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<b>13th Thursday</b>	
	<b>Team Building Activity</b>
9:30	<b>Workshop 7: Use, Analysis and Visualisation of Geodata - <i>Dr. Klaus Albrecht (PHT)</i></b>
11:00	

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**Workshop 7: Use, Analysis  
and Visualisation of Geodata -  
*Dr. Klaus Albrecht (PHT)***

HOW IS IT ALL ORGANISED?

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

<https://portal.geoacademy.eu/>



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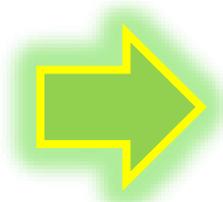
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on satellite data. Users can view and analyse global...  
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### CODAP

CODAP (Common Online Data Analysis Platform) is a free, web-based app designed to support students in learning and doing data science. CODAP (Common Online Data Analysis Platform) is a web-based tool designed for exploring and analyzing data, particularly in...  
[read more](#)

## CODAP = Common ... Online **D**ata **A**nalysis **P**latform

(Workshop Title: Use, Analysis and Visualization of Geodata)

Of course, meanwhile you can find everything on the internet, but if – for example – the mean value (in a data set) has no meaning for you, a lot of things (out there) may be meaningless. You could be vulnerable to manipulation.

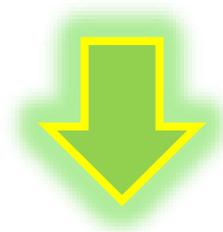
# Data records made up out of (thin) air

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?

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.

AGAIN ...



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## 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/>

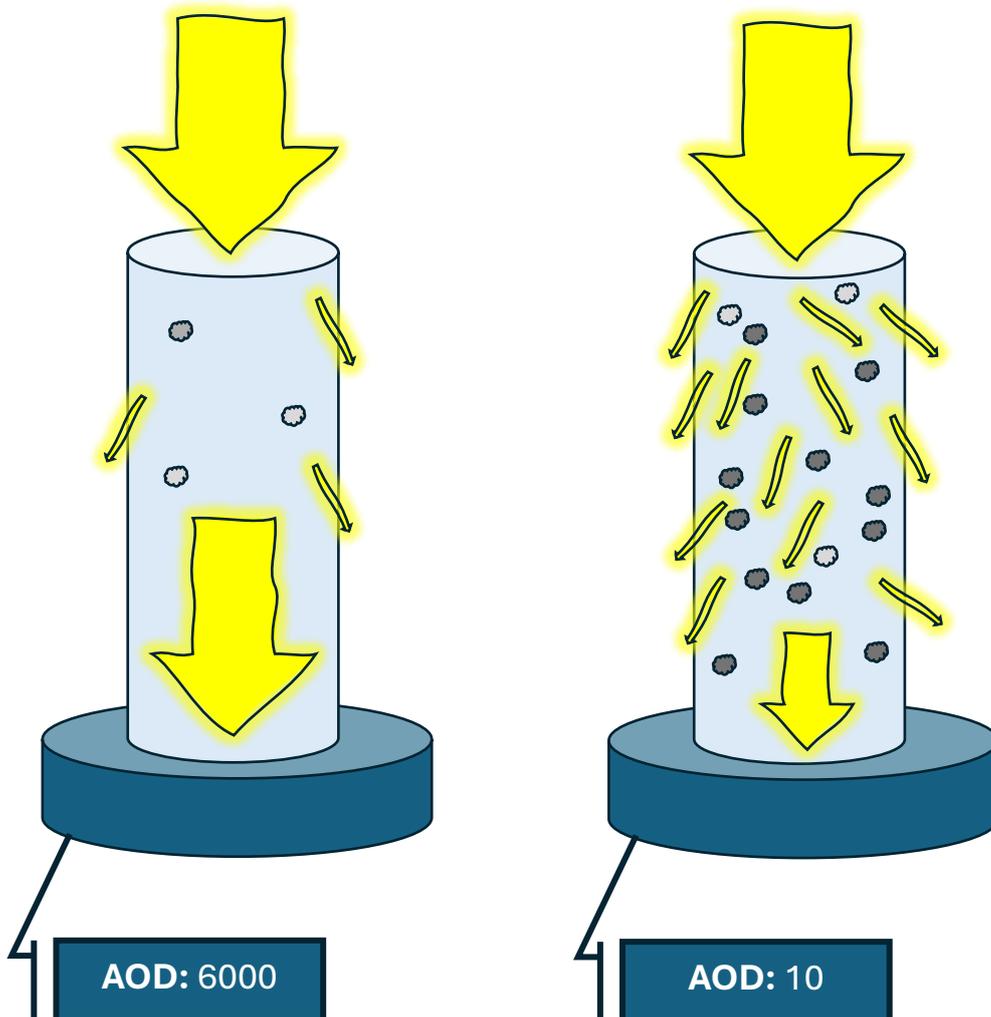


5 June to 23 July 2020, Tucson, Arizona

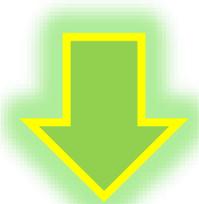
# Aerosol Optical Depth (AOD)

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.

1. **Column with High Aerosol Concentration:** This column contains a significant number of particles, leading to higher light scattering and absorption. As a result, less direct sunlight reaches the ground, corresponding to a higher AOD value.
2. **Column with Low Aerosol Concentration:** This column has fewer particles, resulting in minimal scattering and absorption of sunlight. Consequently, more direct sunlight reaches the ground, corresponding to a lower AOD value.



The data were collected by [NASA's Terra satellite](#) and accessed through the [myNASAdata](#) website.



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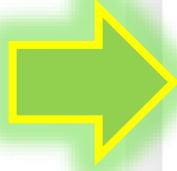
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## my NASA data

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](#)

Fortunately for us, someone has already gone to the trouble of plucking the data from the Internet for us.

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

[Data.csv](#)



# CODAP gets the data talking

Visit the following site:

Common Online Data Analysis Platform (CODAP)

<https://codap.concord.org/>

# Launch CODAP ...



**CODAP**

Get Started Educators Developers Researchers Community Help About [Launch CODAP](#)

## Common Online Data Analysis Platform (CODAP)

CODAP is a free, web-based app designed to support students in learning and doing data science, and as a tool for curriculum developers and education researchers.

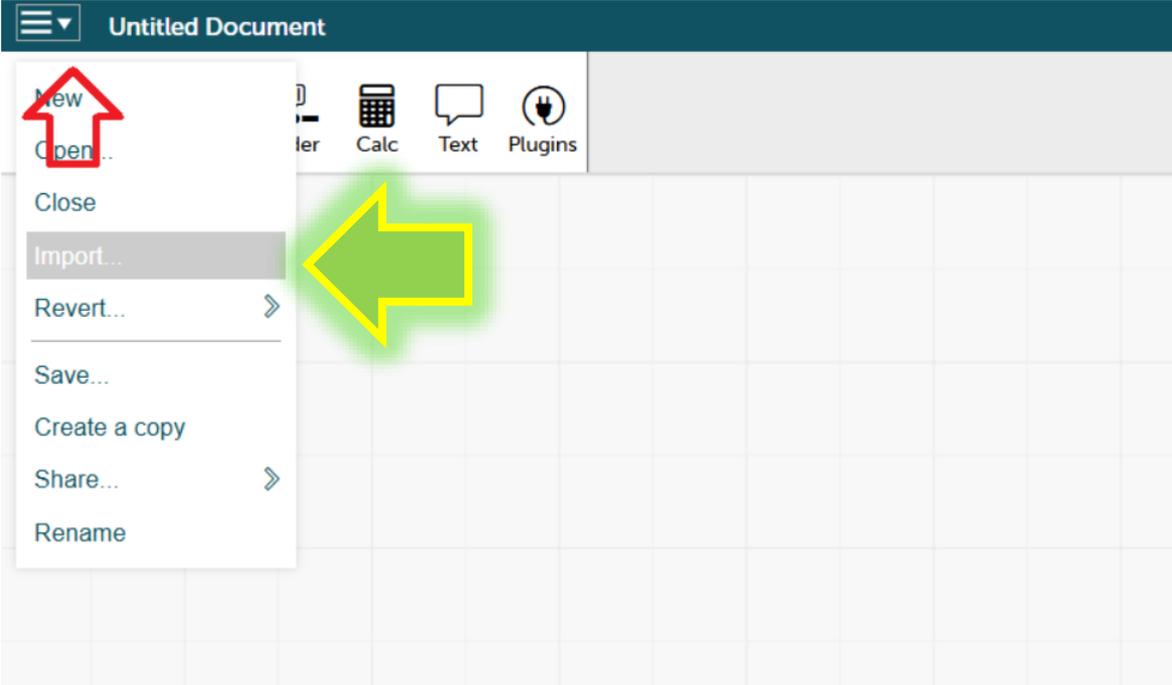
[Learn More](#)



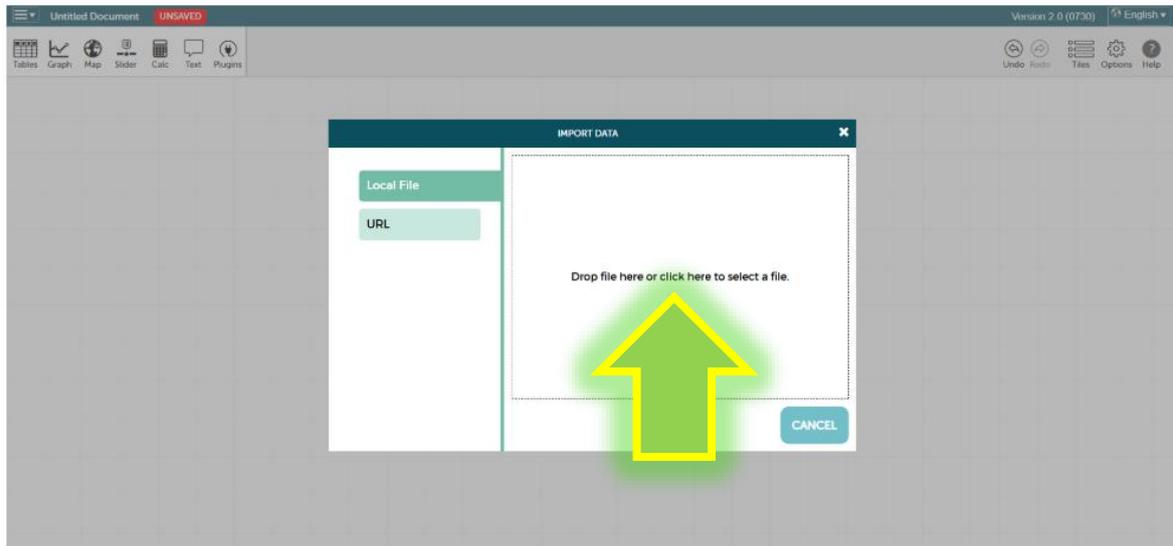
# CREATE NEW DOCUMENT



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



We select the data file previously downloaded ...

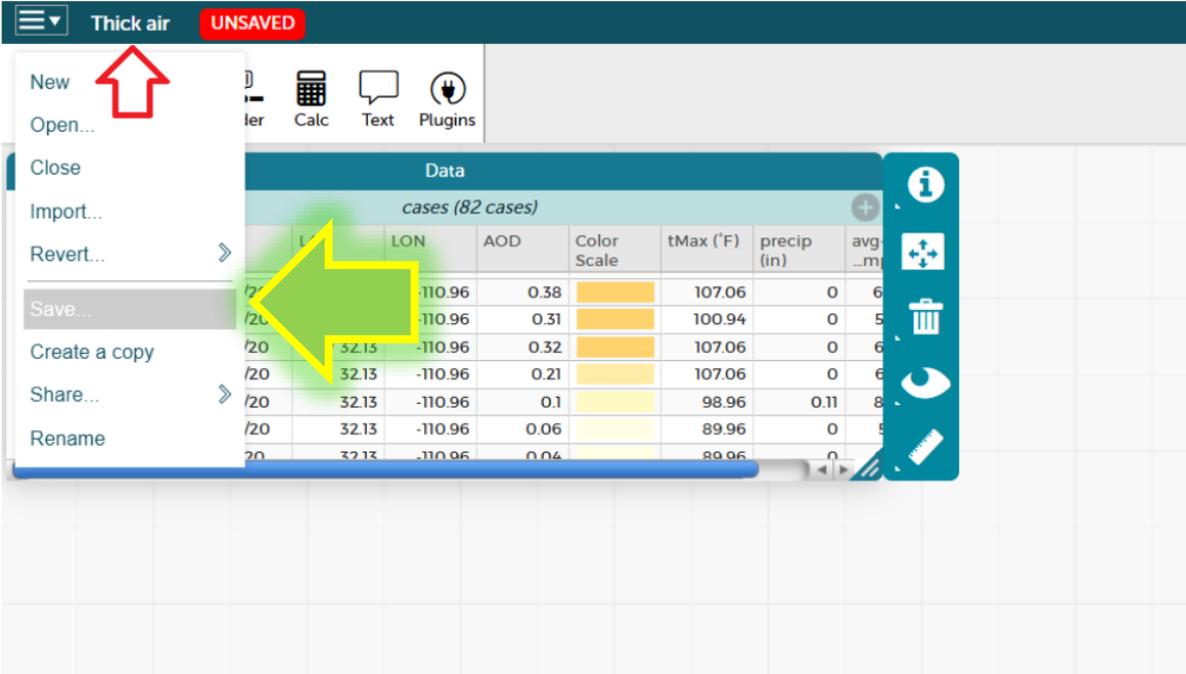


If everything went well, the data sets will now appear in the programme:

The screenshot shows a software interface with a top bar labeled "Untitled Document" and "UNSAVED". Below the bar is a toolbar with icons for Tables, Graph, Map, Slider, Calc, Text, and Plugins. A "Data" panel is open, displaying a table titled "cases (82 cases)". The table has the following columns: in-index, Month, Date, LAT, LON, AOD, Color Scale, tMax (°F), precip (in), and avg...m. The data rows are as follows:

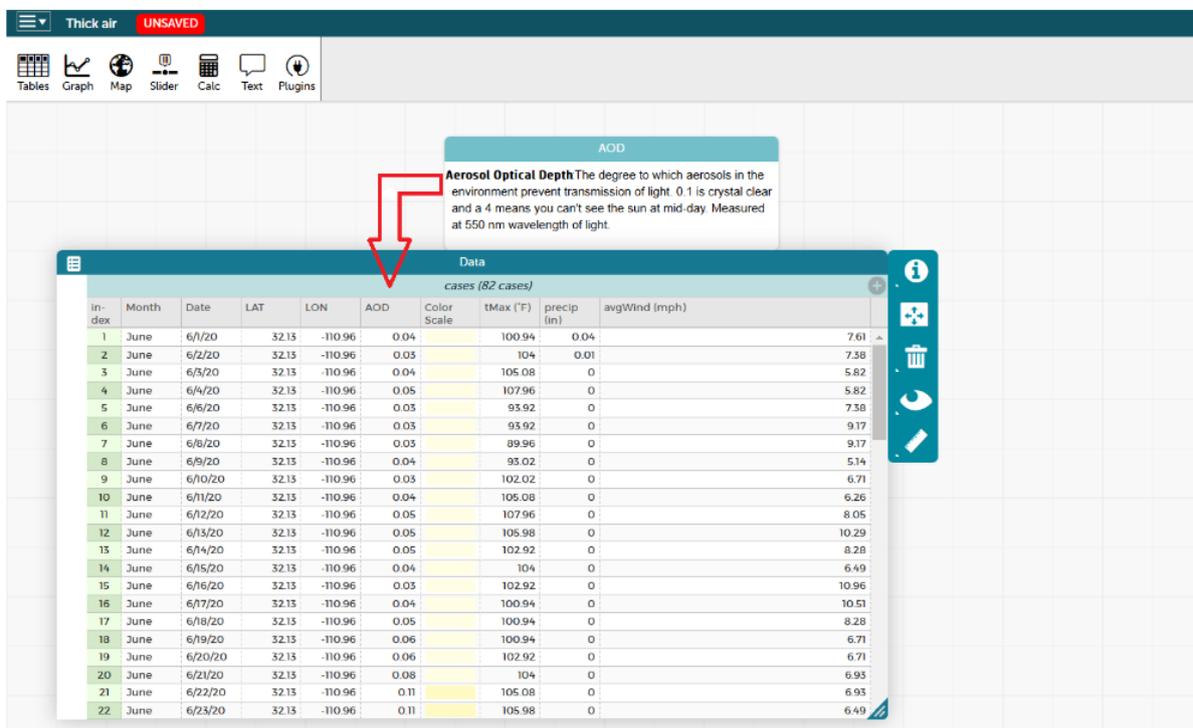
in-index	Month	Date	LAT	LON	AOD	Color Scale	tMax (°F)	precip (in)	avg...m
76	August	8/25/20	32.13	-110.96	0.38	[Orange]	107.06	0	6
77	August	8/26/20	32.13	-110.96	0.31	[Orange]	100.94	0	5
78	August	8/27/20	32.13	-110.96	0.32	[Orange]	107.06	0	6
79	August	8/28/20	32.13	-110.96	0.21	[Yellow]	107.06	0	6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

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



# Get to know your data

We have 82 data entries. A wide range of information is entered for each data entry. If you hold the mouse over a data field, detailed information is displayed:



The screenshot shows a software interface with a top navigation bar containing 'Thick air' and 'UNSAVED'. Below the bar is a toolbar with icons for Tables, Graph, Map, Slider, Calc, Text, and Plugins. The main area displays a data table with a tooltip for the 'AOD' column. The tooltip text reads: 'Aerosol Optical Depth The degree to which aerosols in the environment prevent transmission of light. 0.1 is crystal clear and a 4 means you can't see the sun at mid-day. Measured at 550 nm wavelength of light.' The table below has the following columns: index, Month, Date, LAT, LON, AOD, Color Scale, tMax (°F), precip (in), and avgWind (mph). The data rows represent dates from June 1, 2020, to June 23, 2020.

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

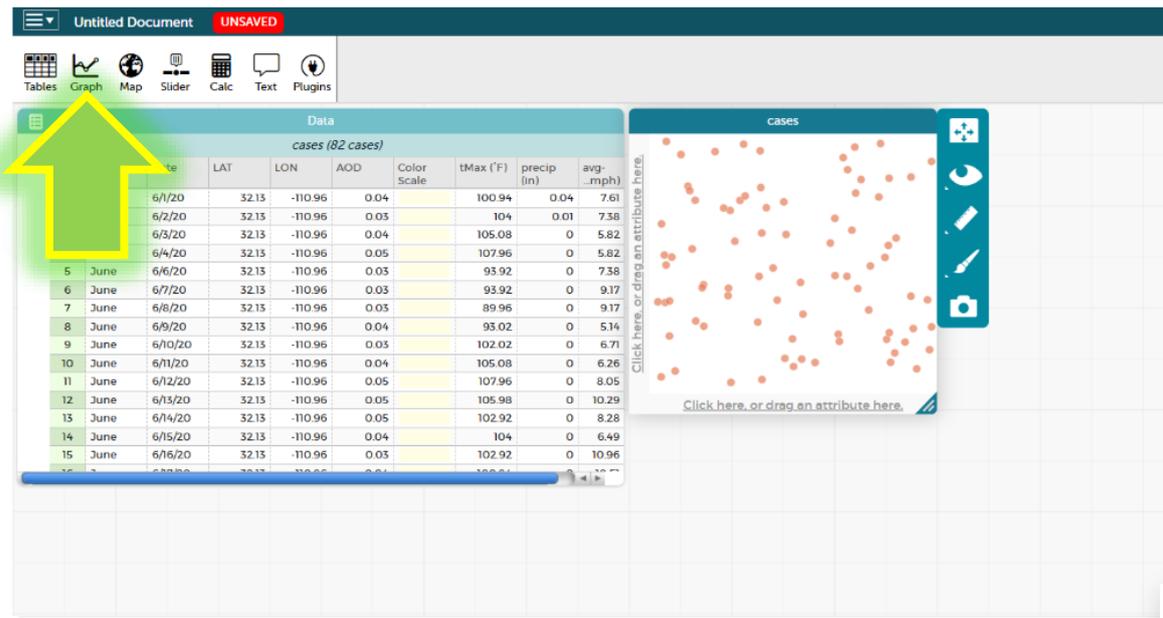
You will find a total of nine attributes (columns) for each of the 82 data entries (rows). An attribute can be numerical or categorical.

Aerosol optical depth (AOD) is calculated from satellite measurements of changes in the reflections and absorption of visible and infrared light due to particles in the atmosphere.

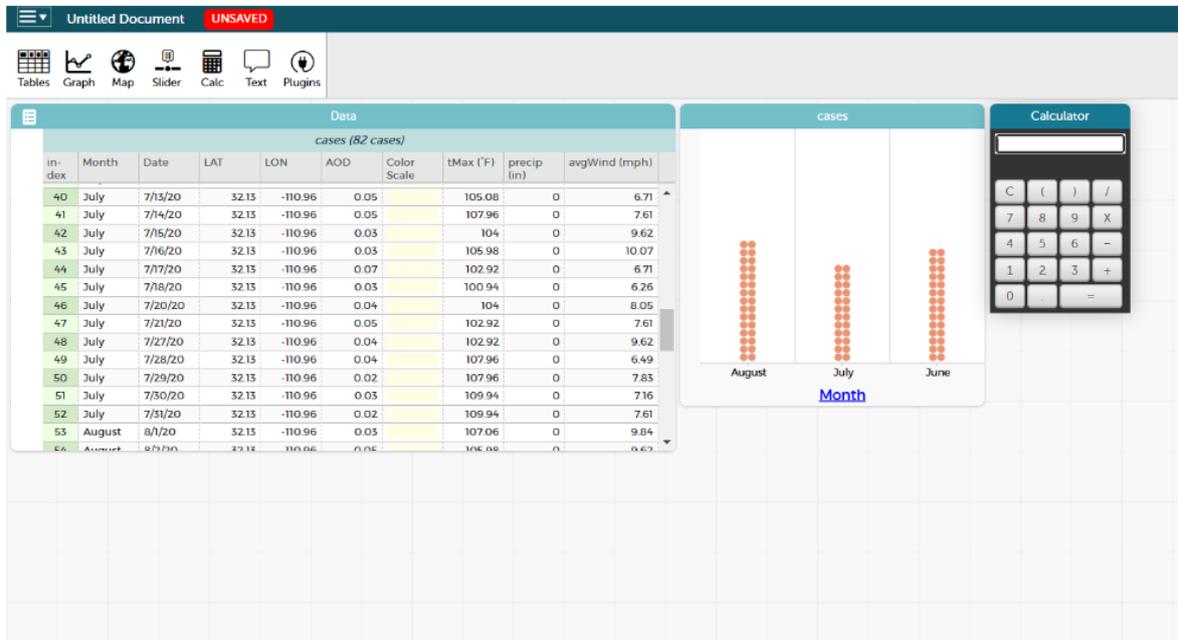
The data for AOD, temperature and other attributes were selected for a three-month period during which a large forest fire, known as the Bighorn Fire, occurred near Tucson, Arizona.

# Juggling with data

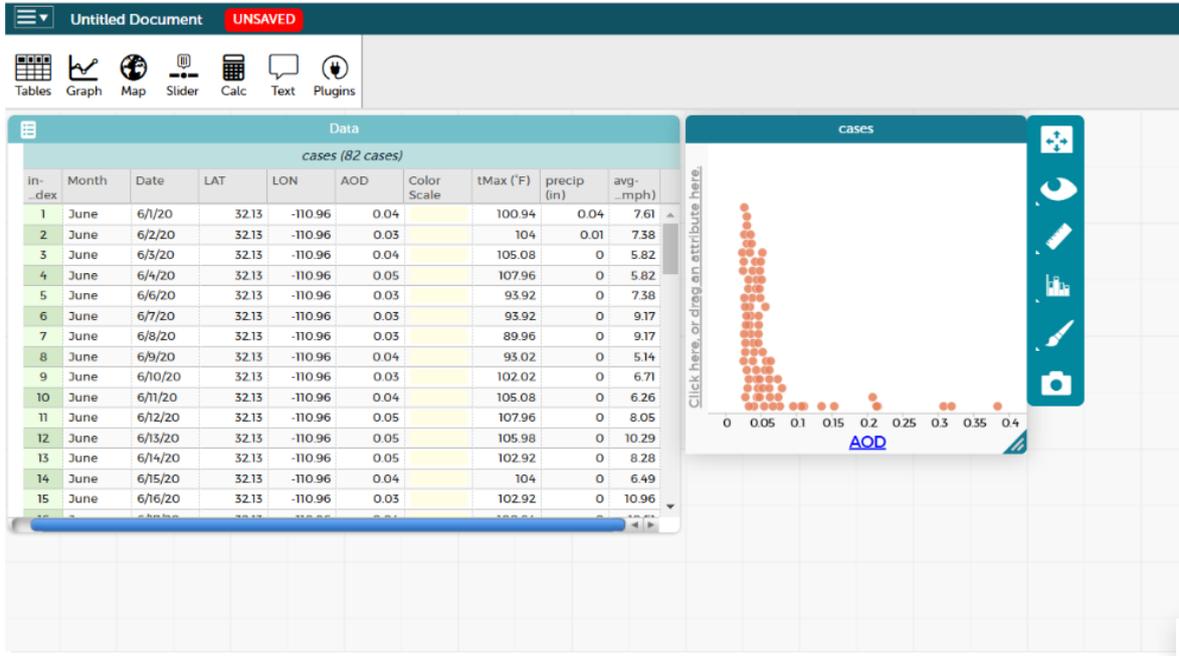
The 'Graph' menu item initially shows us the entire, unorganised 'data cloud'.



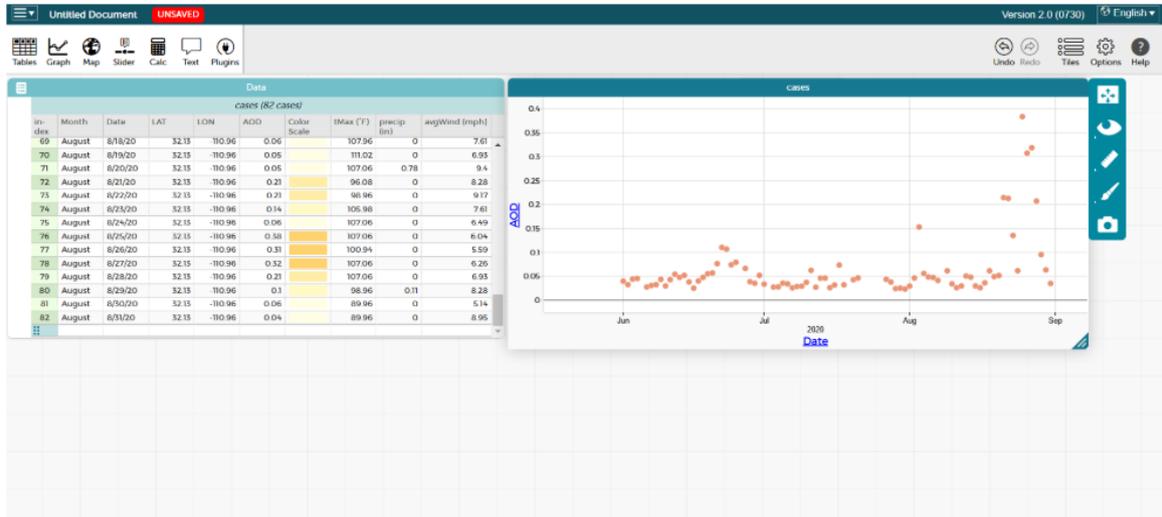
If we drag the 'Month' attribute onto the horizontal axis with the mouse, our pile of data already looks tidier.



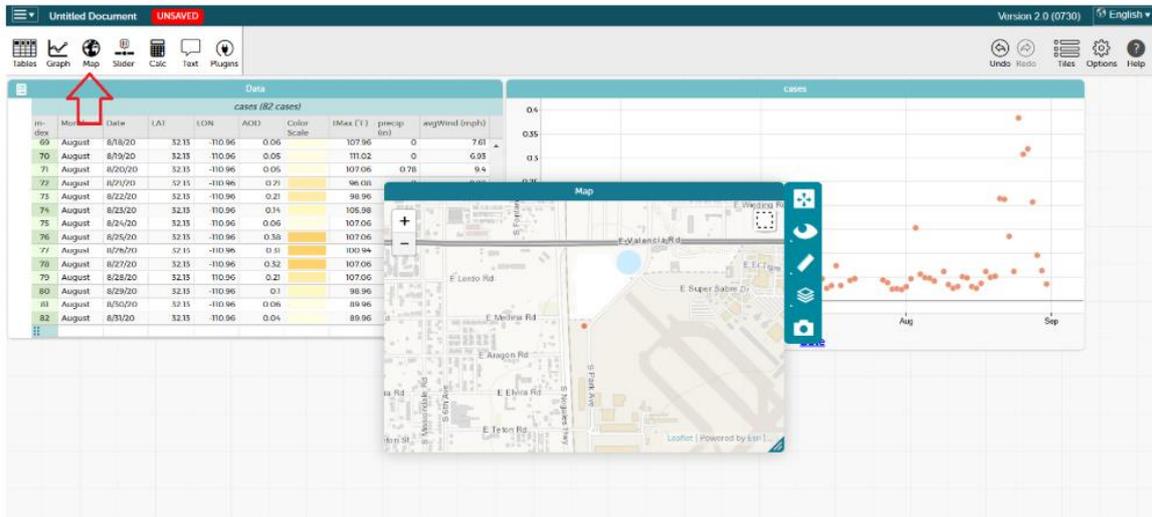
Let's drag another attribute onto the horizontal axis:



Why shouldn't we also assign an attribute to the vertical axis? We have enough attributes!



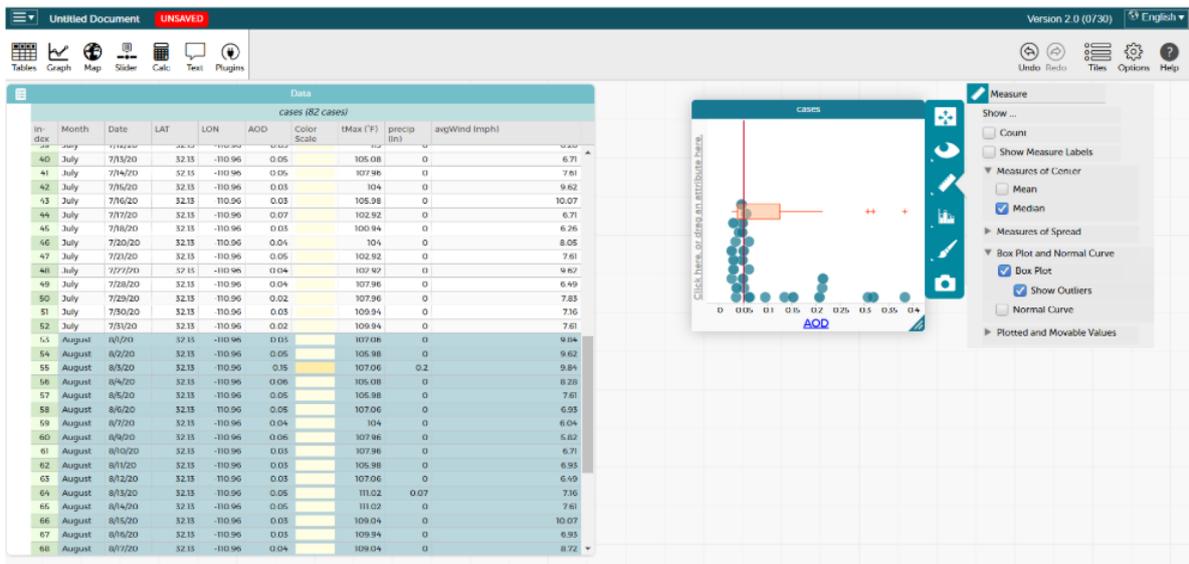
Maybe we'll also try something from the menu bar. How about 'Map'?



Looks like a lonely data point at the airport. Let's check this with Google maps!



With a little perseverance, we can now start analysing the data. We can mark individual data areas and use such wonderful things as Mean, Median or BoxPlot to find out what the forest fire has done to the data.



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:

- $\text{AOD} < 0.1$ : Clear conditions with minimal aerosol presence.
- $0.1 \leq \text{AOD} < 0.25$ : Light aerosol loading, typical of background conditions.
- $0.25 \leq \text{AOD} < 0.4$ : Moderate aerosol presence, indicating noticeable haze.
- $\text{AOD} \geq 0.4$ : 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 ...

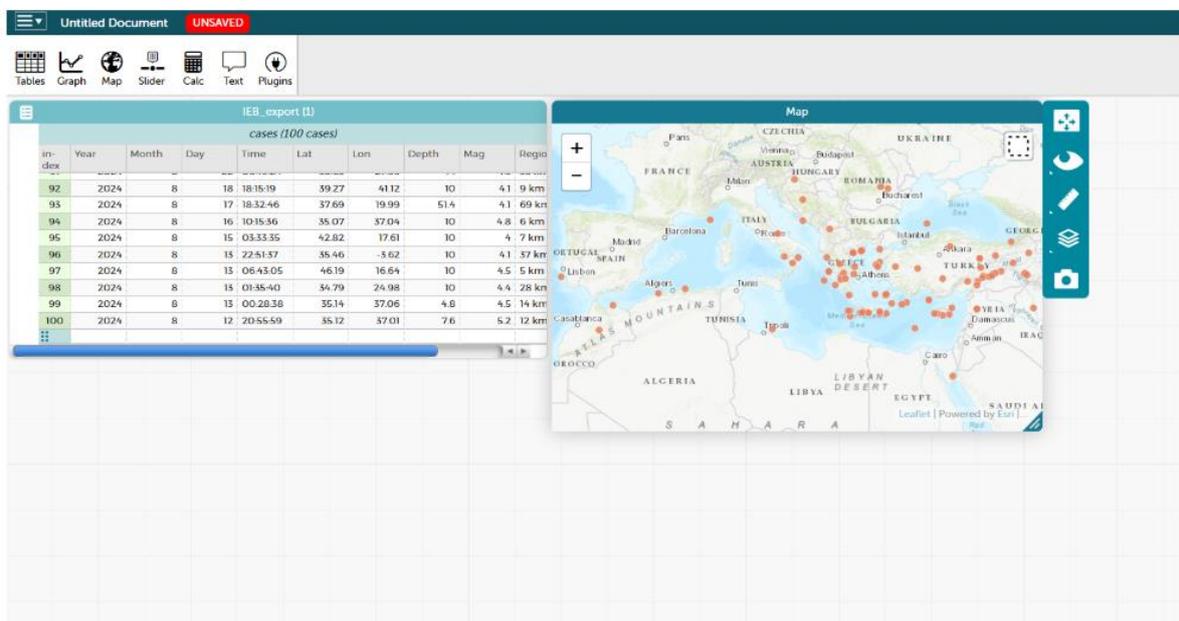
A Second example ...

# Earthquakes

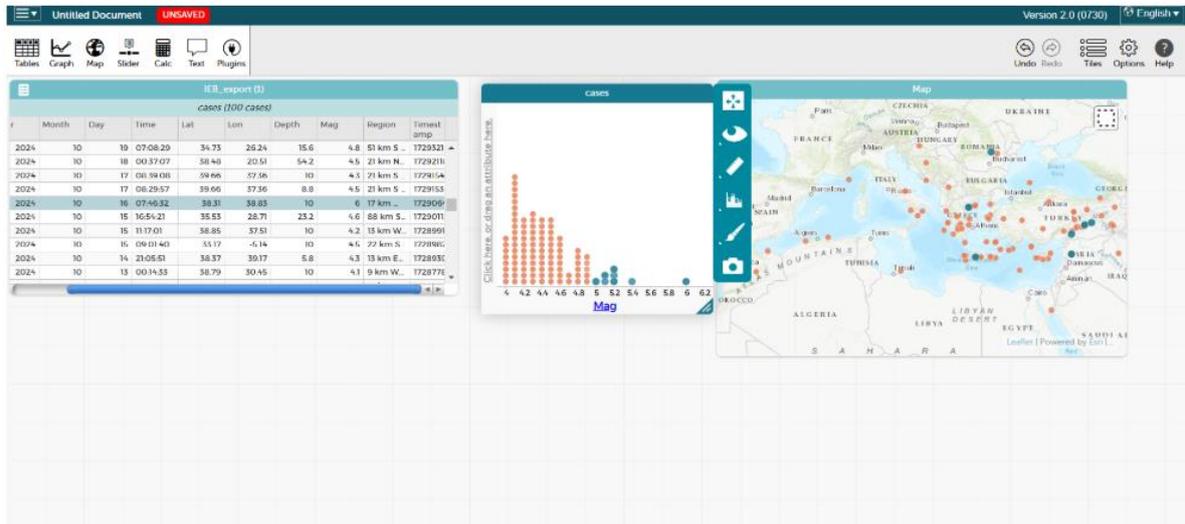
Data Set is here:

[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?

The screenshot shows a software interface with a table, a map, and a bar chart. The table, titled 'IBR\_exploit (1)', contains data for 'cases (100 cases)' with columns for Year, Month, Day, Time, Lat, Lon, Depth, Mag, Region, and Timestamp. The 'Mag' column is circled in red. A red arrow points from this column to a red box on the map, which is currently showing a world map with various locations marked. Below the table is a bar chart titled 'cases' with 'Mag' on the x-axis and 'cases' on the y-axis. The interface also includes a toolbar with icons for Tables, Graph, Map, Slider, Calc, Text, and Plugins, and a top bar with 'Untitled Document', 'UNSAVED', 'Version 2.0 (0/30)', and 'English'.

r	Year	Month	Day	Time	Lat	Lon	Depth	Mag	Region	Timestamp
2024	10	19	07:08:29		34.73	26.24	15.0	4.8	21 km S.	1723321
2024	10	18	00:37:07		38.48	20.51	54.2	4.5	21 km N.	17229211
2024	10	17	08:39:08		39.66	37.36	10	4.3	21 km S.	17227744
2024	10	17	08:29:57		39.66	37.36	8.8	4.5	21 km S.	17229155
2024	10	16	07:46:32		38.33	38.85	10	6	17 km	1722906
2024	10	15	16:54:21		35.51	28.71	25.2	4.6	88 km S.	17229011
2024	10	15	11:17:01		38.86	37.51	10	4.2	13 km W.	17228909
2024	10	15	08:01:40		35.17	-5.14	10	4.5	22 km S.	1722898
2024	10	14	21:05:51		38.57	39.17	5.8	4.3	13 km E.	17228935
2024	10	13	00:14:33		38.79	30.45	10	4.1	9 km W.	17228776

## Background

Before we start practising, we can look at why this is important in the first place.

An introduction to the topic can be found here for interested teachers:

<https://www.teachfirst.org.uk/blog/lead-deliberate-practice-10-things-every-teacher-educator-should-know>

# **Lead deliberate practice – ‘10 things every teacher educator should know’**

LINK:

<https://www.teachfirst.org.uk/blog/lead-deliberate-practice-10-things-every-teacher-educator-should-know>