

MMPM - Mars MetNet Precursor Mission

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Abstract

We are developing a new kind of planetary exploration mission for Mars – MetNet in situ observation network based on a new semi-hard landing vehicle called the MetNet Lander (MNL). The eventual scope of the MetNet Mission is to deploy some 20 MNLs on the Martian surface using inflatable descent system structures, which will be supported by observations from the orbit around Mars. Currently we are working on the MetNet Mars Precursor Mission (MMPM) to deploy one MetNet Lander to Mars in the 2009/2011 launch window as a technology and science demonstration mission. The MNL will have a versatile science payload focused on the atmospheric science of Mars.

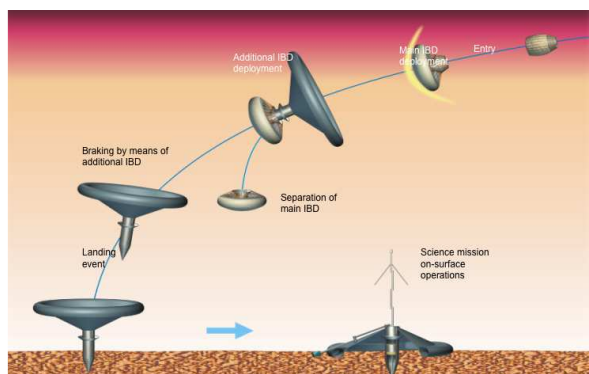


Fig. 1 MetNet Lander (MNL) entry, descent and landing concept.

Detailed characterization of the Martian atmospheric circulation patterns, boundary layer phenomena, and climatology cycles, require simultaneous in-situ measurements by a network of observation posts on the Martian surface. The scientific payload of the MetNet Mission encompasses separate instrument packages for the atmospheric entry and descent phase and for the surface operation phase.

The MetNet mission concept and key probe technologies have been developed and the critical subsystems have been qualified to meet the Martian environmental and functional conditions. Prototyping of the payload instrumentation with final dimensions was carried out in 2003-2006. This huge development effort has been fulfilled in collaboration between the Finnish Meteorological Institute (FMI), the Russian Lavoschkin Association (LA) and the Russian Space Research Institute (IKI) since August 2001. Currently the INTA (Instituto Nacional de Técnica Aeroespacial)

from Spain is also participating in the MetNet payload development.

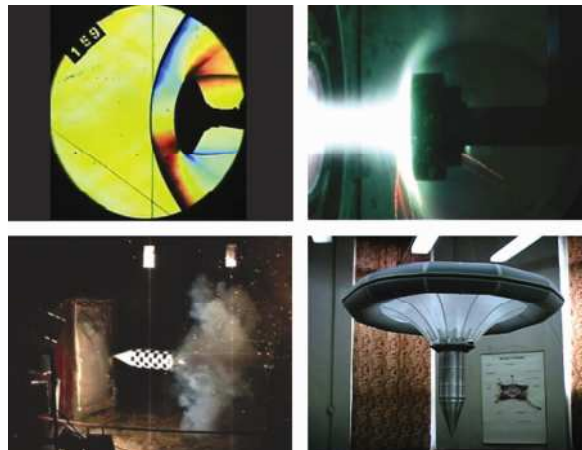


Fig. 3 Qualification tests performed on the MetNet key parts.

To understand the behavior and dynamics of the Martian atmosphere, a wealth of simultaneous in situ observations are needed on varying types of Martian orography, terrain and altitude spanning all latitudes and longitudes. This will be performed by the Mars MetNet Mission. In addition to the science aspects the MetNet Mars Mission will provide a crucial support for the safety of large landing missions in general and manned Mars missions in particular. Accurate knowledge of atmospheric conditions and weather data is essential to guarantee safe landings of the forthcoming Mars mission elements. The MetNet Mars Mission is exactly this type of tool that is needed both for the Martian atmospheric science as well as for the mission safety issues.



Fig. 3 Flight-ready parts of the MetNet landing unit.