GEO-ACADEMY

GEO-Hub for teachers in Europe

Innovative digital GEO-Tools for enhancing teachers' digital, green and spatial skills towards an effective STEAM Education for Sustainability Development

Strengthening students' spatial, digital, and green skills

Nikolaus Albrecht
University College of Teacher Education Tyrol, Austria

GEO-Academy is a Teachers' Academy project funded by the Erasmus+ Programme of the European Union. REF: ERASMUS-EDU-2022-PEX-TEACH-ACA under GA No. 101104693. The European Commission's support for the production of this publication does not constitute an endorsement of the contents, which reflect the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein

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

Our offer

Today you will see …

a selection of what **GEO-Academy** has to offer …

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

Geo-Academy Tour

This quick tour can only give you a rough overview.

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

Geo-Academy Tour

If you are interested in pursuing a topic further ...

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

Geo-Academy Tour

simply register on our website and gain access

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

Geo-Academy Tour

to our extensive range of resources

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

Geo-Academy Tour

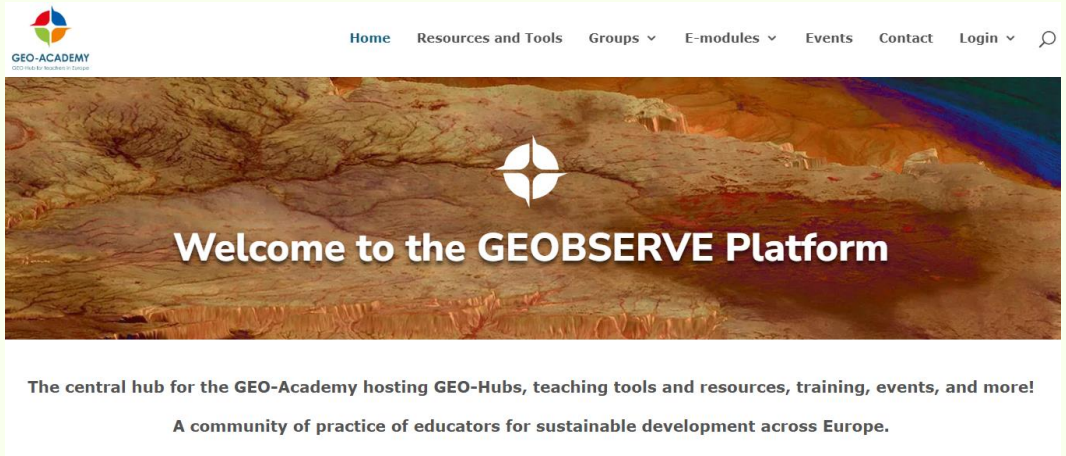
and e-learning modules for teachers.

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

Website

Main GEO-Academy website:

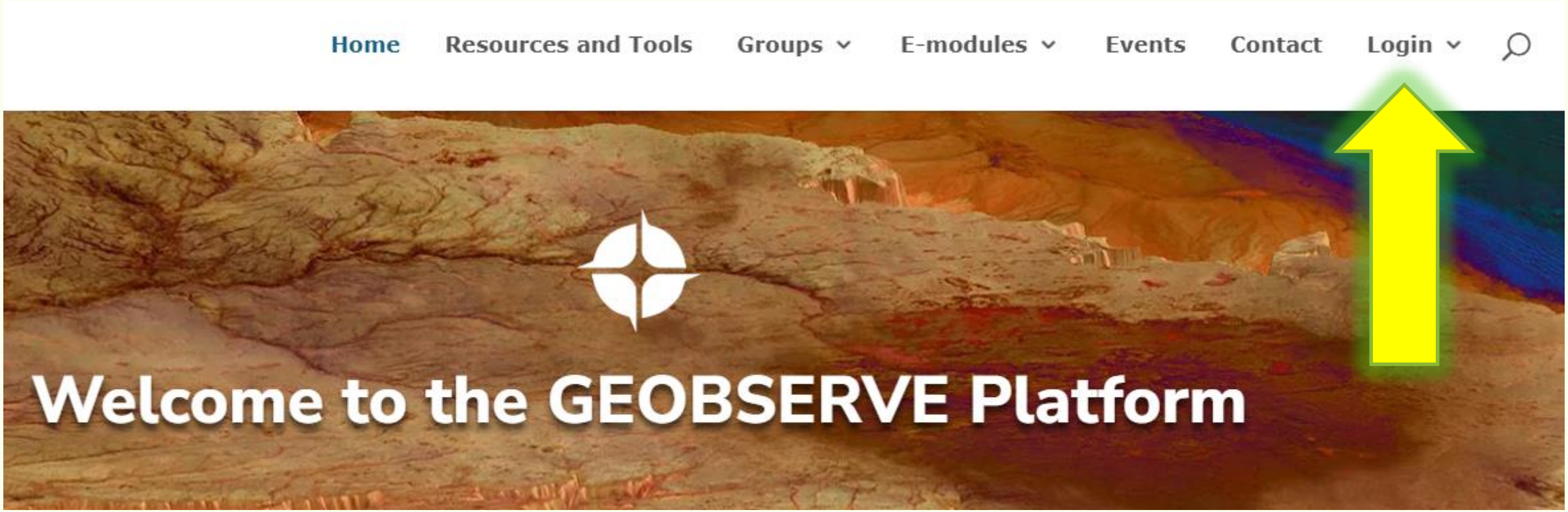
https://portal.geoacademy.eu/



French

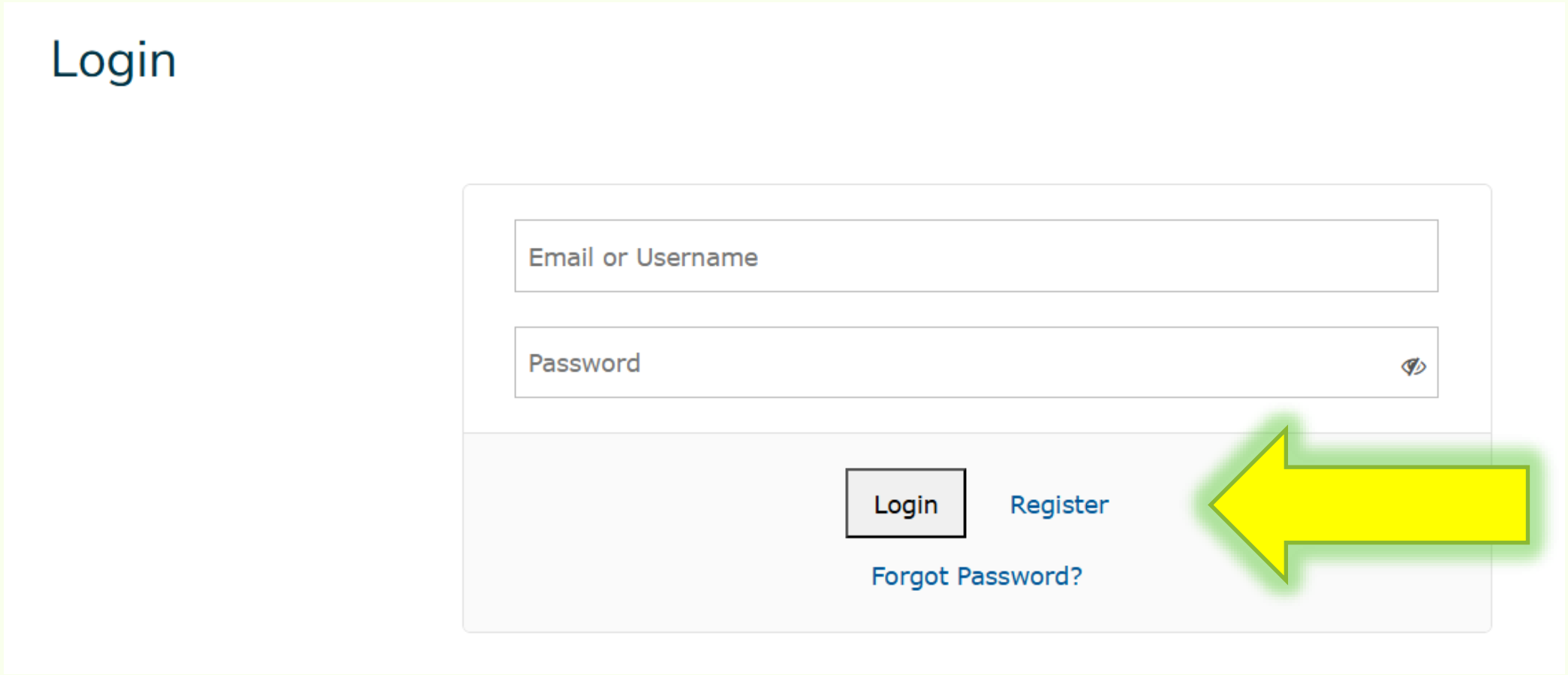

GEO-ACADEMY
Maison
Ressources et outils
Groupes
Modules électroniques
Événements
Contact
Se connecter
Bienvenue sur la plateforme GEOBSERVE
Le centre névralgique de la GEO-Académie hébergeant des GEO-Hubs, des outils et ressources pédagogiques, des formations, des événements et bien plus encore !
Une communauté de pratique d'éducateurs pour le développement durable en Europe.
Devenez membre
Vous découvrez Geobserve ?
Explorez la plateforme
FR

Gain FULL access

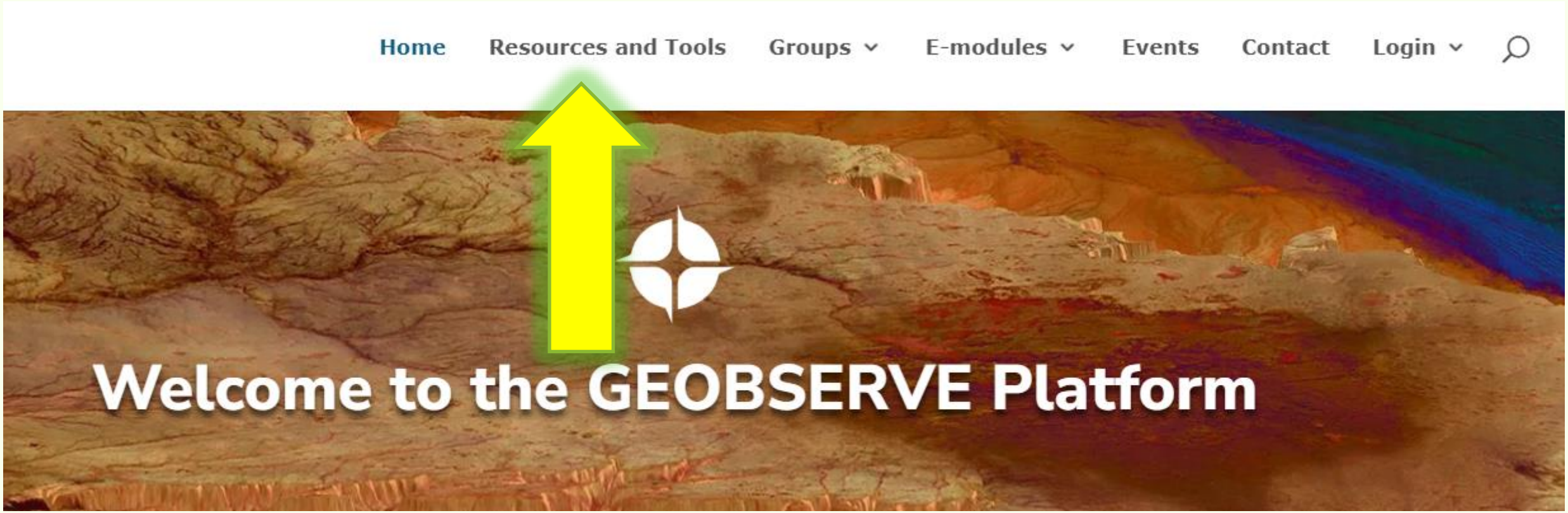


Co-funded by the
Erasmus+ Programme
of the European Union

Gain FULL access



Resources and Tools

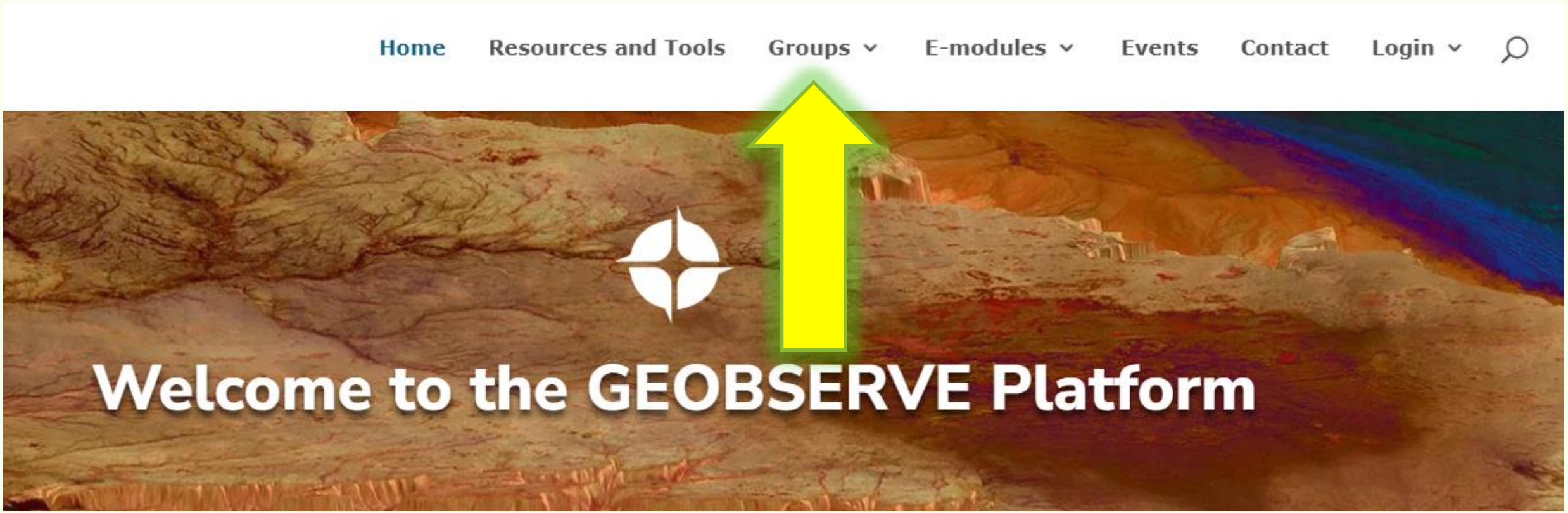


Co-funded by the
Erasmus+ Programme
of the European Union

E-learning Modules

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

Groups

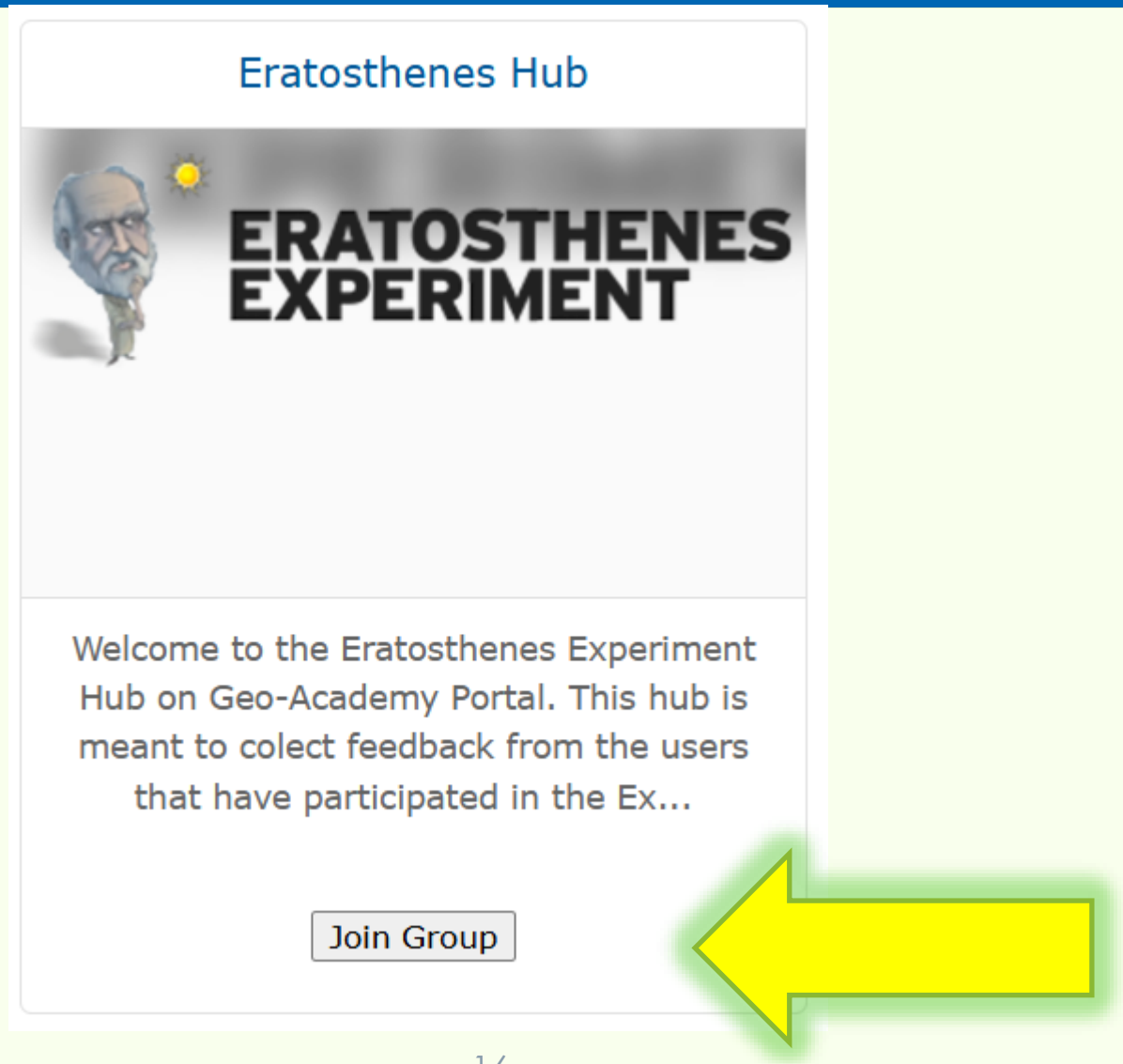


Co-funded by the
Erasmus+ Programme
of the European Union

Groups

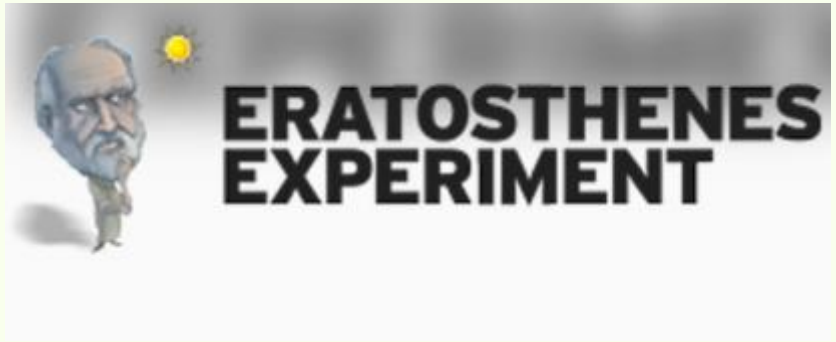
Co-funded by the Erasmus+ Programme of the European Union

Groups

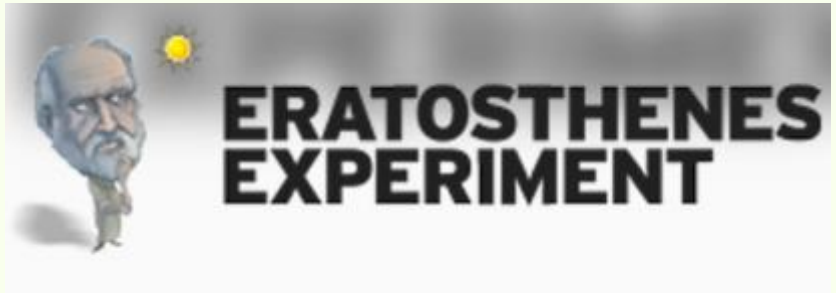


Co-funded by the Erasmus+ Programme of the European Union

The tour starts here …



Eratosthenes Experiment



How did Eratosthenes measure the circumference of the Earth

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

Eratosthenes Experiment

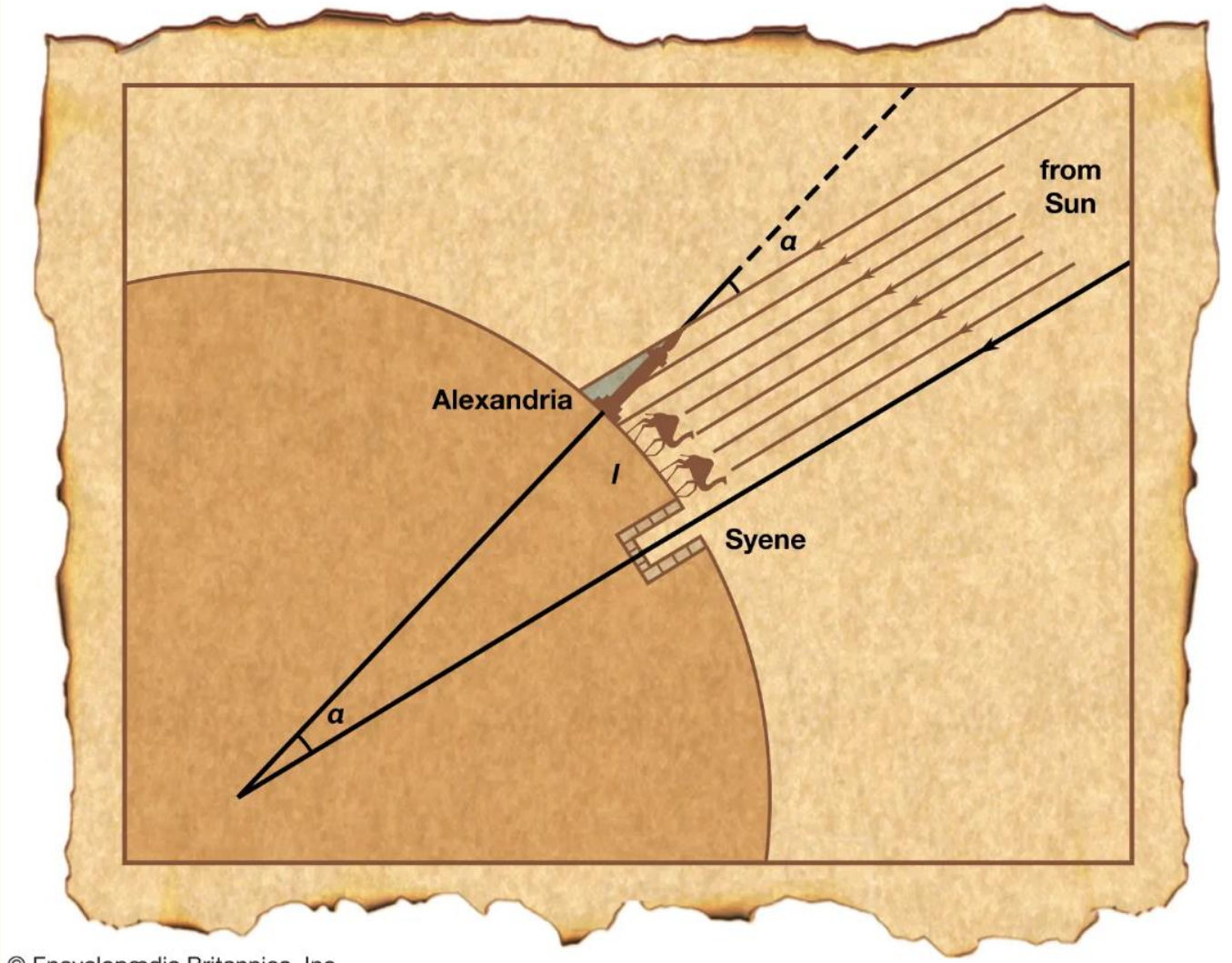
Eratosthenes Experiment

© **Website Name**: Encyclopædia Britannica

Publisher: Encyclopædia Britannica

URL: https://www.britannica.com/biography/Eratosthenes

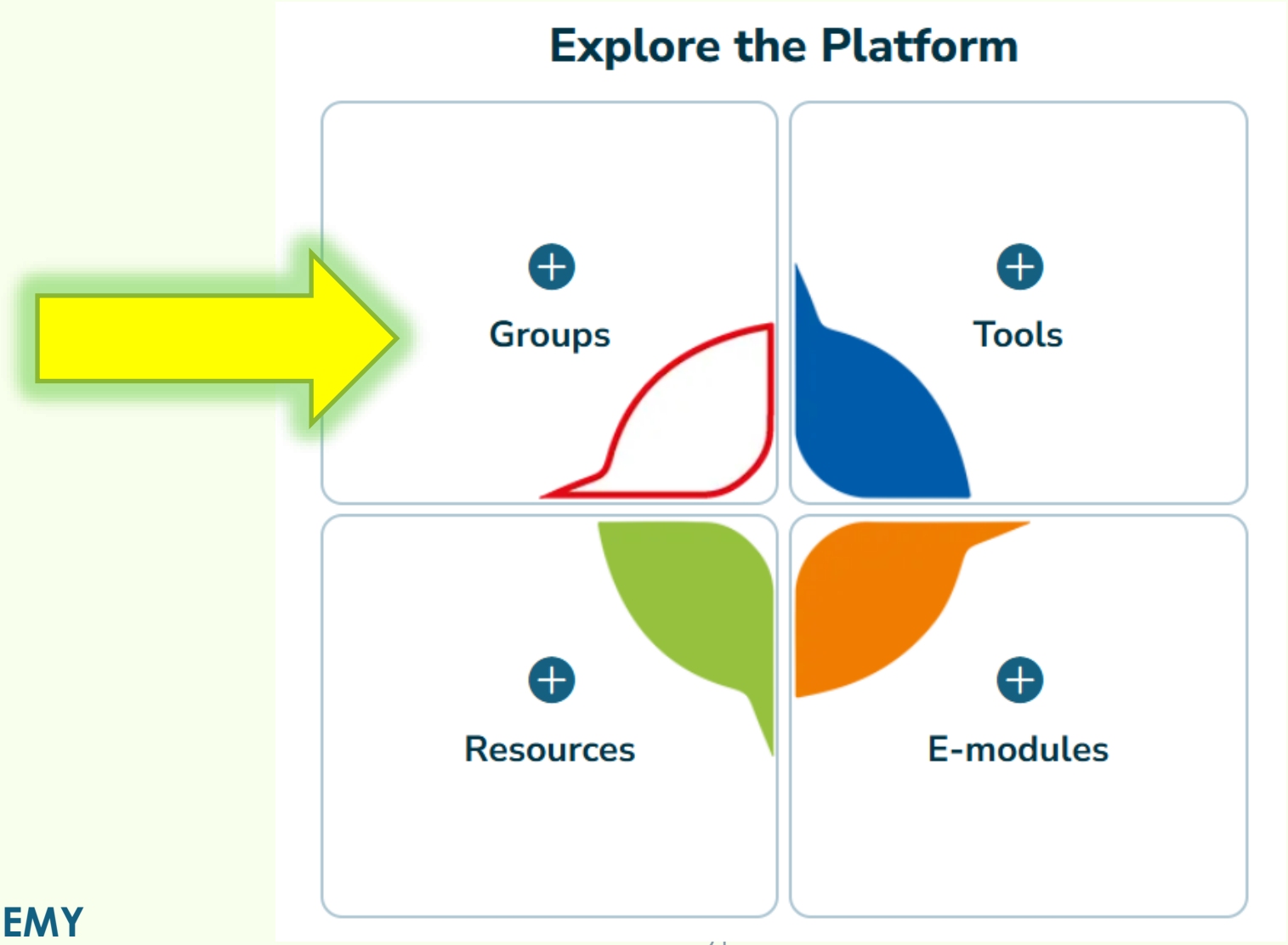
Access Date: November 23, 2025



© Encyclopædia Britannica, Inc.

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

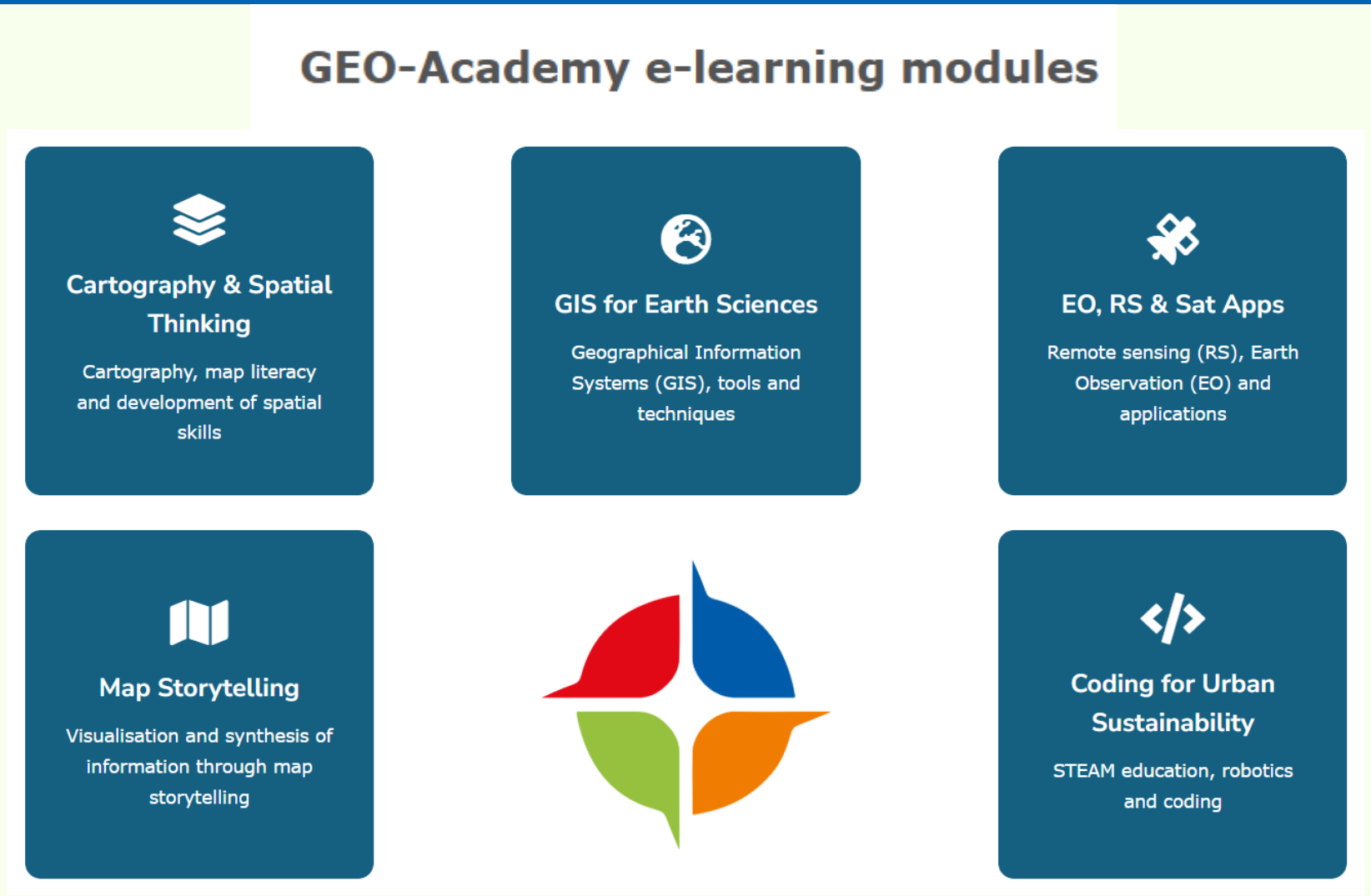
Community



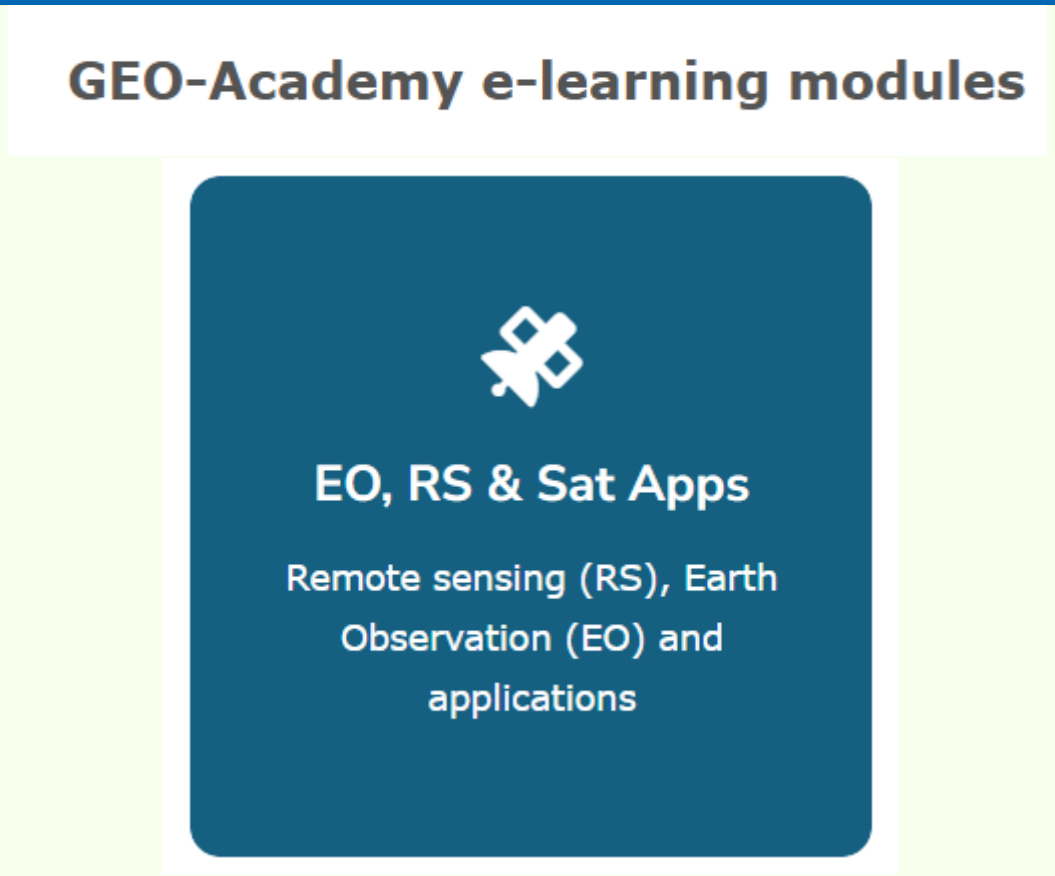
GEO-ACADEMY
GEO-Hub for teachers in Europe

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

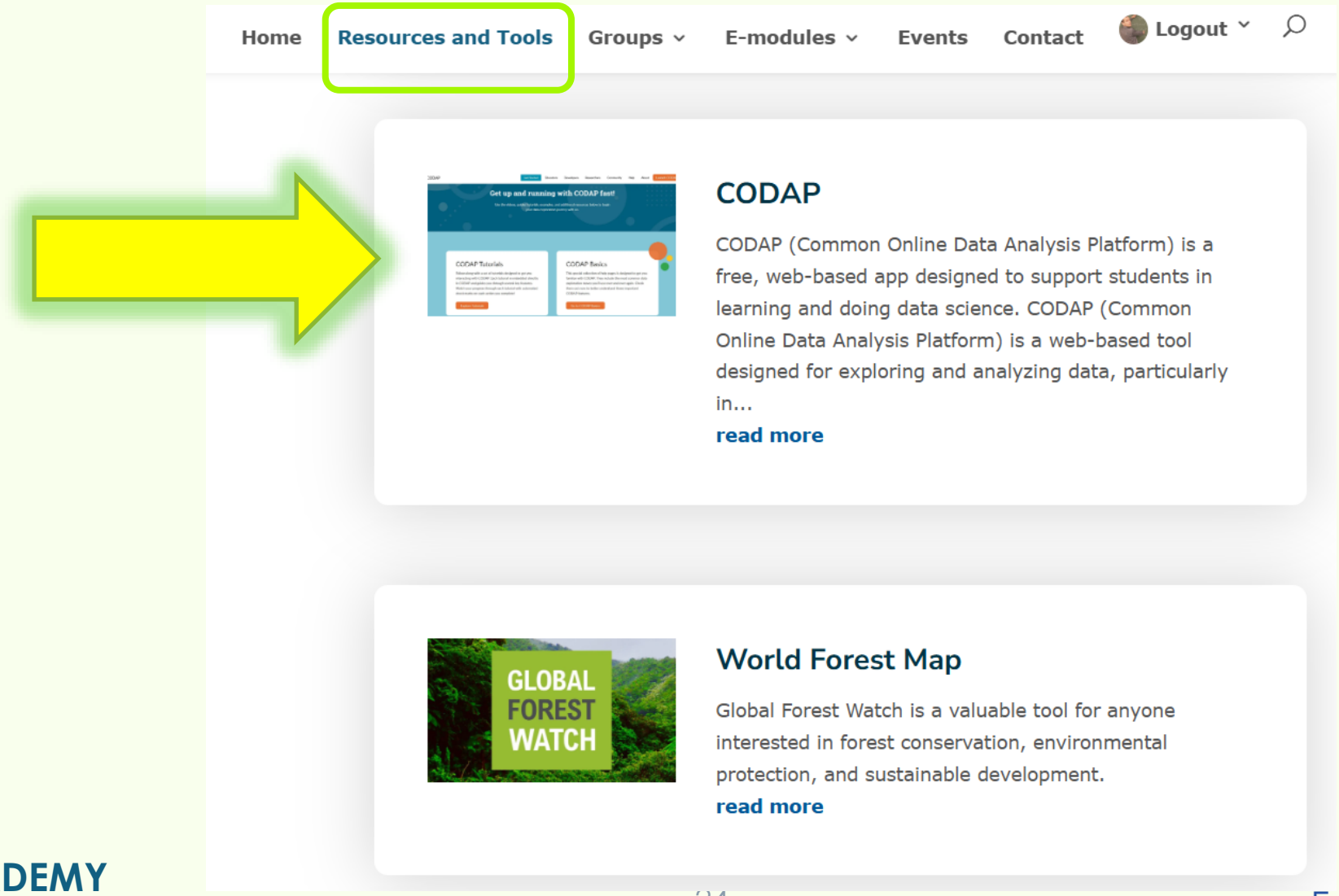
Tour … next stop



EO, RS & Sat Apps

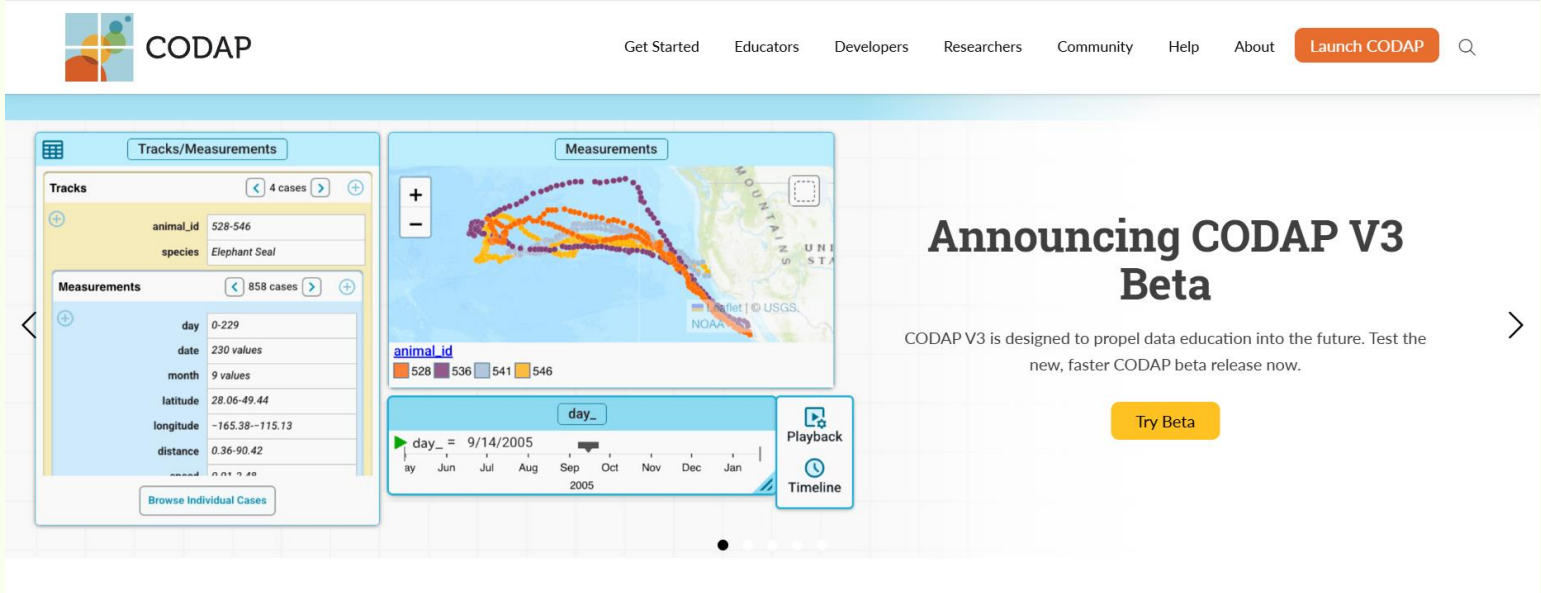


EO, RS & Sat Apps



CODAP

https://codap.concord.org/



CODAP (overview)

CODAP = **C**ommon ...

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

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

CODAP (along a storyline)

Data records made up out of (thin) air

For someone who has respiratory problems, the question of air quality can be important. A forest fire close to home could have an impact on air quality. But how can we find out?

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

CODAP (along a storyline)

We will analyse the air quality during and after the Bighorn Wildfire (5 June to 23 July 2020) in the nearby city of Tucson, Arizona.

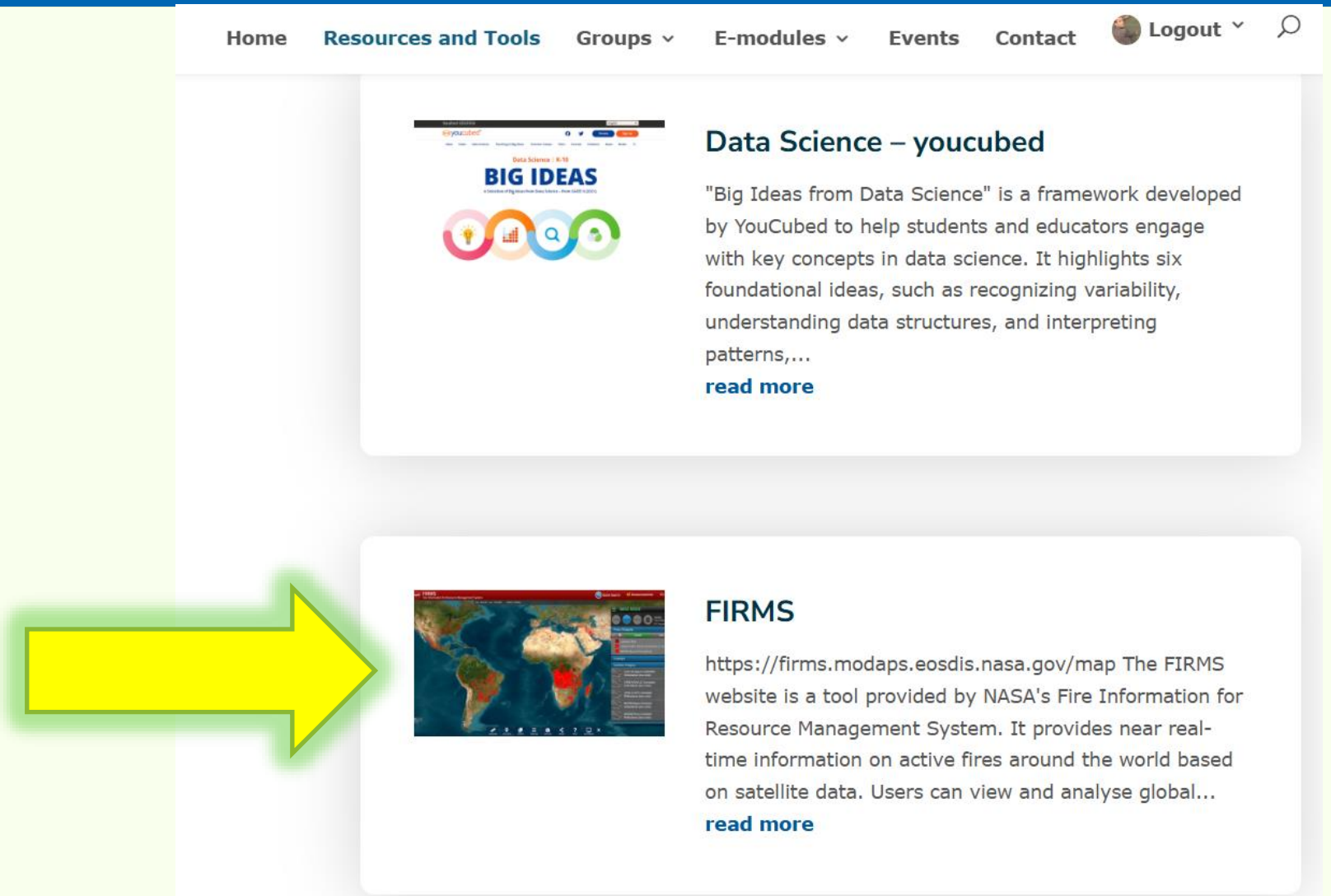
To be able to do this at all, we need data.

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

CODAP (along a storyline)

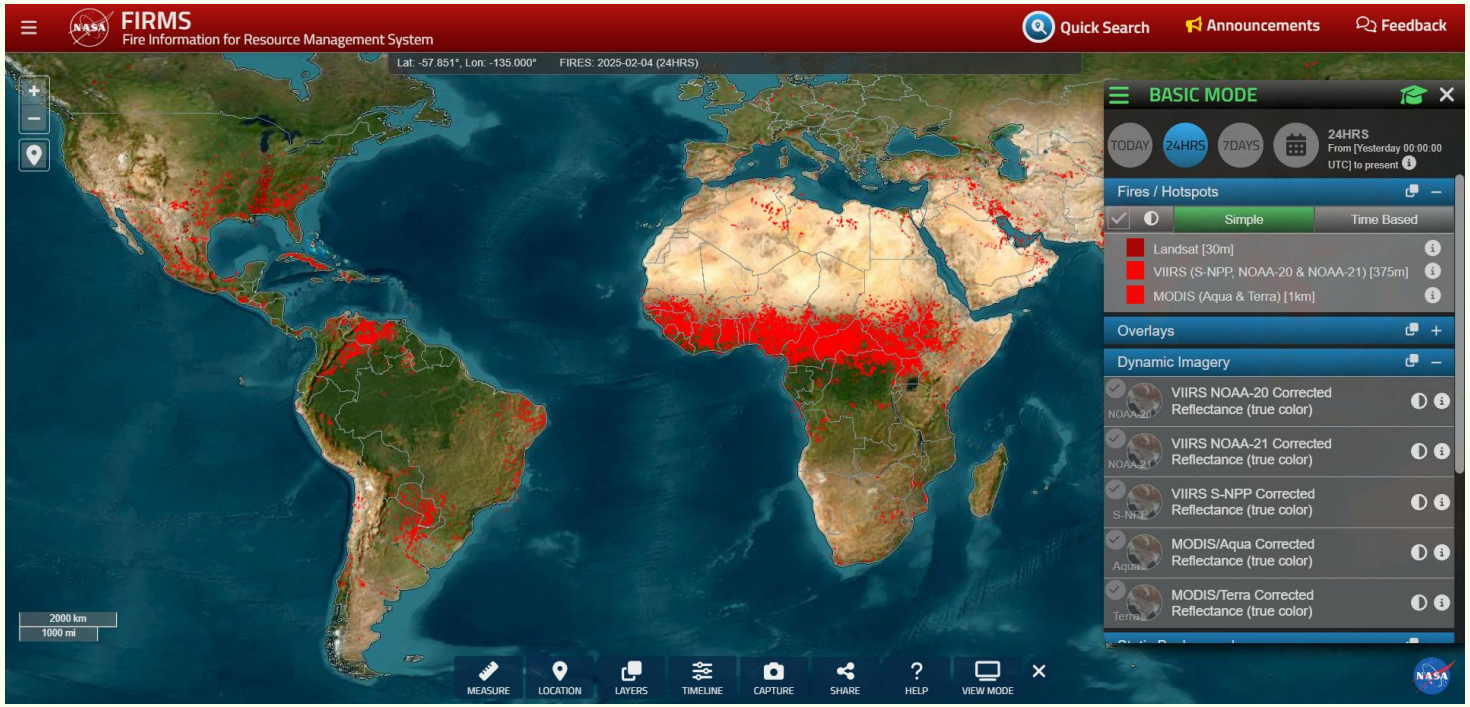
https://firms.modaps.eosdis.nasa.gov/map/

CODAP (along a storyline)



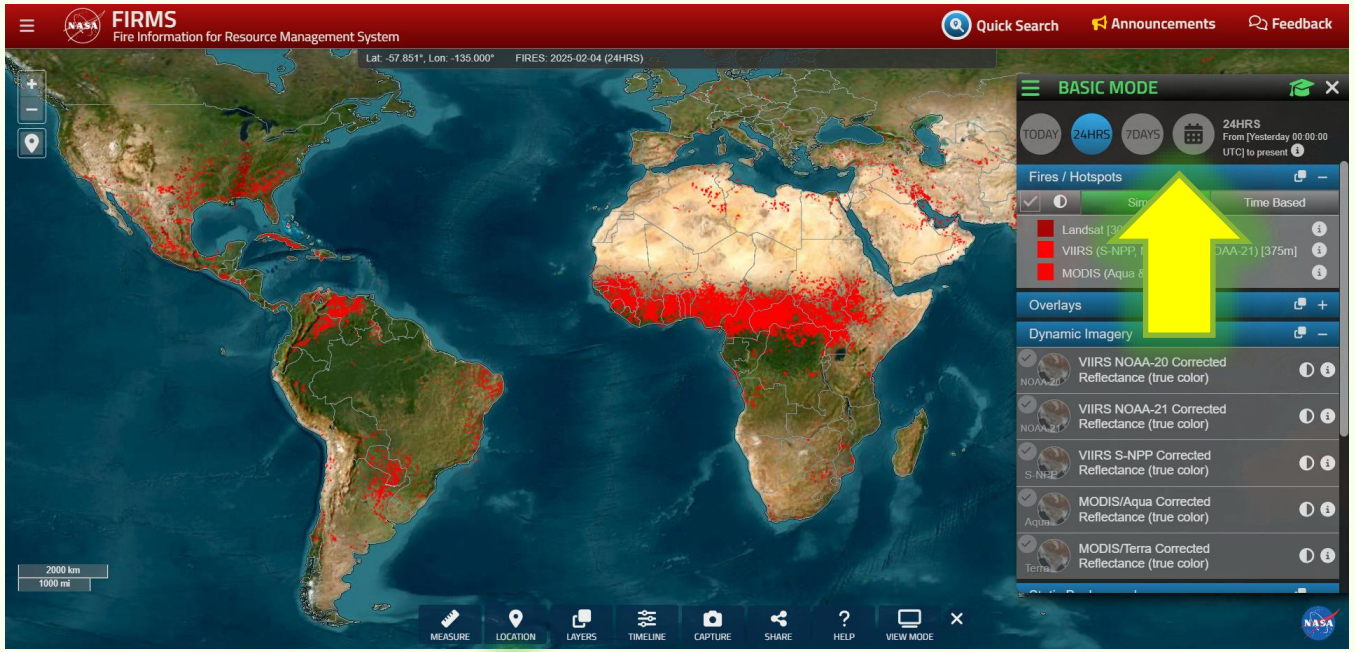
CODAP (along a storyline)

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



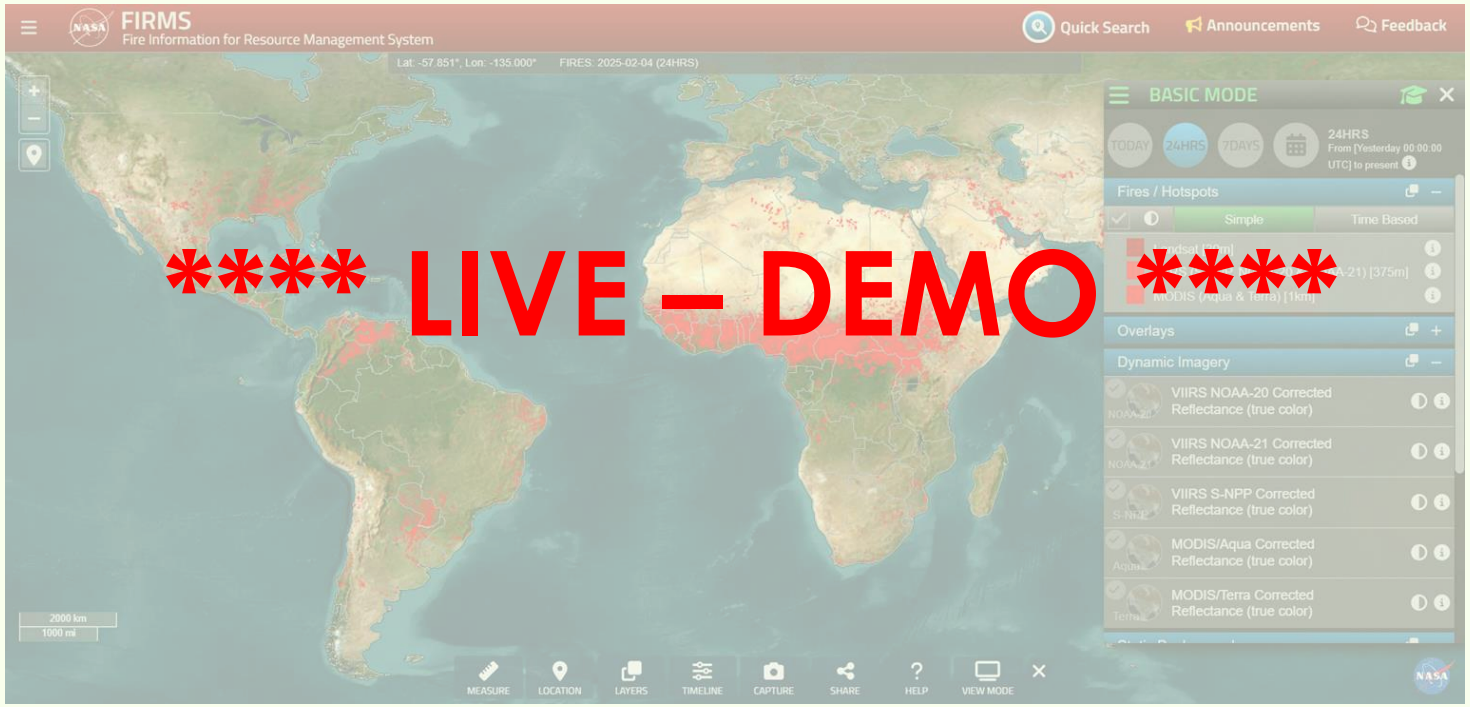
CODAP (along a storyline)

5 June to 23 July 2020, Tucson, Arizona



**** LIVE – DEMO ****

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



**** LIVE – DEMO ****

CODAP (along a storyline)

We found the fire—but …

How can you find out about air quality?

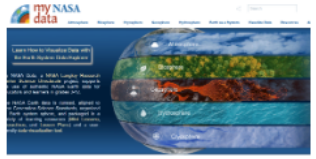
Co-funded by the
Erasmus+ Programme
of the European Union

CODAP (along a storyline)

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

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

CODAP (along a storyline)



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

CODAP (along a storyline)

CODAP (along a storyline)

Data we are looking for …

Aerosol Optical Depth (AOD)

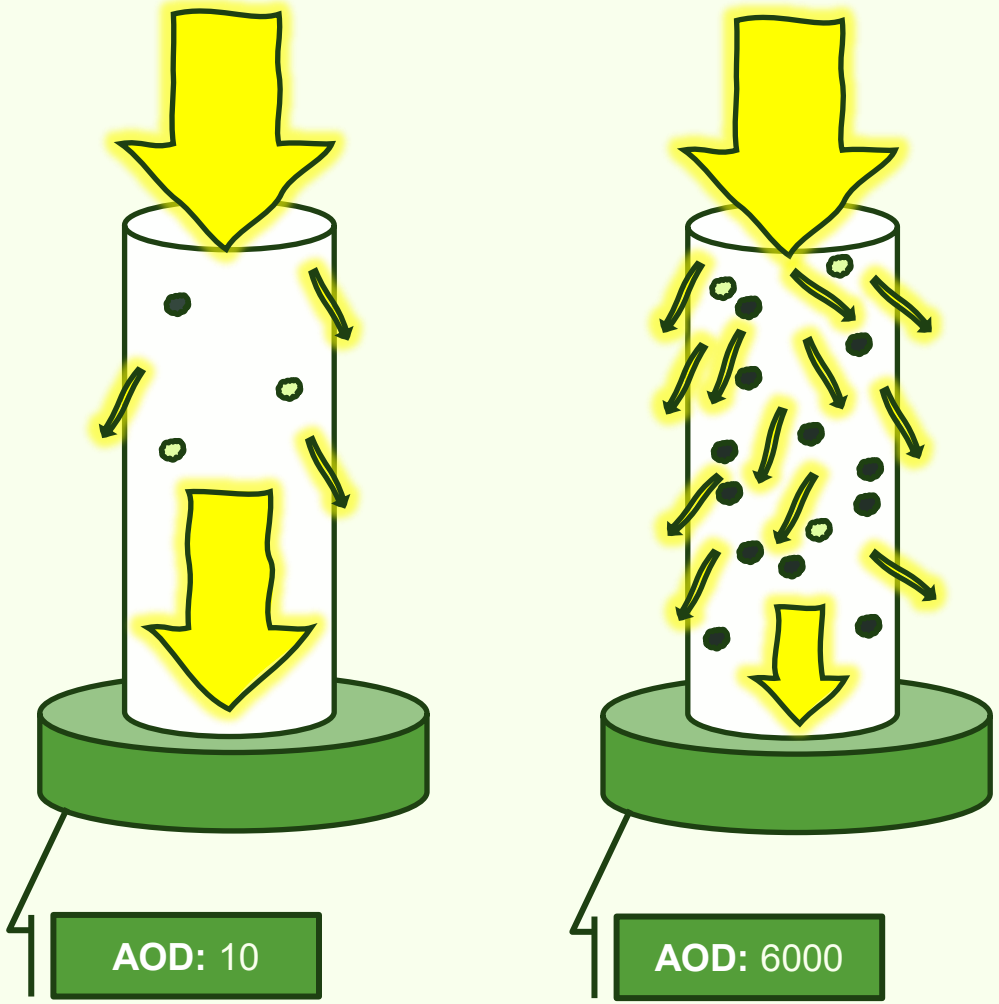
Co-funded by the
Erasmus+ Programme
of the European Union

CODAP (along a storyline)

Aerosol Optical Depth (AOD) is a value calculated via satellite measurements of aerosols (e.g., urban haze, smoke particles, desert dust) distributed within a column of air from Earth's surface to the top of the atmosphere.

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

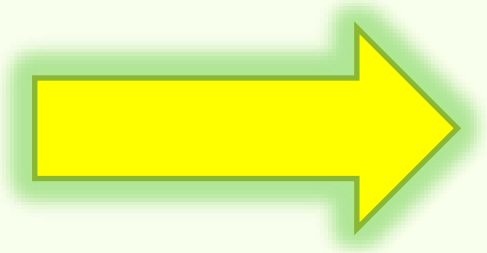
CODAP (along a storyline)



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

CODAP (along a storyline)

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



Data.csv

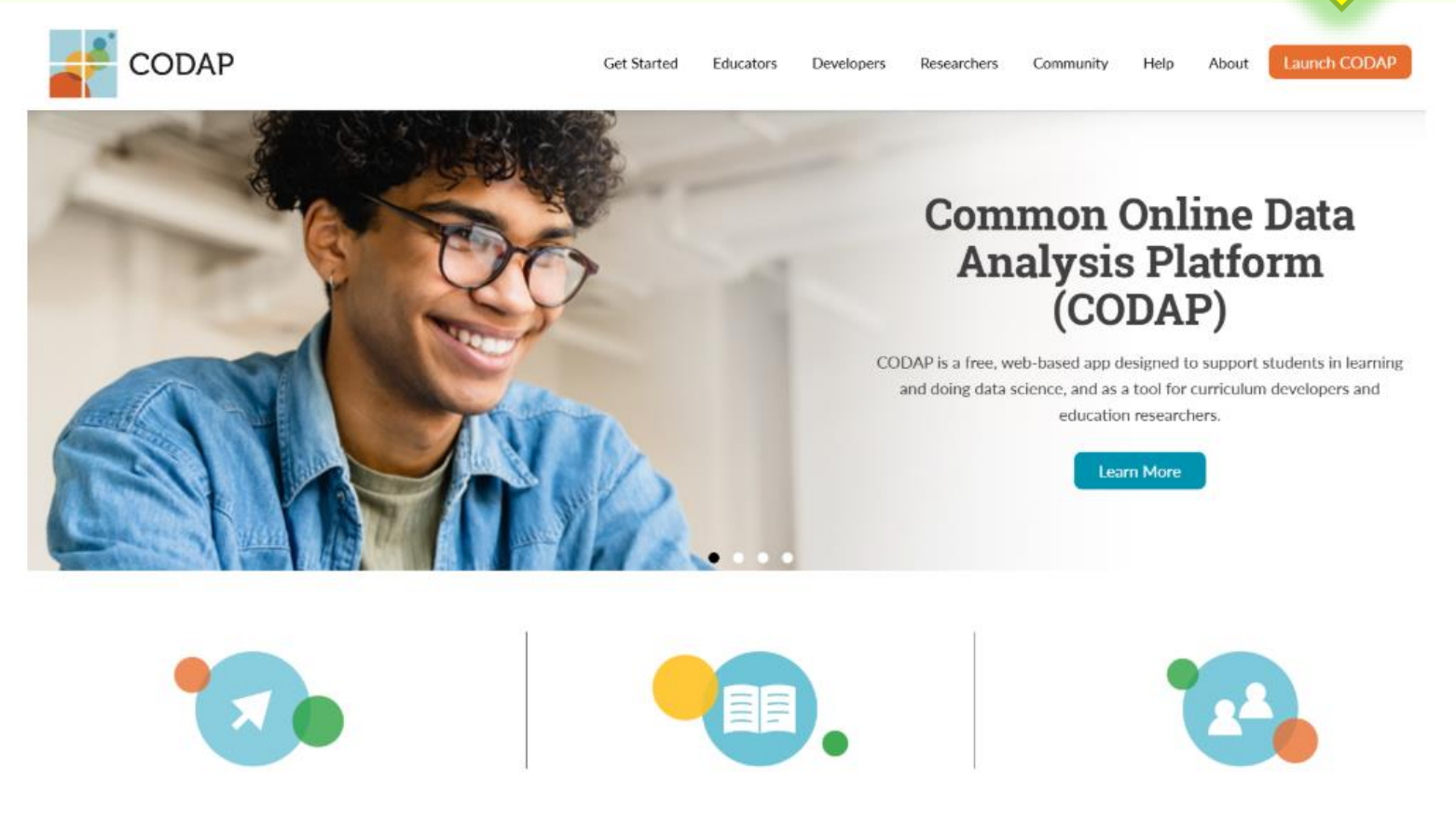
Co-funded by the
Erasmus+ Programme
of the European Union

CODAP (along a storyline)

https://codap.concord.org/

CODAP (along a storyline)

Launch CODAP ...



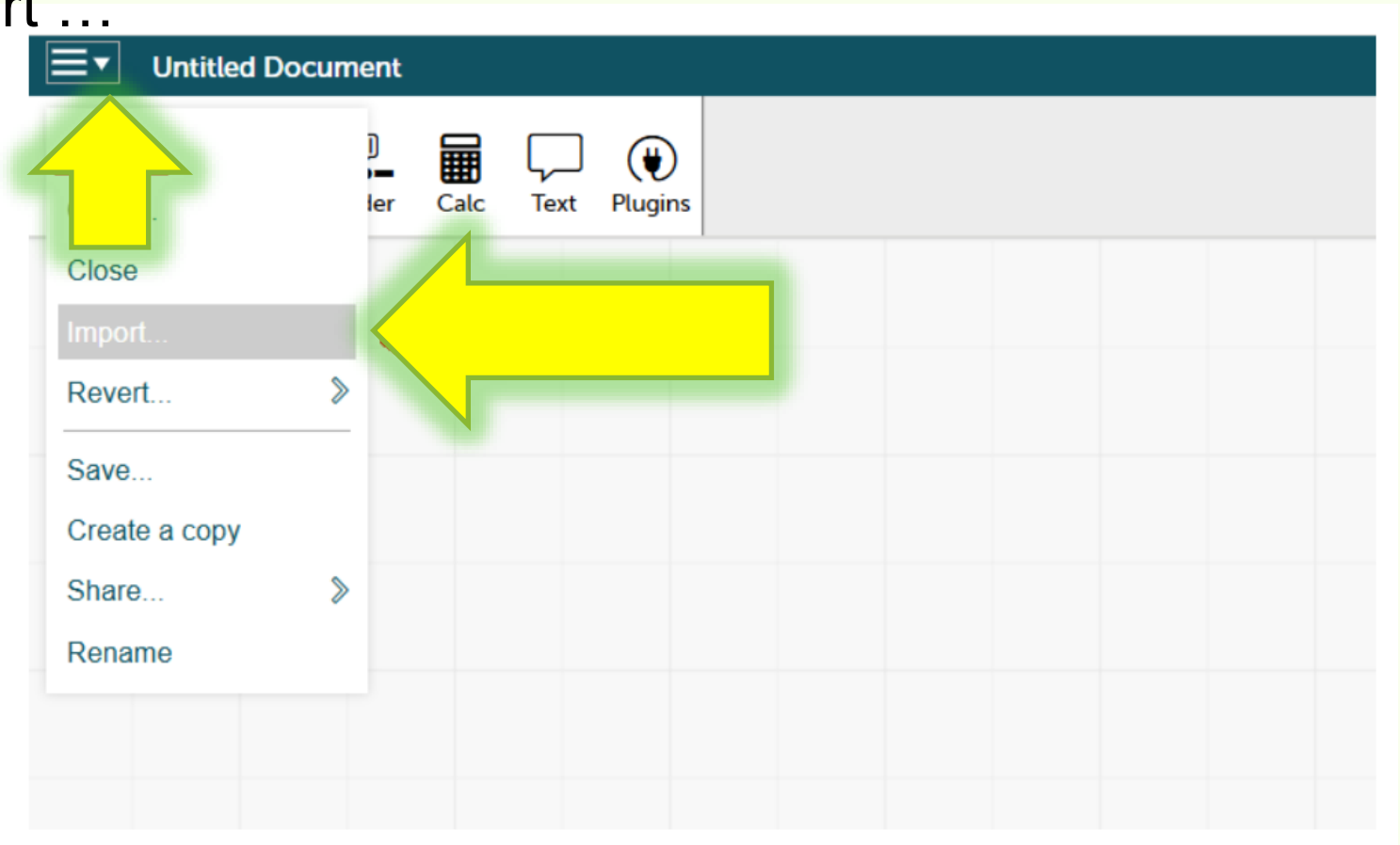
Co-funded by the Erasmus+ Programme of the European Union

CODAP (along a storyline)

CREATE NEW DOCUMENT …

CODAP (along a storyline)

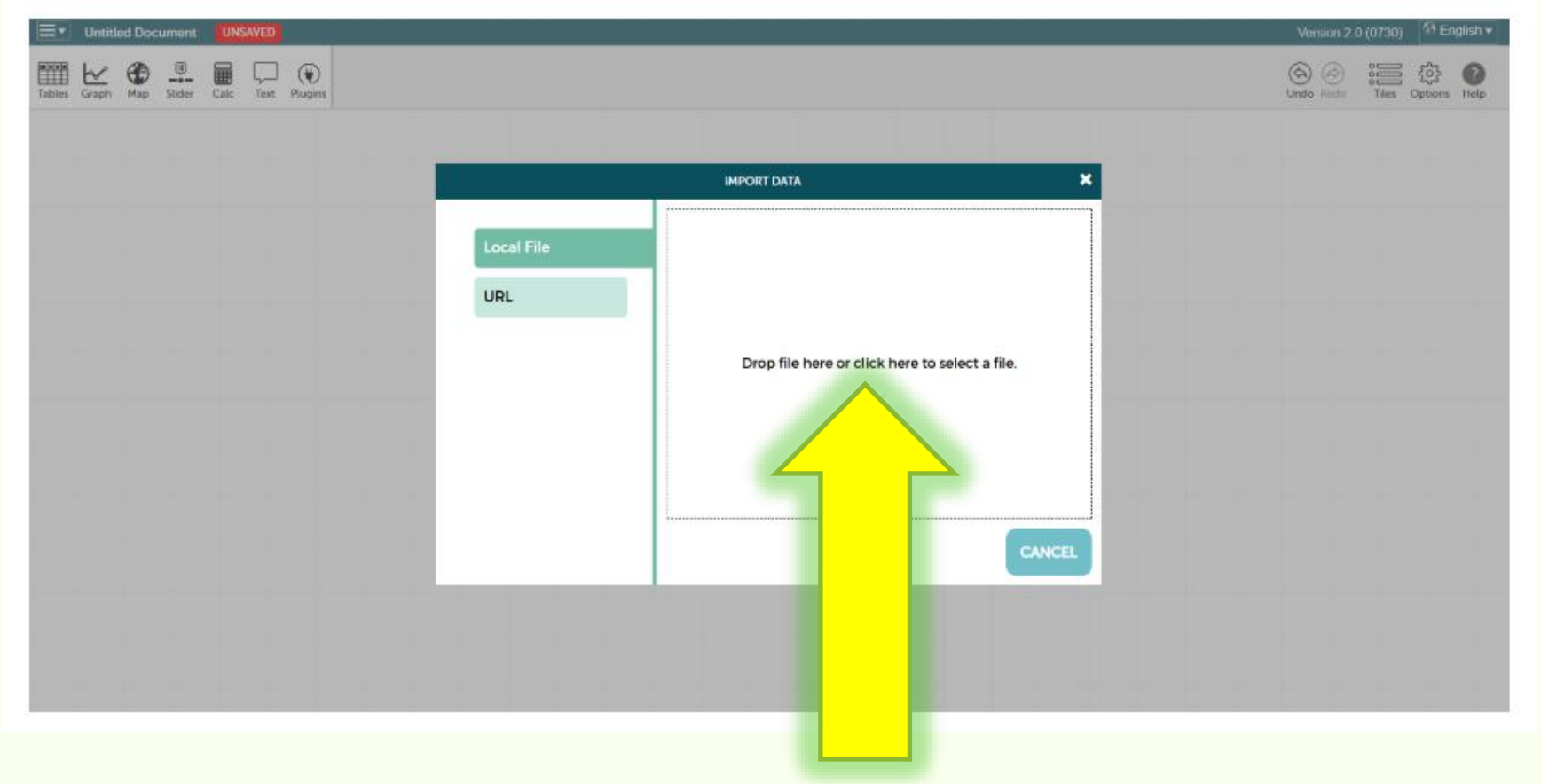
Drop-down menu in the top left-hand corner and then select ‘Import …’



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

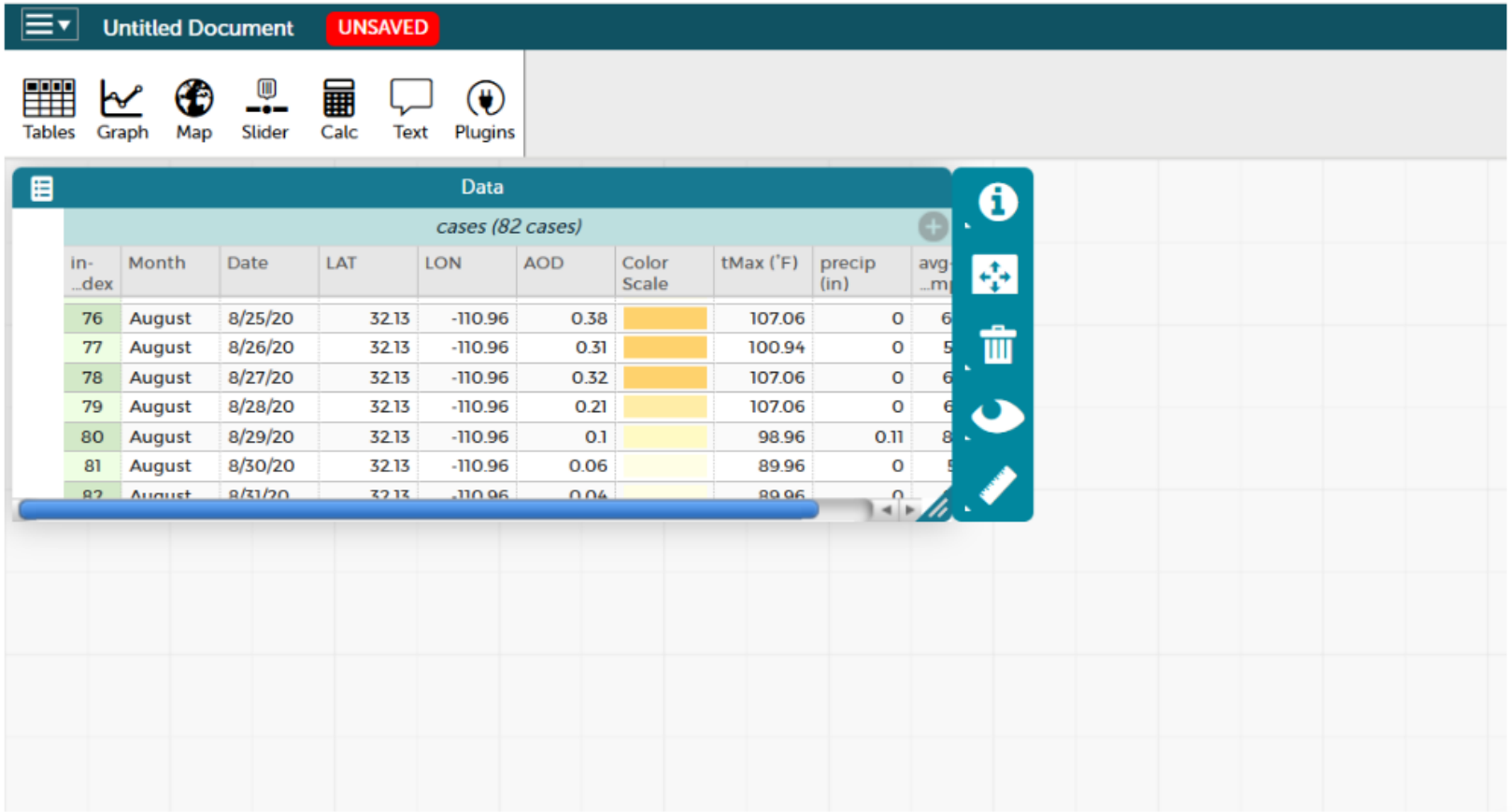
CODAP (along a storyline)

Select the data file previously downloaded …



CODAP (along a storyline)

If everything went well, the data set will now appear in the programme...

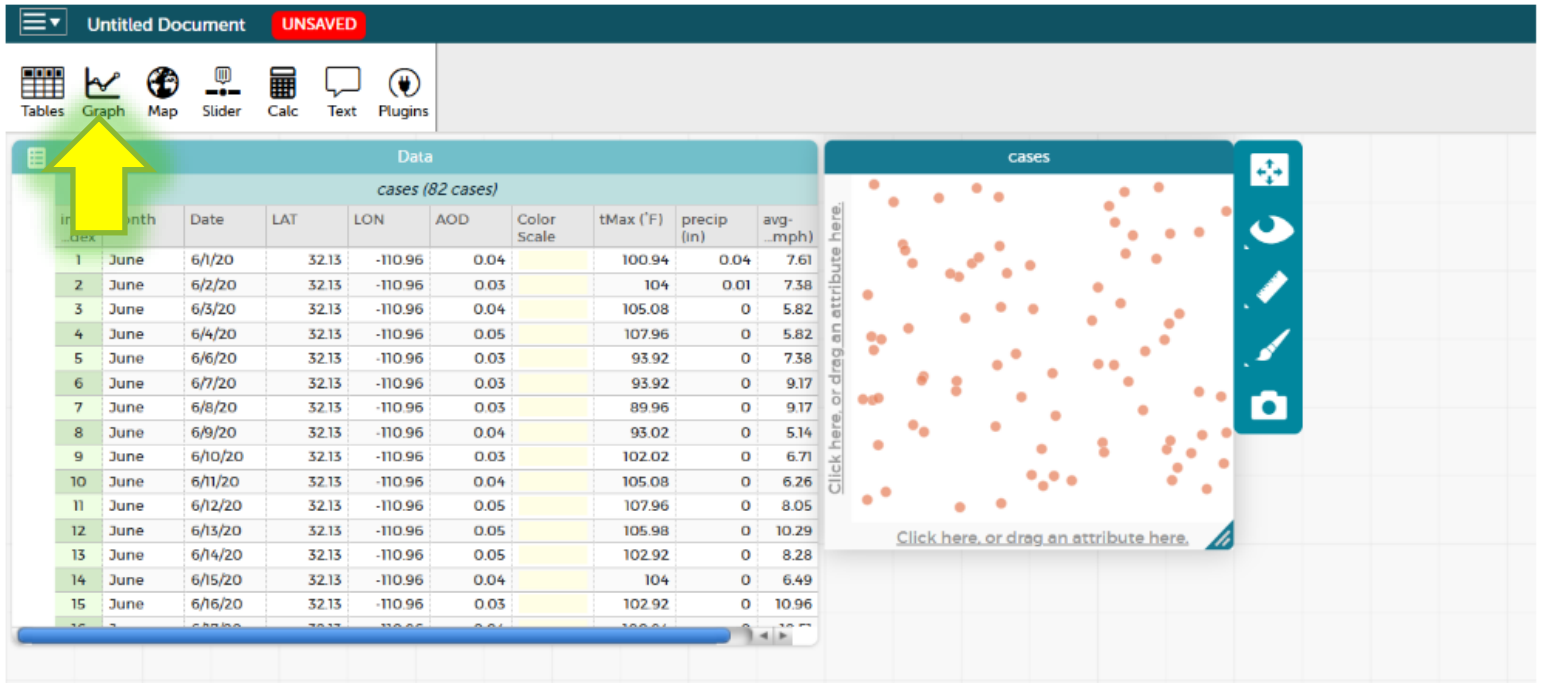


in-...dex	Month	Date	LAT	LON	AOD	Color Scale	tMax (°F)	precip (in)	avg-...m
76	August	8/25/20	32.13	-110.96	0.38		107.06	0	6
77	August	8/26/20	32.13	-110.96	0.31		100.94	0	5
78	August	8/27/20	32.13	-110.96	0.32		107.06	0	6
79	August	8/28/20	32.13	-110.96	0.21		107.06	0	6
80	August	8/29/20	32.13	-110.96	0.1		98.96	0.11	8
81	August	8/30/20	32.13	-110.96	0.06		89.96	0	5
82	August	8/31/20	32.13	-110.96	0.04		89.96	0	

CODAP (along a storyline)

Juggling with data

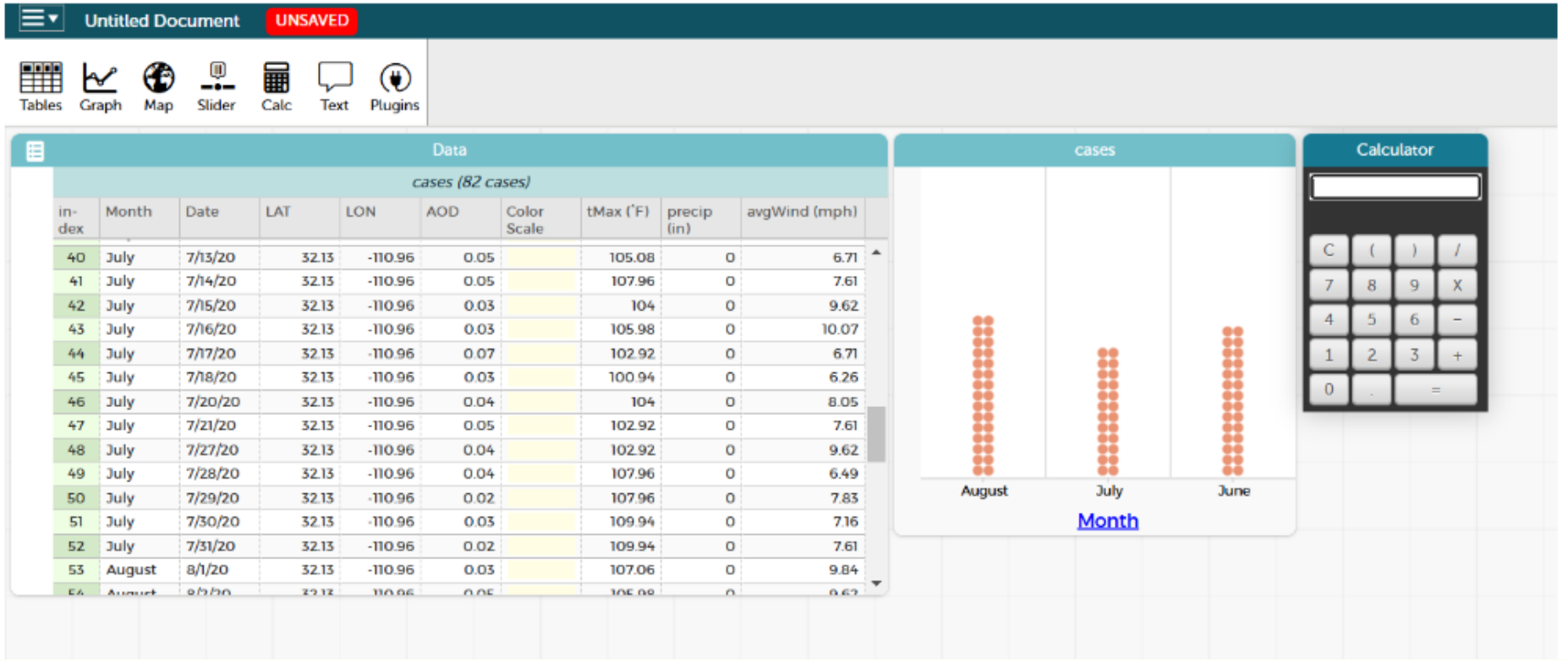
The 'Graph' menu item initially shows us the entire, unorganised 'data cloud'.



index	month	Date	LAT	LON	AOD	Color Scale	tMax (°F)	precip (in)	avg-…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

CODAP (along a storyline)

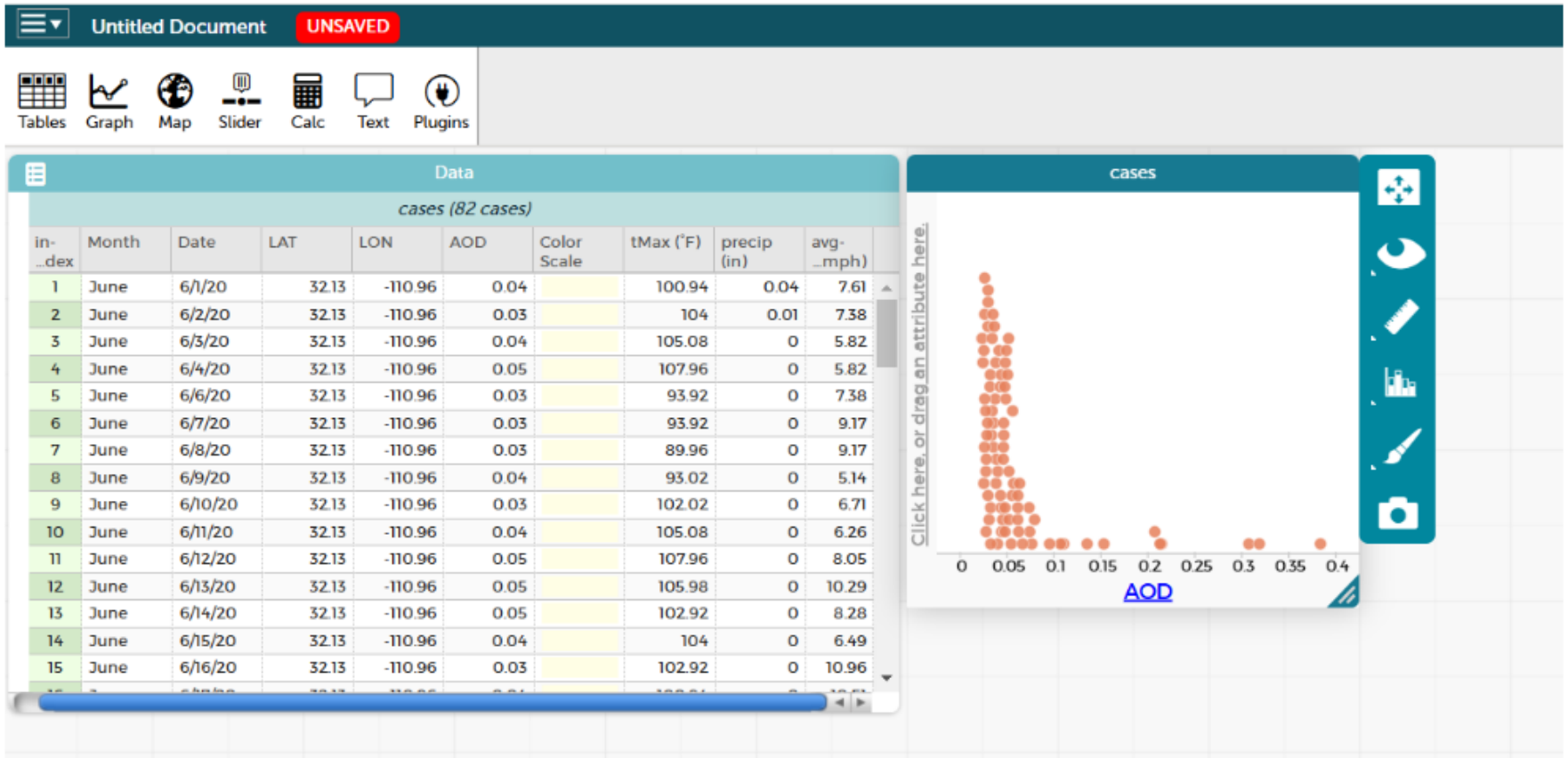
If we drag the 'Month' attribute onto the horizontal axis with the mouse, our pile of data already looks tidier.



index	Month	Date	LAT	LON	AOD	Color Scale	tMax (°F)	precip (in)	avgWind (mph)
40	July	7/13/20	32.13	-110.96	0.05		105.08	0	6.71
41	July	7/14/20	32.13	-110.96	0.05		107.96	0	7.61
42	July	7/15/20	32.13	-110.96	0.03		104	0	9.62
43	July	7/16/20	32.13	-110.96	0.03		105.98	0	10.07
44	July	7/17/20	32.13	-110.96	0.07		102.92	0	6.71
45	July	7/18/20	32.13	-110.96	0.03		100.94	0	6.26
46	July	7/20/20	32.13	-110.96	0.04		104	0	8.05
47	July	7/21/20	32.13	-110.96	0.05		102.92	0	7.61
48	July	7/27/20	32.13	-110.96	0.04		102.92	0	9.62
49	July	7/28/20	32.13	-110.96	0.04		107.96	0	6.49
50	July	7/29/20	32.13	-110.96	0.02		107.96	0	7.83
51	July	7/30/20	32.13	-110.96	0.03		109.94	0	7.16
52	July	7/31/20	32.13	-110.96	0.02		109.94	0	7.61
53	August	8/1/20	32.13	-110.96	0.03		107.06	0	9.84

CODAP (along a storyline)

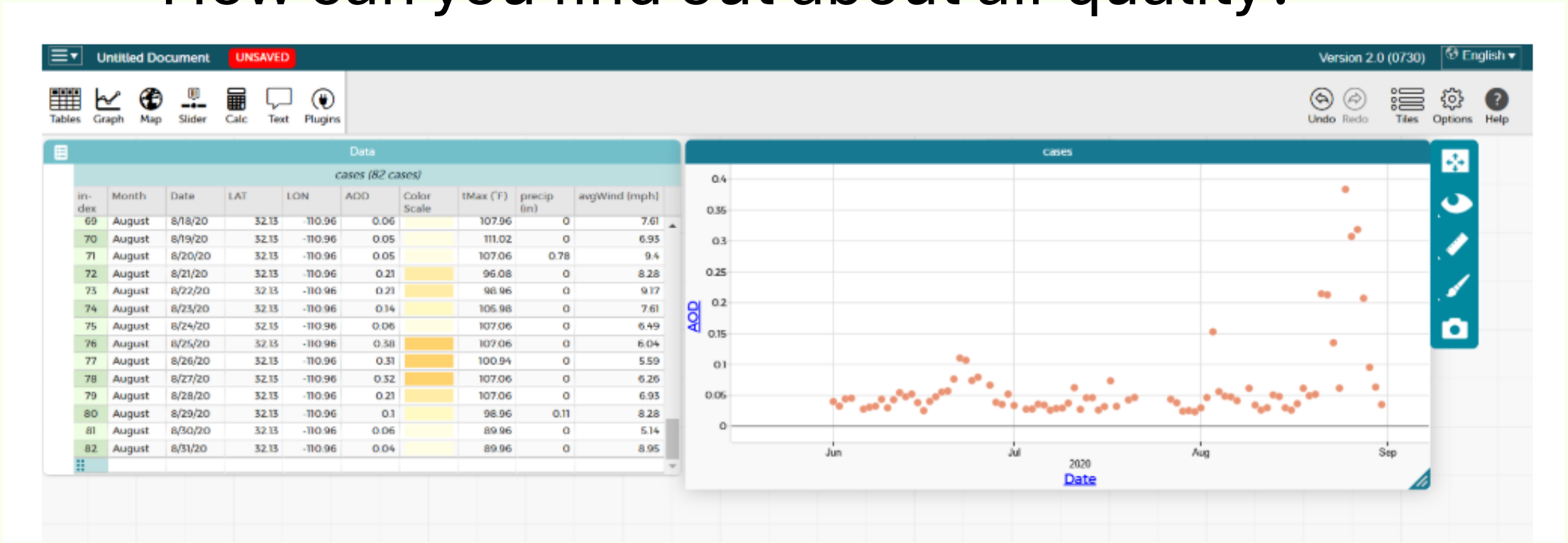
Let's drag another attribute onto the horizontal axis:



in-..dex	Month	Date	LAT	LON	AOD	Color Scale	tMax (°F)	precip (in)	avg-..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

CODAP (along a storyline)

How can you find out about air quality?



index	Month	Date	LAT	LON	AOD	Color Scale	tMax (°F)	precip (in)	avgWind (mph)
69	August	8/18/20	32.13	-110.96	0.06		107.96	0	7.61
70	August	8/19/20	32.13	-110.96	0.05		111.02	0	6.93
71	August	8/20/20	32.13	-110.96	0.05		107.06	0.78	9.4
72	August	8/21/20	32.13	-110.96	0.21		96.08	0	8.28
73	August	8/22/20	32.13	-110.96	0.21		98.96	0	9.17
74	August	8/23/20	32.13	-110.96	0.14		105.98	0	7.61
75	August	8/24/20	32.13	-110.96	0.06		107.06	0	6.49
76	August	8/25/20	32.13	-110.96	0.38		107.06	0	6.04
77	August	8/26/20	32.13	-110.96	0.31		100.94	0	5.59
78	August	8/27/20	32.13	-110.96	0.32		107.06	0	6.26
79	August	8/28/20	32.13	-110.96	0.21		107.06	0	6.93
80	August	8/29/20	32.13	-110.96	0.1		98.96	0.11	8.28
81	August	8/30/20	32.13	-110.96	0.06		89.96	0	5.14
82	August	8/31/20	32.13	-110.96	0.04		89.96	0	8.95

Aerosol particles vs time

**** LIVE – DEMO ****

**** LIVE – DEMO ****

CODAP (second example)

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

CODAP (second example)

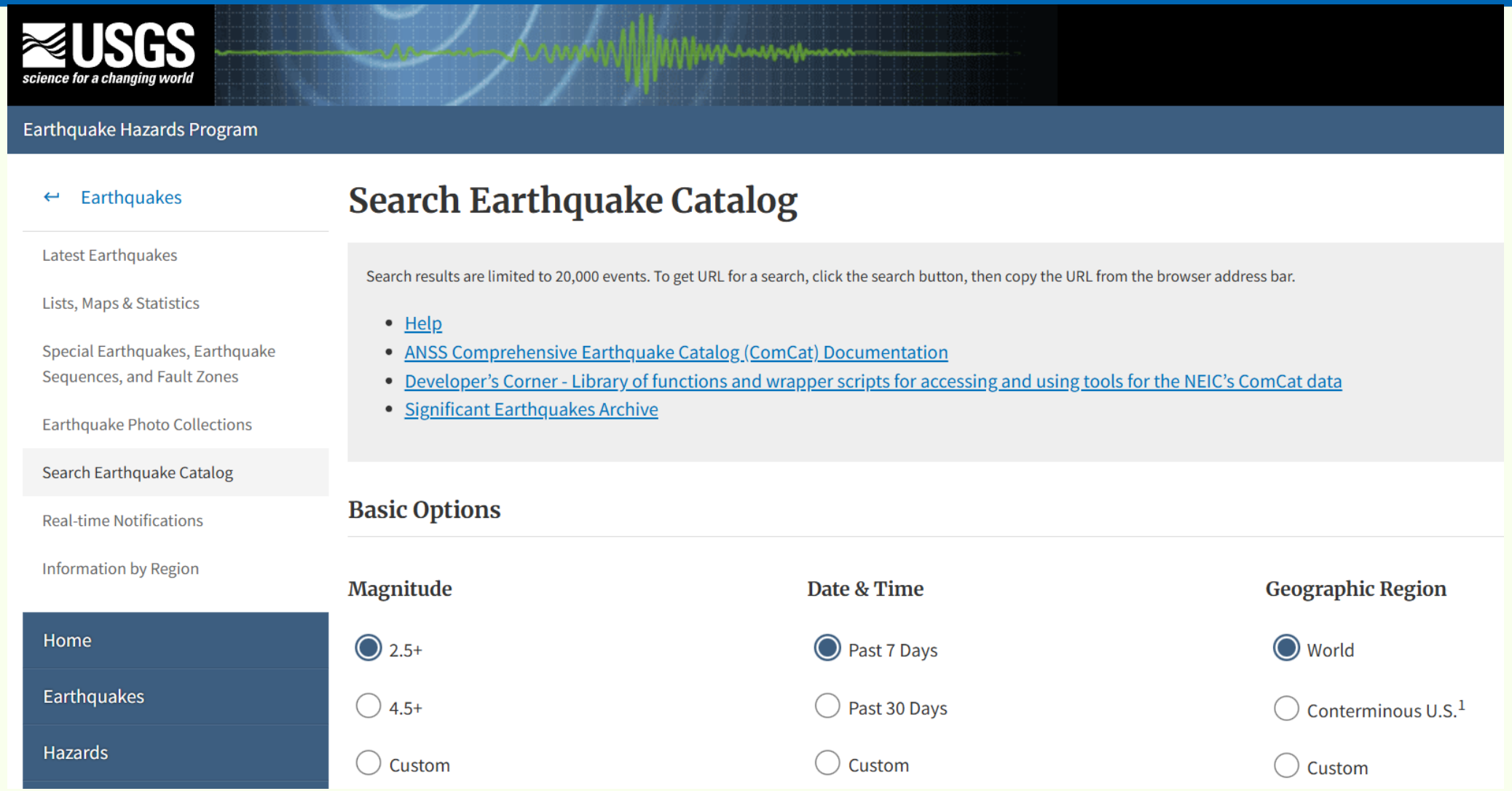
Earthquakes

Data we are looking for …

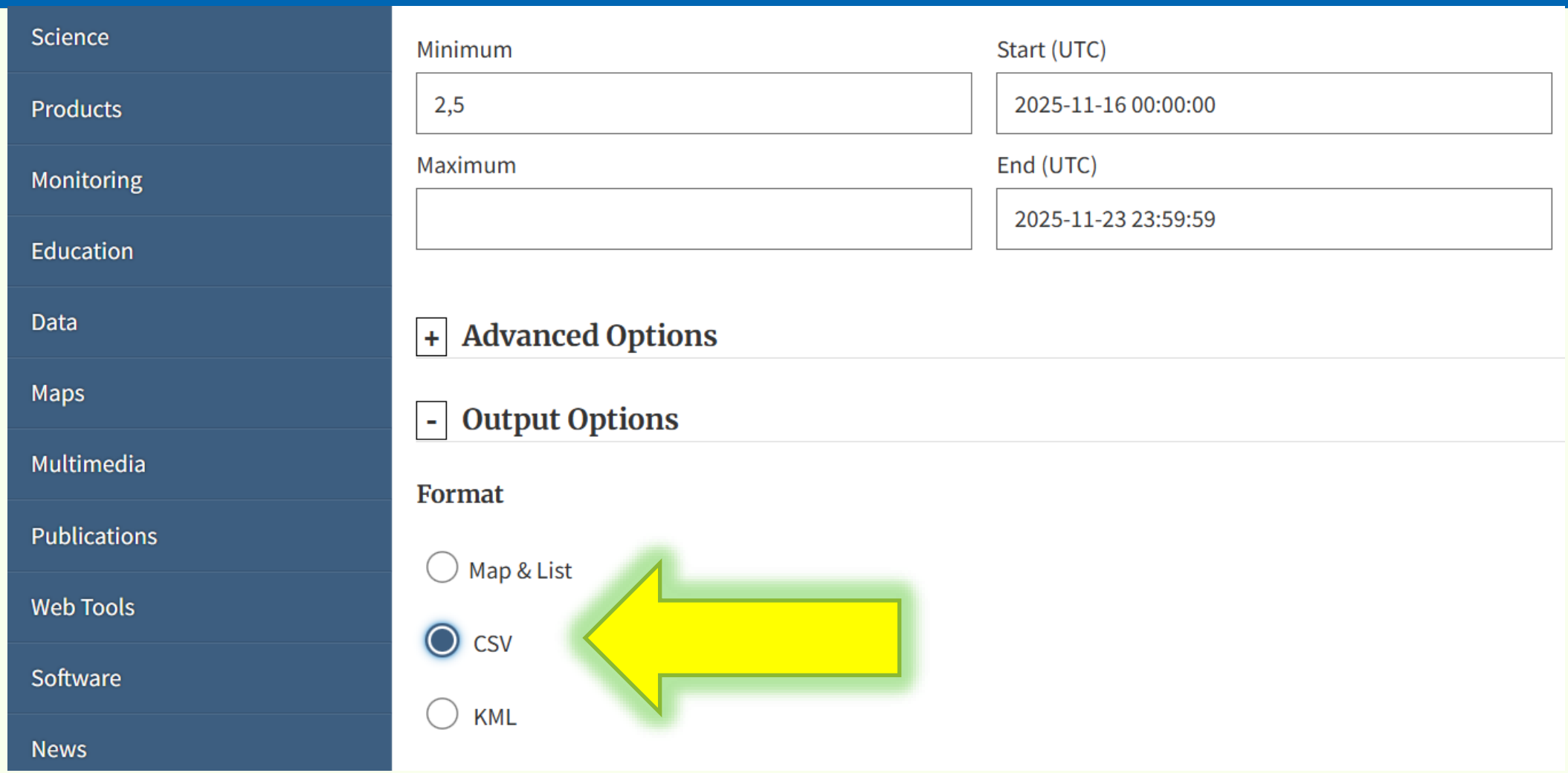
https://earthquake.usgs.gov/earthquakes/search/

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

CODAP (second example)



CODAP (second example)



CODAP (second example)

Earthquakes

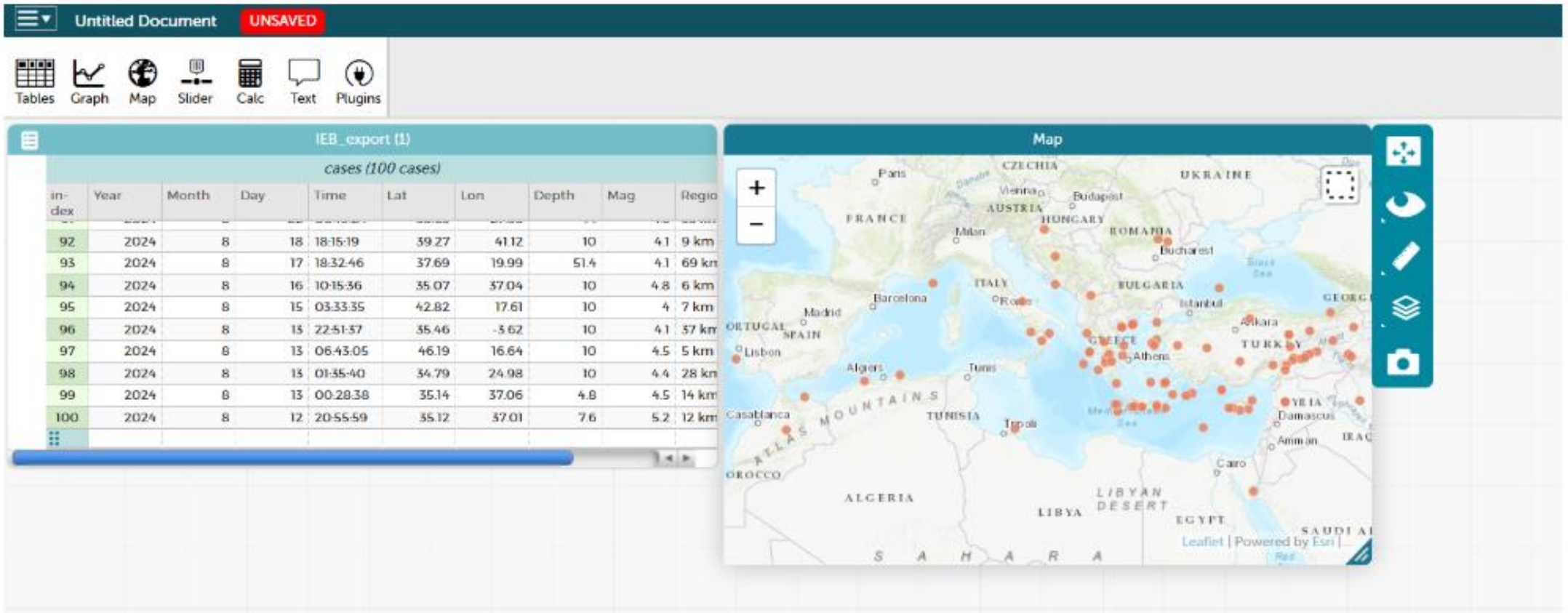
Data Set is here:

earthquakes.csv

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

CODAP (second example)

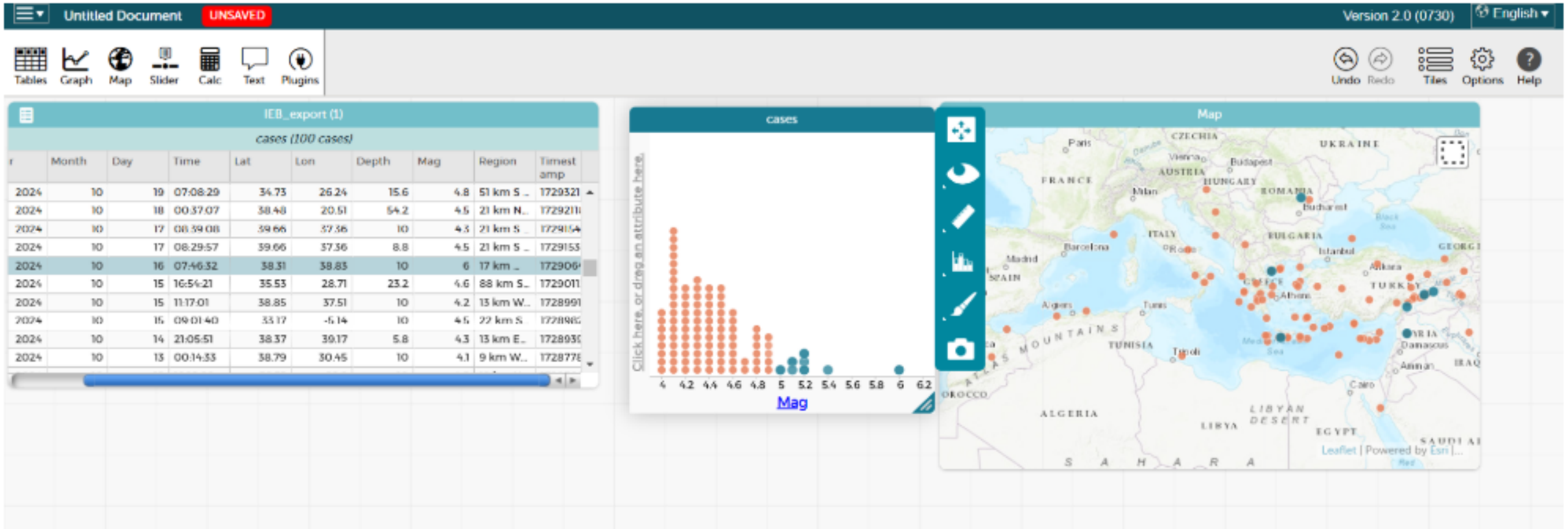
Firstly: Import data



index	Year	Month	Day	Time	Lat	Lon	Depth	Mag	Regio
92	2024	8	18	18:15:19	39.27	41.12	10	4.1	9 km
93	2024	8	17	18:32:46	37.69	19.99	51.4	4.1	69 km
94	2024	8	16	10:15:36	35.07	37.04	10	4.8	6 km
95	2024	8	15	03:33:35	42.82	17.61	10	4	7 km
96	2024	8	15	22:51:57	35.46	-5.62	10	4.1	57 km
97	2024	8	13	06:43:05	46.19	16.64	10	4.5	5 km
98	2024	8	13	01:55:40	34.79	24.98	10	4.4	28 km
99	2024	8	13	00:28:38	35.14	37.06	4.8	4.5	14 km
100	2024	8	12	20:55:59	35.12	37.01	7.6	5.2	12 km

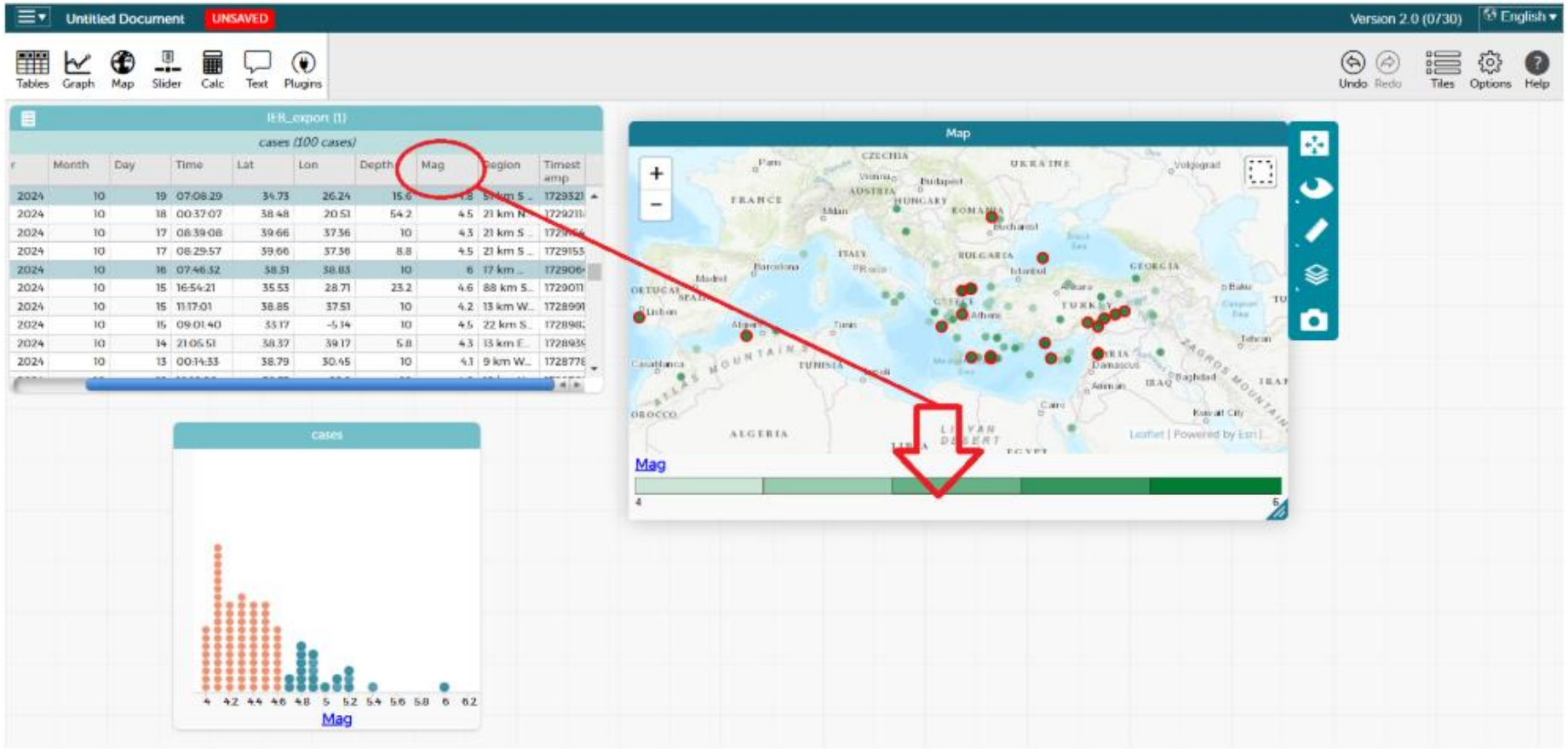
CODAP (second example)

Then: Organise the pile of data



CODAP (second example)

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



**** LIVE – DEMO ****

Then: Organise the pile of data

Tour … next stop

GEO-Academy e-learning modules

Round the Eiffel - Tower

https://portal.geoacademy.eu/courses/the-numbers-beneath-the-map/lessons/round-the-eiffel-tower/

Tour … next stop

Round the Eiffel Tower

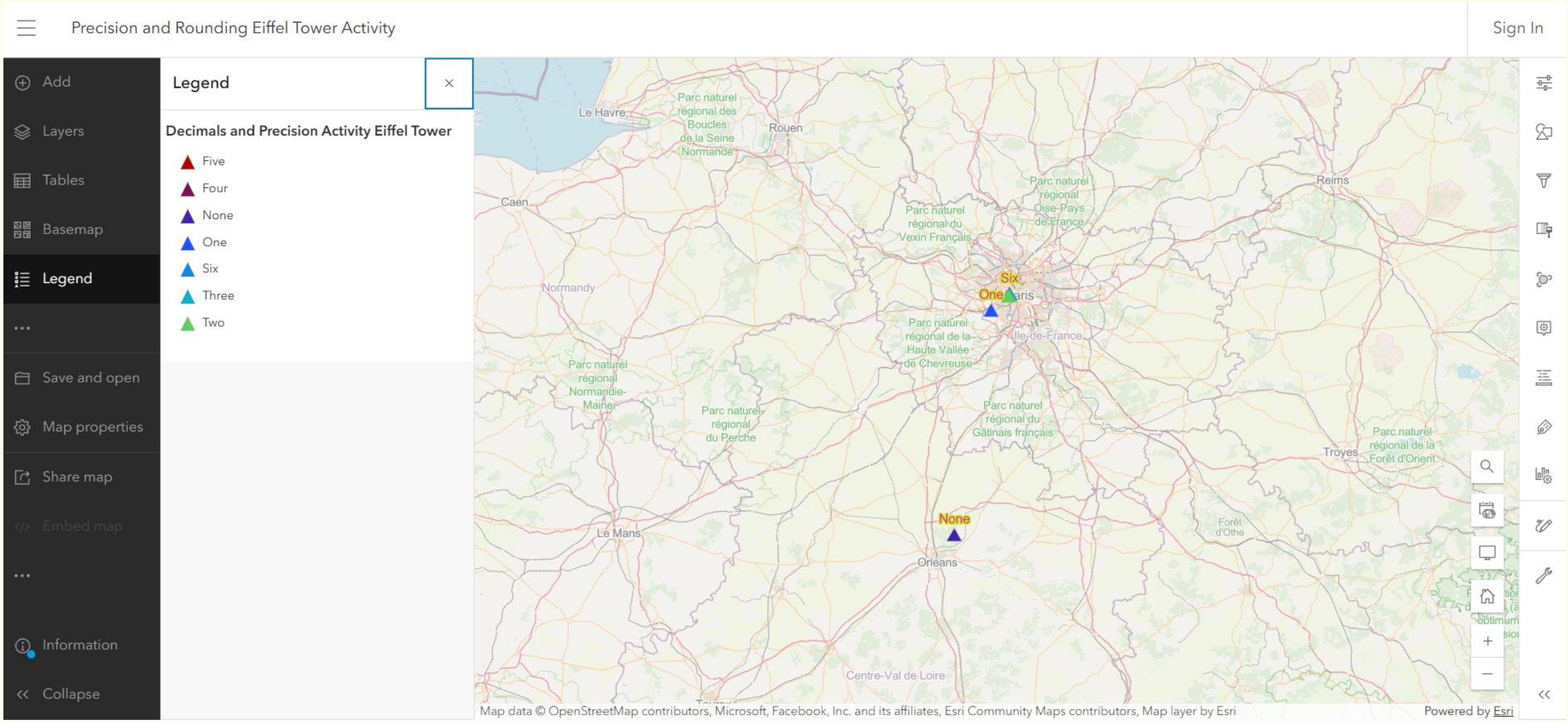
The following exercise is intended to familiarise students with **the meaning of decimal places** and the effect of rounding numbers in connection with longitude and latitude.

Open the page:

https://www.arcgis.com/apps/mapviewer/index.html?webmap=fce1f5d41bbf4eafbbc5757a57a01cfe

The following graphic shows us where we end up when someone tells us the position of the Eiffel Tower – and always simply omits more and more decimal places for the longitude and latitude.

ArcGIS


Precision and Rounding Eiffel Tower Activity
Sign In
Add
Layers
Tables
Basemap
Legend
Save and open
Map properties
Share map
Embed map
Information
Collapse
Legend
Decimals and Precision Activity Eiffel Tower
Five
Four
None
One
Six
Three
Two
Le Havre
Rouen
Caen
Normandy
Reims
Troyes
Le Mans
Orléans
Six
One
None
Parc naturel régional des Boucles de la Seine Normande
Parc naturel régional du Vexin Français
Parc naturel régional Oise-Pays de France
Parc naturel régional de la Haute Vallée de Chevreuse
Parc naturel régional Normandie-Maine
Parc naturel régional du Perche
Parc naturel régional du Gâtinais français
Parc naturel régional de la Forêt d'Orient
Forêt d'Othe
Centre-Val de Loire
Map data © OpenStreetMap contributors, Microsoft, Facebook, Inc. and its affiliates, Esri Community Maps contributors, Map layer by Esri
Powered by Esri

ArcGIS

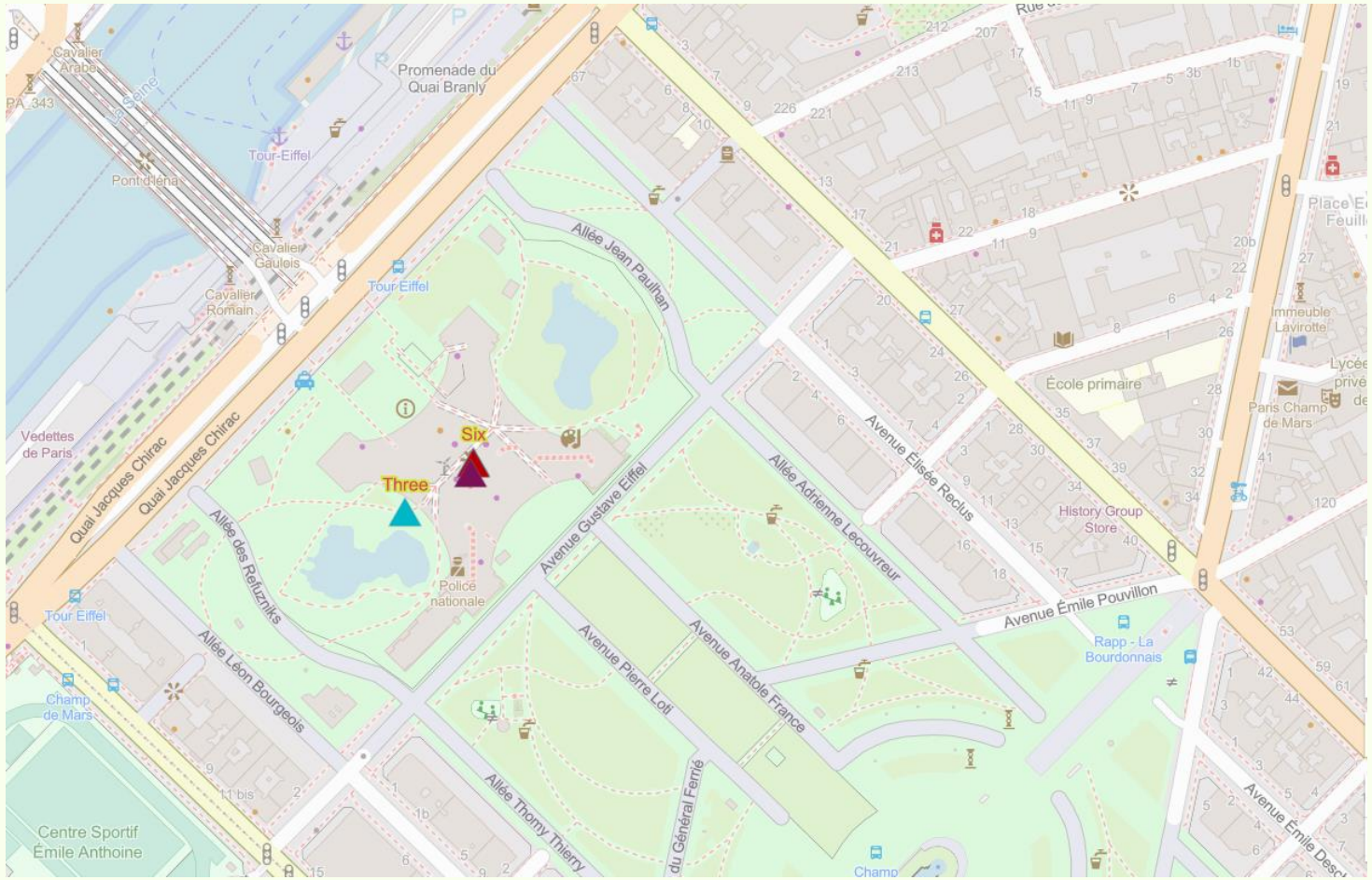
Accuracy (discarding decimal places and their visible effect on a map):

Decimalplaces	Longitude	Latitude
6	2,294524	48,858260
5	2,29452	48,85826
4	2,2945	48,8582
3	2,294	48,858
2	2,29	48,85
1	2,2	48,8
0	2	48

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

ArcGIS

To recognise the more minor effects, we need to zoom in on the map:



ArcGIS

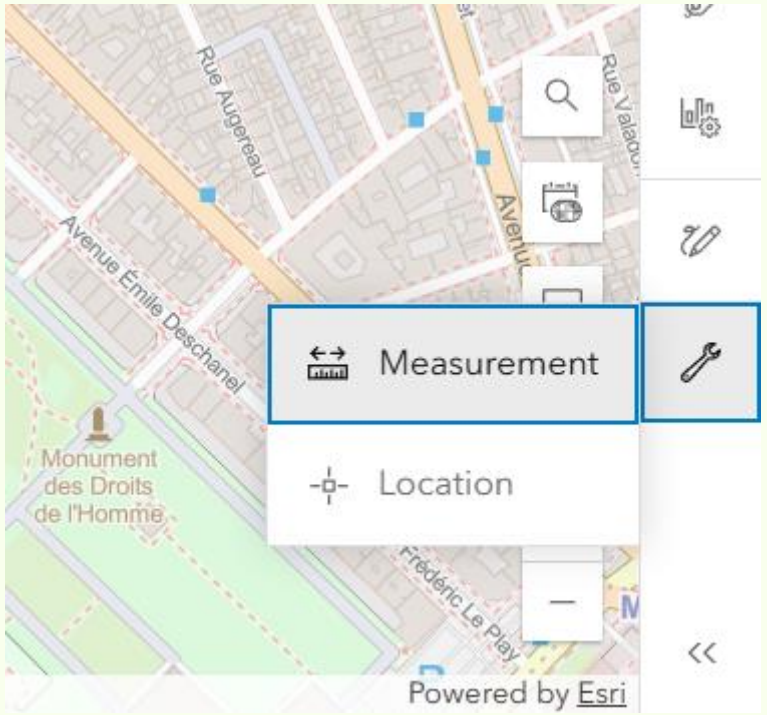
We see similar (but not identical) effects if we round the longitudes and latitudes mathematically correctly. To do this, we need to activate the visibility of another layer of the map (menu navigation on the left):

Decimalplaces	Longitude	Latitude
6	2,294524	48,858260
5	2,29452	48,85826
4	2,2945	48,8583
3	2,295	48,858
2	2,29	48,86
1	2,3	48,9
0	2	49

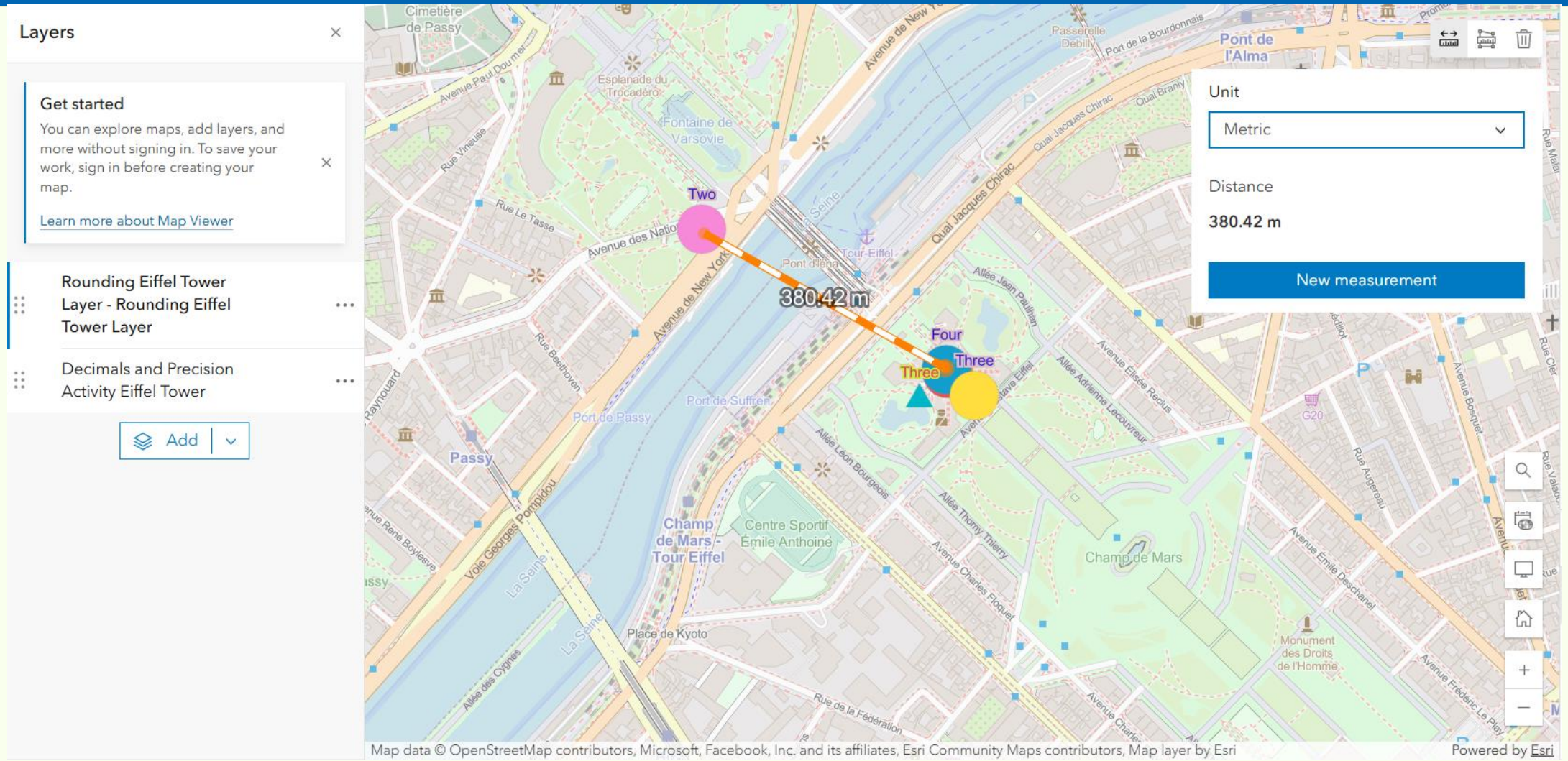
Co-funded by the
Erasmus+ Programme
of the European Union

ArcGIS

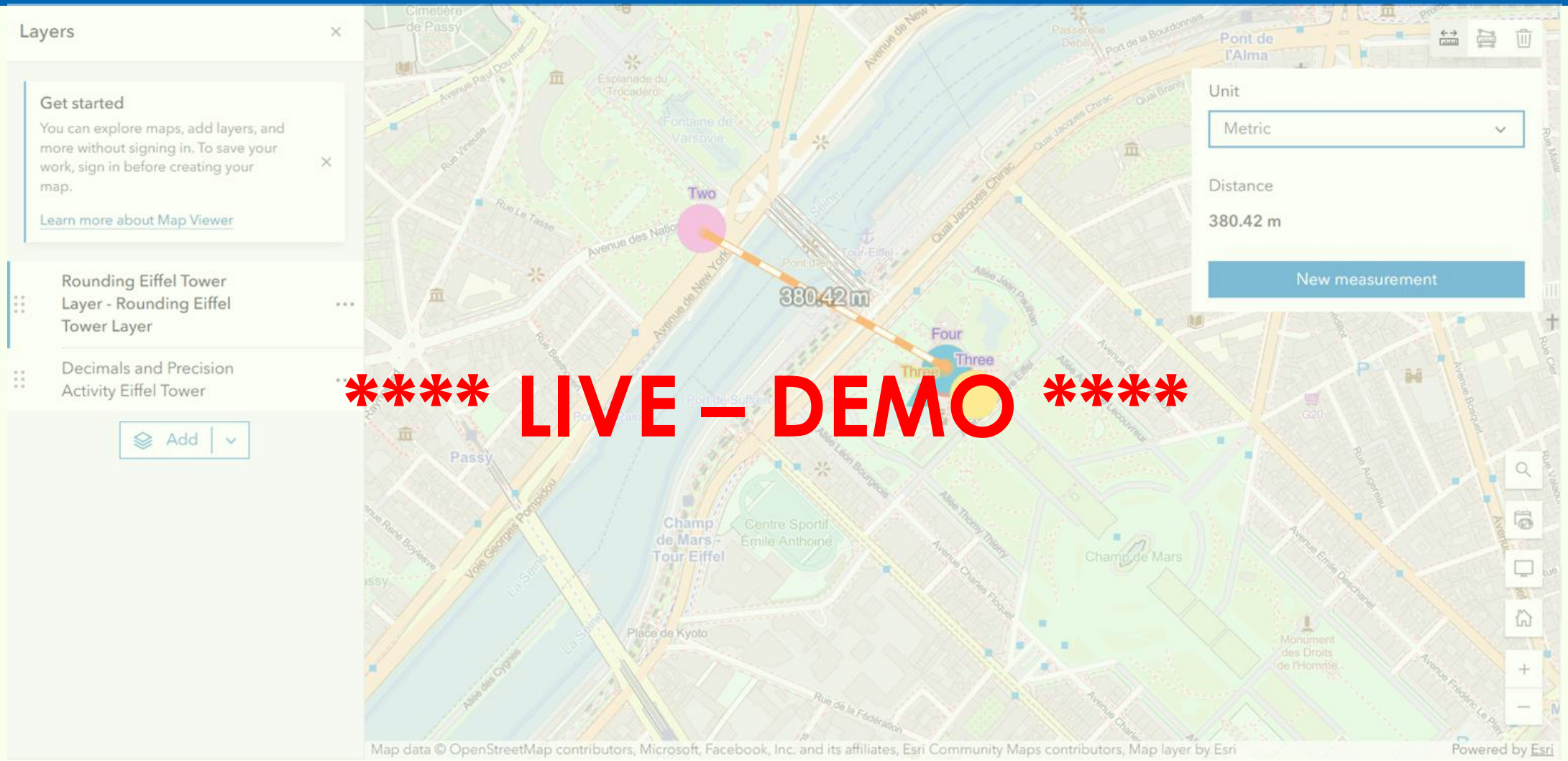
To measure the difference between the individual position coordinates, we use the distance measurement tool. This can be found on the left-hand side:



ArcGIS


Layers
Get started
You can explore maps, add layers, and more without signing in. To save your work, sign in before creating your map.
Learn more about Map Viewer
Rounding Eiffel Tower Layer - Rounding Eiffel Tower Layer
Decimals and Precision Activity Eiffel Tower
Add
Unit
Metric
Distance
380.42 m
New measurement
Two
Three
Four
Three
380.42 m
Champ de Mars - Tour Eiffel
Centre Sportif Émile Anthoine
Champ de Mars
Passy
Port de Passy
Port de Suffren
Tour Eiffel
Pont de l'Alma
Pont d'Iéna
Place de Kyoto
Monument des Droits de l'Homme
Map data © OpenStreetMap contributors, Microsoft, Facebook, Inc. and its affiliates, Esri Community Maps contributors, Map layer by Esri
Powered by Esri

**** LIVE – DEMO ****



**** LIVE – DEMO ****

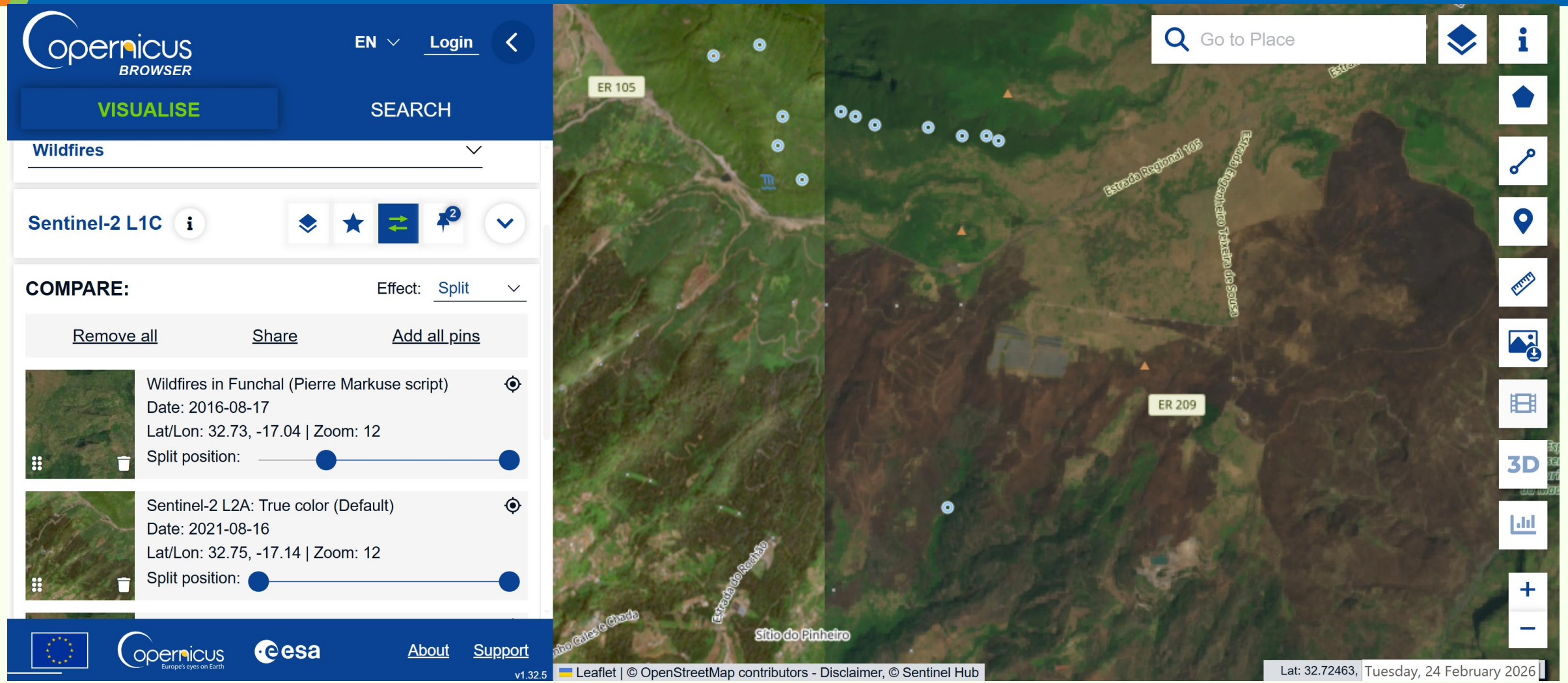
Tour … next stop

Copernicus browser

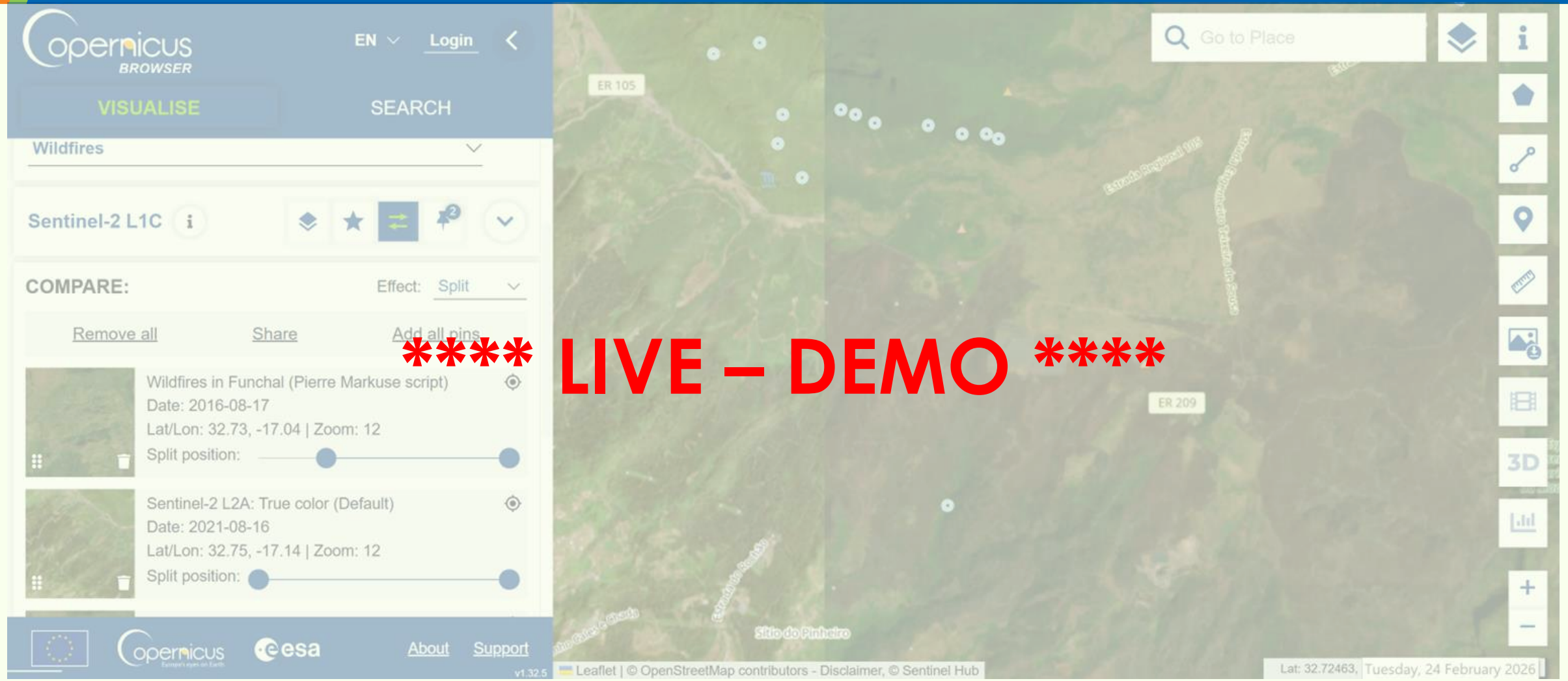
Open the page:

https://browser.dataspace.copernicus.eu/

Tour … next stop



Tour … next stop



****** LIVE – DEMO ******

Tour … last stop

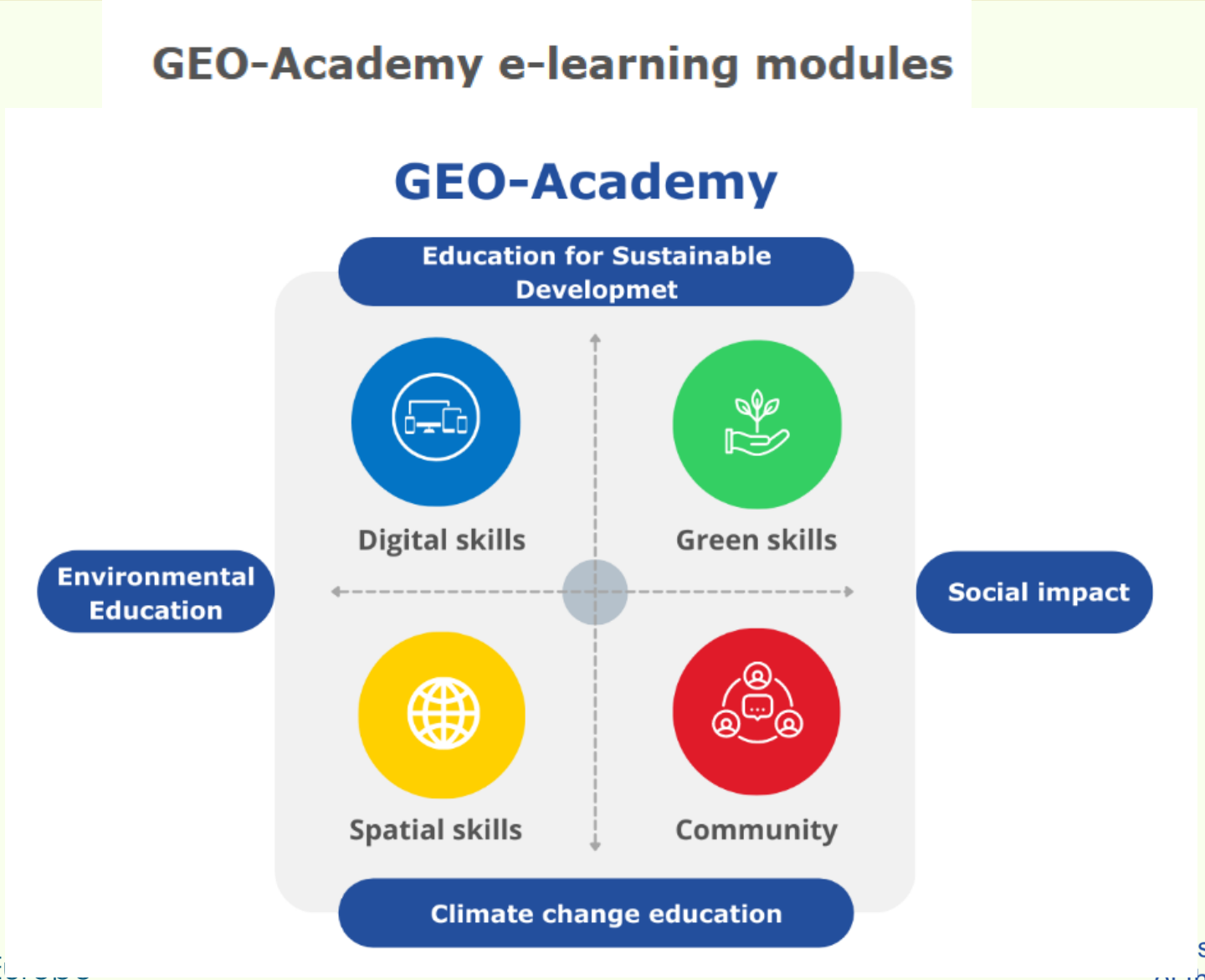
GEO-Academy e-learning modules

Gapminder

https://portal.geoacademy.eu/courses/the-gap-and-the-mind/

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

Tour … last stop



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

Tour … last stop

Tour … last stop

https://www.gapminder.org/

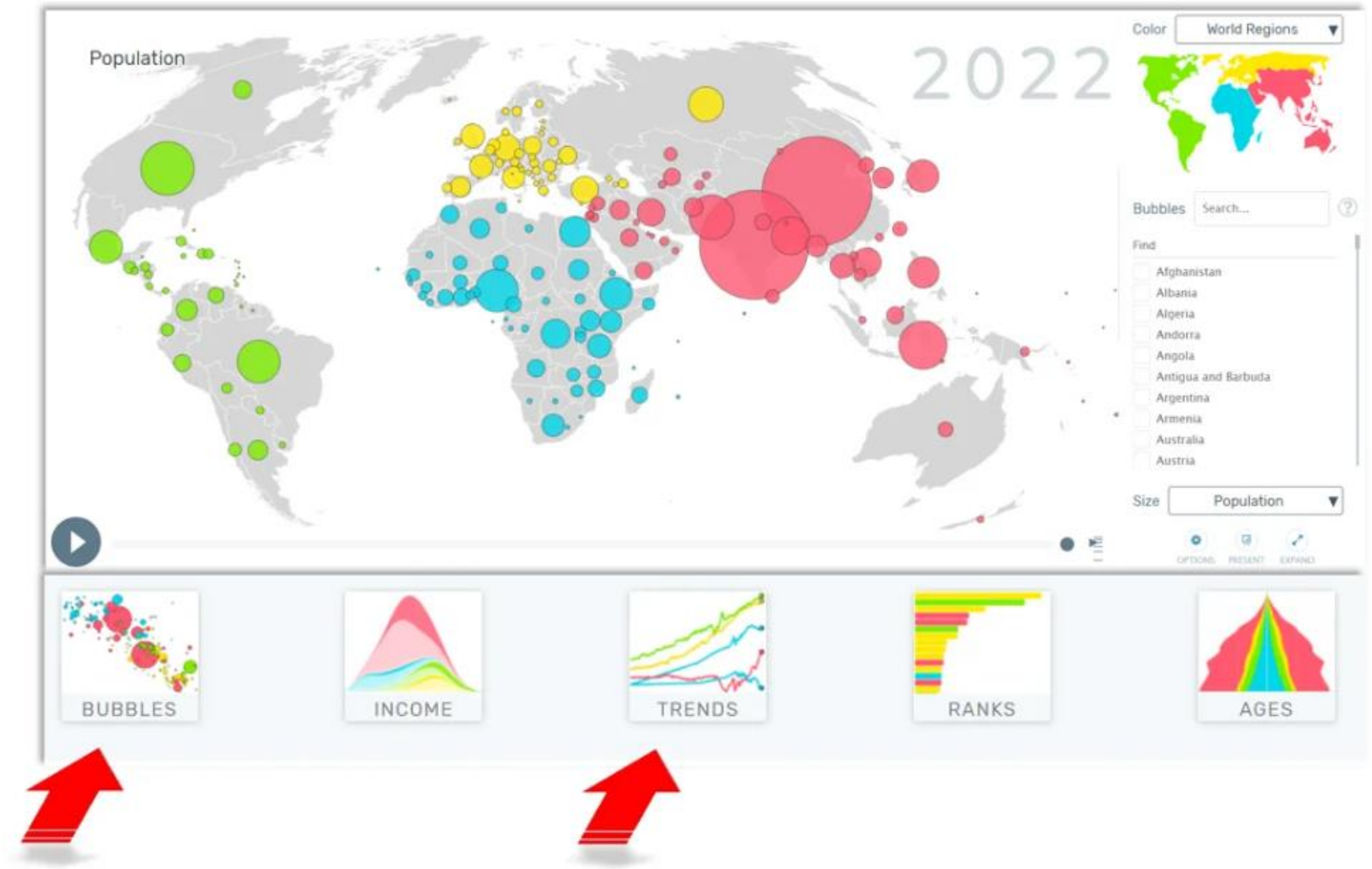
Tour … last stop

What data visualisations are there?

Try out the different **visualisations** and find out what they each mean.

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

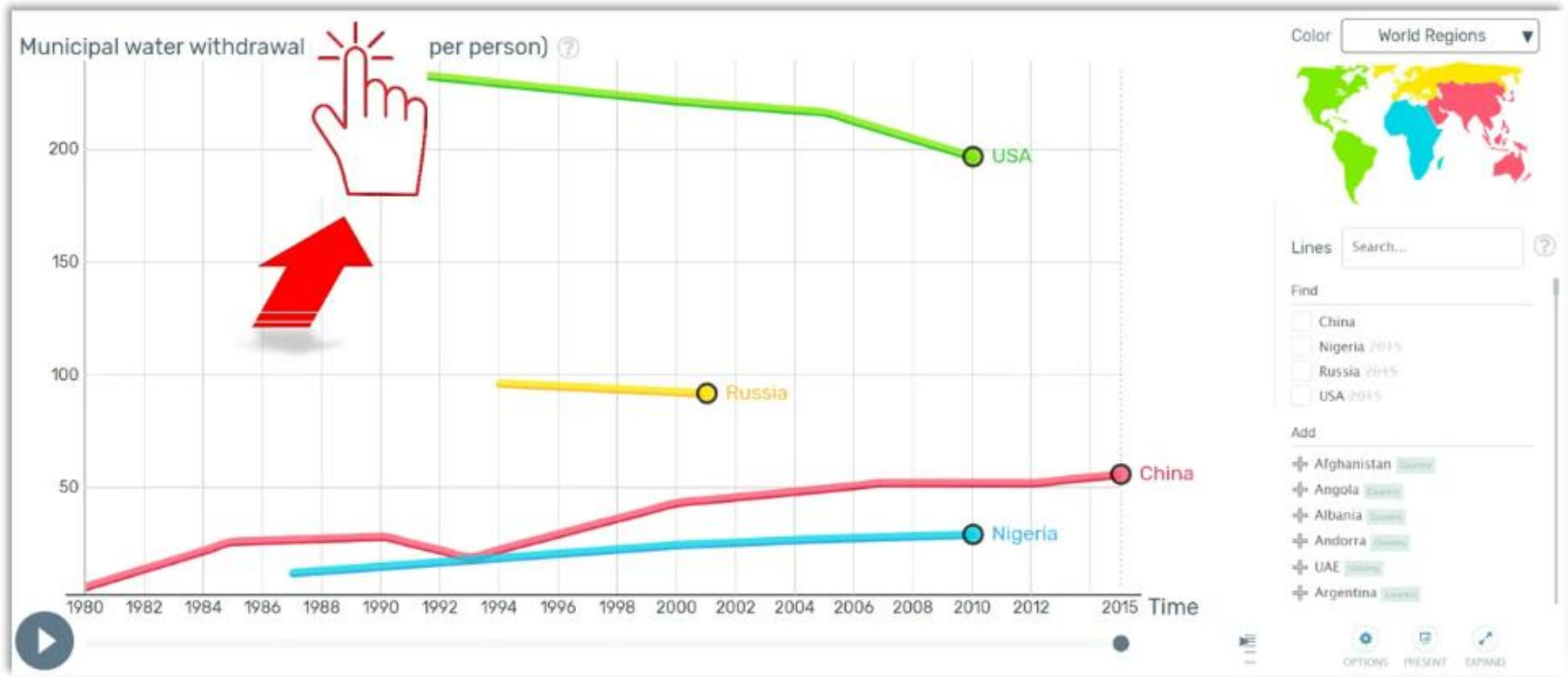
Tour … last stop



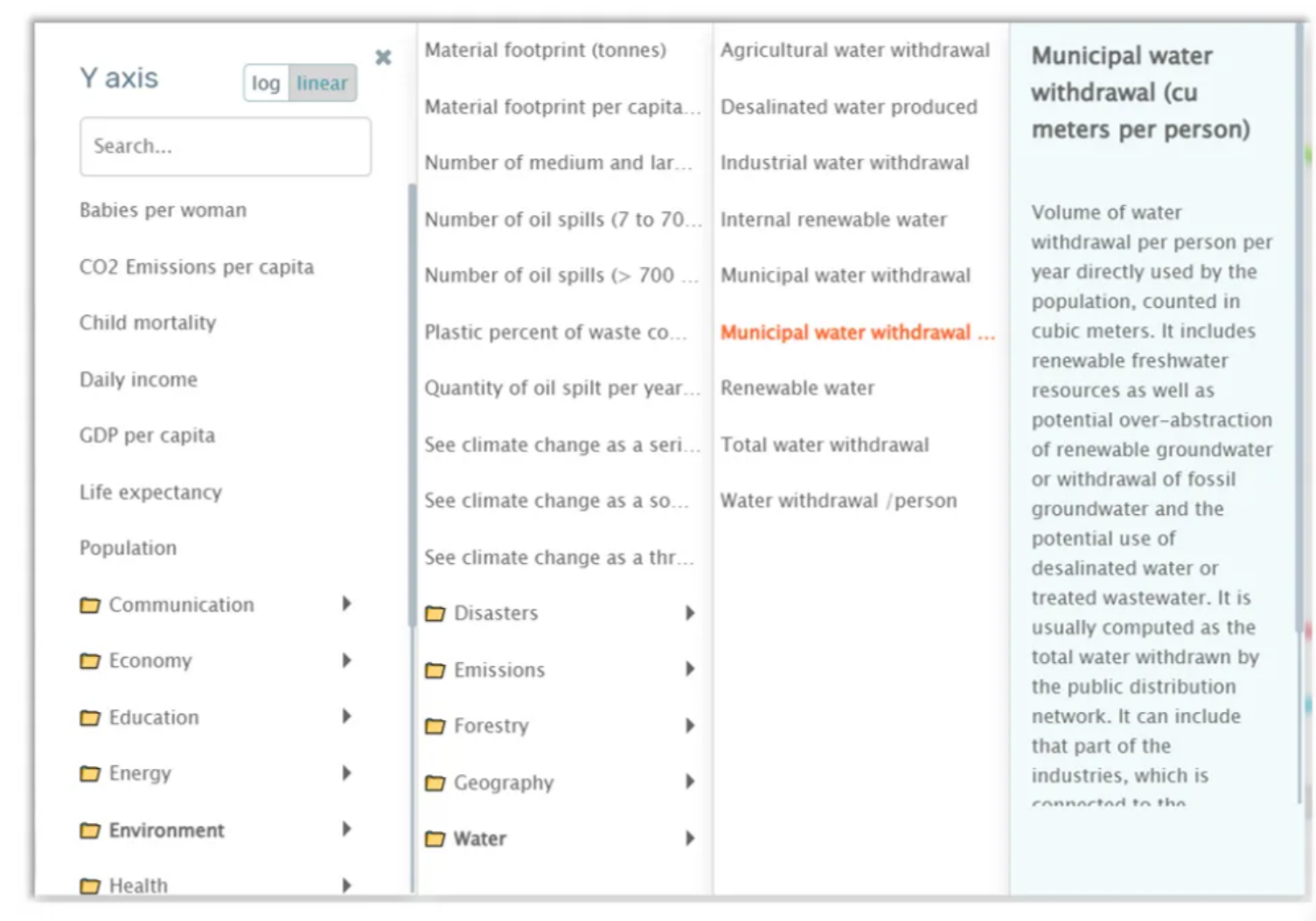
Co-funded by the
Erasmus+ Programme
of the European Union

Tour … last stop

If you **click on the label** in the various visualisations, a list of all available variables will open, sorted by topic.

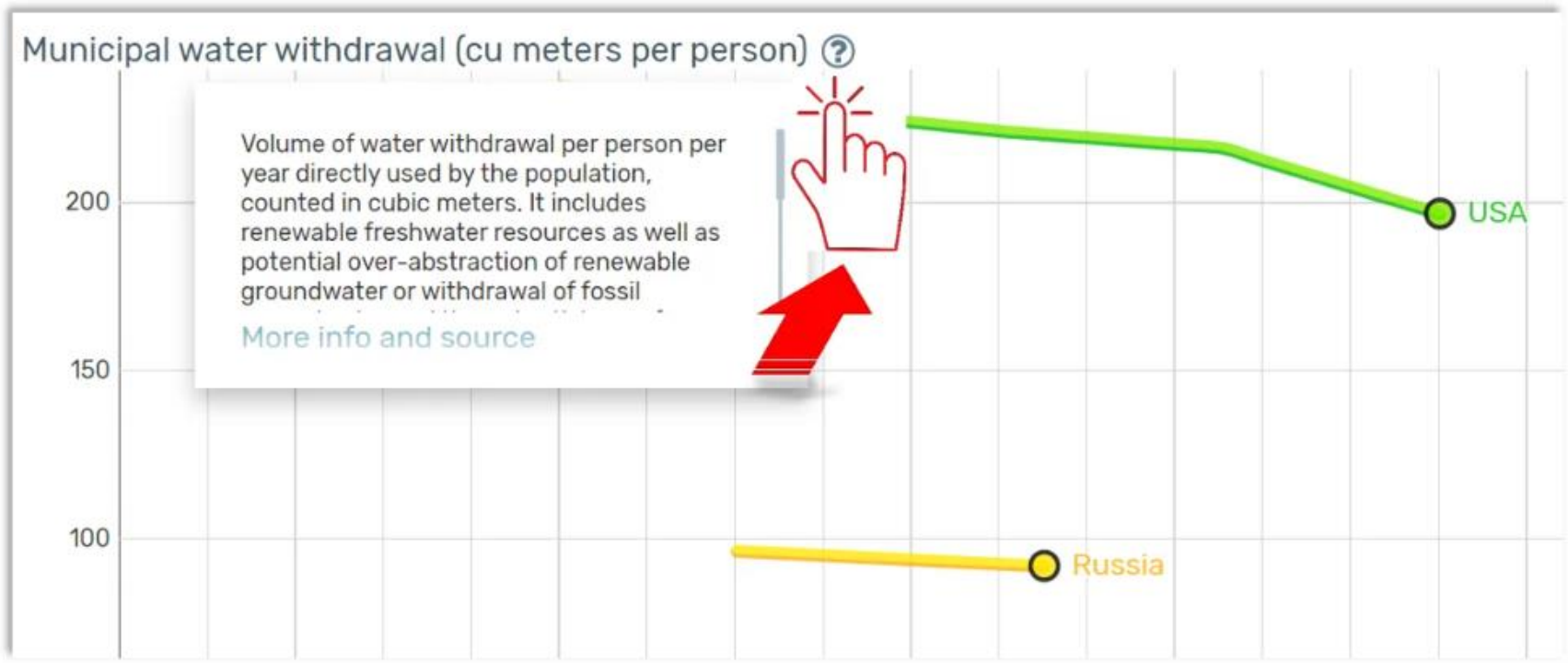


Tour … last stop



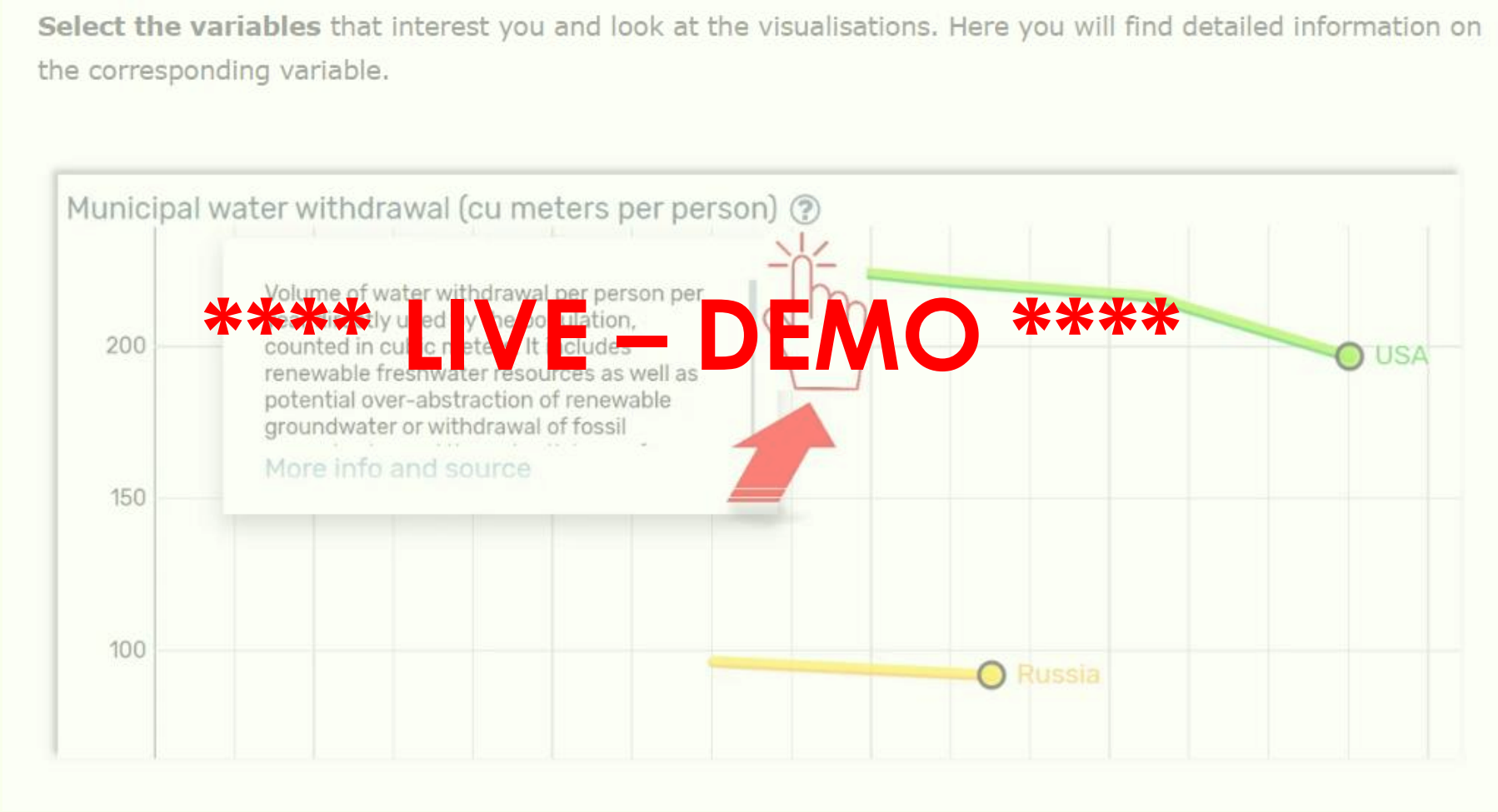
Tour … last stop

Select the variables that interest you and look at the visualisations. Here you will find detailed information on the corresponding variable.



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

**** LIVE – DEMO ****


Select the variables that interest you and look at the visualisations. Here you will find detailed information on the corresponding variable.
Municipal water withdrawal (cu meters per person)
Volume of water withdrawal per person per
counted in cu
renewable freshwater resources as well as
potential over-abstraction of renewable
groundwater or withdrawal of fossil
More info and source
200
150
100
USA
Russia
**** LIVE – DEMO ****

Thank you!


GEO-Academy key actions
Development of educational material
Establishment of national hubs
Implementation of training activities
GEOBSERVE platform: central node for educational material and training activities