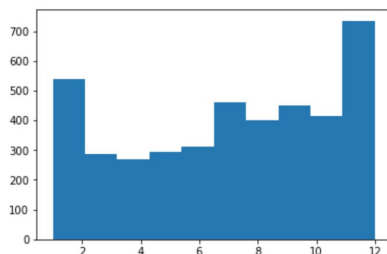


UFO Sightings: Fact or Fiction?

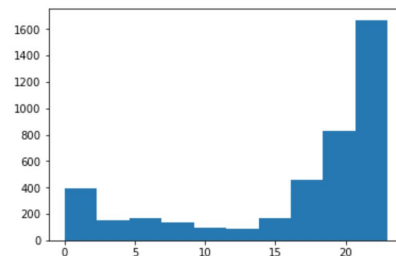
Every year thousands of people in the United States report seeing UFOs. They report seeing different shapes, durations, colors etc.. At the same time, skeptics are looking for explanations as to why these sightings are happening. Are people making them up? Are they seeing other air crafts and mistaking them? Or is there not a logical explanation for them? We analyzed 4,163 reports of UFOs and numerous public datasets to test the plausibility of a few of the most common sighting explanations. Let's see how they hold up:

In order to begin to understand how these UFO reports compare to possible explanations, we must look at the specifics of what exactly is being observed and when. One possible explanation skeptics give towards UFO sightings being fake is that people are not making them up, but in fact confusing airplanes for UFOs. In the US, specifically in 2015, there were 4,163 reports of UFO sightings. The majority of these sightings took place towards the end of the year,

UFO Sightings By Month



UFO Sightings By Hour



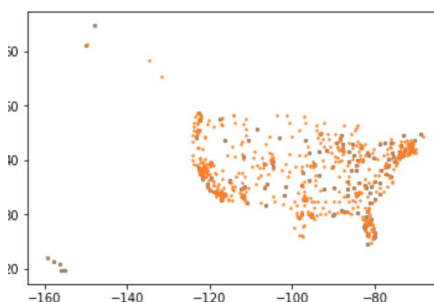
with November having the most reports. This data would support the idea that people who claim they saw UFOs in fact saw planes leaving or arriving to airports. The fact that most of the reports were at the end of the year can be explained by the fact that towards the end of the year there are many more holidays, and people might be traveling via planes more often to visit family and friends. This possible explanation is further supported by the fact that most of the sightings were in the late evening or night time. During the day, people might be able to not only see the lights of the plane but also the shape of the plan surrounding it. At night, it becomes harder to see the plane and easier to see a single point of light in the sky -- meaning it could easily be confused for a UFO by the public.

Aside from the date and time of day data, we decided to further flush out this possible

Filtered UFO Sightings



3 Large Airports(brown), Medium Aiports(orange)



explanation by looking at airports around the US and seeing how they correlate with the

location of the UFO sightings across the country in 2015. Here are two graphs showing the large and medium airports and the location of the recorded UFO sightings in the US.

With the amount of airports located in the US, we thought it necessary to focus on more specific types of airports in order to assess the relationships between airports and UFO sightings in the US. We decided to look at the location of medium and large airports as this would include the major airports and therefore the ones that have more traffic. As we can see by the two graphs, both have clusters of points in the northeast, southeast, and west coast, with a scarcity of points in the central/western US, Alaska, and Hawaii. In both graphs, we also see another possible clustering near the northern center of the US. The clusters of UFO sightings were calculated to be Los Angeles, CA, Sacramento, CA, Orlando, FL, Boston, MA, and New York, NY. These cities all have large airports and the similarities between the UFO sightings and the cities airports are apparent, which supports the idea that UFO sightings might actually be planes that are not seen clearly in the sky.

Another date that had a significantly high number of UFO reports was July 4th. This could be explained by the number of fireworks that are fired every July 4th in America to celebrate independence day. Which brings us to the next thing we decided to explore: Shapes of the alleged UFO sightings.

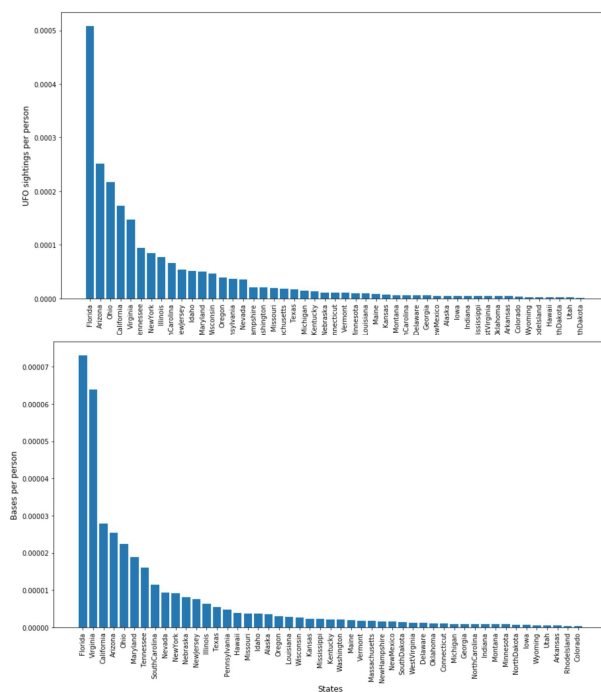
The shapes have a clear hierarchy, with the most common shapes being “light”, “circles”, and “fireballs”, and the least common shapes being a “cross”, “egg”, and “cone”. The shapes tell us a little about whether these sightings could be do to airplanes or not, because when planes are in the air, they typically flash, and are visible for an extended period of time. Many of these reports had “light”, which was frequently occurring and others had “flash” as a shape, however, it was far less occurring than light or fireball. With that being said, the average time of the UFO sightings was found to be around 15 minutes with some variation depending on the shape. This means that, it could still be a plane and the flashing was not as clear because of the time of day or the type of aircraft.

Next, we have a possible explanation of the sightings having been due to meteors or astronomical events. Approximately 36% of reported UFO sightings in 2015 overlapped with the largest known meteorite showers in the northern hemisphere. This number actually seems quite low only because most major meteorite shower list documentation only takes into account the largest ones. With that being said, the number of sporadic meteors that can be seen in the night sky depends on the season, increasing during the fall months, but generally varies between 2-8 sporadic meteors per hour (Greicius). This leads us to believe that meteor showers, in fact, play a major role in the observation



Marc Ward/Getty Images

Another common explanation for UFO sightings is confusion with aircrafts, testing and explosions from the military. To account for this, we analyzed a data set from the US Department of Transportation that contains the current Military bases in the country and information about them. Although the set did not contain information about the cities where each base was located, it had information about the corresponding states. When ordered by the amount of bases in each state, we found that the states with the highest number of bases had some overlap with the states with the most UFO sightings -- something that indicated that military bases might be a possible explanation as to why UFO sightings were being reported. These states included California, Florida, and New York, among others. Since the size of these states might account for their high ranking on both lists, we needed to adjust the values for each set based on population. Using projected data from the Census for 2015, we calculated the amount of UFO sightings per person in each state and compared that to the adjusted number of Military bases in each state.



The p value for this correlation indicated that this finding was quite significant ($p = 1.87355e-16$), though the small sample size ($s=50$) may affect this value. Ultimately, the information from these data sets indicates that there is a positive correlation between high concentrations of military bases and states with

high amounts of UFO sightings. This means that the hypothesis that people are mistaking military-related events for UFOs is supported by our analysis. Those interested in this area may want to look at military bases and UFO sightings on a county or city level to better understand

the effects of being in range of one. However, public data is not easily available on the exact locations of military bases at this point likely due to safety reasons, and for the same reasons government databases may also omit some bases from these records.

Our findings from this analysis indicate that a number of the explanations given for UFO sightings in the United States can be supported through data on population, airports, meteors, and military presence. While we do observe trends that confirm the plausibility of these findings, this does not claim to explain all UFO sightings as resulting from these factors. Things that were not described in the scope of this analysis but would be interesting in future work include an exploration into the other factors that cause certain states to have more UFO sightings than others. For example, Florida shows a significantly higher amount of sightings per person than any other state-- nearly double the amount of Arizona which has the next highest value. Other factors to consider in analyzing UFO sightings (if reliable data become available) would be weather, drug usage, religion, and the relationship between timing of sightings and UFOs in the media. While science has come very far in the past several decades, there is still a lot we do not know about the universe and our place in it. Continue to look to the stars, but use data in your search.

References

Greicius, T. (2015, April 22). Meteor Showers 2015. Retrieved from <https://www.nasa.gov/beta/jpl/asteroids/best-meteor-showers>

Ward, M. (2018, November 13). Meteorite Image [Digital image]. Retrieved May 14, 2019, from <https://www.thetimes.co.uk/article/ufo-seen-in-night-sky-was-meteorite-says-astronomer-6m7flbmqq>