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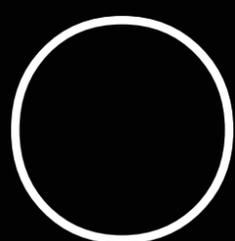
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See and image twilight
clouds at the top of
our atmosphere



HOPE: one year at MARS

After 12 months spent observing the Martian atmosphere with its Hope probe, the United Arab Emirates has released a global map of the planet



On 9 February 2021, the Hope Emirates Mars mission – the first interplanetary mission from the United Arab Emirates (UAE) – arrived at the Red Planet.

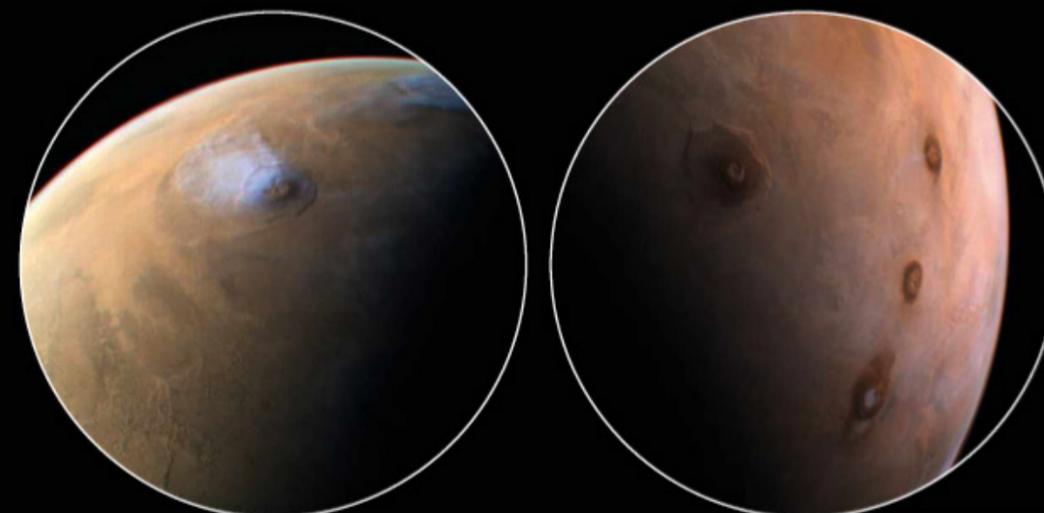
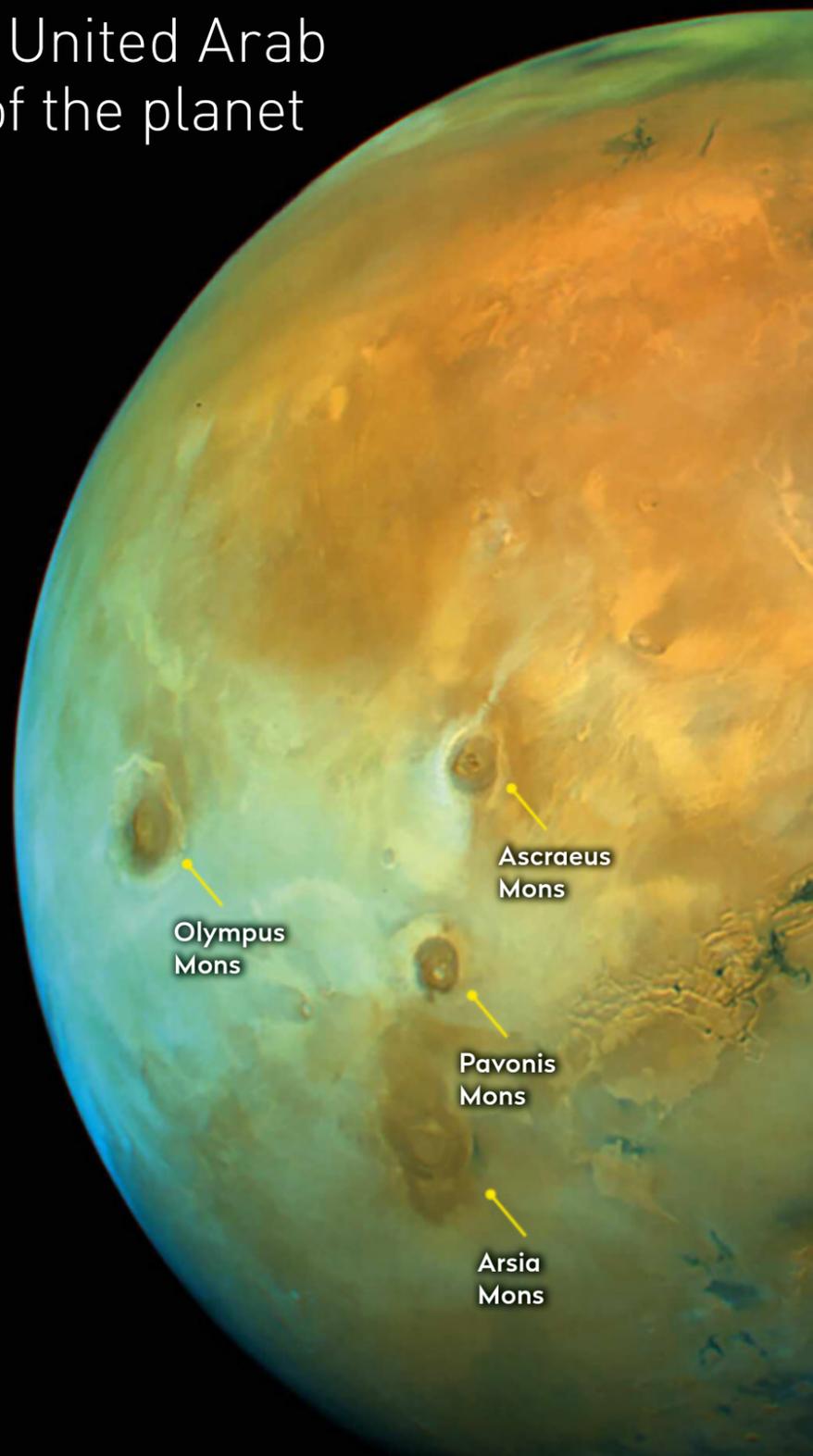
“The objective of the mission is to study the atmosphere’s variability for a full Martian year – two Earth years,” says Hessa Al Matroushi, science lead

on Hope. “The maps we have from other missions to Mars have gaps in them. There would be measurements of the planet, say, two times a day and you’d have to predict what’s happening in between – that’s not accurate. Hope looks at the whole planet, surveying different layers of the atmosphere at different times of day, so we get full coverage. This is something that hasn’t been done before with such accuracy.”

Hope began science observations in May 2021 and the team has now released the first set of maps from its Atlas of Mars, tracking atmospheric and temperature changes during the day. This main science phase is set to cover one Martian year, giving a full picture of the Red Planet’s atmosphere.



▲ **Valles Marineris** is a 4,000km-long canyon that reaches depths of 7km – about five times deeper than the Grand Canyon on Earth. It is a tectonic crack, created four billion years ago as the planet cooled.



◀ The **Tharsis** region (pictured, left) covers a geological hotspot that has been pushing the terrain upwards for billions of years, creating a 7km-high plateau. It is home to three of Mars’s largest shield volcanoes: **Ascræus Mons**, **Pavonis Mons** and **Arsia Mons** (from north to south). **Olympus Mons** (pictured, far left with clouds around the summit), the Solar System’s largest volcano, lies to the west of Tharsis.

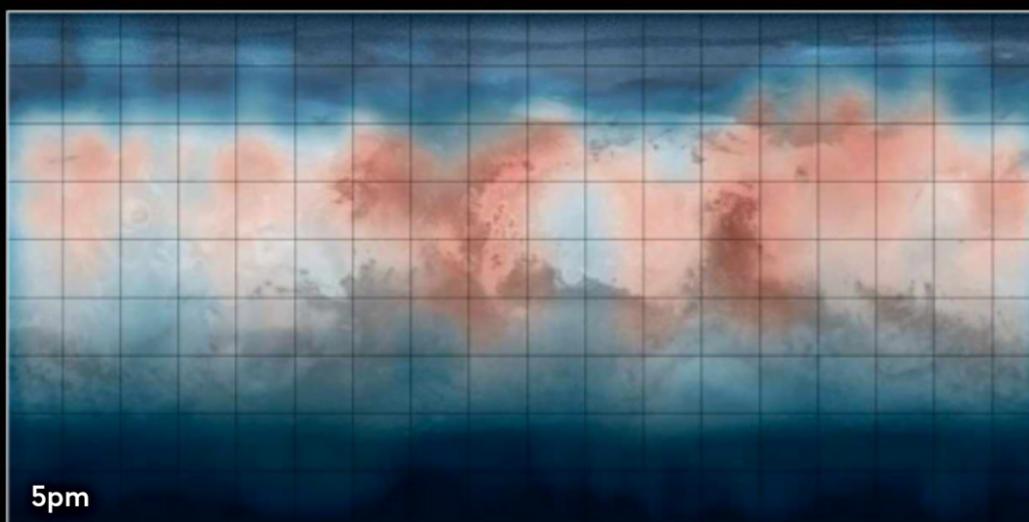
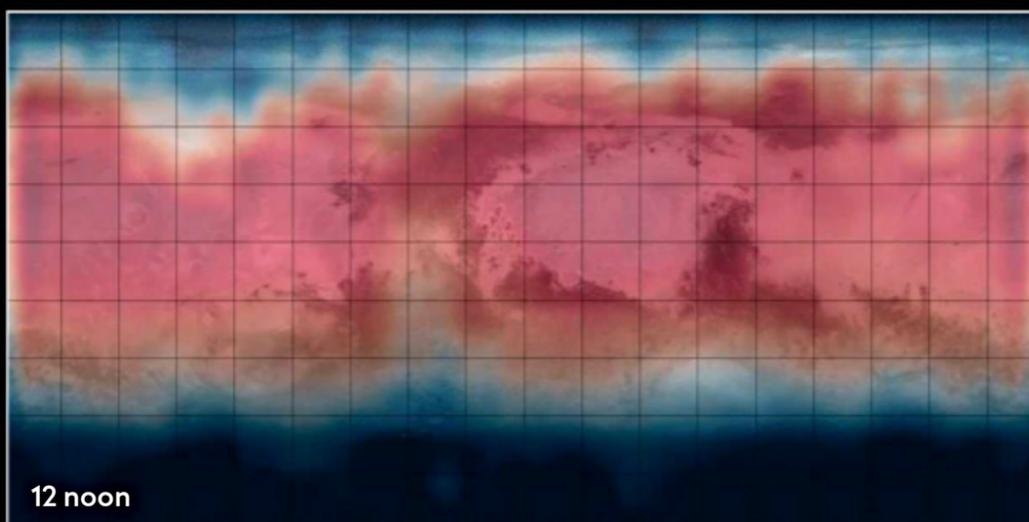
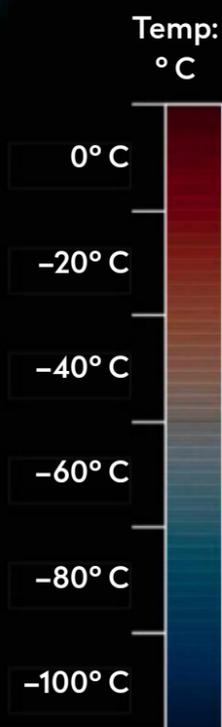
A global view of Mars

“Although the mission was designed to study the atmosphere, the surface is also a very important component, and we need to understand how the two interact together,” says Al Matroushi.

To do this, Hope conducted a ‘capture’ orbit, where it came very close to the planet, allowing it to take higher resolution images of the surface. It then moved out to its science orbit, which is wide to **view the whole globe at once** (below). “That was exciting because you can do a lot of surface science – you’re able to see the rocks and the sand and study different regions, including **Valles Marineris and Tharsis**,” says Al Matroushi.



Valles Marineris



Taking the temperature of the Red Planet

The Emirates Mars Infrared Spectrometer (EMIRS) looks at infrared light from Mars, generating heat maps of the entire planet at various points in the day. “We’re looking into the globe’s temperature and understanding its variability, as that impacts the climate,” says Al Matroushi.

This set of **heat maps** (above) was created in July 2021, in the season of spring for the Red Planet’s northern hemisphere, and it shows the change in temperature across the whole planet over an average day. 🌍