Water could disappear from Mars faster than expected

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When the sun lights up the large reservoirs of ice at the poles, water vapor is released into the atmosphere. These water molecules are then transported by winds toward higher and colder altitudes where, in the presence of dust particles, they can condense into clouds and prevent a rapid and mass progression of water toward higher altitudes (as on Earth). On Mars condensation is often hindered. The atmosphere is thus regularly supersaturated in water vapor, which allows even more water to reach the upper atmosphere, where the sun's UV rays

disassociate them into atoms. The discovery of the increased presence of water vapor at very high altitude entails that a greater number of hydrogen and oxygen atoms are able to escape from Mars, amplifying the loss of Martian water over the long term. Credit: © ESA

Mars is losing water more quickly than theory and observations would suggest. The gradual disappearance of water (H_2O) occurs in the upper atmosphere of Mars as sunlight and chemistry disassociate water molecules into hydrogen and oxygen atoms that the weak gravity cannot prevent from escaping into space.

An international research team, led partly by CNRS researcher Franck Montmessin, has just revealed that water vapor is accumulating in large quantities and unexpected proportions at an altitude of over 80 km in the Martian atmosphere. Measurements showed that large atmospheric pockets are even in a state of supersaturation, with the atmosphere containing 10 to 100 times more water vapor than its temperature should theoretically allow. With the observed supersaturation rates, the capacity of water to escape would greatly increase during certain seasons.

These results, which were published in *Science* on 9 January 2020, were obtained thanks to the Trace Gas Orbiter probe from the ExoMars mission, financed by the European Space Agency and the Russian space agency Roscosmos.

More information: A.A. Fedorova el al., "Stormy water on Mars: The distribution and saturation of atmospheric water during the dusty season," *Science* (2019). science.sciencemag.org/cgi/doi … 1126/science.aay9522

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