What's the Weather Like?

Background:

This project is to visualize the weather of randomly selected 500+ cities across the world of varying distance from the equator. It utilizes, the [OpenWeatherMap API](https://openweathermap.org/api) and citipy python library to create a representative model of weather across world cities.

API calls are used to gather information about current weather around the globe.
The information goes into some of the relations a cities latitude and longitude has on things like humidity, cloudiness, wind speed, and max temperatures. Series of scatter plots are used to showcase the following relationships:

* Temperature (F) vs. Latitude
* Humidity (%) vs. Latitude
* Cloudiness (%) vs. Latitude
* Wind Speed (mph) vs. Latitude

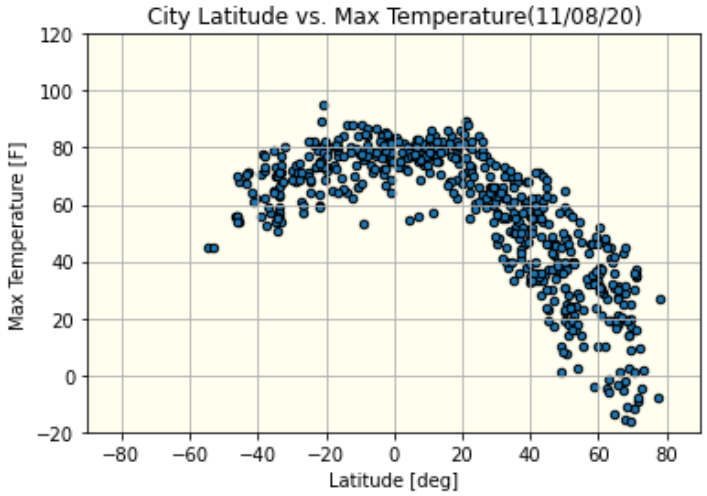
A linear regression has been run on each relationship, separating them into Northern Hemisphere.

Summary statistics of the ~500 randomly selected cities:

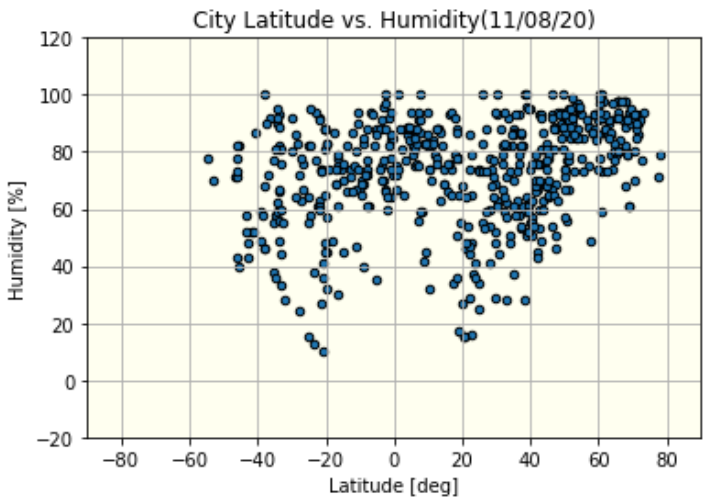
	Lat	Lng	Max Temp	Humidity	Cloudiness	Wind Speed	Date
count	564.000000	564.000000	564.000000	564.000000	564.000000	564.000000	5.640000e+02
mean	20.192092	19.782660	56.416986	73.927305	48.996454	8.382128	1.604881e+09
std	33.563130	90.710545	23.851948	18.282178	38.600288	5.890398	6.313182e+01
min	-54.800000	-175.200000	-28.320000	10.000000	0.000000	0.160000	1.604881e+09
25%	-7.972500	-63.015000	39.940000	63.750000	5.000000	3.905000	1.604881e+09
50%	25.085000	24.170000	62.910000	77.500000	42.000000	6.930000	1.604881e+09
75%	47.930000	101.335000	76.147500	88.000000	90.000000	12.047500	1.604881e+09
max	78.220000	179.320000	95.000000	100.000000	100.000000	33.330000	1.604881e+09

Scatter plots:

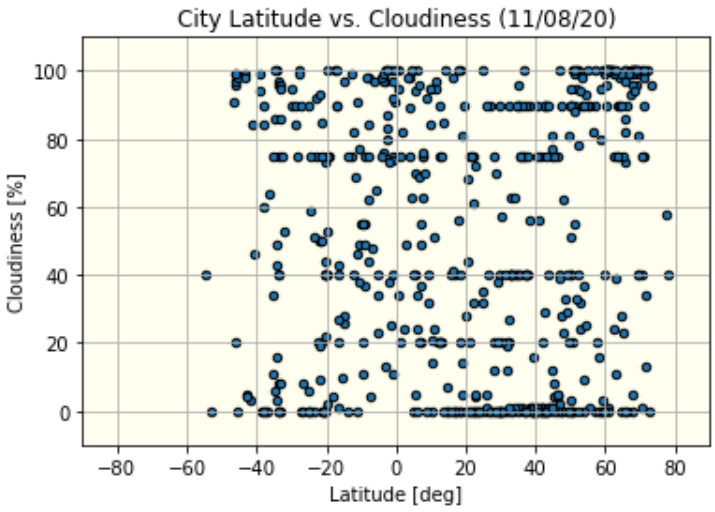
Latitude vs. Temperature Plot



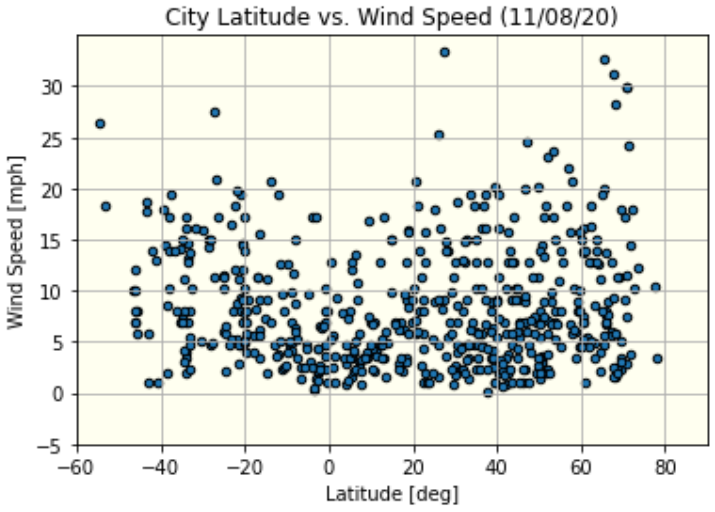
Latitude vs. Humidity Plot



Latitude vs. Cloudiness Plot



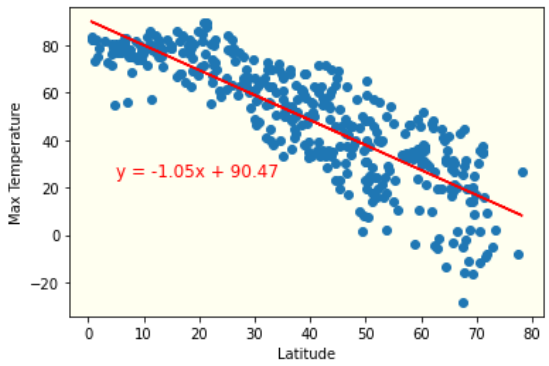
Latitude vs. Wind Speed Plot



Linear Regression:

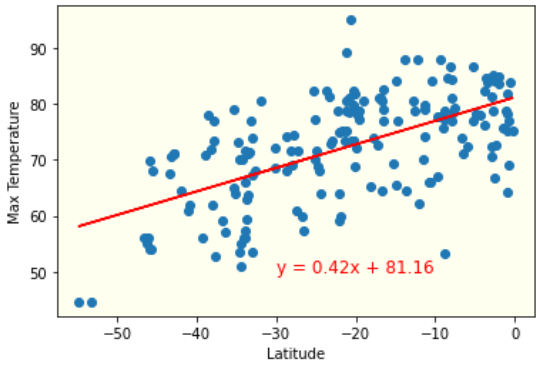
Northern Hemisphere - Max Temp vs. Latitude

The r-value is: 0.715641456317112
The correlation is: -0.8459559423026194



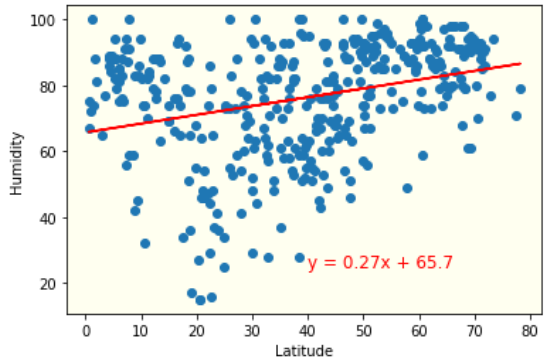
Southern Hemisphere - Max Temp vs. Latitude

The r-value is: 0.36016234164142347
The correlation is: 0.6001352694529981



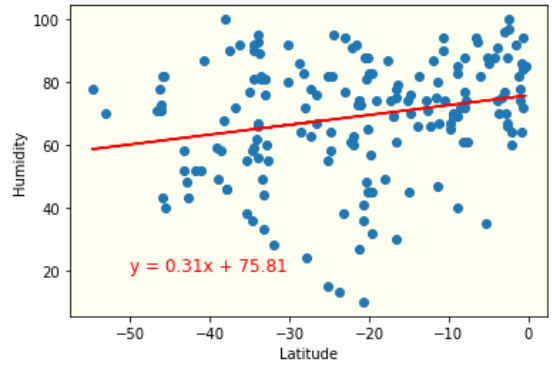
Northern Hemisphere - Humidity (%) vs. Latitude

The r-value is: 0.09171995006382345
The correlation is: 0.3028530172605575



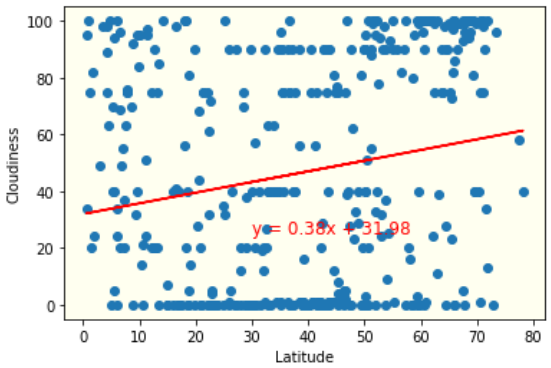
Southern Hemisphere - Humidity (%) vs. Latitude

The r-value is: 0.051761754070407534
The correlation is: 0.22751209653644244



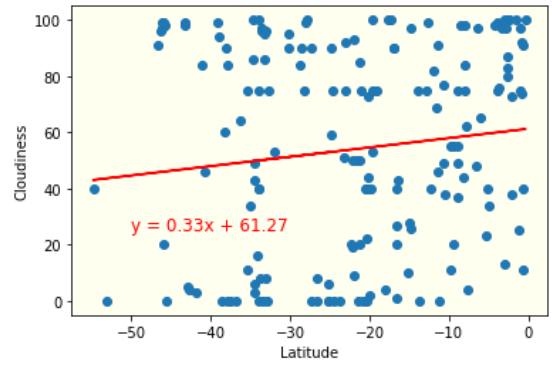
Northern Hemisphere - Cloudiness (%) vs. Latitude

The r-value is: 0.03672976446104937
The correlation is: 0.1916501094730953



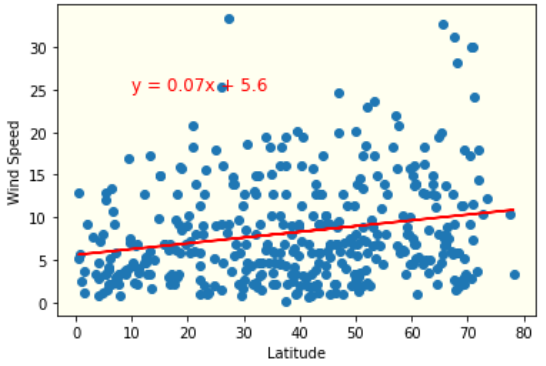
Southern Hemisphere - Cloudiness (%) vs. Latitude

The r-value is: 0.015358787913885358
The correlation is: 0.12393057699327208



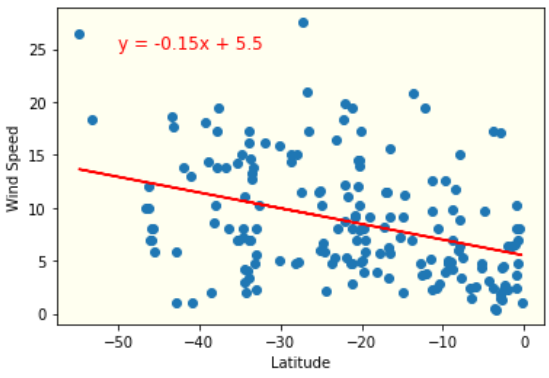
Northern Hemisphere - Wind Speed (mph) vs. Latitude

The r-value is: 0.05002666126249128
The correlation is: 0.22366640620015182



Southern Hemisphere - Wind Speed (mph) vs. Latitude

The r-value is: 0.1345682685942763
The correlation is: -0.36683547891974166



Analysis:

- Temperature rises going closer to the equator. As we move away from the equator on either directions, northern or the southern hemisphere, the temperature drops from high to low.¶

  The highest temperatures are around 23.5 N latitude which is known as the Tropic of Cancer, latitude on Earth at which the Sun can be directly overhead and may be due to the tilt in the Earth`s Axis.

- Humidity tends to be high closer to the north pole.
- Cloudiness tends to be either 0 or 100% for majority locations.¶
- Wind speed is on an average around 8 mph (pretty calm) compared to the highest windspeed of about 33 mph. As we move away from the equator the wind speed remains closely tied to the 0 to 10 mph.
- There is a strong negative correlation between latitude and maximum temperature in northern hemisphere.
- There is a moderate positive correlation between latitude and max temperature in southern hemisphere.
- There is a weak positive correlation between latitude and humidity in northern hemisphere.
- There is very weak correlation between latitude and humidity in southern hemisphere. The difference between hemispheres is not significant enough to point out.
- There is a weak positive correlation between latitude and cloudiness in northern hemisphere.
- There is a weak positive correlation between latitude and humidity in southern hemisphere. The difference between hemispheres is not significant enough to point out.
- There is a very weak positive correlation between latitude and wind speed in northern hemisphere. It indicates that there is no relationship between wind speed and latitude.
- There is a weak positive correlation between latitude and wind speed in southern hemisphere. It indicates that there is no relationship between wind speed and latitude. The difference between hemispheres is not significant enough to point out.
- Latitude does not seem to affect humidity percentages, cloudiness, or wind speed.