



Deimos Sample Return Technology Reference Study

D. Renton (1), F. Arbusti (2), R. Bessudo (2) and **P. Falkner** (1)

(1) Science Payload & Advanced Concepts Office, Planetary Exploration Studies Section, European Space Agency, ESTEC, Noordwijk, The Netherlands, (2) Alcatel Space, Cannes, France (Danielle.Renton@esa.int / Phone: +31 71 565 6586)

Determining the origin and composition of asteroids is a key step in understanding the nature of the solar system. Believed to be a captured asteroid, Deimos, Mars' moon, therefore is of dual scientific interest. The upper regolith of the moon contains Martian material accreted during the late heavy bombardment period. Retrieving a sample from Deimos would therefore contain both asteroidal and Martian material. The perceived scientific interests in Deimos, as well as for other small body sample return missions, is one of the key reasons that Deimos Sample Return (DSR) was chosen as one of ESA's Technology Reference Studies.

Technology Reference Studies (TRS) are a technology development tool introduced by ESA's Science Payload and Advanced Concepts Office, whose purpose is to provide a focus for the development of strategically important technologies that are of likely future relevance for scientific missions. This is accomplished through the study of several technologically demanding and scientifically interesting missions, which are currently not part of the ESA science programme.

The goal of DSR-TRS is to study the feasibility and technologies required to collect a scientifically significant sample of regolith from Deimos' surface and return it to Earth. The DSR mission profile consists of a small spacecraft, launched on a Soyuz-Fregat 2B. After transferring to the Martian system, the spacecraft will enter into a co-orbit with Deimos where it will perform remote sensing observations and ultimately perform a series of sampling maneuvers. Upon completion of sampling the spacecraft will return to Earth, where the sample canister will perform a direct Earth entry.

This presentation will outline the mission architecture and critical technology drivers of DSR. This will include a description of the sampling method, observation phase,

rendezvous maneuvers and re-entry method.