Volcanic Eruptions in the Holecene Period

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Volcanic eruptions give us a window into the past while newer ones are a stark reminder of the awesome, and sometimes frightening, power of nature. There is not much we can do to control or stop future eruptions, but through continued study we are able to predict them and take the necessary precautions to save lives.

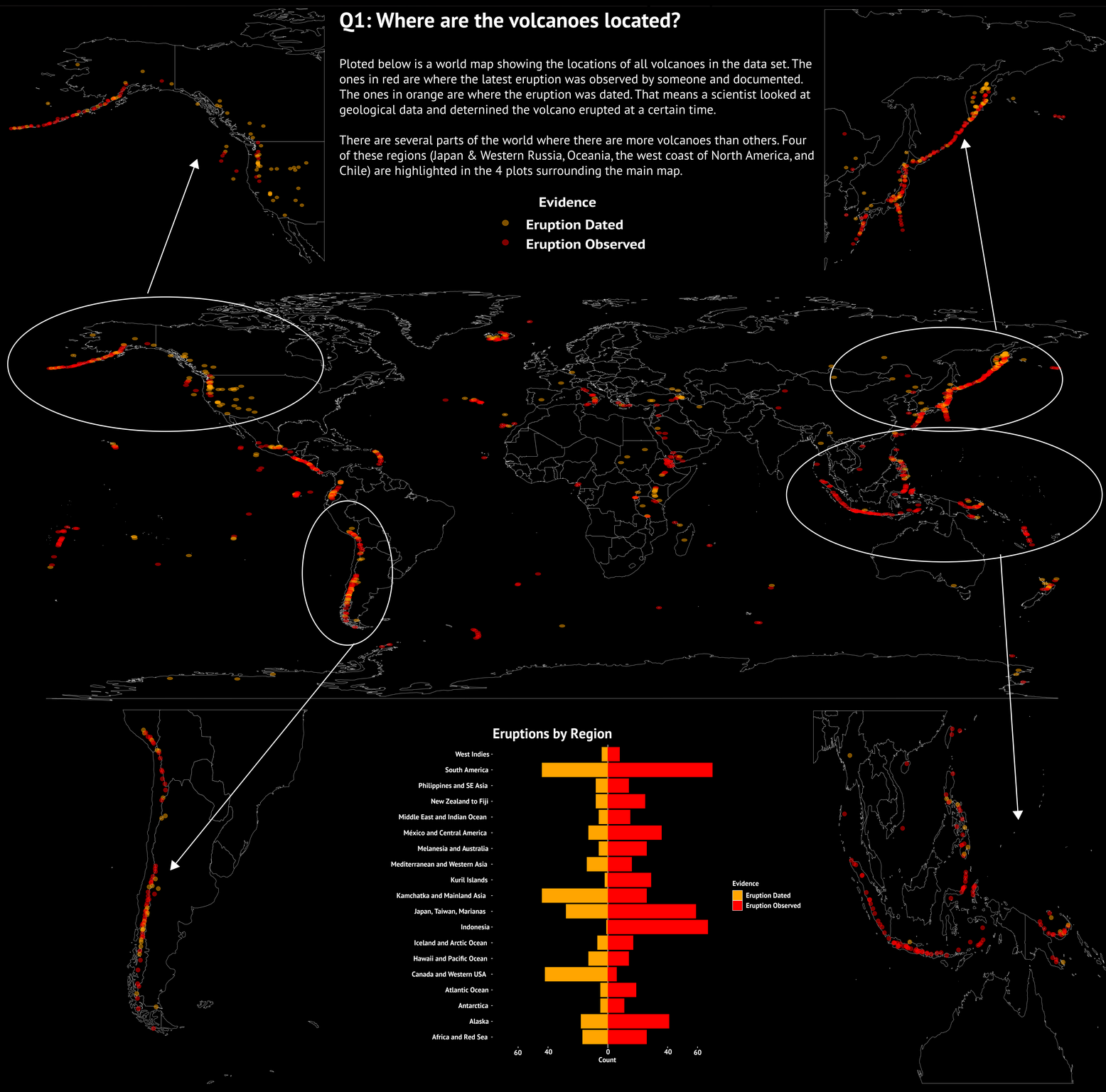
Data: This data set was uploaded by the Smithsonian Institution to Kaggle and is titled "Volcanic Eruptions in the Holocene Period." It includes the time, location, and geological data of volcanic eruptions from the past 10,000 years (up until 2016). After cleaning the data and ignoring the "Number" and "Name" variables, there are 810 observations (rows) of 10 columns. It should be noted that only the last known eruption for each volcano was recorded. For example, the famous eruption of Mt. Vesuvius in 79C.E. is not present in this data, but its most recent eruption from 1944 is.

Audience: This poster is for the 800 million people who live within 100km of an active volcano (https://www.bbc.com/news/world-us-canada-44212666)." It is also for anyone who wants to learn more about the characteristics of volcanoes and their most recent eruptions.

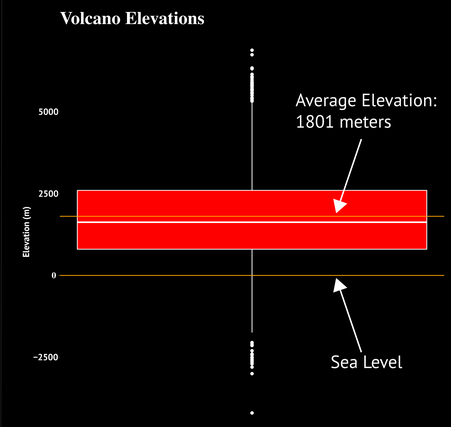
Q1: Where are the volcanoes located?

Ploted below is a world map showing the locations of all volcanoes in the data set. The ones in red are where the latest eruption was observed by someone and documented. The ones in orange are where the eruption was dated. That means a scientist looked at geological data and determined the volcano erupted at a certain time.

There are several parts of the world where there are more volcanoes than others. Four of these regions (Japan & Western Russia, Oceania, the west coast of North America, and Chile) are highlighted in the 4 plots surrounding the main map.



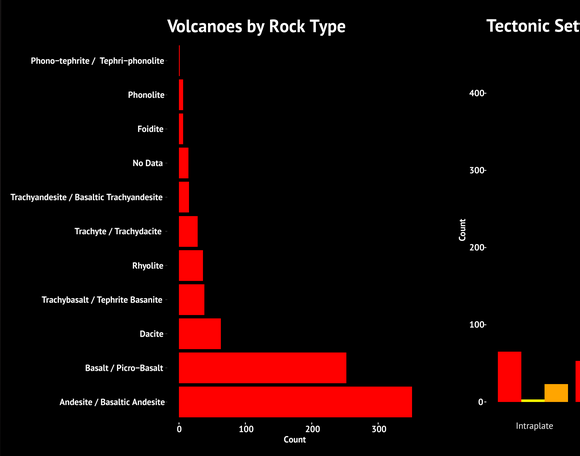
Q2: In what geological conditions do these eruptions occur?

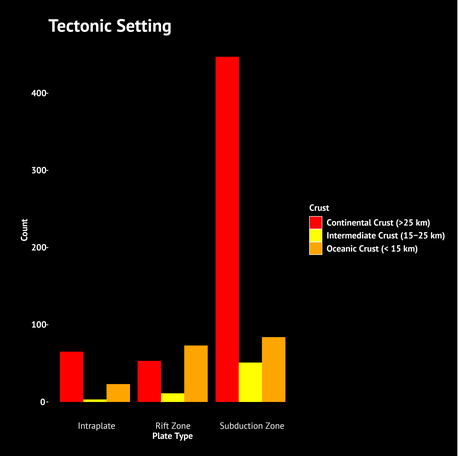


Most of the volcanoes in this data are above sea level with most falling between 800m (first quartile) and 2598m (third quartile). The tallest volcano was 6879 meters while one volcano was 4200 meters below sea level.

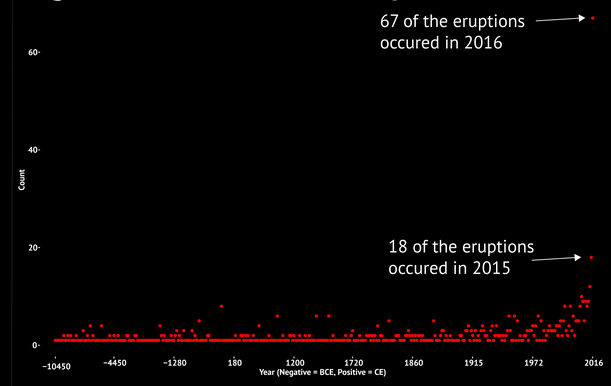
More than 300 of these volcanoes contain Andesite, a family of igneous rocks common around continental crust above subduction zones (where one tectonoic plate slides under another). This is in line with what is seen in the Tectonic setting bar chart where volcanoes formed in a subduction zone and continental crust make up most of this data set.

Basalt (the second most common rock type in the data) is the most common rock type on the Earth's surface, but forms mostly in ocaenainc hotspots and beneath continents.





Q3: When did the latest eruptions for these volcanoes occur?



For each volcano in the data set, we are given the date of that volcano's latest eruption. This graph counts the number of volcanoes whose most recent eruption was in that given year. We can assume that many of these volcanoes are active as most of the eruptions occured in the Common Era, with a good number of them occuring in the past 100 years. 2016 had the most eruptions by far with 67 while 2015 had the second most with 18. This discrepancy between 2016 and the rest of the data could mean that it was a year with more eruptions than usual or that a good number of vocanoes in the data erupt every couple of years.

Main Data Source:
Smithsonian Institute (via Kaggle)

Other Sources and References:

https://www.statology.org/population-pyramid-in-r/ http://www.sthda.com/english/wiki/ggplot2-themes-and-background-colors-the-3-elements https://datavizpyr.com/how-to-make-world-map-with-ggplot2-in-r/ https://datavizpyr.com/how-to-make-world-map-with-ggplot2-in-r/ https://stackoverflow.com/questions/55789198/how-to-reduce-number-of-ticks-for-ggplot-with-axis-derived-from-basecut-func
https://www.bbc.com/news/world-us-canada-44212666 geology.com https://www.usgs.gov/special-topics/subduction-zone-science/science/introduction-subduction-zones-amazing-events

R Packages:

stringr, ggplot2, maps, mapproj, ggmap, rworldmap, plyr