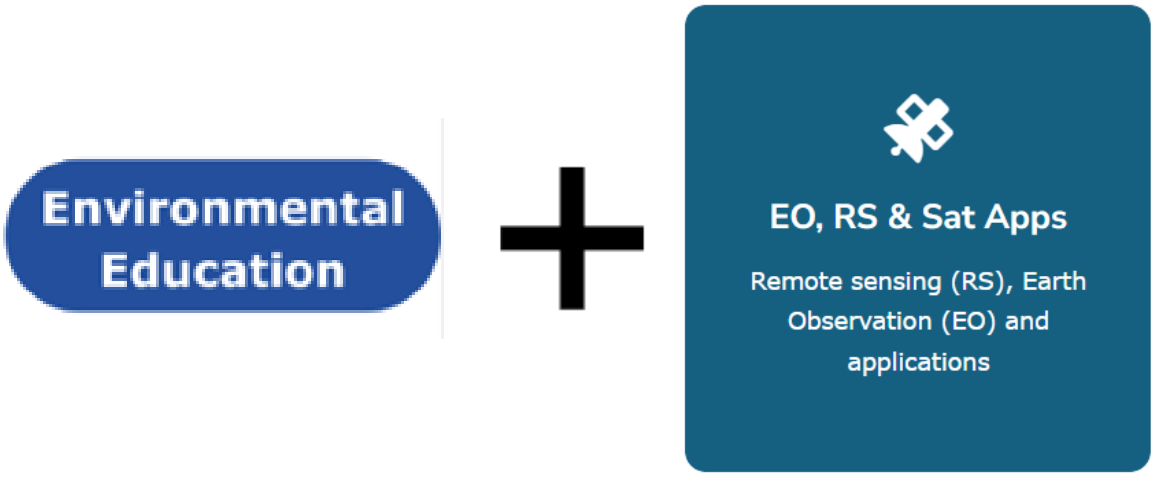
Create an account at LearningApps.org

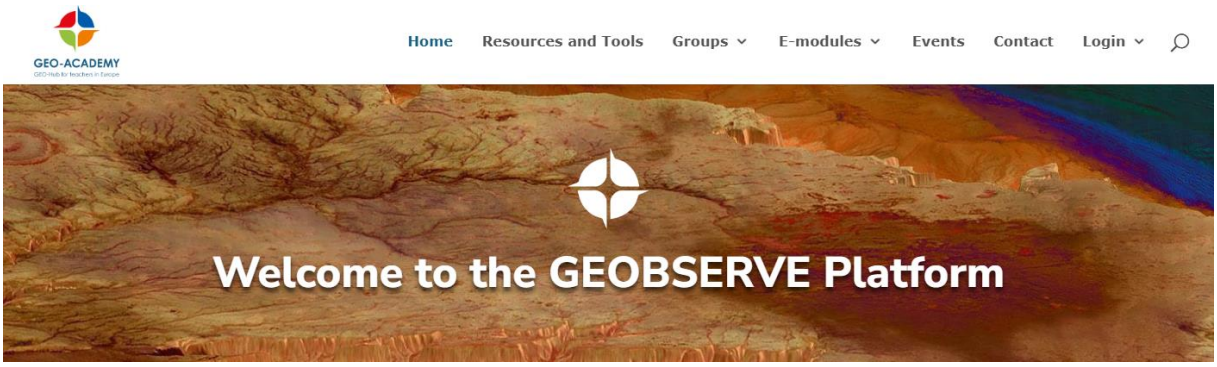
GO TO: https://learningapps.org/



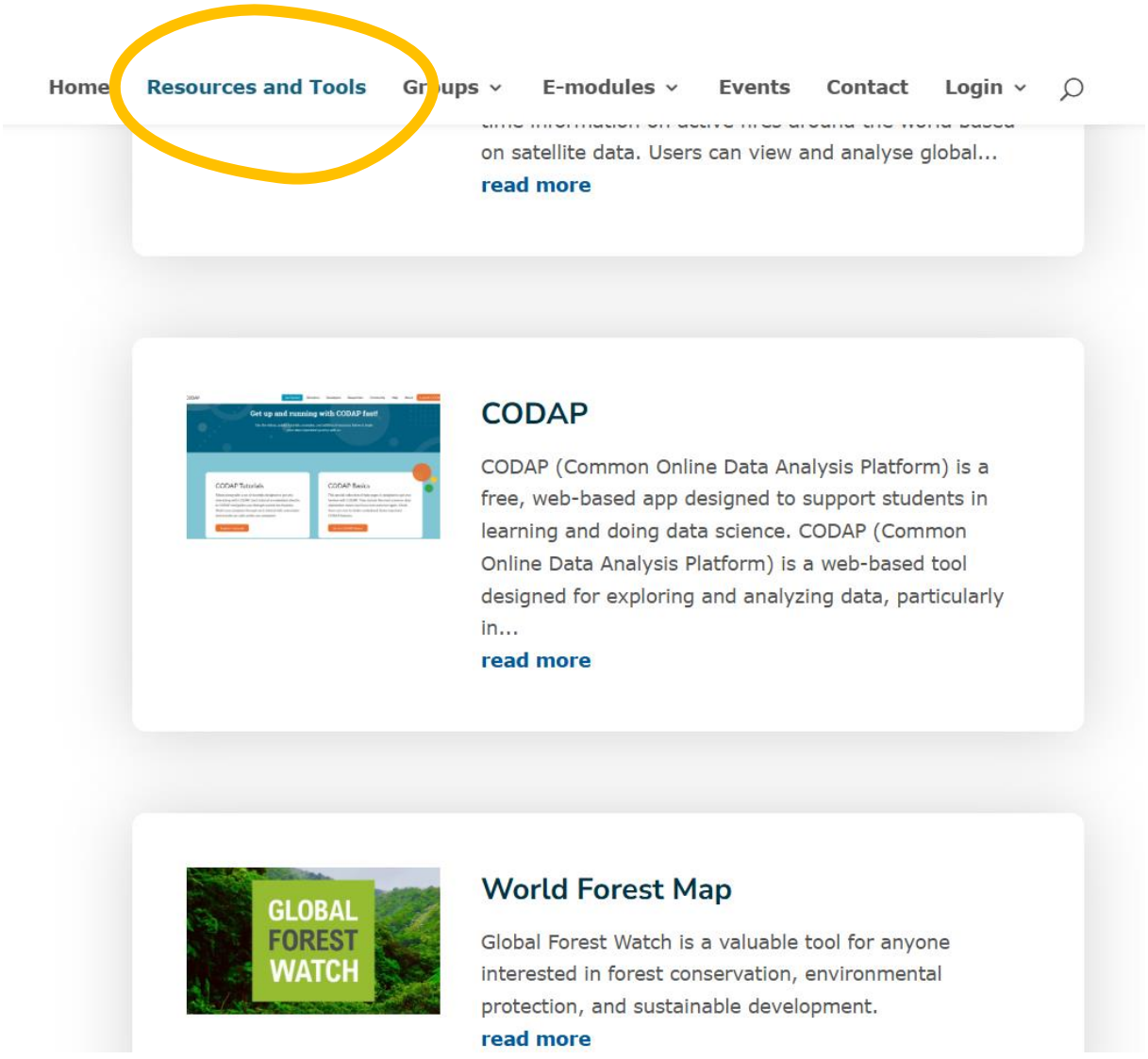
Now let’s move on to the second topic …

Data analysis with CODAP





https://portal.geoacademy.eu/



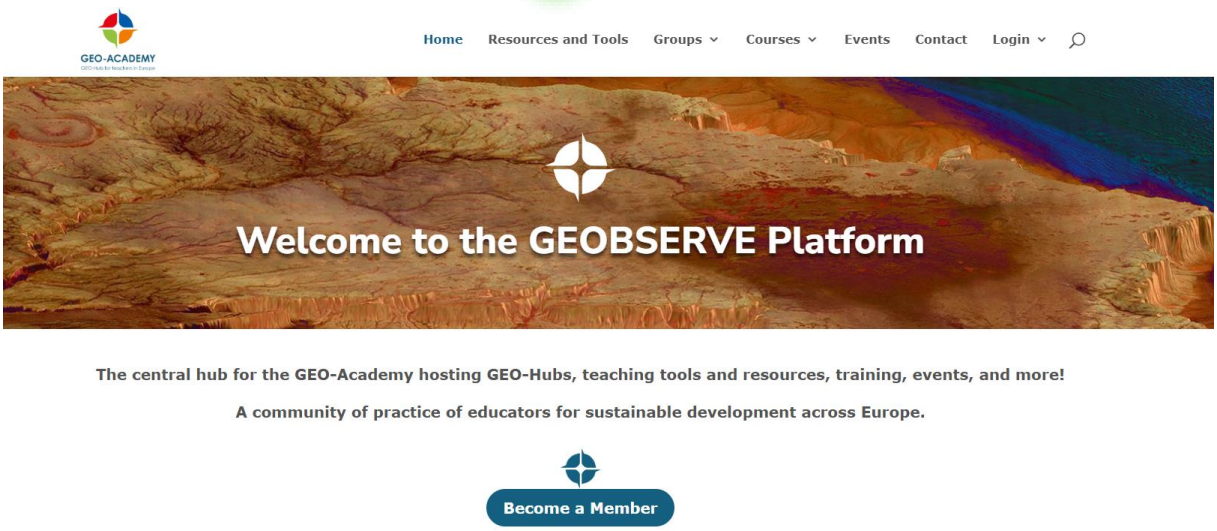
Here, too, we will master the following three steps together ...

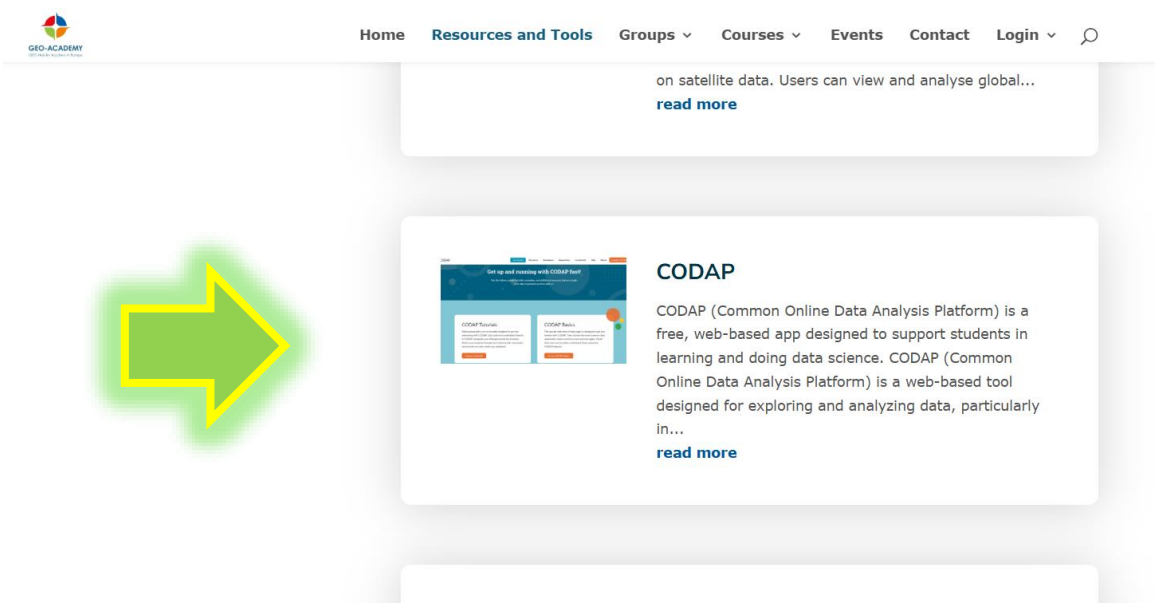
- **INPUT PHASE** (lean back, relax and watch as I guide you through the first part of the session)

- **EXAMPLES**: Together, we will work on the examples, which were presented before.

- **PRACTICE**: Now it just needs a lot of practice.

https://portal.geoacademy.eu/





CODAP = Common ...

Online **D**ata **A**nalysis **P**latform

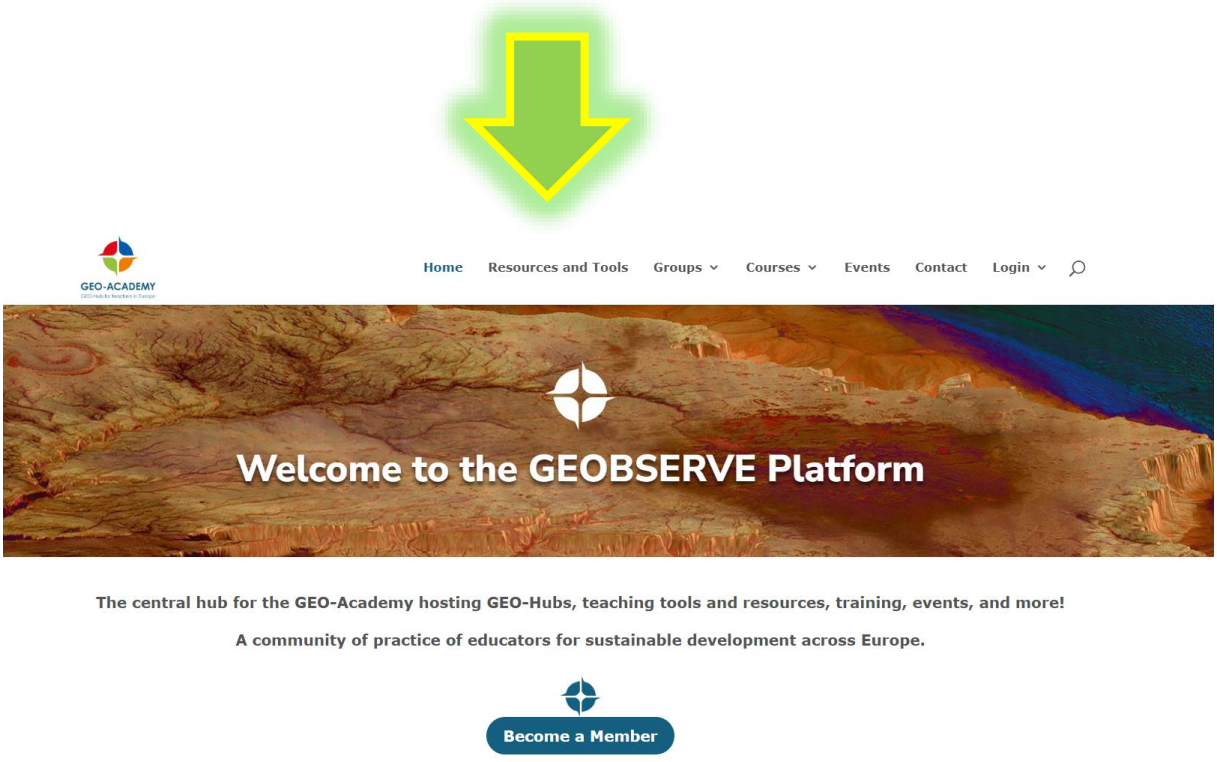
Air quality

A forest fire could affect air quality in a nearby town.

Let’s see …

Bighorn Wildfire | near Tucson, Arizona | from June 5 to July 23, 2020

AGAIN …



Resources and Tools

read more

FIRMS

https://firms.modaps.eosdis.nasa.gov/map The FIRMS website is a tool provided by NASA's Fire Information for Resource Management System. It provides near real-time information on active fires around the world based on satellite data. Users can view and analyse global...

read more

CODAP

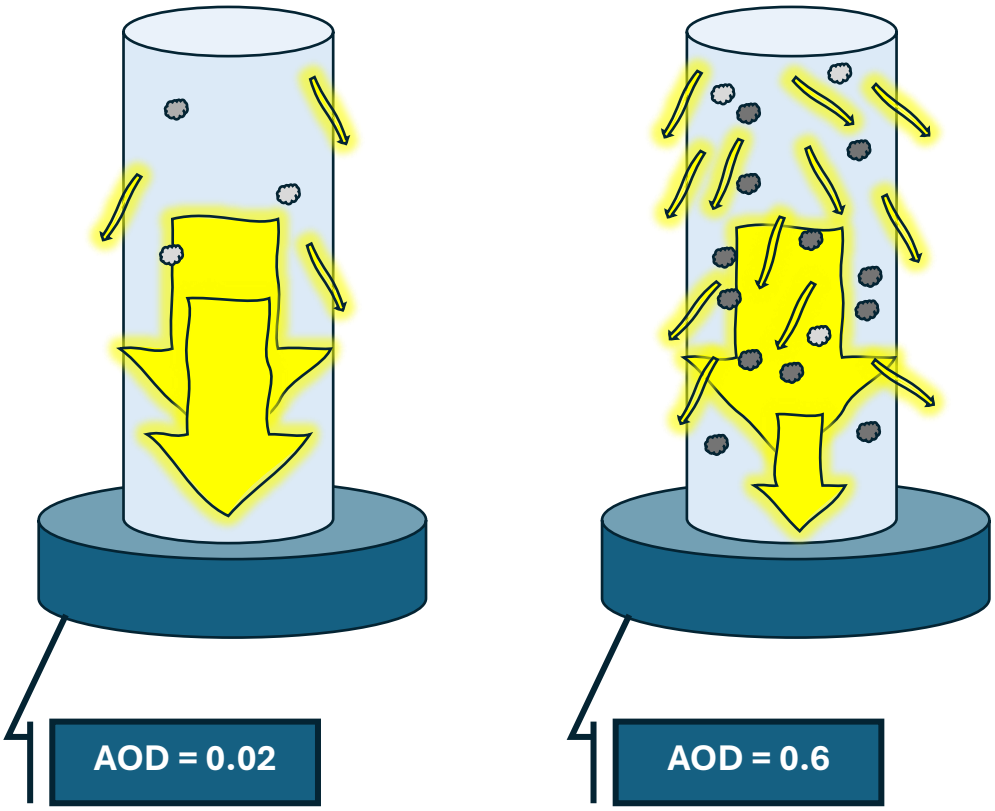
CODAP (Common Online Data Analysis Platform) is a

https://firms.modaps.eosdis.nasa.gov/map/

https://firms.modaps.eosdis.nasa.gov/map/

5 June to 23 July 2020, Tucson, Arizona

Aerosol Optical Depth (AOD)



The data were collected by NASA's Terra satellite and accessed through the myNASAdata website.

GEO-ACADEMY

Home Resources and Tools Groups Courses Events Contact Login

The central hub for the GEO-Academy hosting GEO-Hubs, teaching tools and resources, training, events, and more!

A community of practice of educators for sustainable development across Europe.

Become a Member

my NASA data

My NASA Data is an educational platform designed to make NASA's Earth science data accessible to students, educators, and lifelong learners. The website offers a wealth of resources, including interactive tools, lesson plans, and real-world data sets, to support the...

read more

TERRA

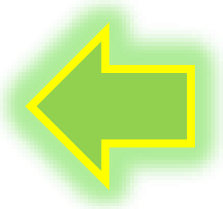
Terra is a key NASA mission dedicated to studying Earth's systems from space, providing vital data for understanding our planet's climate, environment, and natural processes. Launched in 1999, the Terra satellite carries a suite of advanced scientific instruments that...

read more

Voilà, here are the data:

Download the data and save the file on your computer (for later use):

Data.csv



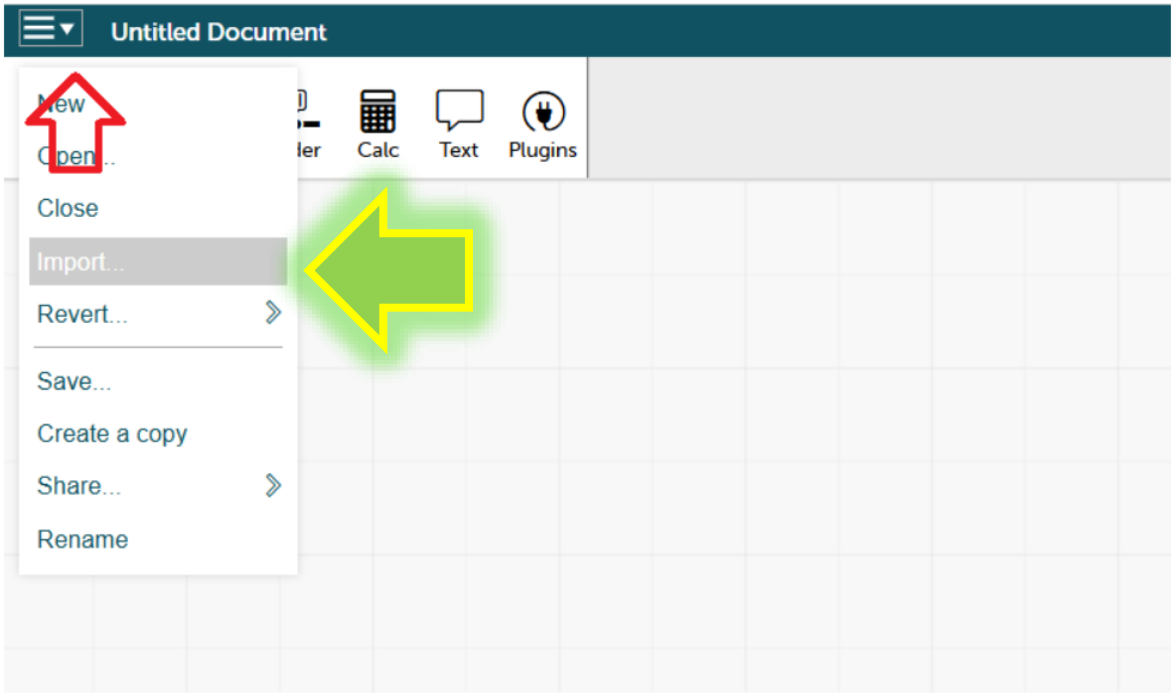
https://codap.concord.org/

Go to: https://codap.concord.org/

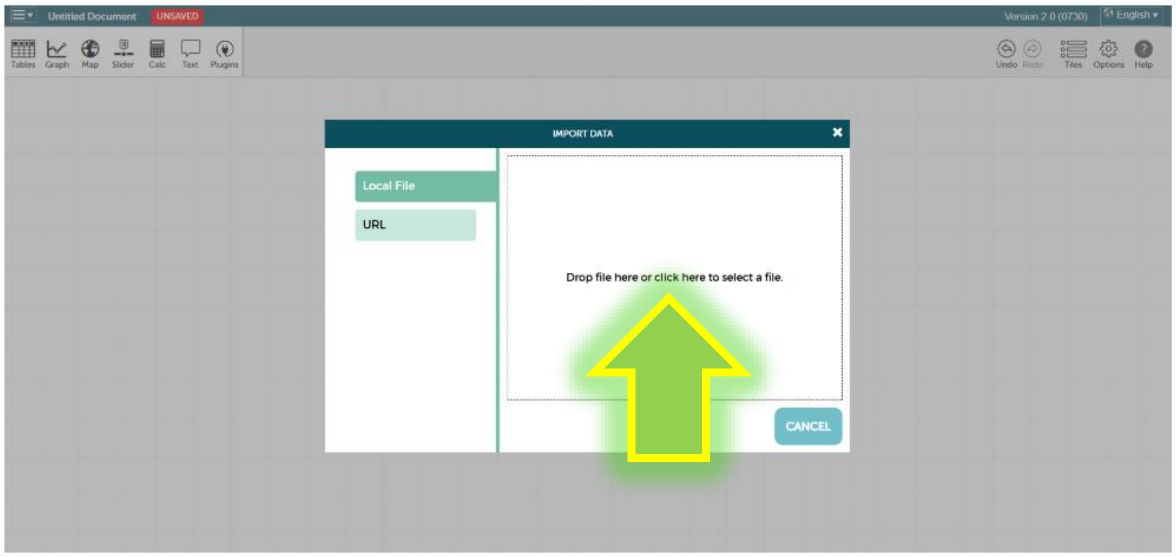
Launch CODAP ...

CREATE NEW DOCUMENT

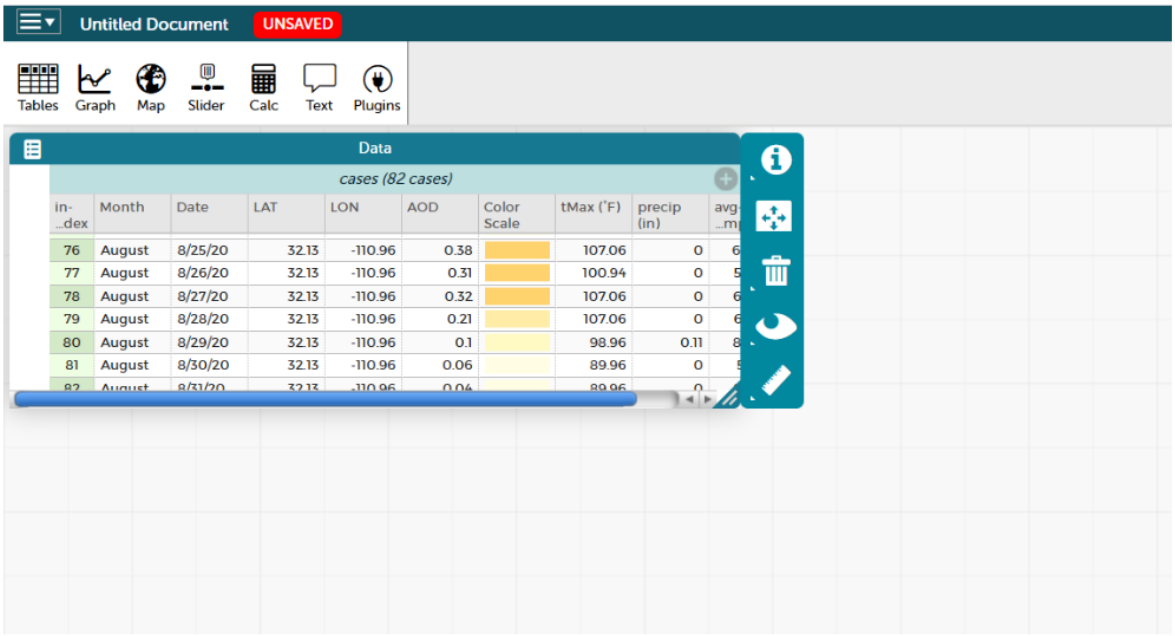
Drop-down menu in the top left-hand corner and then select ‘Import ...’.



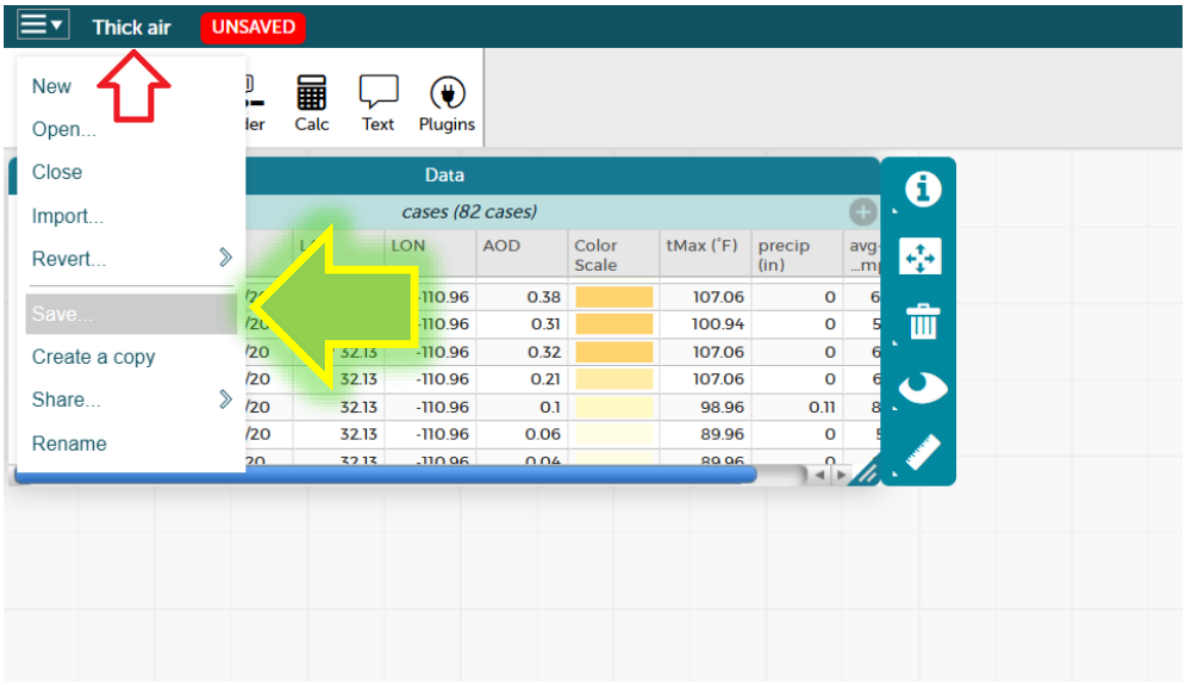
We select the data file previously downloaded ...



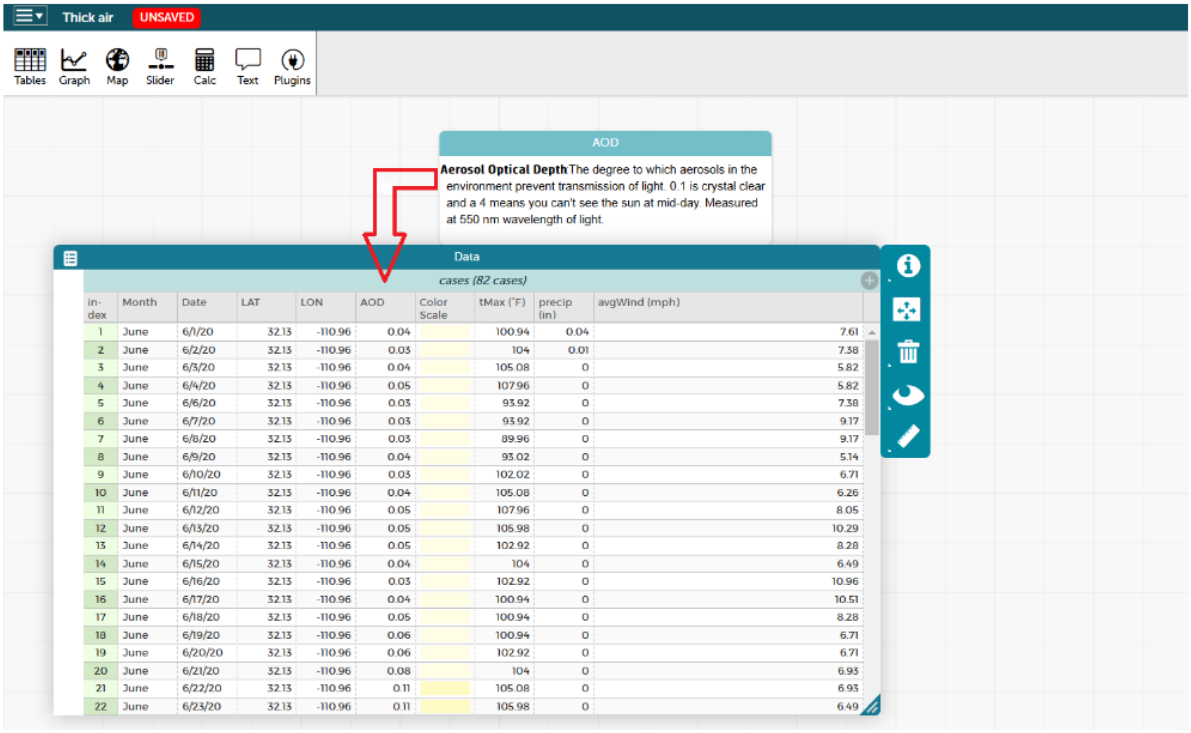
If everything went well, the data sets will now appear in the programme:



Now it is time to give our document a name and save it:

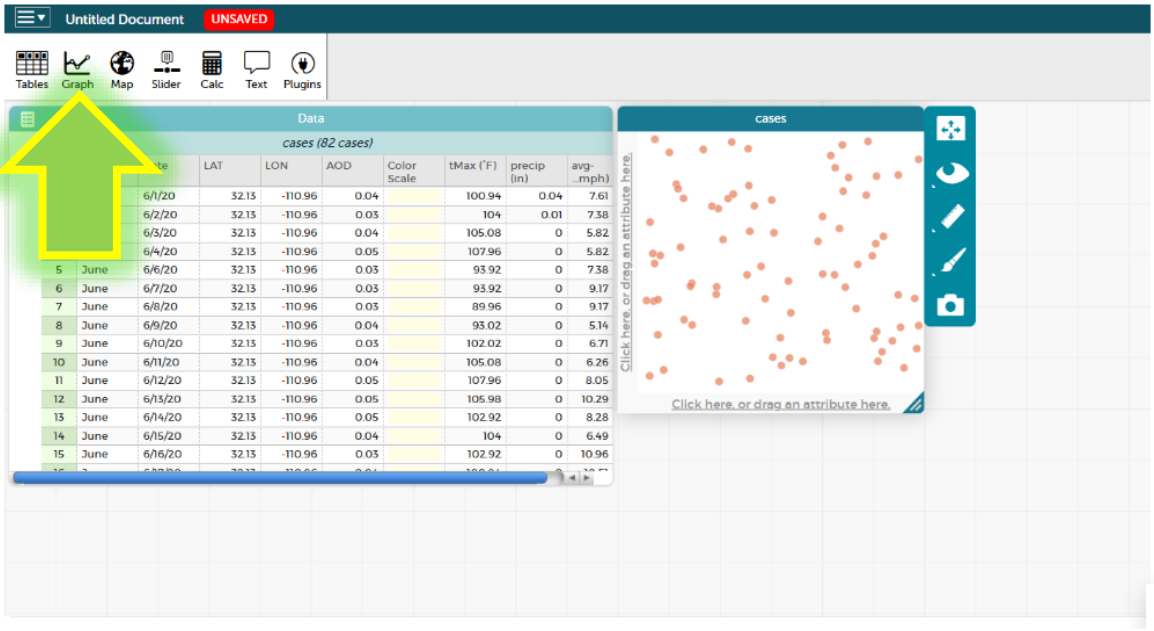


When you hover your mouse over the data field, information is displayed ...

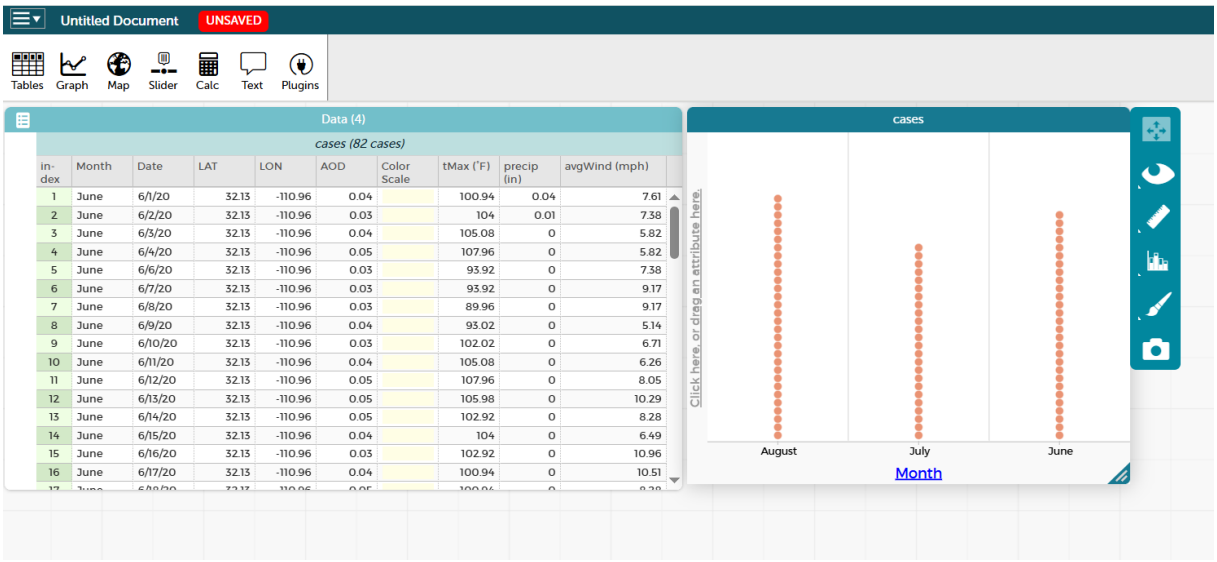


index	Month	Date	LAT	LON	AOD	Color Scale	tMax (°F)	precip (in)	avgWind (mph)
1	June	6/1/20	32.13	-110.96	0.04		100.94	0.04	7.61
2	June	6/2/20	32.13	-110.96	0.03		104	0.01	7.38
3	June	6/3/20	32.13	-110.96	0.04		105.08	0	5.82
4	June	6/4/20	32.13	-110.96	0.05		107.96	0	5.82
5	June	6/6/20	32.13	-110.96	0.03		93.92	0	7.38
6	June	6/7/20	32.13	-110.96	0.03		93.92	0	9.17
7	June	6/8/20	32.13	-110.96	0.03		89.96	0	9.17
8	June	6/9/20	32.13	-110.96	0.04		93.02	0	5.14
9	June	6/10/20	32.13	-110.96	0.03		102.02	0	6.71
10	June	6/11/20	32.13	-110.96	0.04		105.08	0	6.26
11	June	6/12/20	32.13	-110.96	0.05		107.96	0	8.05
12	June	6/13/20	32.13	-110.96	0.05		105.98	0	10.29
13	June	6/14/20	32.13	-110.96	0.05		102.92	0	8.28
14	June	6/15/20	32.13	-110.96	0.04		104	0	6.49
15	June	6/16/20	32.13	-110.96	0.03		102.92	0	10.96
16	June	6/17/20	32.13	-110.96	0.04		100.94	0	10.51
17	June	6/18/20	32.13	-110.96	0.05		100.94	0	8.28
18	June	6/19/20	32.13	-110.96	0.06		100.94	0	6.71
19	June	6/20/20	32.13	-110.96	0.06		102.92	0	6.71
20	June	6/21/20	32.13	-110.96	0.08		104	0	6.93
21	June	6/22/20	32.13	-110.96	0.11		105.08	0	6.93
22	June	6/23/20	32.13	-110.96	0.11		105.98	0	6.49

If you now click on the “Graph” menu, you will see the entire, unorganized “data cloud.”



To organize the data, we need to drag the “Month” attribute to the horizontal axis.



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9	June	6/10/20	32.13	-110.96	0.03		102.02	0	6.71
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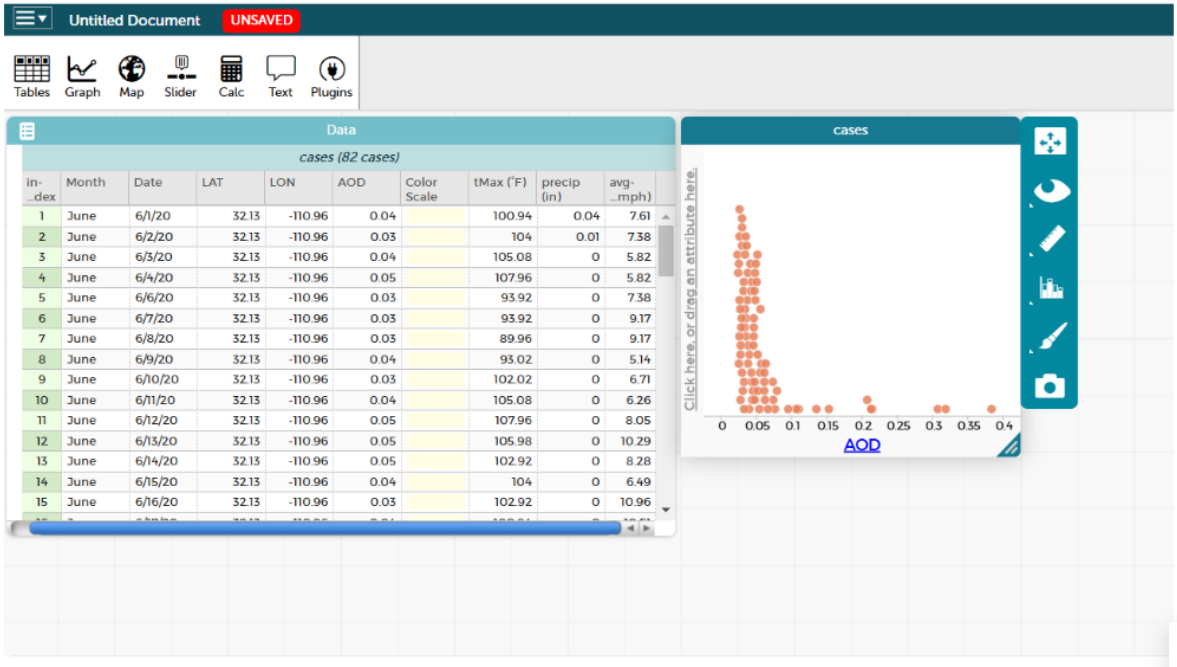
14	June	6/15/20	32.13	-110.96	0.04		104	0	6.49
15	June	6/16/20	32.13	-110.96	0.03		102.92	0	10.96
16	June	6/17/20	32.13	-110.96	0.04		100.94	0	10.51

Now let's drag the AOD attribute onto the horizontal axis:



in-..dex	Month	Date	LAT	LON	AOD	Color Scale	tMax (°F)	precip (in)	avg-..mph)
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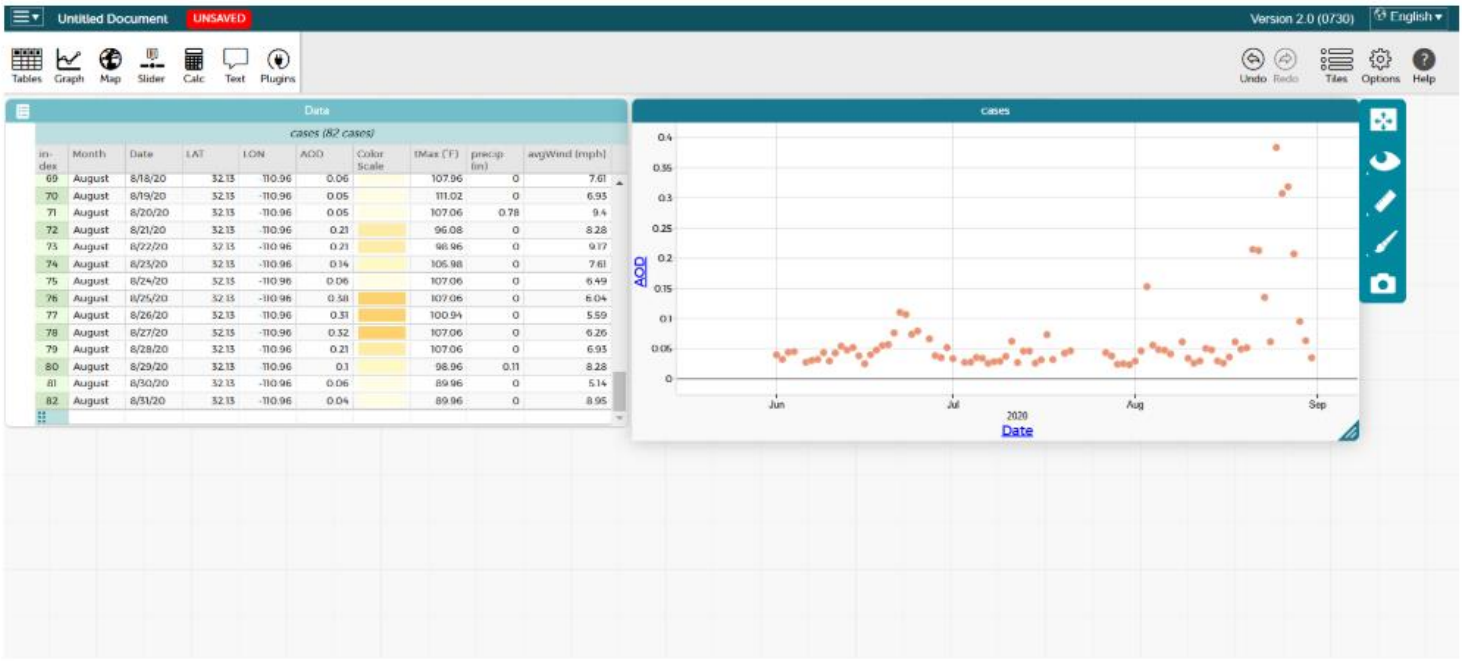
11	June	6/12/20	32.13	-110.96	0.05		107.96	0	8.05
12	June	6/13/20	32.13	-110.96	0.05		105.98	0	10.29
13	June	6/14/20	32.13	-110.96	0.05		102.92	0	8.28
14	June	6/15/20	32.13	-110.96	0.04		104	0	6.49
15	June	6/16/20	32.13	-110.96	0.03		102.92	0	10.96

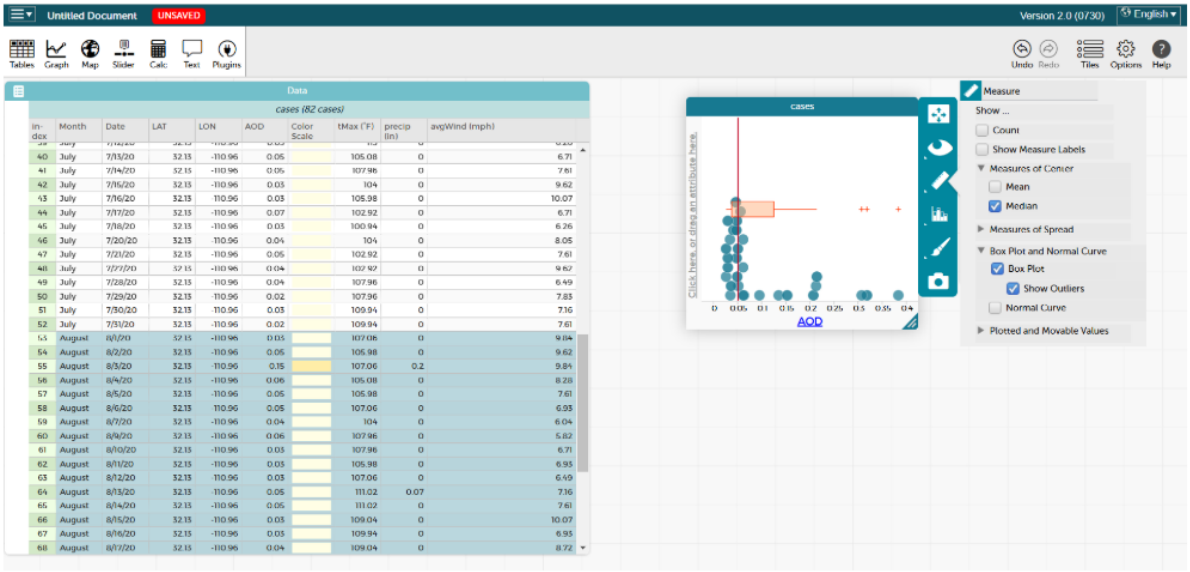
QUESTION:

How did the AOD values change during the fire period?



CODAP provides advanced users with valuable tools:

Mean, Median, and **Box Plot** are displayed with just a few mouse clicks!



The data analysis must then be interpreted with the students:

I wanted to find out about the optical depth categories of aerosols at 550 nm. For example, what does it mean if the value is below, say, 0.05. Can you provide me with a general categorization table for this?

Aerosol Optical Depth (AOD) at 550 nm quantifies the degree to which aerosols in the atmosphere prevent the transmission of sunlight by absorption or scattering. AOD values range from 0 (completely clear sky) to 1 or more (very hazy conditions).

While there isn't a universally standardized categorization for AOD values, a general classification is as follows:

- **AOD < 0.1**: Clear conditions with minimal aerosol presence.
- **0.1 ≤ AOD < 0.25**: Light aerosol loading, typical of background conditions.
- **0.25 ≤ AOD < 0.4**: Moderate aerosol presence, indicating noticeable haze.
- **AOD ≥ 0.4**: High aerosol loading, leading to significant haze and reduced visibility.

Making sense of data

Note: This dataset is intended for students to find no effect of the wildfire on the AOD for Tucson, Arizona.

The AOD data here are not elevated due to the wildfire. This dataset can be used to help students understand that approaching a dataset with bias or expectation can influence what one finds in the data. There are some higher AOD values toward the end of the data, which students may assume represent the fire.

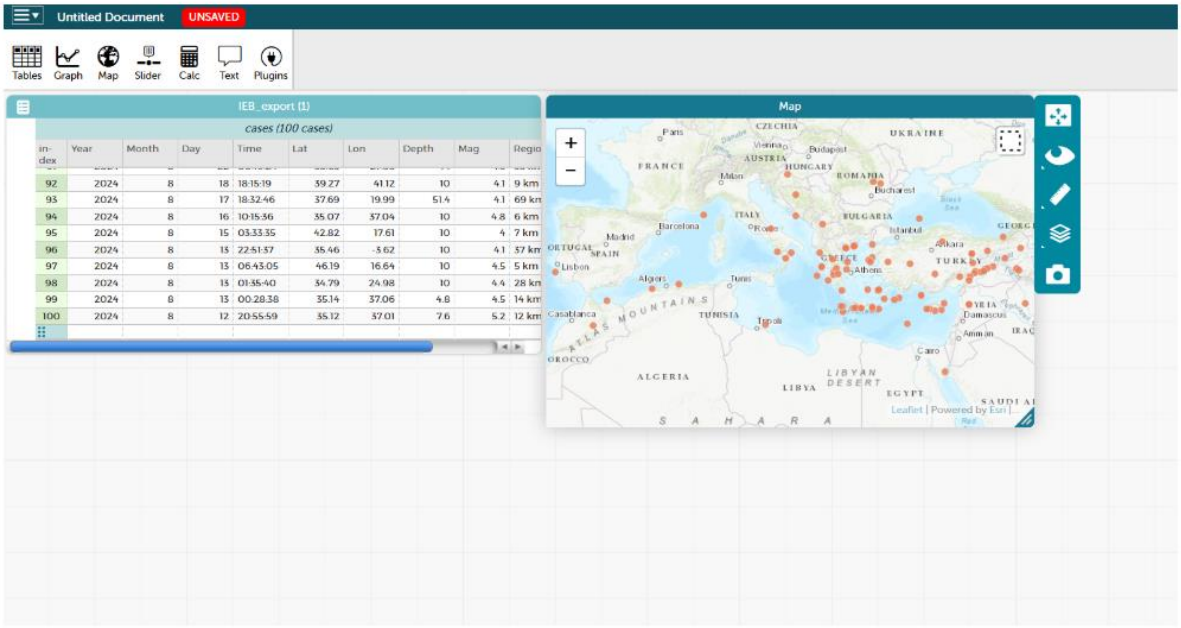
Deliberate Practice and a second example about ...

Earthquakes

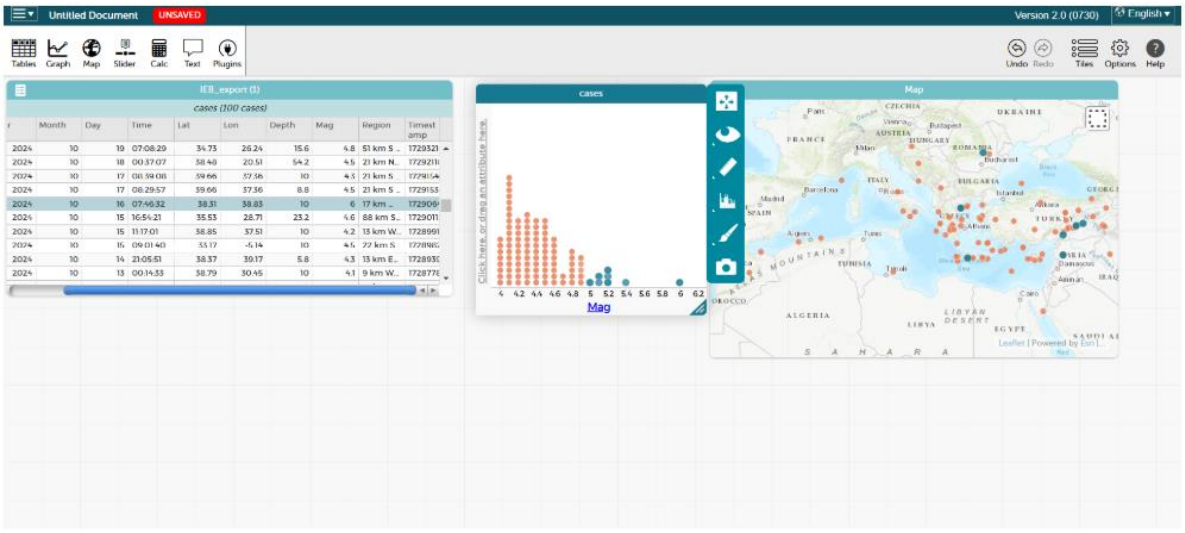
Data Set is here:

[earthquakes.csv]

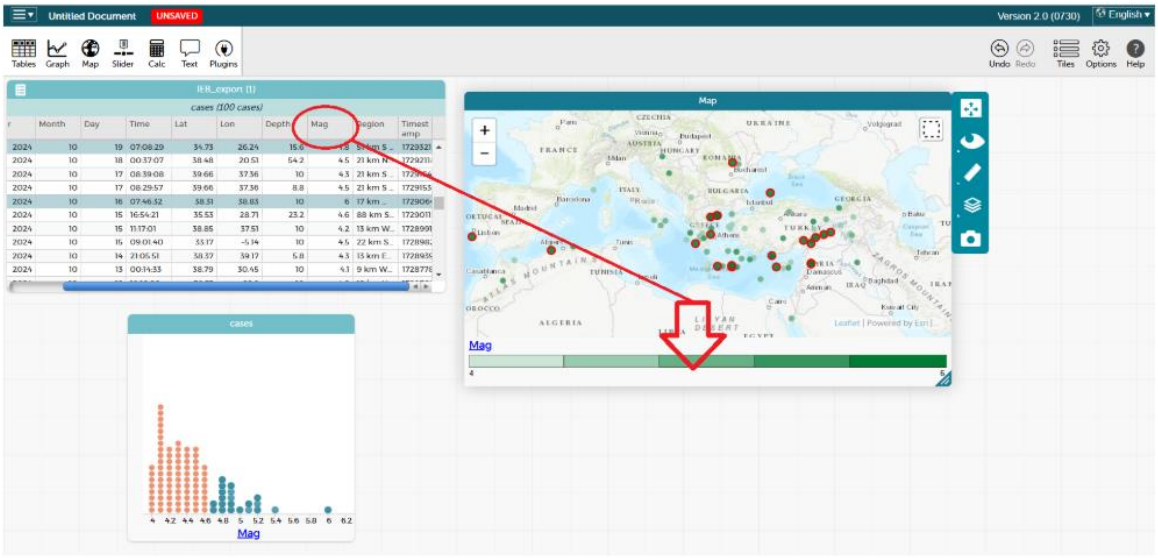
Firstly: Import data



Then: Organise the pile of data



What happens when you drag the ‘Mag’ attribute to the Map with the mouse?

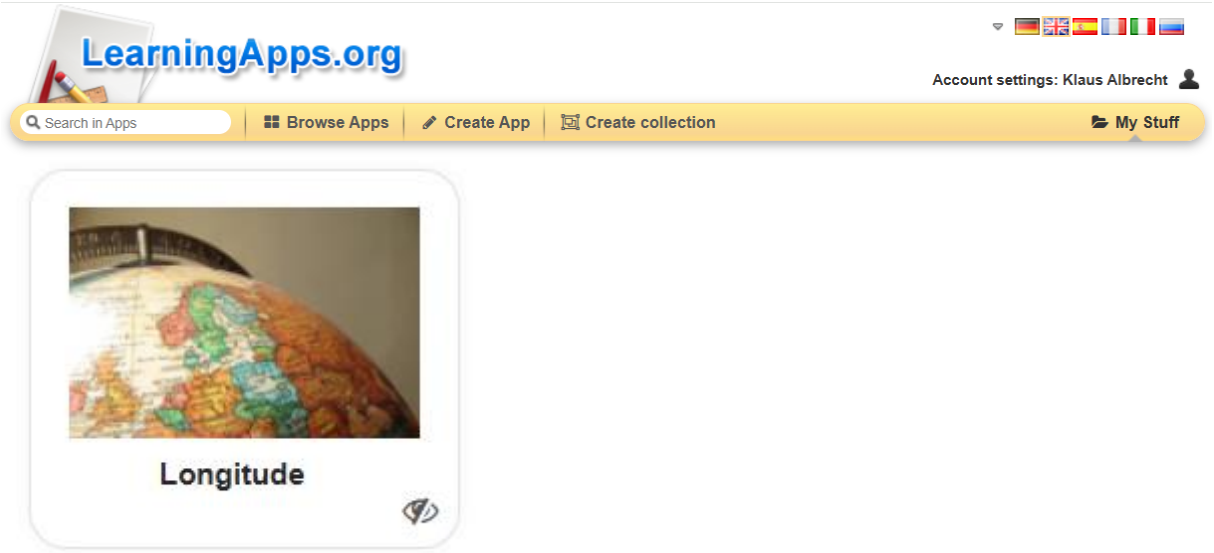


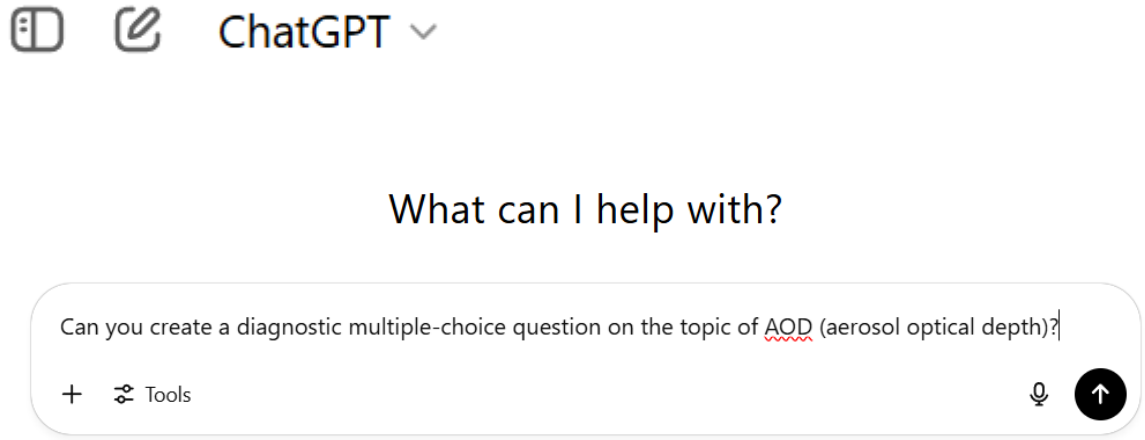
Before we continue, let's take a look back (LearningApps.org)

That's **Retrieval Practice** in action!

Here's a **diagnostic multiple-choice question** about **longitude and latitude** that reveals common misconceptions and is useful at the start of a unit:

https://learningapps.org/watch?v=p1cks3hmn25





Let's work together to implement the diagnostic question suggested by ChatGPT ...

Go to ...


LearningApps.org
Search in Apps
Browse Apps
Create App
Create collection
Login
have an idea
pick a template
fill in content
save your App
share it
Matching Pairs
Group assignment
Time line
Simple order
Freetext input
Matching Pairs on Images
Multiple-Choice Quiz
Cloze text

Certainly! Here's a **diagnostic multiple-choice question** designed to assess students' conceptual understanding of **Aerosol Optical Depth (AOD)**:

Question:
Which of the following best describes what a high Aerosol Optical Depth (AOD) value indicates?

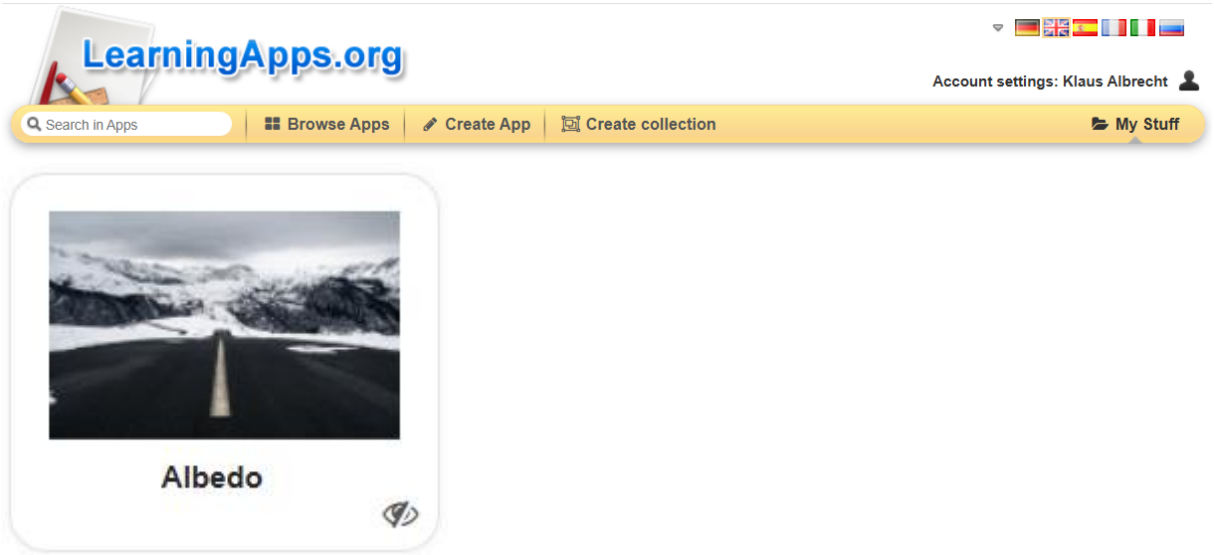
A. The air is very clear and has few aerosols.
B. The atmosphere contains a large number of aerosols that reduce the passage of sunlight.
C. The surface reflectance of the Earth is high due to desert regions.
D. There is a low level of atmospheric water vapor.

Correct Answer:
B. The atmosphere contains a large number of aerosols that reduce the passage of sunlight.

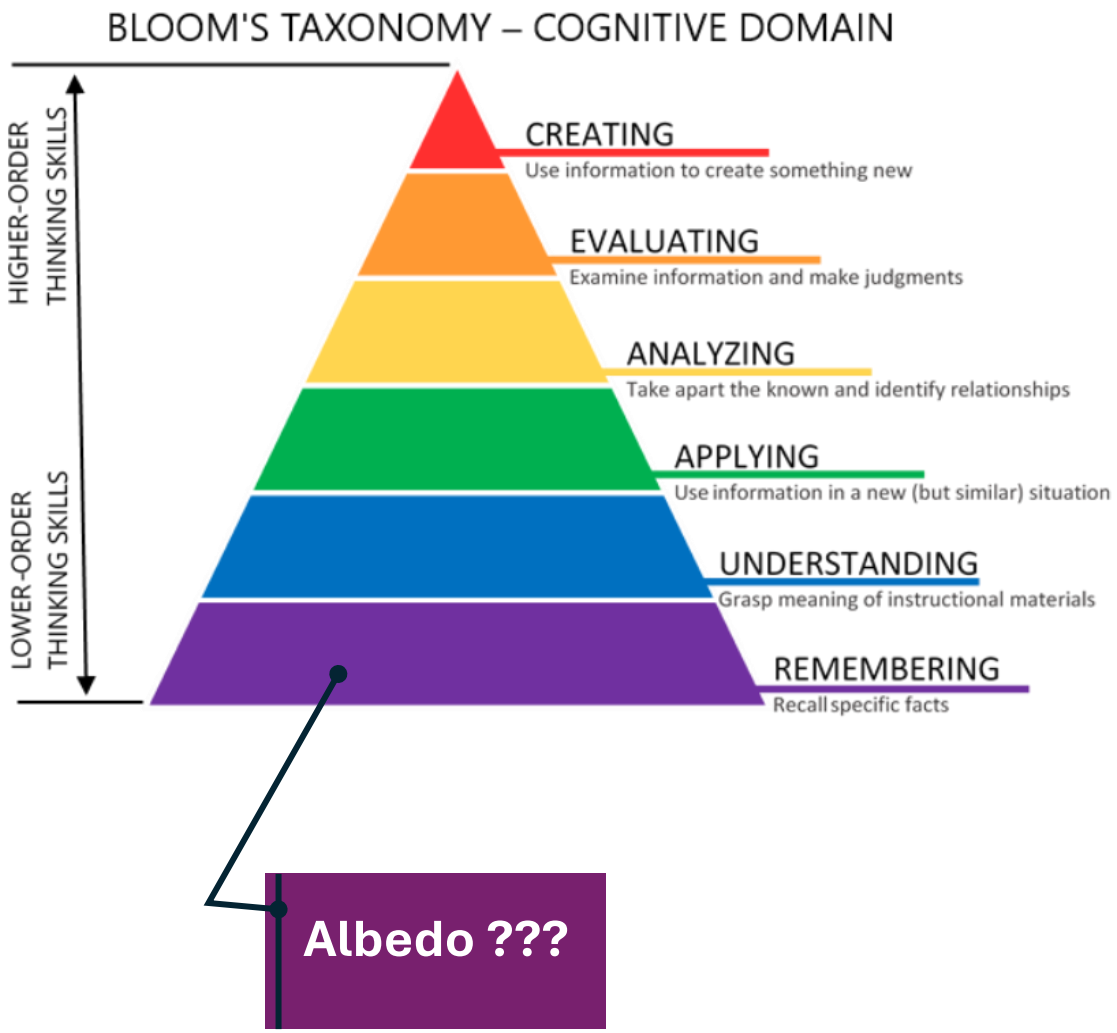
Diagnostic questions are also ideal for testing students' prior knowledge ...

Prerequisite Knowledge

https://learningapps.org/watch?v=pk5wycaca25



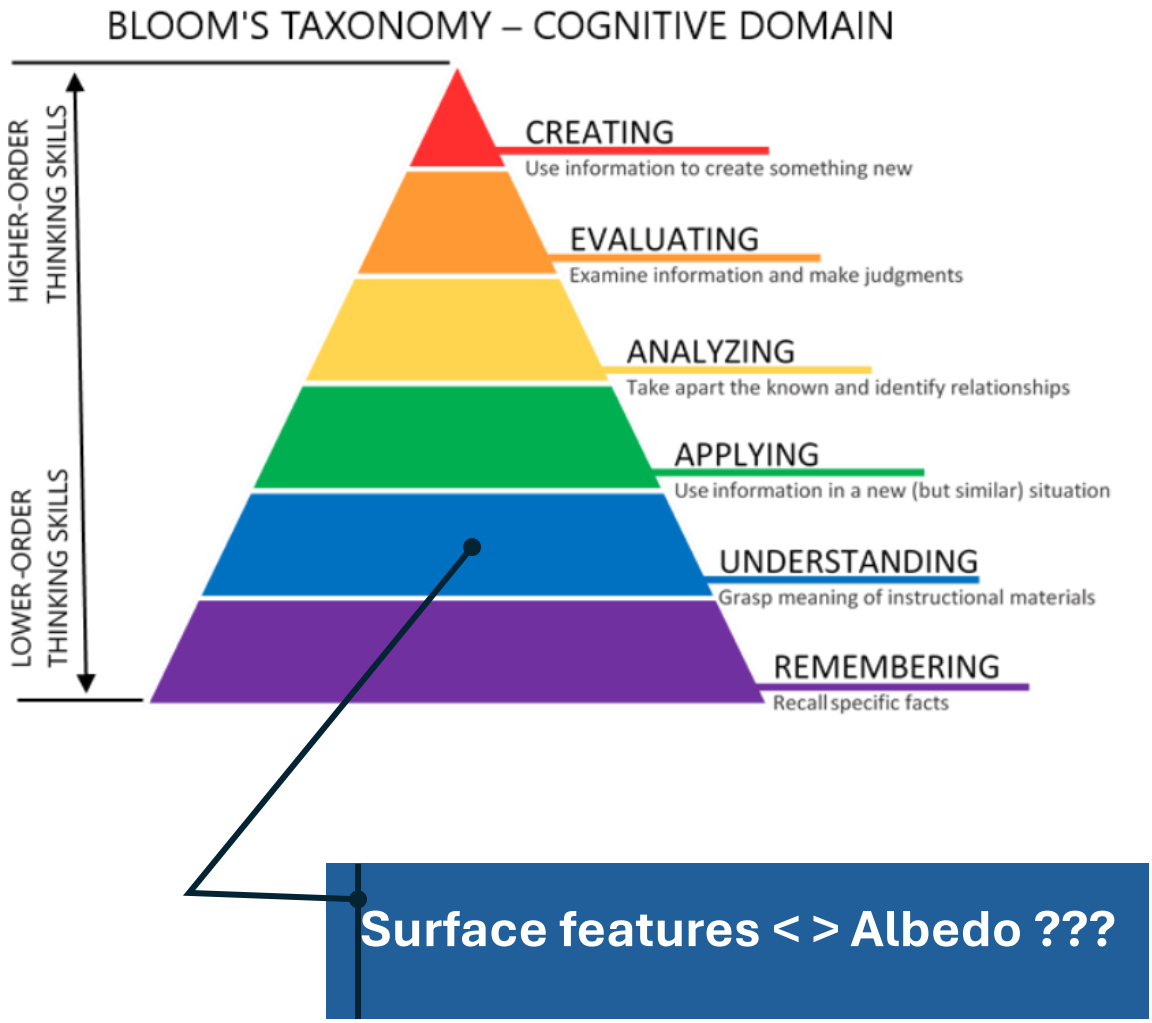
This demonstrates the importance of **knowledge building blocks** (at the “lower end” of Benjamin Bloom's taxonomy) in a broad spectrum of knowledge areas (“Unified Competence Framework”).



Understanding ...

What could be meant by a “**positive feedback loop**” in the context of surfaces and their albedo values?

This is the “next level” in Bloom's taxonomy – understanding. To answer the above question, it is necessary to have some basic knowledge.



To spark our students' interest...

Real world examples ...

Albedo plays a crucial role in regulating Earth's temperature. Changes in albedo affect how much solar energy is absorbed or reflected, which directly influences the **intensity of the greenhouse effect** and **climate change**.

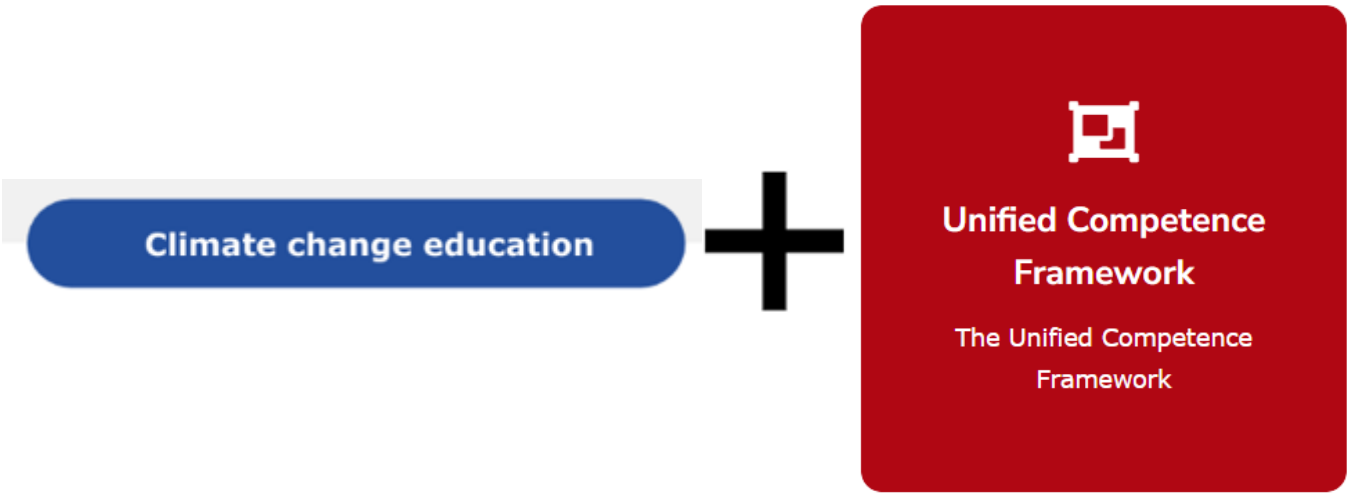
To better understand our complex world …

Direct Instruction is best!

https://my.chartered.college/wp-content/uploads/2018/08/Direct-Instruction.pdf

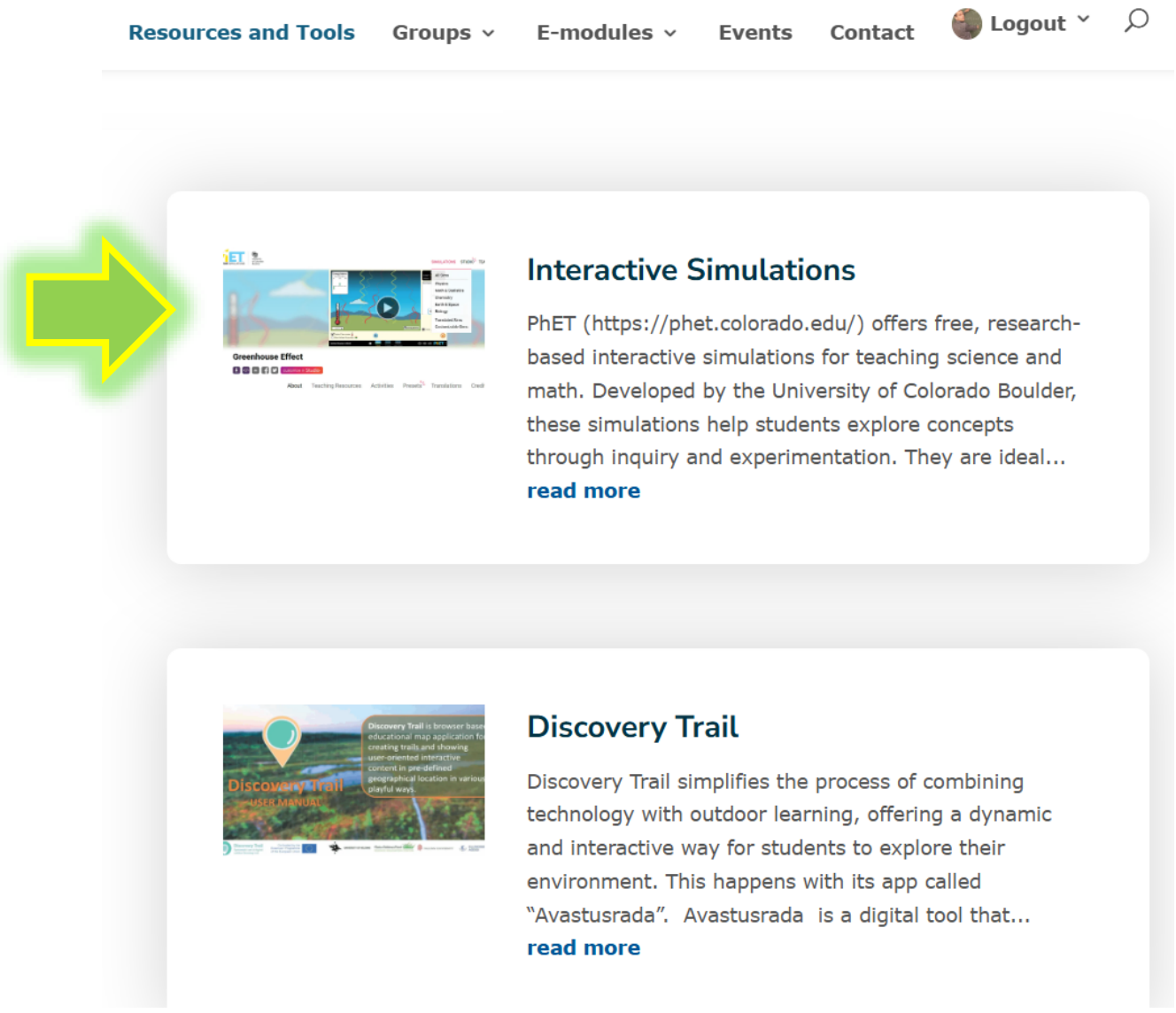
This takes us to our third topic:

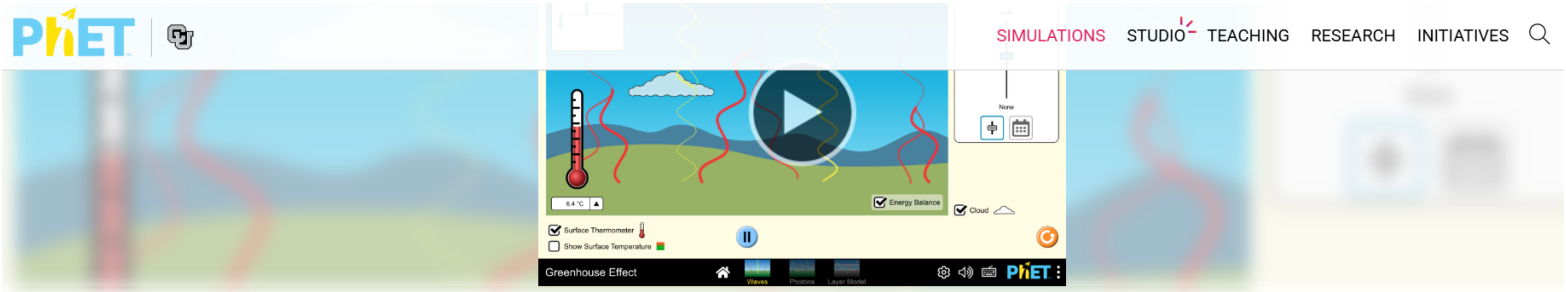
Data modeling & simulations



You can find a great tool for data modelling and simulations here …

https://portal.geoacademy.eu/resources-and-tools/





Greenhouse Effect

Customize in Studio

About | Teaching Resources | Activities | Presets | Translations | Credits

Topics

- Greenhouse Gases
- Thermal Equilibrium

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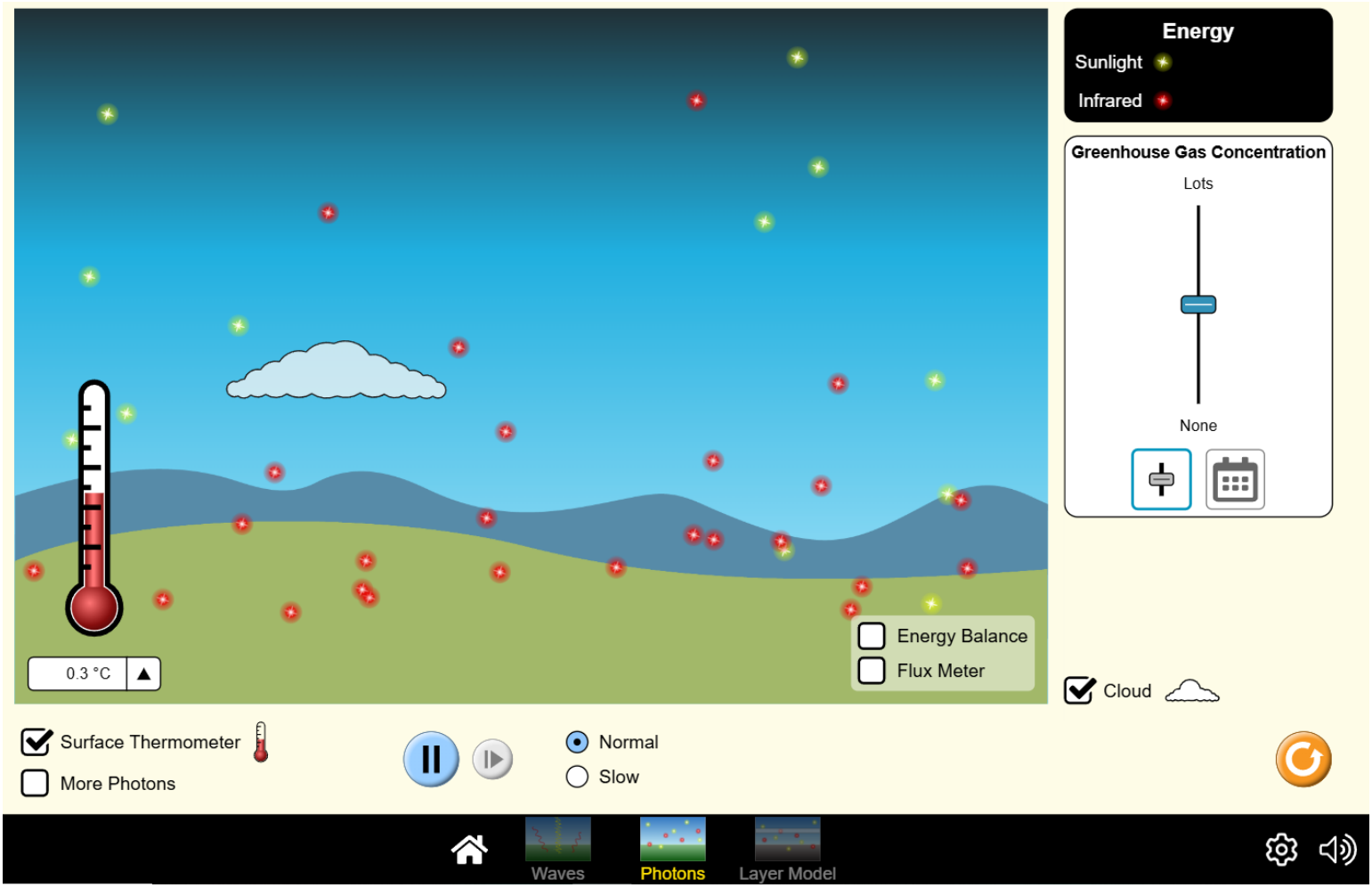
https://phet.colorado.edu/

During Direct Instruction, you can use the simulation to explain quite complex, interrelated topics, such as the ...

Greenhouse Effect

Climate change education



"The tricky part here is getting students **not just to goof around** with the simulation, but to get things done!"

To achieve this, you can do the following (five steps):

1

Practice the necessary basic key knowledge (= Retrieval Practice)

For example, students should **know what photons** are.

2

Instruct the students on what they need to pay attention to during the simulation (= Direct Instruction).

3

Ask key questions to check understanding. (= Diagnostic Questions)

For example:

Why do red photons sometimes change direction and yellow photons not?

Why do some yellow photons disappear on the ground?

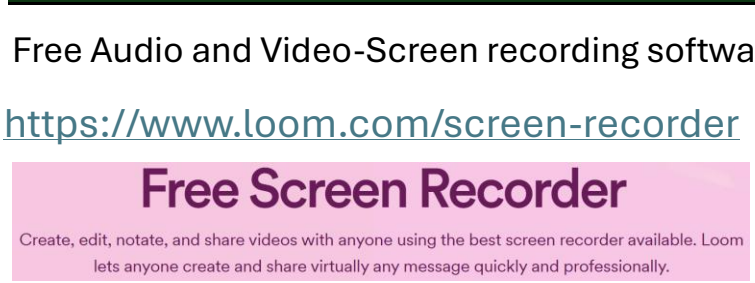
What would happen if no yellow photons were bouncing back to the sky?

4

All students record their individual answers using the simulation running on their own computers. They use recording software (for audio and screen video) for their explanation (audio recording) while the simulation runs on their own computer (computer screen recording).

Free Audio and Video-Screen recording software:

https://www.loom.com/screen-recorder



5

Collect some of the students' videos, play them in front of the whole class, and start an interactive discussion about them with the entire class (using “Cold Call” as well).

Further information on Cold Calling:

https://teacherhead.com/2021/02/07/cold-calling-the-1-strategy-for-inclusive-classrooms-remote-and-in-person/

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