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UAE

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DUBAI
BY ANGEL TESORERO
Senior Reporter

HOPE PROBE TAKES UAE'S SPACE JOURNEY BEYOND MARS

UAE'S DREAM WAS LAUNCHED INTO THE SKIES FROM JAPAN A YEAR AGO

July 20 – in the early hours of this day last year, the UAE's dream of reaching for the stars was realised. Hope Probe, the first Arab interplanetary mission, was successfully launched from Tanegashima Space Centre (TNSC) in the Kagoshima Prefecture of south-western Japan was successfully launched at 1.58am (UAE time) on July 20, 2020.

One year has passed and Hope Probe is currently orbiting the Red Planet to create a complete picture of the Martian atmosphere. "The mission has not only performed nominally across all areas, but has exceeded its anticipated performance, encompassing a range of additional activities and freeing up valuable resources to perform additional observations," said the Emirates Mars Mission (EMM) on the eve of its first anniversary.

'From strength to strength'

EMM project director Omran Sharaf said yesterday: "We've had quite a lot of 'wobble room' in addition to our planned parameters and our confidence in our spacecraft has gone from strength to strength, to be honest. We were able to cut the number of trajectory correction manoeuvres, perform additional observations during our flight to Mars and now have added a whole area of scientific study to the mission that I can only describe as a 'bonus'. It has been a very busy year indeed for Hope Probe."

'A day full of pride'

Recalling the historic moment, Sharaf said in an earlier interview with *Gulf News*: "It was a day 'full of pride, happiness and positivity. Yes, it was a very busy, intense and stressful day; but personally, I was confident about the teamwork and spacecraft design.'"

Hope Probe journeyed over 493 million km to reach the Red Planet. The original seven Trajectory Correction Manoeuvres (TCMs) was cut to four because of the spacecraft's outstanding performance during the Launch and Early Operations Phase (LEOPs). This conserved resources and allowed the EMM team to perform a series of observations en route to Mars.

Then came the most critical part of the mission – the Mars Orbit Insertion (MOI). Worried,

MARS MISSION

- July 20, 2020: Hope Probe was launched into the orbit.
- February 9, 2021: Hope probe entered the Mars orbit.
- Hope Probe transitioned to its unique 20,000-43,000km elliptical science orbit, with an inclination to Mars of 25 degrees. In this orbit, the is orbiting the Red Planet every 55 hours to capture a full planetary sample every four orbits or nine Martian days.
- Hope Probe has a two-year mission to map Mar's atmospheric dynamics. According to EMM, the first Science data from the mission will be released globally with no embargo, following a period of validation and checking, on October 2021.



493m
kilometres Hope Probe journeyed to reach Red Planet

Hope probe's three instruments were activated on April 10 then a period of commissioning and testing followed, before the mission's Science phase formally commenced on May 23.

scared, but confident – it was definitely a mixed feeling for Sharaf and his team who have reached that point – the farthest that any Arab would go in the universe. They only had one shot and with only 50 per cent success rate – it could go either way: failure or accomplishment.

Entering Mars

On February 9, Hope Probe entered the Mars orbit. Sharaf told *Gulf News*: "After we arrived, the stress went away. The feeling was very difficult to describe. For the first few minutes, I was still in shock. The past seven years (from Hope Probe announcement in 2014), went really fast in front of me. It took me a while to realise our feat and it was a good feeling.

Now, the load is still high but the stress level is significantly less."

Members of the EMM then worked on calibrating Hope Probe's scientific instruments to make sure the Martian atmospheric data that will be collected were accurate as they shifted to Science orbit.

Cruise to Mars

EMM's Emirates Mars Ultraviolet Spectrometer (EMUS) instrument was activated during Hope's cruise to Mars and used to image Mars' exospheric hydrogen. The instrument was also cross-calibrated with the PHEBUS spectrometer aboard the European Space Agency's BepiColombo spacecraft, itself en route to Mercury. "These ex-

periments were possible simply because Mars Hope was in such good shape," Hessa Al Matroushi, EMM's Science Lead, recalled.

Because resources were available and the spacecraft performance so exceeded planning scenarios, the dust tracking feature of Mars Hope's star tracker instruments was also enabled, allowing measurements of interplanetary dust in the wake of Mars as it spins around the sun. Hope Probe transitioned to its unique 20,000-43,000km elliptical science orbit, with an inclination to Mars of 25 degrees. In this orbit, the is orbiting the Red Planet every 55 hours to capture a full planetary sample every four orbits or nine Martian days.

WHY STUDY THE RED PLANET

Emirates Mars Mission has repeatedly answered the question – why study the Red Planet. It replied: "Mars has captured human imagination for centuries. Now, we are at a junction where we know a great deal about the planet, and we have the vision and technology to explore further. Mars is an obvious target for exploration for many reasons. From our pursuit to find extraterrestrial life to someday expand human civilisation to other planets, Mars serves as a long-term and collaborative project for the entire human race."

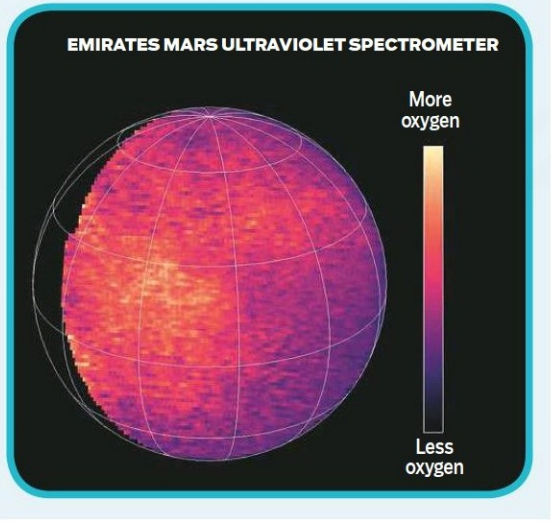
As the first weather satellite of Mars, Hope (Al Amal in Arabic) is the first probe to provide a complete picture of the Martian atmosphere. It will help answer key questions about the global Martian atmosphere and the loss of hydrogen and oxygen gases into space over the span of one Martian year.

Specifically, Hope Probe will help humans "understand climate dynamics and the global weather map through characterising the lower atmosphere of Mars; explain how the weather changes the escape of hydrogen and oxygen through correlating the lower atmosphere conditions with the upper atmosphere; and understand the structure and variability of hydrogen and oxygen in the upper atmosphere, as well as identifying why Mars is losing them into space."

Hope Probe's historic journey to the Red Planet coincides with a year of celebrations to mark the UAE's Golden Jubilee. According to EMM, "beyond the scientific objectives of Hope Probe are its strategic objectives that revolve around human knowledge, Emirati capabilities, and global collaboration."

The mission will achieve beyond data and results. It will improve the quality of life on Earth by pushing our limits to make new discoveries; encourage global collaboration in Mars exploration; demonstrate leadership in space research; build Emirati capabilities in the field of interplanetary exploration.

— A.T.



ON GULFNEWS.COM

UAE Hope Probe shares images of Mars' Discrete Aurora



Read full story on Hope Probe's space journey to Mars and beyond