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# Hope Probe discovers new 'patchy' Mars proton aurora

## FINDING CAN HELP SCIENTISTS TRACK WATER LOSS FROM RED PLANET'S ATMOSPHERE

**DUBAI**

**BY ANGEL TESORERO**
Senior Reporter

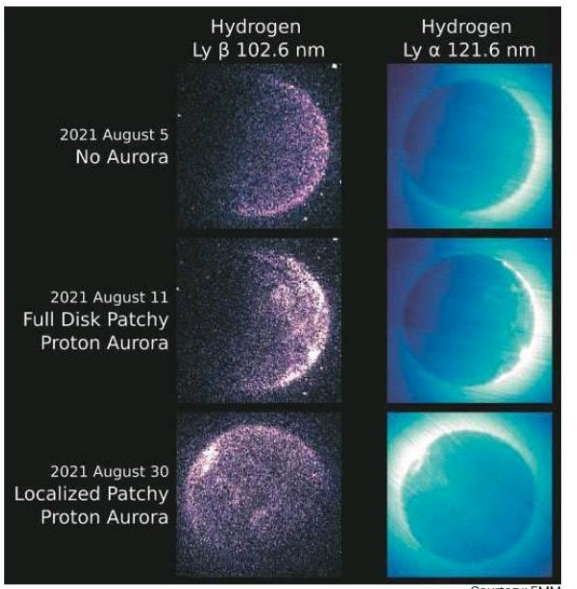
A new type of proton aurora around Mars has been observed by the Emirates Mars Mission (EMM), in collaboration with US National Aeronautics and Space Administration (Nasa), the UAE Space Agency announced yesterday.

A proton aurora can help scientists track water loss from Mars' atmosphere. "The spatially variable 'patchy' proton aurora potentially triggers new insights into unexpected behaviours in the Martian atmosphere," UAE Space Agency said in a statement.

"The EMM team has worked together with Nasa's MAVEN (Mars Atmosphere and Volatile Evolution) mission to fully characterise these observations. The combination of EMM's unprecedented global aurora images with MAVEN's simultaneous local plasma observations opens up new avenues for understanding the drivers of Mars' enigmatic aurora."

### Phenomena uncovered

Hessa Al Matroushi, EMM's Science Lead, said: "Our discovery of these patchy proton aurora adds a new kind of event to the long list of those currently studied by EMM and challenges our existing views of how the proton aurora on Mars' dayside are formed.




Courtesy: EMM

■ Hope Probe finds new 'patchy' Mars proton aurora.

"The EMM Hope Probe has so far uncovered many unexpected phenomena that extend our understanding of Mars' atmospheric and magnetospheric dynamics. These new observations, combined with MAVEN data, have lifted the lid on entirely new possibilities for scientific research," she added.

According to the UAE Space Agency, the new patchy type of proton aurora is formed when the solar wind directly impacts Mars' dayside upper atmosphere and emits ultraviolet light as it slows down. It was discovered in snapshots of the dayside disk obtained by Hope Probe's Emirates Mars Ultraviolet Spectrometer (EMUS), which observes the planet's upper atmosphere and exosphere, scanning for variability in atmospheric composition and atmospheric escape to space.

The aurora manifests as bright regions scattered across the dayside of the planet in two ultraviolet wavelengths associated with the Hydrogen atom, Lyman beta at 102.6 nm and Lyman alpha at 121.6 nm.

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>
> **Hessa Al Matroushi**
> | EMM's Science Lead

### Localised energy

Under normal conditions, the dayside disk of the planet at these wavelengths is uniform, and the planetary brightness results from Hydrogen atoms scattering sunlight. When the aurora occurs, small regions of the planet become much brighter at these wavelengths, signifying intense localised energy deposition in the atmosphere.

"We've seen emissions at these wavelengths before, thanks to proton aurora studies by Nasa's MAVEN mission, but these EMM EMUS images represent the first time we've had a global view of spatial variability in proton aurora at Mars, and the first time we've been able to unambiguously observe this patchy structure," said Mike Chaffin, EMM science team member and lead author of a newly submitted paper on the proton aurora.