

Mars Exploration (5)

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EMIRATES MARS MISSION (EMM) 2020

Abstract

United Arab Emirates has entered the space exploration race with the announcement of Emirates Mars Mission, the first Arab Islamic mission to another planet, in 2014. Through this mission, UAE is to send an unmanned probe, called Hope probe, to be launched in summer 2020 and reach Mars by 2021 to coincide with UAE's 50th anniversary. Through a sequence of subsequent maneuvers, the spacecraft will enter a large science orbit that has a periapsis altitude of 20,000 km, an apoapsis altitude of 43,000 km, and an inclination of 25 degrees. The mission is designed to (1) characterize the state of the Martian lower atmosphere on global scales and its geographic, diurnal and seasonal variability, (2) correlate rates of thermal and photochemical atmospheric escape with conditions in the collisional Martian atmosphere, and (3) characterize the spatial structure and variability of key constituents in the Martian exosphere. These objectives will be met by four investigations with diurnal variability on sub-seasonal timescales which are (1) determining the three-dimensional thermal state of the lower atmosphere, (2) determining the geographic and diurnal distribution of key constituents in the lower atmosphere, (3) determining the abundance and spatial variability of key neutral species in the thermosphere, and (4) determining the three-dimensional structure and variability of key species in the exosphere. EMM will collect these information about the Mars atmospheric circulation and connections through a combination of three distinct instruments that image Mars in the visible, thermal infrared and ultraviolet wavelengths and they are the Emirates Exploration Imager (EXI), the Emirates Mars InfraRed Spectrometer (EMIRS), and the EMM Mars Ultraviolet Spectrometer (EMUS). EMM has passed its Mission Concept Review (MCR), System Requirements Review (SRR), System Design Review (SDR), and Preliminary Design Review (PDR) phases. The mission is led by Emiratis from Mohammed Bin Rashid Space Centre, Dubai, UAE, and it will expand the nation's human capital through knowledge transfer programs set with international partners from the University of Colorado Laboratory for Atmospheric and Space Physics (LASP), University of California Berkeley Space Sciences Lab (SSL), and Arizona State University (ASU) School of Earth and Space Exploration.