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The DREAMS scientific package for the Exomars Entry Descent and Landing Demonstrator Module

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Abstract

The *Dust characterization, Risk assessment and Environment Analyser on the Martian Surface* (DREAMS) package is an integrated multi-sensor scientific payload proposed to be accommodated on the ExoMars 2016 *Entry Descent and Landing Demonstrator Module* (EDM). It is dedicated to characterizing fundamental aspects of Mars' climate, geology and boundary layer dynamics at the EDM landing site. The DREAMS package is fully autonomous, providing both power and data handling resources through a Common Electronics Unit (CEU) and a battery. The DREAMS proposal gathers a wide consortium of institutions led by Italy, reflecting the current involvement of European countries in the ExoMars program.

1. Introduction

The *Joint Mars Exploration Programme* by ESA and NASA comprises two missions for launch in 2016 and 2018. The whole program is devoted to the achievement of important scientific objectives, such as the searching for signs of past and present life on Mars, the investigation of water-related geochemical processes on the surface, the monitoring and mapping of trace gases in the Martian atmosphere, and to demonstrate new technologies that are necessary for a future Mars sample return mission in the 2020's.

The 2016 mission foresees the launch of the *Trace Gas Orbiter* (TGO), mainly devoted to the study of methane and other atmospheric gases that are present in small concentration in the Martian atmosphere, and an EDM, whose main goal is to enable Europe to acquire the capability to land on Mars. Although designed to demonstrate entry, descent and landing technologies, the EDM also offers limited, but useful, science capabilities. So, on 30th November 2010, ESA and NASA issued an announcement of opportunity (AO) for scientific investigations on the 2016 EDM.

The DREAMS proposal was submitted in response to this AO.

2. The DREAMS proposal

The DREAMS proposal is the result of the strong collaborative effort of a broad international scientific community engaged in the selection and optimization of a mature package of sensors, that draws heavily on heritage from currently operating missions and advanced developments (Technical Readiness Level ≥5). Despite the limited duration of the landed EDM mission, DREAMS will nonetheless be capable of addressing important scientific Mars exploration goals. DREAMS' central objective is the characterization of the landing site environment in the dust storm season. This goal shall be achieved by monitoring key environmental parameters (basic meteorological state parameters such as pressure, temperature, wind and atmospheric opacity) close to the surface, and, by providing the first ever *in situ* measurements of important physical properties of dust aerosols (including local electric activity).

The publication of the results of ESA and NASA selection of the payload of EDM is expected for June 2011.

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