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Mars EXpress: status and recent findings

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Mars Express has entered its second decade in orbit in excellent health. The mission extension in 2015-2016 aims at augmenting of the surface coverage by imaging and spectral imaging instruments, continuing monitoring of the climate parameters and their variability, study of the upper atmosphere and its interaction with the solar wind in collaboration with NASA's MAVEN mission. Characterization of geological processes and landforms on Mars on a local-to-regional scale by HRSC camera constrained the martian geological activity in space and time and suggested its episodicity. Six years of spectro-imaging observations by OMEGA allowed correction of the surface albedo for presence of the atmospheric dust and revealed changes associated with the dust storm seasons. Imaging and spectral imaging of the surface shed light on past and present aqueous activity and contributed to the selection of the Mars-2018 landing sites. More than a decade long record of climatological parameters such as temperature, dust loading, water vapor, and ozone abundance was established by SPICAM and PFS spectrometers. Observed variations of HDO/H₂O ratio above the subliming North polar cap suggested seasonal fractionation. The distribution of aurora was found to be related to the crustal magnetic field. ASPERA observations of ion escape covering a complete solar cycle revealed important dependences of the atmospheric erosion rate on parameters of the solar wind and EUV flux. Structure of the ionosphere sounded by MARSIS radar and MaRS radio science experiment was found to be significantly affected by the solar activity, crustal magnetic field as well as by influx of meteorite and cometary dust. The new atlas of Phobos based on the HRSC imaging was issued. The talk will give the mission status and review recent science highlights.