February 2023

Meteorite Investigation

Data Analytics Project 1

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Introduction

What are meteorites?

Fun Fact #1:

eBay lists more than one thousand meteorites for auction online.

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What is a meteorite?

A meteorite is a **rock that falls to Earth from space.** The vast majority of meteorites are pieces of asteroids, the small rocky bodies that orbit the Sun mostly between Mars and Jupiter.

Dataset Variables:

01

Name

The name of the meteorite typically a location, modified with a number

02

Id

A unique identifier for the meteorite

03

Nametype

Two types:
-Valid: a typical meteorite
-Relict: meteorite highly degraded by weather on Earth

04

Recclass

The class of meteorite. There are many classes based on physical and chemical characteristics.

05

Mass

The mass of the meteorite in kilograms.

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Dataset Variables:

06

Fall

Weather the meteorite was seen falling or discovered after its impact

07

Year

The year the meteorite fell or was found

08

Reclat

The latitude of the meteorite's landing

09

Reclong

The longitude of the meteorite's landing

10

GeoLocation

Reclat and reclong combined.

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CLEANING PROCESS

02

Link to GitHub

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Where did the biggest meteorites land?

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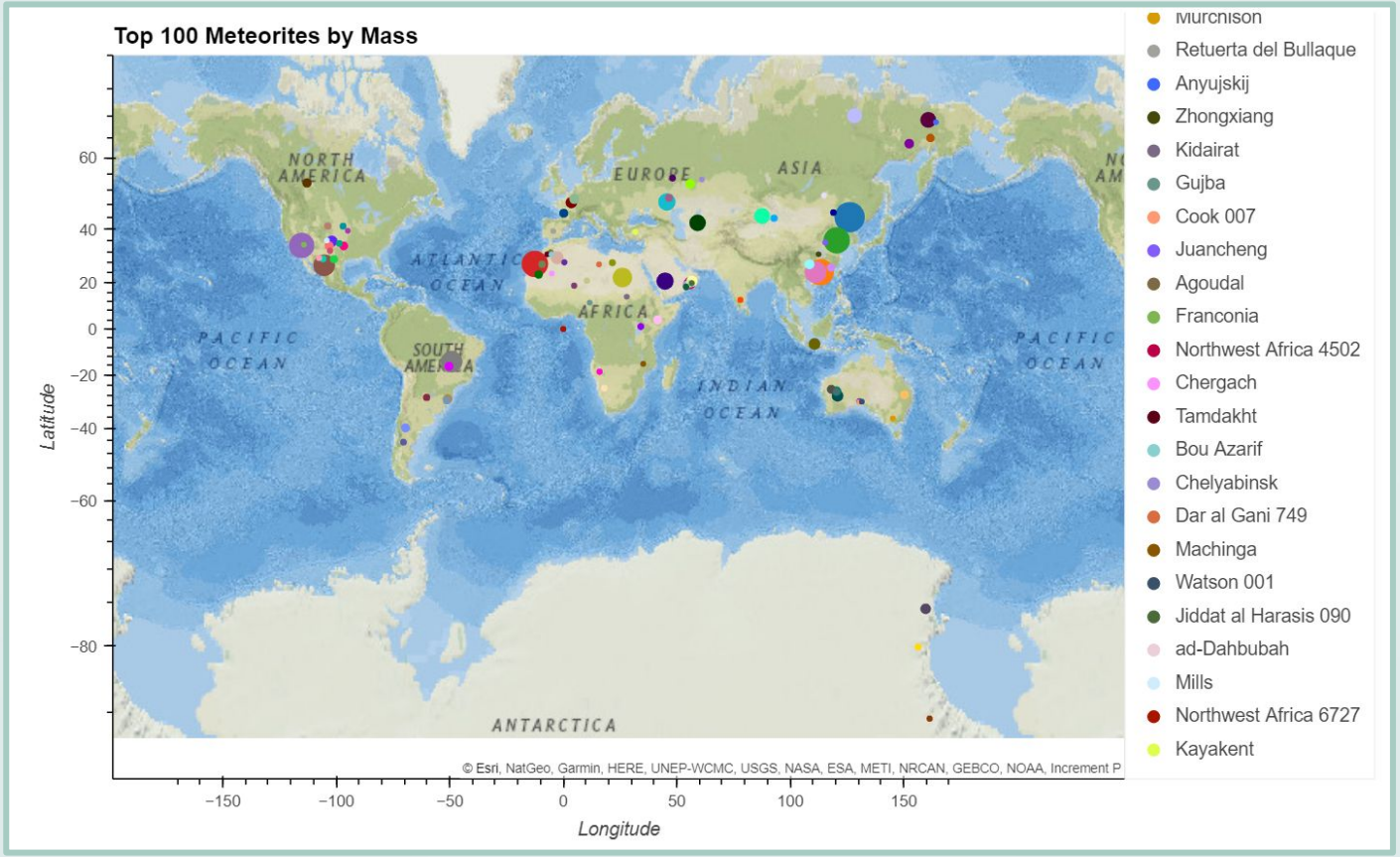

BONUS: Using APIs

Where did the biggest meteorites land?

Jupyter Notebook Screenshot

In [18]:

```
# Print a message to follow up the City search
print("Starting City search")

# Iterate through the DataFrame
for index, row in meteorite_top_max.iterrows():

    # get latitude, longitude from the DataFrame
    lat = meteorite_top_max.loc[index, "reclat"]
    lng = meteorite_top_max.loc[index, "reclong"]

    # Set base URL
    base_url = "https://api.geoapify.com/v1/geocode/reverse?"

    name_city = requests.get(f'{base_url}lat={lat}&lon={lng}&format=json&apiKey={geoapify_key}').json()
#     print(f'{base_url}lat={lat}&lon={lng}&format=json&apiKey={geoapify_key}')

    # Grab the first City from the results and store the name in the DataFrame
    try:
        meteorite_top_max.loc[index, "City Name"] = name_city["results"][0]["region"]#["city"]
        meteorite_top_max.loc[index, "Country"] = name_city["results"][0]["country"]#["country_code"]
    except (KeyError, IndexError):
        # If no City is found, set the City name as "No City found".
        meteorite_top_max.loc[index, "City Name"] = "No city found"
        meteorite_top_max.loc[index, "Country"] = "No Country found"

    # Log the search results
#     print(f"{meteorite_data_max.loc[index, 'City Name']} - nearest city: {meteorite_data_max.loc[index, 'City Name']}")

# Display sample data
meteorite_top_max.sample(10)
```

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BONUS: Using APIs

Where did the biggest meteorites land?

Data Frame Screenshot

Out[18]:

	name	id	nametype	recclass	fall	year	reclat	reclong	mass (Kg)	City Name	Country
5661	Bilibino	5046	Valid	MIM	Found	1981	67.30000	160.80000	1000.0	Far Eastern Federal District	Russia
286	Wildara	24265	Valid	OC	Found	1968	-28.23333	120.85000	500.0	No city found	No Country found
1600	Jilin	12171	Valid	OC	Fell	1976	44.05000	126.16667	4000.0	Jilin City	China
7013	Owasco	18060	Valid	OC	Found	1984	41.20000	-103.68333	168.4	No city found	No Country found
242	Zerhamra	30403	Valid	MIM	Found	1967	29.85861	-2.64500	630.0	No city found	No Country found
24090	Fukang	34491	Valid	P	Found	2000	44.43333	87.63333	1003.0	No city found	No Country found
24027	Sayh al Uhaymir 001	23193	Valid	OC	Found	2000	20.51667	56.66667	450.0	No city found	No Country found
29166	Porto Alegre	52091	Valid	MIM	Found	2005	-30.03306	-51.23000	200.0	No city found	No Country found
28727	Jiddat al Harasis 055	12119	Valid	OC	Found	2004	19.65167	55.69000	200.0	No city found	No Country found
18108	Bur-Abor	5166	Valid	MIM	Found	1997	3.98333	41.65000	290.0	No city found	No Country found

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Where did the biggest meteorites land?

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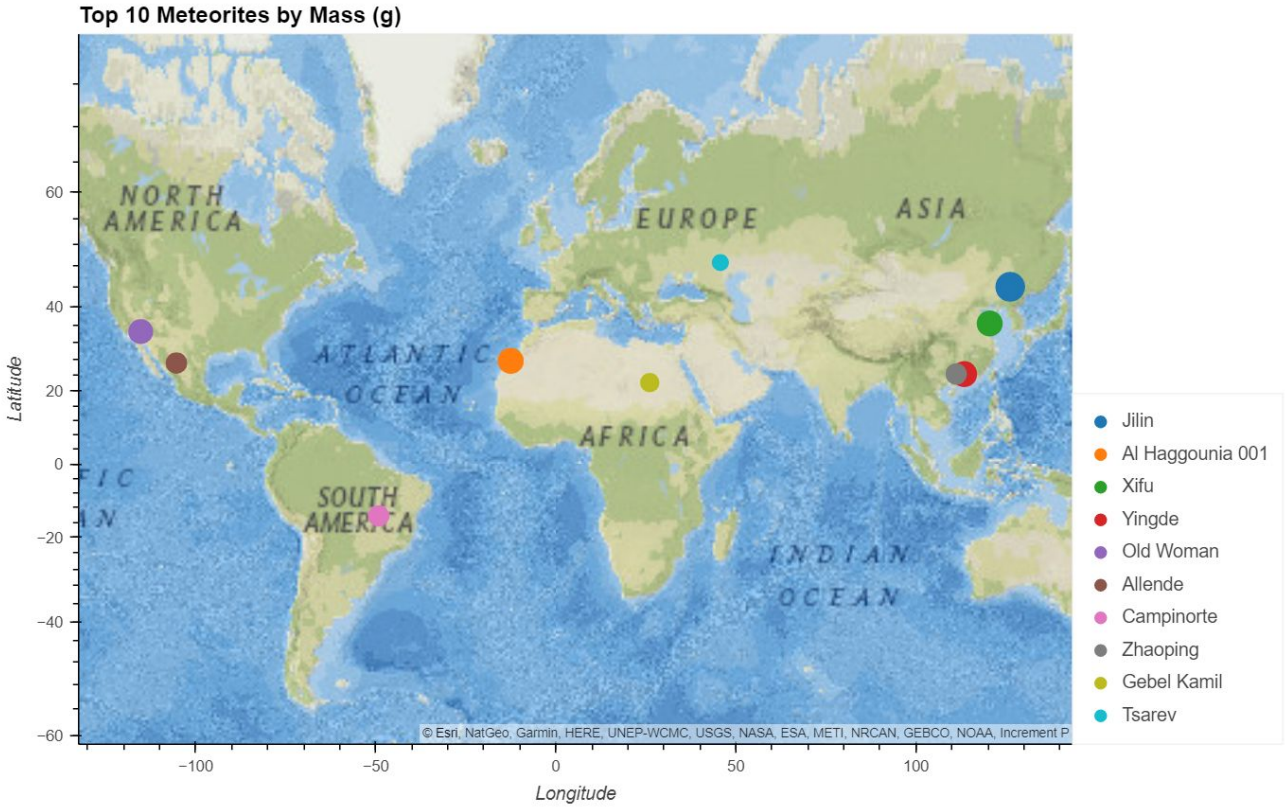
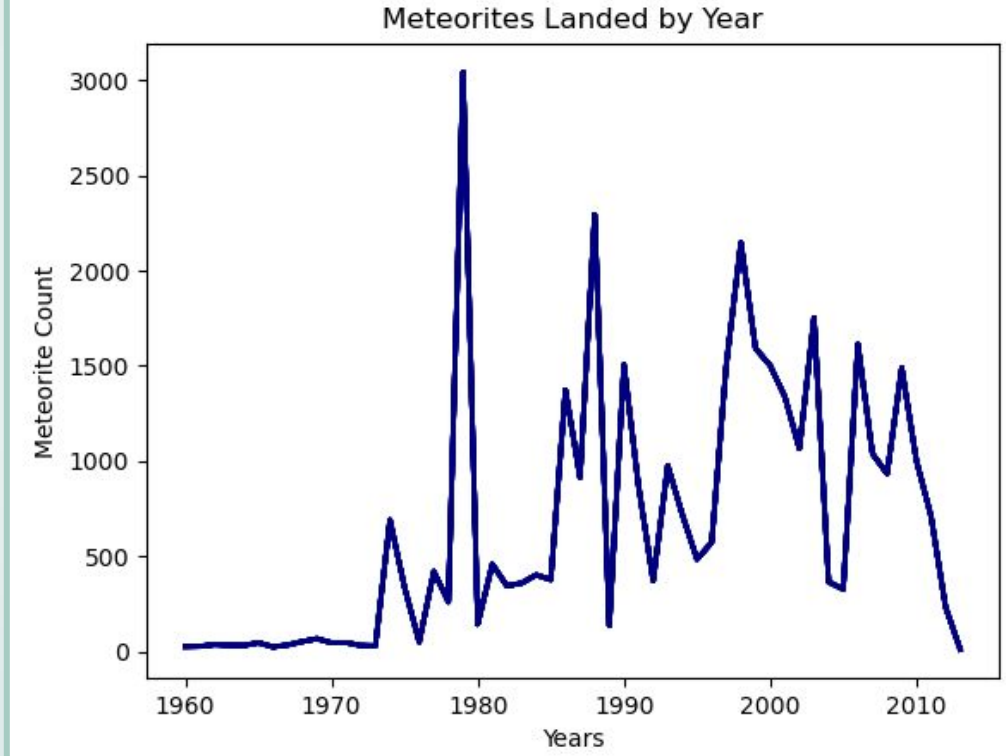


When did the most meteorites land since 1960-2010?

The most meteorites landed around the year of 1980 and they decreased as the years went by (1990 and 2010)



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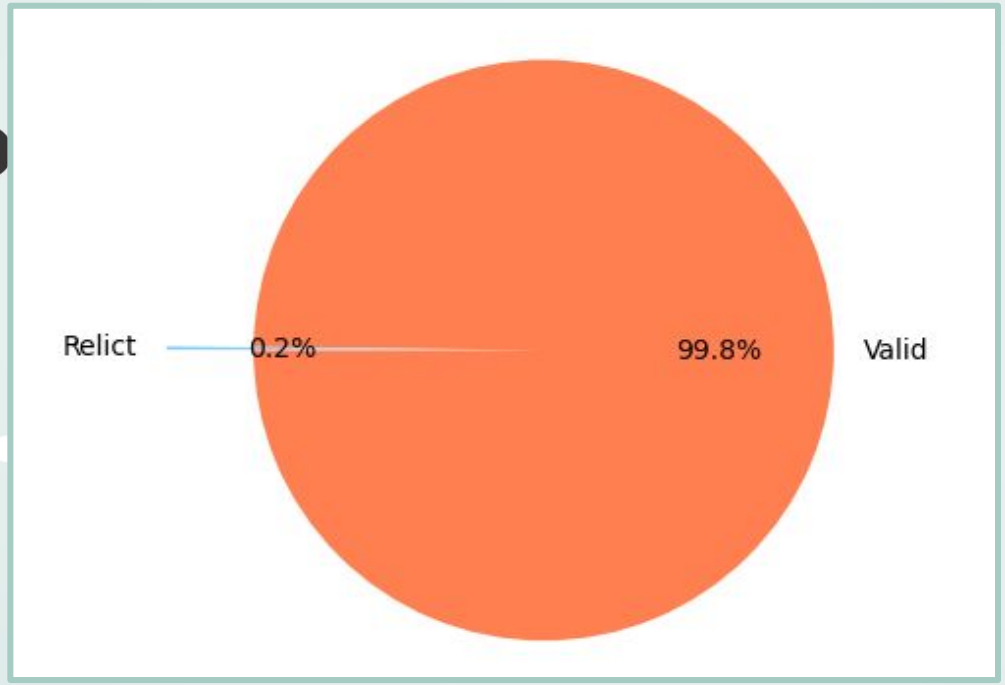
Which is the most common type of meteorite?



VALID

a typical meteorite

RELICT

meteorite highly degraded by weather on Earth

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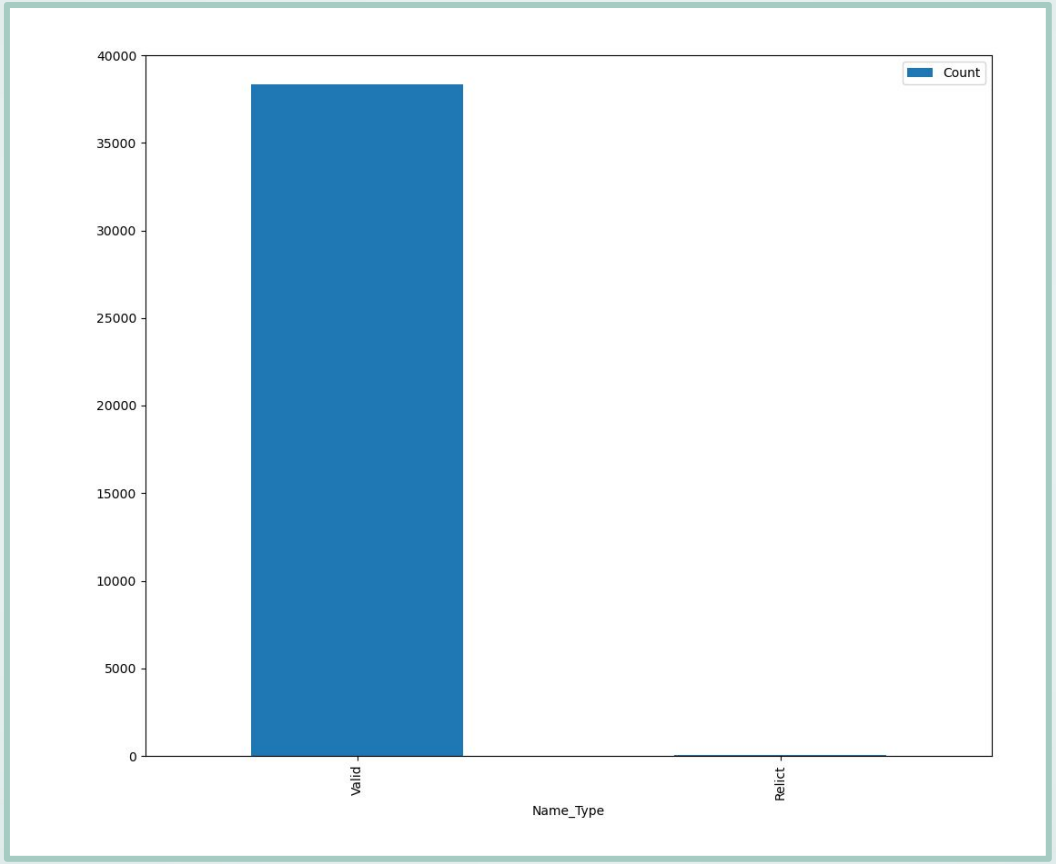
Which is the most common type of meteorite?



Name_Type	Count
Valid	38331
Relict	70

Reclass (Class) Types

1. CC: Carbonaceous Chondrite
2. OC: Ordinary Chondrite
3. M: Martian
4. AA: Asteroidal Achondrites
5. PA: Primitive Achondrites
6. L: Lunar
7. EC: Enstatite Chondrite
8. AOC: Other Chondrite Groups(not in one of the major classes)
9. P: Pallasites
10. MG: Mesosiderite Group
11. MIM: Magmatic Iron Meteorite Groups
12. NMIM: Non-magmatic or Primitive Iron Meteorite Groups
13. UN: Not Enough Information (Ungrouped or Unknown)

Resources: https://en.wikipedia.org/wiki/Meteorite_classification

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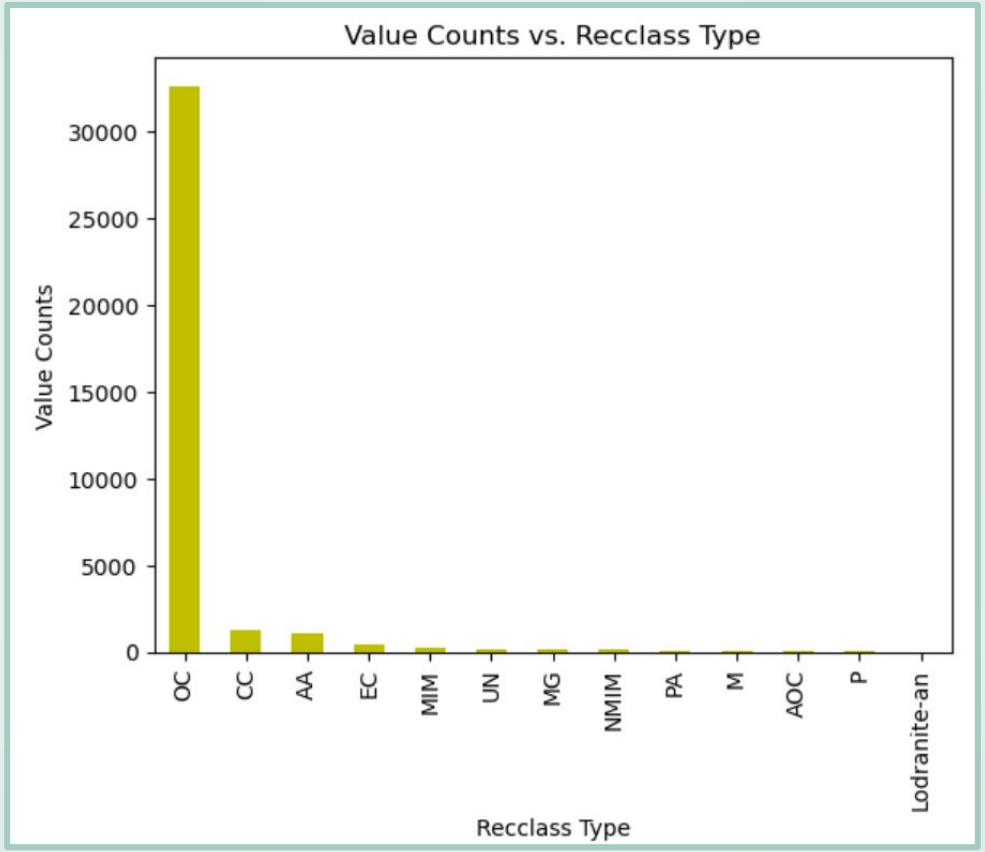
Which is the most common class type of meteorite?

The 13 types are in descending order. As we can see there is a huge difference between OC with the rest of them.



Recclass_Types	Counts
OC	32673
CC	1230
AA	1112
EC	409
MIM	205
UN	140
MG	125
NMIM	109
PA	90
M	69
AOC	64
P	31
Lodranite-an	1

Which is the most common class type of meteorite?

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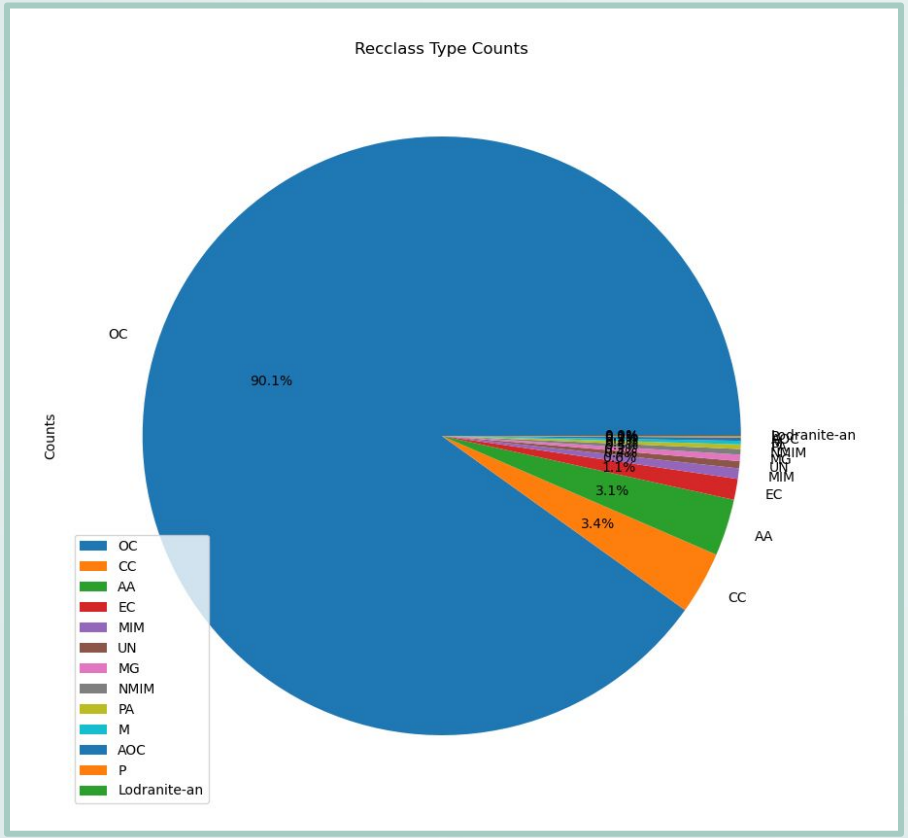
Complete data frame



Recclass_Types	Counts
OC	32673
CC	1230
AA	1112
EC	409
MIM	205
UN	140
MG	125
NMIM	109
PA	90
M	69
AOC	64
P	31
Lodranite-an	1

Pie chart with the 13 types included (complete data frame).

Which is the most common class type of meteorite?

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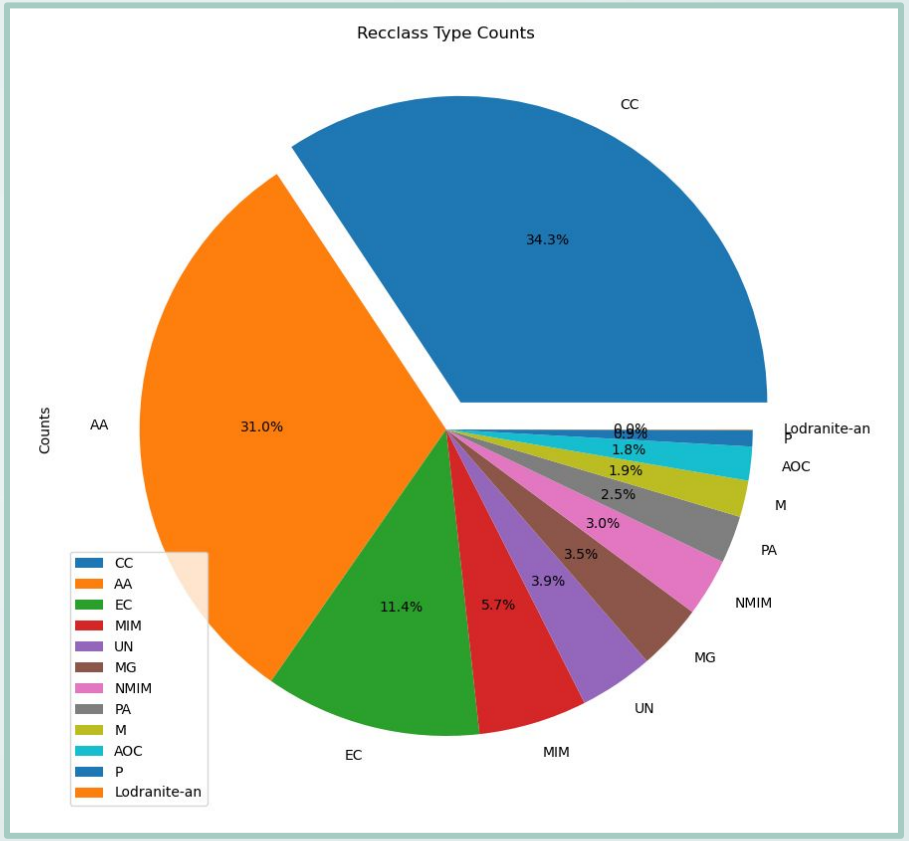
We dropped the Recclass type OC to have a better view of the other types and their dimensions.

Data frame without OC

Recclass_Types	Counts
CC	1230
AA	1112
EC	409
MIM	205
UN	140
MG	125
NMIM	109
PA	90
M	69
AOC	64
P	31
Lodranite-an	1



Which is the most common class type of meteorite?

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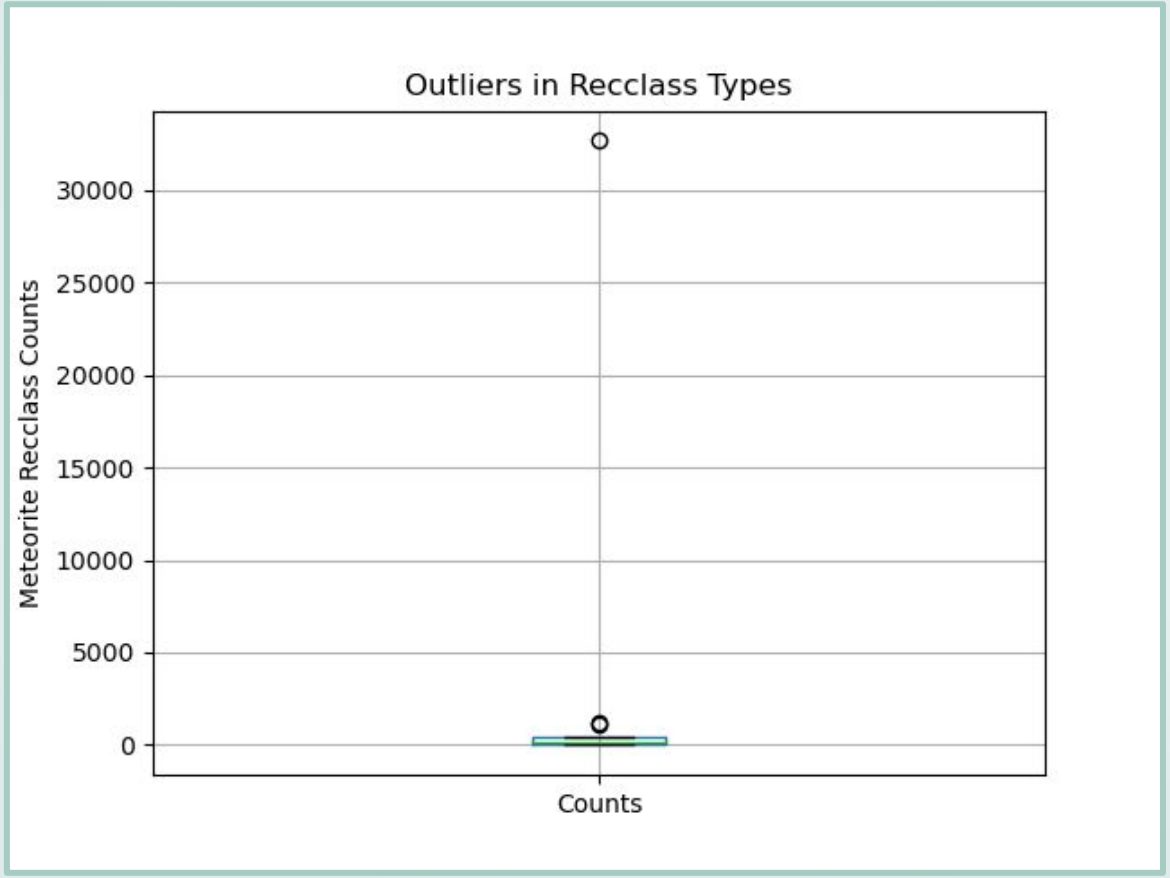
We can see that we have two points as outliers which would be OC and CC as we expected.



Recclass_Types	Counts
OC	32673
CC	1230
AA	1112
EC	409
MIM	205
UN	140
MG	125
NMIM	109
PA	90
M	69
AOC	64
P	31
Lodranite-an	1

Is there a correlation between latitudes (North) and the mass (Kg) of the meteorites?

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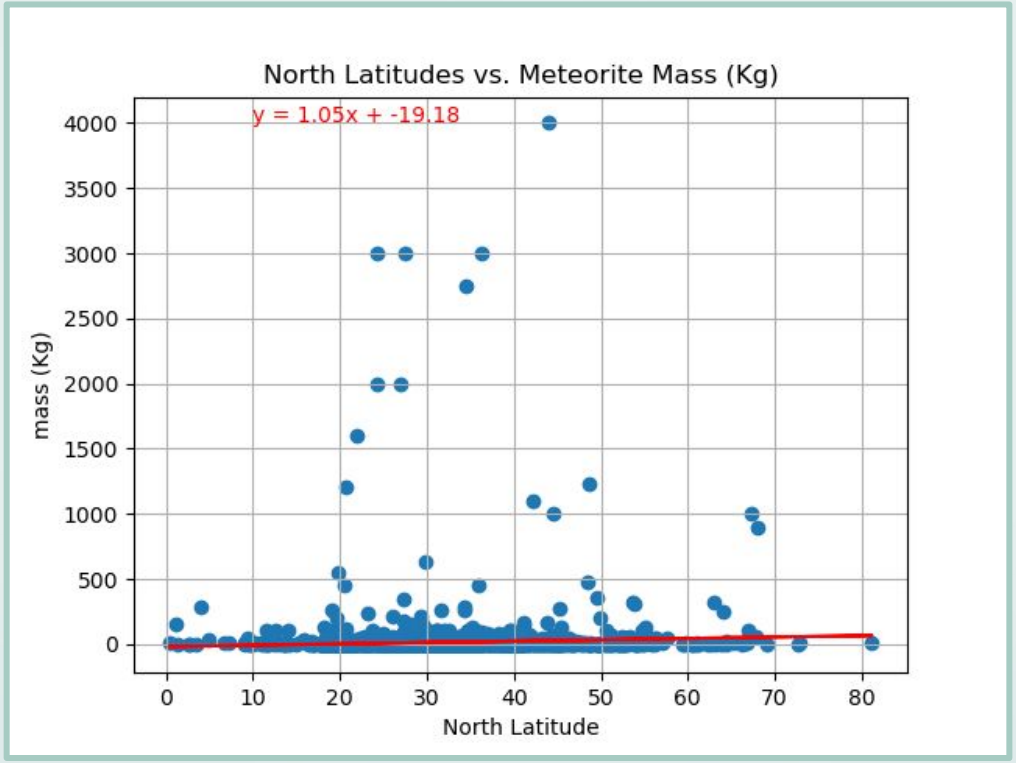

There is no correlation between North latitudes and the mass (Kg) of the meteorites.

Is there a correlation between latitudes (South) and the mass (Kg) of the meteorites?

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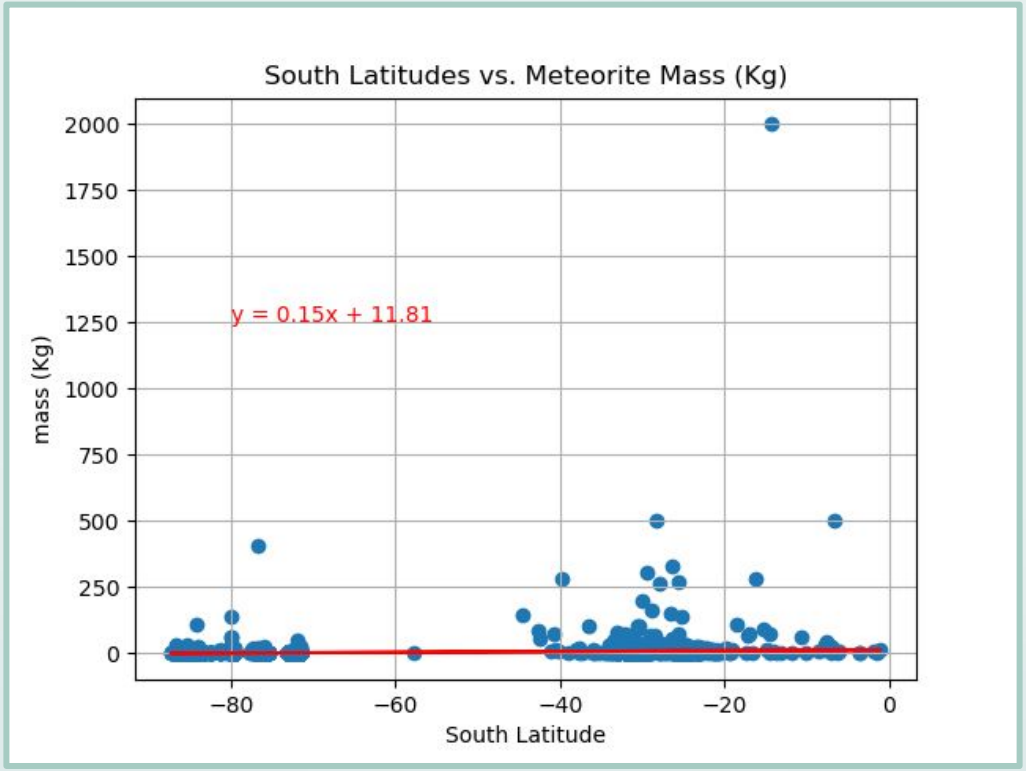
There is no correlation between South latitudes and the mass (Kg) of the meteorites.



CONCLUSIONS

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1. Where did the biggest meteorites land?

The biggest meteorite with a mass of 4,000kg landed in China, in the city of Jilin.

2. Where did the most meteorites land since 1960 - 2010?

The most meteorites landed in 1960 (around 3,000) and they decreased as each decade passed by up to 1,500 in 2010.

3. Which is the most common type of meteorite?

The most common type is valid (38,331 meteorites), which is a meteorite that wasn't deteriorated by Earth's weather.

4. Which is the most common class of meteorite?

The most common class of meteorite is the OC, which stands for Ordinary Chondrite.

5. Is there a correlation between latitudes and number of meteorites?

There is no correlation for neither North or South latitudes with the mass of the meteorites.

Biggest Meteorite

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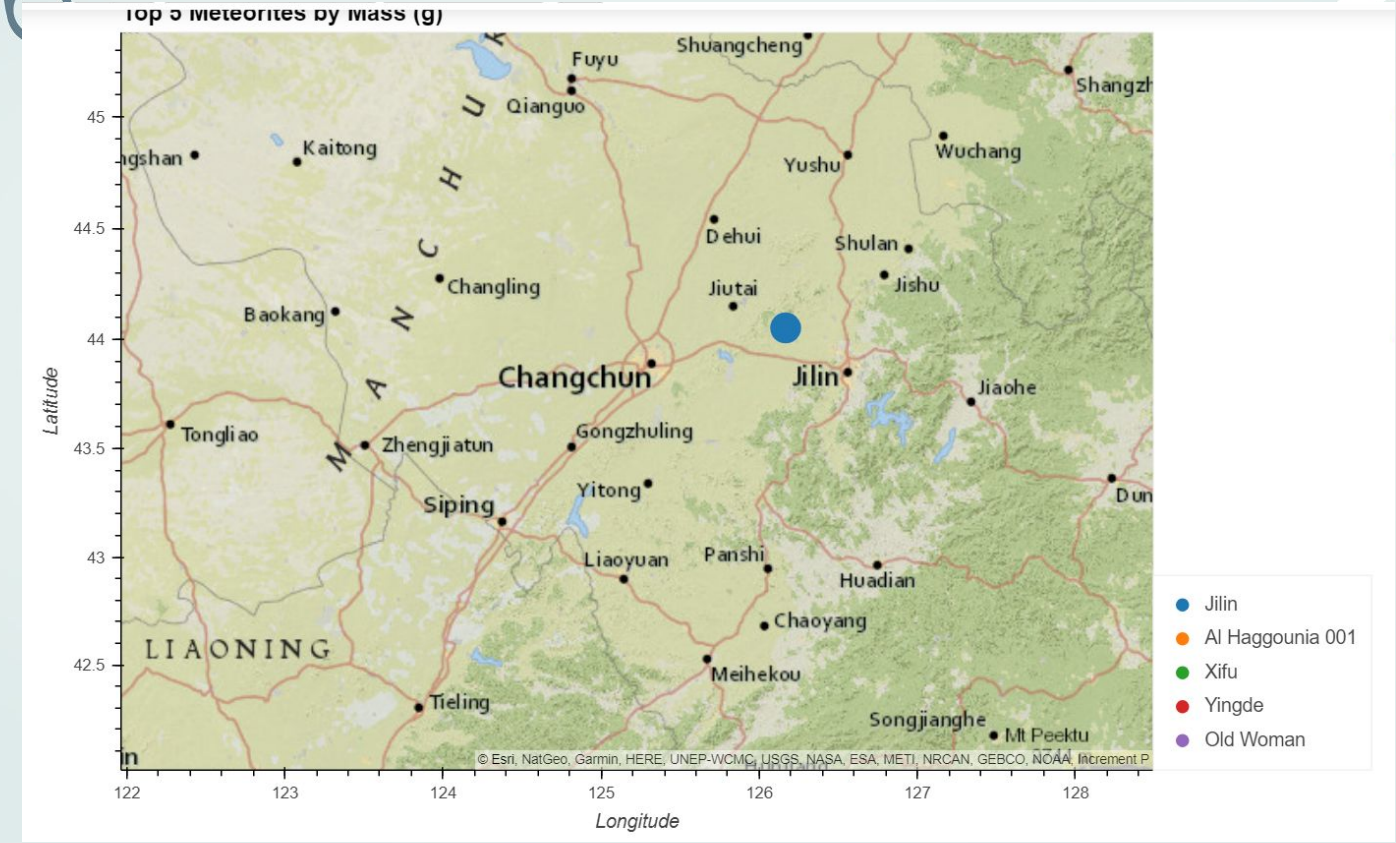

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THANKS!

Fun Fact #2:

Martian meteorites can be sold for as much as 500 dollars per gram.