

**ASTRO PI**

MISSION SPACE LAB

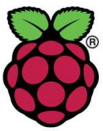
## **Mission Space Lab Phase 4 Report Template**

**Team Name: MyWay**

**Chosen theme: Life on Earth**

**Organization name: I.T.I.S M. Delpozzo**

**Country: Italy**



## Introduction

Our aim is to use the ISS data to verify if human activities, Earth magnetic field and natural environment can impact on 17 migratory birds' routes. This is interesting because it gives us important information about how much humans affect the environment and what we can do to preserve the biodiversity of these animals. We expected to receive data that confirmed our thesis and to find correlation between our researches and the experiment results.

## Method

We used the Pi Noir Camera to take pictures of the Earth, which has been useful to control the environment status in certain places and analyze them with the NDVI filter. We also used the magnetometer to measure the Earth magnetic field. We used two csv files (made with the logging library) to save our data. One contains the debug info and the other the actual data.

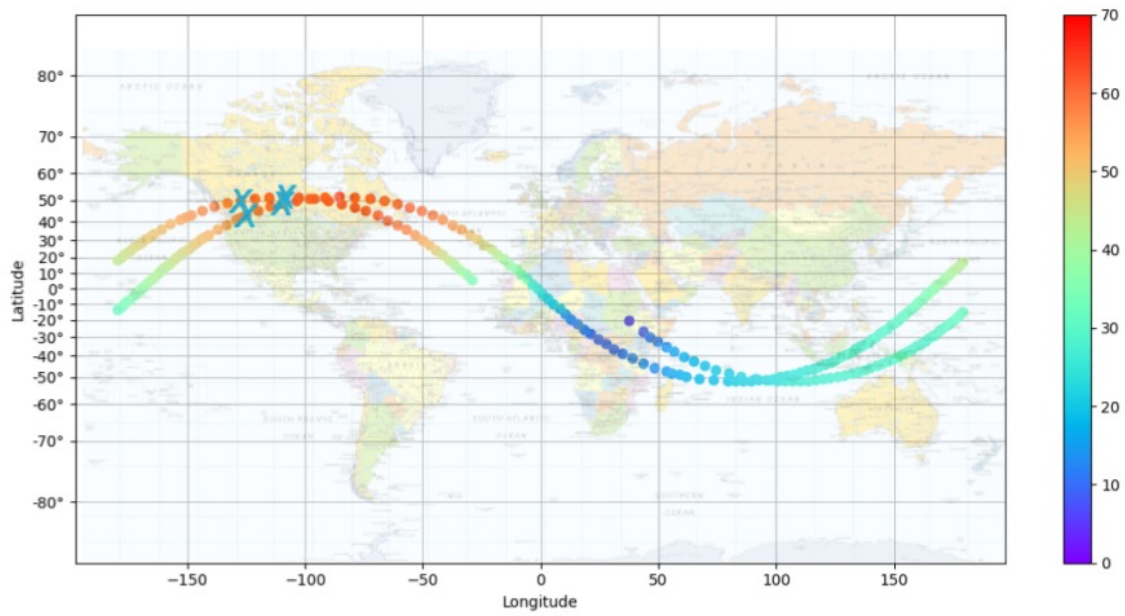
First of all, to analyze our data we converted each picture using the NDVI filter and we applied to them a rainbow color scale map to make them more readable. In order to find exactly where the ISS passed, we checked every not-cloudy image to search for relevant natural elements - such as mountains, lakes, forests... At the same time, we wrote an algorithm to compare the ISS positions with migratory routes we had previously found. It helped us to find out what data to concentrate our research on. After that, we wrote another algorithm to represent the Earth magnetic field, the ISS path and its crossing point with migratory routes to clearly visualize these data. Both our research and algorithms can be found on our Github at this link: [MyWay](#).

## Results

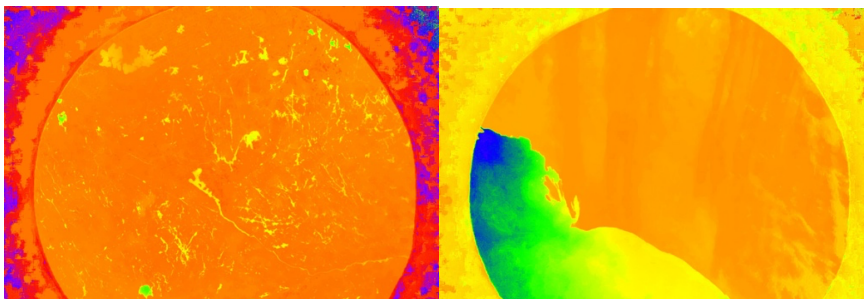
From this experiment we can find out very interesting information. Studying the environment around migratory routes we discovered that 5 bird species pass in the same area of Saskatchewan (Canada, picture 1). We searched why this happens and we learned that in that zone there is a perfect climate for birds and a rich environment full of lakes and plains. Unfortunately, according to the [University of Saskatchewan](#), nowadays a lot of farmers in that area are releasing in the atmosphere two types of insecticides (imidacloprid and chlorpyrifos) that are contaminating the environment and are making more and more species move away. This is a problem we have to solve quickly if we want to preserve biodiversity.

The next important result is that probably (as you can see in picture 1) the Earth magnetic field helps birds find their path. This is because where the migratory routes start (almost all of them start in Europe) the Earth magnetic field is low (in picture 1 is colored in blue), while in North America (which is the destination of all bird species) the measured field is high (red in

picture 1). For this reason, we suppose that they use this difference in intensity to find their way every season. Also, this result is really important in the comprehension and preservation of these species.



**Figure 1: Mercader scale world map, the points are where the ISS passed. The four Xs are the cross with migratory routes**



**Figure 2: this are two of the photos we converted using NDVI. We mapped them using the rainbow color map (the more is red the less there is vegetation).**



**Figure 3: the rainbow color map scale**



## Conclusion

From this experiment we have achieved two important results. Fortunately, they are exactly what we supposed to find. The first one, which is about the impact of human activity and environment on migratory routes, revealed that humans can have a strong impact on the natural world. This is also one of the most relevant global issues of the century. If we, as humans, continue to enter toxic substances in the atmosphere we will completely destroy biodiversity and, with it, ourselves. The second result is also correlated with climate change, but in another way. We discovered that the Earth magnetic field is necessary to birds to find their migration routes. For this reason, it is important that we preserve the Earth magnetic field (which can also be influenced by human activity). Furthermore, if we harm birds, we will break the balance of nature causing great damage. The final conclusion of this experiment is that humans, birds and the environment are strongly interconnected so we can't continue to ignore the world around us if we want to preserve our species.