



The Jovian Entry Probe Study

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In the framework of Technology Reference Studies ESA's Science Payload and Advanced Concepts Office has initiated a CDF-study to investigate the critical technologies and design issues of a ballistic Jovian entry probe vehicle, with the aim to perform atmospheric measurements during descent and to survive to an ambient atmospheric pressure up to 100 bar. The goal is to assess a 'minimum' entry probe design and to constrain issues such as design, mass, size, telecommunications and specific technology requirements.

The present knowledge of the Jovian atmosphere is still limited. Most of the available information comes from the remote sensing observations performed by Galileo, the Pioneers and Voyagers fly-by's or from Earth or Earth orbiting telescopes. Only one in-situ study has ever been performed. The Galileo descent probe could however only cover a limited part of the Jovian atmosphere in terms of spatial location and pressure levels.

A promising way to further investigate the atmosphere is to deploy deep multi probes (50-100 bar) into different regions of Jupiter. However the study shows that with the given limitations due to the harsh entry conditions (at minimum of 47km/s) and associated heat fluxes entry at higher latitudes is very hard to achieve.

Two different options have been investigated, a 'shallow' probe surviving up to 40 bar and a deep probe able to survive even 100 bar ambient pressure, resulting in minimum system masses of around 270 kg and 320 kg respectively.

The study has provided a design concept for a Jovian Entry Probe and outlined the required technologies. Furthermore a short overview on the study framework and context is given in this paper as well.