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ExoMars Atmospheric Mars Entry and Landing Investigations and Analysis (AMELIA)

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The entry, descent and landing of ExoMars EDM offers a rare (once-per-mission) opportunity to perform an *in situ* investigation of the martian environment over a wide altitude range. The ExoMars AMELIA team seeks to exploit the Entry Descent and Landing System (EDLS) engineering measurements for scientific investigations of Mars' atmosphere and surface. From the measurements recorded during entry and descent, using similar methods and analysis employed on previous entry probe missions (e.g. ESA Huygens at Titan, NASA Mars PathFinder, Mars Exploration Rovers and Phoenix) we will retrieve an atmospheric vertical profile along the entry and descent trajectory.

To date, only six vertical profiles of density, pressure and temperature of the martian atmosphere have been obtained from *in situ* measurements. Three high vertical resolution and high accuracy atmospheric vertical profiles have been retrieved from measurements performed by Viking 1 and 2 during the day [1] and by Mars Pathfinder during the night [2, 3]. Two more vertical profiles have been retrieved from the deceleration curves and aeroshell drag properties of the two Mars Exploration Rovers during atmospheric entry [4], but with a much lower accuracy. Recently the Mars Phoenix EDL data have been used to obtain the first profile of atmospheric density, pressure and temperature at the martian polar regions [5]. Such profiles are vital for cross-calibrating remotely-sensed observations (such as from the Mars Climate Sounder instrument [6] on board NASA Mars Reconnaissance Orbiter), testing atmospheric models used in numerous studies of atmospheric variability on a range of temporal and spatial scales, as well as for the practical issue of reaching the martian surface reliably [e.g. 7] and to investigate the climate of Mars.

ExoMars 2016 will provide the opportunity for new direct *in situ* measurements during the martian statistical dust storm season. These data will contribute to exploring an altitude range not covered by remote sensing observations from an orbiter, providing a surface and atmosphere "ground truth" for remote sensing observations and important constraints for validation of Mars atmosphere models.

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