Mars Dust Storms

Studying where dust storms occur by using Emirates Mars Mission data converted to RGB composite images and explaining the physics behind it

Summary

During our time at the UAE Space Agency, we significantly enhanced our communication skills and interacted with professionals from diverse backgrounds, enriching our collaborative experience. We honed our programming abilities and strengthened our data analysis skills through various projects, particularly in characterizing the atmosphere of Mars. Utilizing the Emirates Mars Mission (EMM) website, we extracted critical data and employed Jupyter Notebook to write and execute code. Our role involved analyzing images to pinpoint essential features and conducting in-depth studies of Martian dust storms, which broadened our understanding of planetary atmospheres and improved our technical proficiency.

What did we do

- We downloaded the data from EMM website specifically from EXI instrument

- We wrote a Python code that does the following:
  - Creates a main folder
  - Contains folders each named by the date
  - Moved each image to these folders that matches its date
  - Separated each set of 3 images with different wavelength
  - Created RGB composite images & saved it in each subfolder for further analysis
- we attended weekly science lectures by Dr. Noora Rashid, Space Science Researcher at UAESA

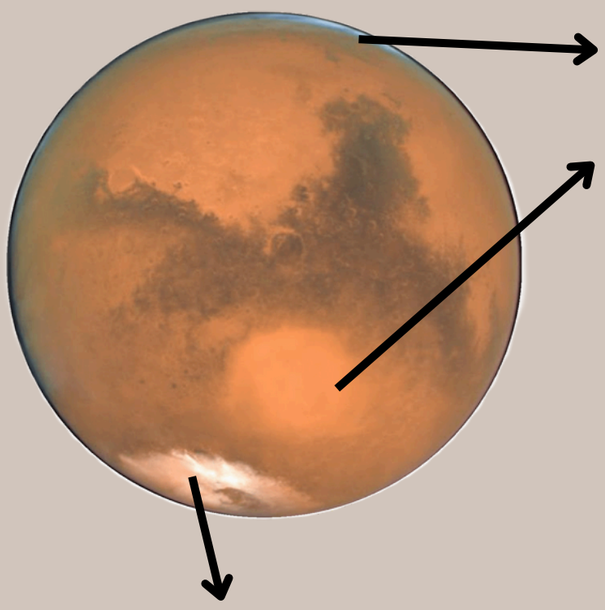
- We used an article written by researchers at NSSTC where they studied dust storms on Mars and gathered all the dust storms of Martian Year 36 in an excel sheet

Advantages

We made great progress in recognizing important details and data points in scientific picture analysis and interpretation. Additionally, we improved our communication abilities, which allowed us to work well together in a diverse and professional team. Through hands-on experience in space-related projects, we improved our programming skills and strengthened our data analysis capabilities—both of which are essential for deciphering complicated scientific data.

Results

1- Hellas basin dust storm



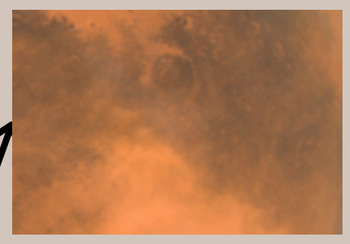
water Ice Clouds

Hellas basin dust storm

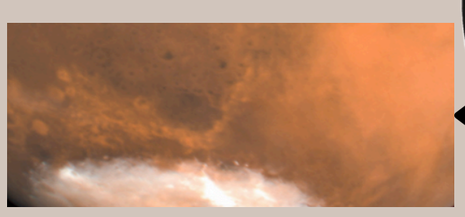
The Hellas Basin is considered dustier than its surroundings because it is the deepest crater on the surface of Mars, with a depth of 7 km, which leads to the accumulation of dust over time.

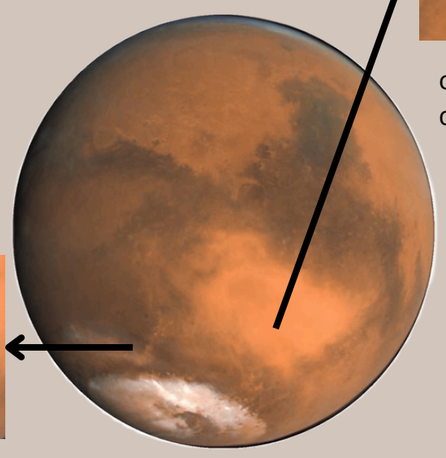
south polar

southern hemisphere summer because the sun hit the pollar



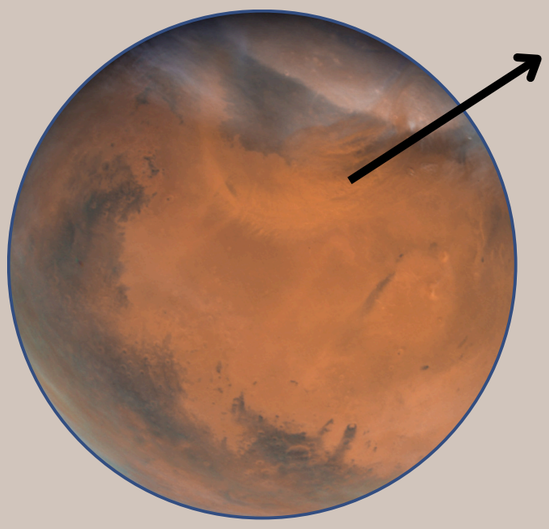
clouds maybe it formed due to a dust storm





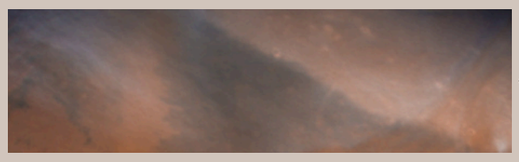
Dust storms move from the Hellas Basin towards the Southern Hemisphere due to seasonal changes for example Hadley circulation. This process leads dust to be raised and transported over distances.

2- Cap-edge dust storm

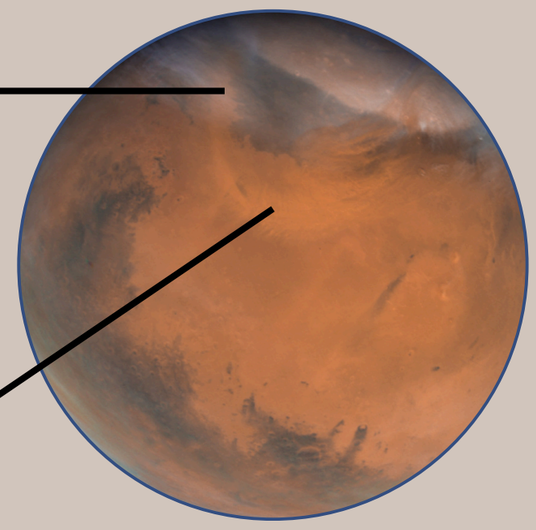


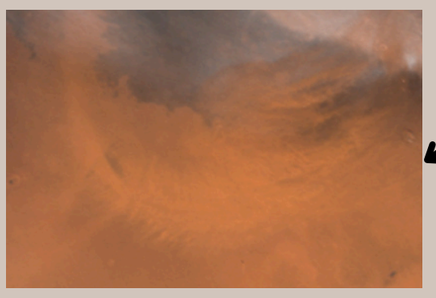
Type of dust storm that occurs near the edges of the polar ice caps. These storms are typically observed in the late spring and early summer seasons.

1. Driven by the sublimation of CO_2 ice
2. increases atmospheric pressure
3. creates strong winds that lift dust into the air



water ice clouds





Dust Storm

Conclusion

The UAE Space Agency offered an outstanding internship experience, significantly enhancing our skills and providing excellent opportunities for growth. I extend my heartfelt thanks to Dr. Noora for her crucial role in developing our skills, assisting with all our needs, and ensuring we received the education and training opportunities necessary for our success.

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