



# STUDYING THE MARS ATMOSPHERE BASED ON THE EMIRATES MARS MISSION FROM THE PERSPECTIVE OF A UNIVERSITY STUDENT

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## UAE Space Programs

- The UAE Space Agency (UAESA) has come a long way since its inception in 2014.
- The United Arab Emirates Space Agency is responsible for the development of the country's space industry. Also for fostering and regulating a sustainable and world-class space sector in the UAE.
- Signed cooperation agreements with around 20 countries, including the US, Russia, China and France.
- The agency is a member of international space organizations and alliances
- It is hosting the 71st International Astronautical Congress in Dubai in 2020.
- The UAE was also an early and active member in the development and application of regional and international satellite and radio-communication regulatory frameworks, even before the agency was established.
- It is currently looking to expand on its more than seven satellites in operation for commercial, defense and government use.
- With the cooperation of Thuraya, UAE University, Yahsat, Khalifa University and the Mohammed bin Rashid Space Centre (MBRSC), UAE has invested more than 5.5 billion dollars in the space sector to date.



## Emirates Mars Mission

- The Hope spacecraft will advance human knowledge about the atmosphere and climate on Mars.
- It will study how the lower and upper layers of the atmosphere interact with each other.
- It will search for connections between today's Martian weather and the ancient climate of the Red Planet.
- It will study why Mars is losing its atmosphere to space by tracking the behavior and escape of hydrogen and oxygen, which are the building blocks of water.
- Create the first global picture of how the Martian atmosphere changes throughout the day and between the seasons.
- More than 75 Emiratis will work on the Emirates Mars Mission team, expected to reach 150 before 2020
- More than 200 other personnel at U.S. partner institutions will also contribute.

## Science Instruments

- An Imager – a digital camera that will send back high-resolution colour images.
- An Infra-Red Spectrometer – which will examine temperature patterns, water ice clouds, water vapour and dust in the atmosphere.
- An Ultraviolet Spectrometer – which will study the upper atmosphere and traces of oxygen and hydrogen further out into space.

## Emirates eXploration Imager (EXI)

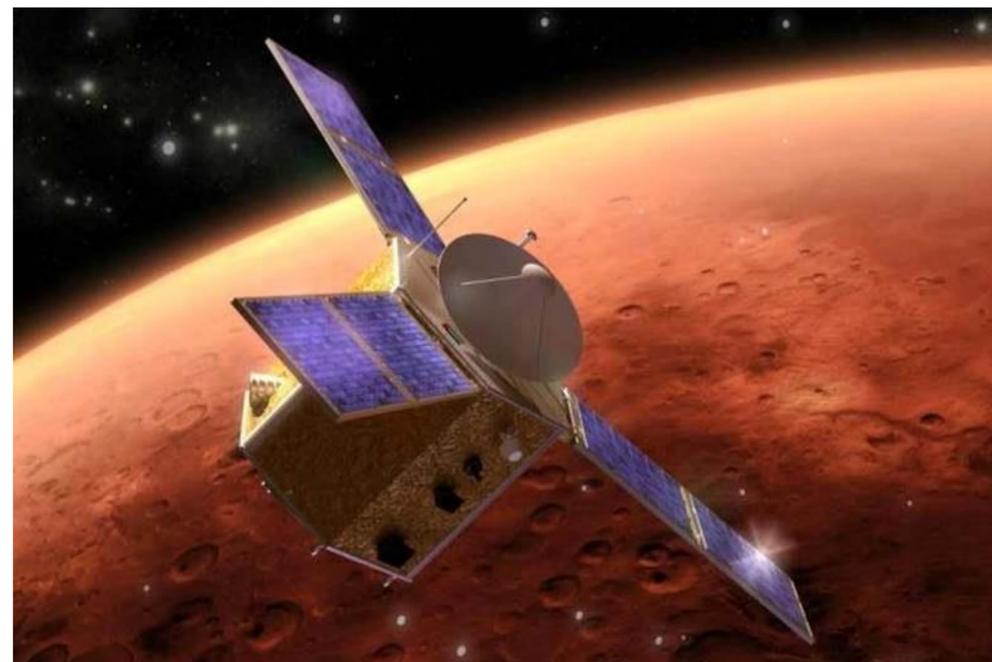
- Measure properties of water ice and dust aerosols, and abundance of ozone in Mars's atmosphere.

## Emirates Mars Ultraviolet Spectrometer (EMUS)

- Measures global characteristics and variability of thermosphere and hydrogen and oxygen coroneae.

## Emirates Mars InfraRed Spectrometer (EMIRS)

- Measure global thermal structure and abundances of water ice, water vapor, and dust in Mars's atmosphere.



<http://emiratesmarsmission.ae/>

## Introduction to Mars

- Mars is the fourth planet from the Sun and the second-smallest planet in the Solar System after Mercury.
- "Red Planet" because the reddish iron oxide prevalent on its surface gives it a reddish appearance, with red dust covers large parts of Mars.
- Tiny dust storm can look like dust devils in Earth, and the largest ones can cover the whole planet.
- Mars is a terrestrial planet with a thin atmosphere, it has canyons, volcanoes and craters all over it.
- Very cold, the average temperature is minus 80 degrees Fahrenheit (26.6 degrees Celsius).
- Mars has a very thin atmosphere composed mostly of the tiny amount of remaining carbon dioxide (95.3%) plus nitrogen (2.7%), argon (1.6%) and traces of oxygen (0.15%) and water vapor (0.03%).



## Earth Vs. Mars

Mars	Earth
Called the red planet because of the brownish-red color of its surface	Blue planet; mostly blue and green
141 million miles (226917504 Km) away from sun	93 million miles (149668992 Km) away from sun
Half size of earth, with a diameter of 4220 miles (6791.432 Km)	Diameter of 7926 miles (12755.66 Km)
The speed to orbit the sun is 14.5 miles per second (23 km/s)	The speed to orbit the sun is 18.5 miles per second (30 km/s)
687 (Earth) days in a year	365.25 days in a year
Day length is 24 hours and 37 minutes	Day length is 24 hours
Tilt is 23.5 degrees	Tilt is 25 degrees
The average temperature is -81 degrees F (-62.8 degrees C)	The average temperature is 57 degrees F (13.9 degrees C)
Gravity is 3.711 m/s <sup>2</sup>	Gravity is 9.807 m/s <sup>2</sup>
Atmosphere component (carbon dioxide 95.3% - argon 1.6% - Nitrogen 2.7% - Oxygen 0.15%)	Atmosphere component (nitrogen 77% - Oxygen 21% - Argon 1% - Carbon dioxide 0.038%)
Tallest mountain is Olympus Mons 14mi (22 km)	Tallest mountain is Everest 5.5mi (8.8 km)
2 moons (Phobos and Deimos)	1 moon