

SPACE EXPLORATION SYMPOSIUM (A3)
Mars Exploration – Science, Instruments and Technologies (3B)

Author: Mr. Gabriel Pont
Centre National d'Etudes Spatiales (CNES), France

Mr. Philippe Laudet
Centre National d'Etudes Spatiales (CNES), France

Mr. Nicolas Verdier
Centre National d'Etudes Spatiales (CNES), France

Mr. Laurent Kerjean
Centre National d'Etudes Spatiales (CNES), France

Dr. Philippe Lognonné
IPGP, France

Mr. Sébastien de Raucourt
Institut de Physique du Globe de Paris, France

SEIS SEISMOMETER DEVELOPMENTS FOLLOWING THE INSIGHT MISSION LAUNCH REPORT

Abstract

Because of a major anomaly having occurred in 2015 in SEIS, the main instrument of the INSIGHT (Interior Exploration using Seismic Investigations, Geodesy and Heat Transport) mission, the launch to Mars, initially planned in 2016, had to be reported to 2018.

SEIS stands for Seismic Experiment for Interior Structure. This instrument will allow for a characterization of the deep interior structure of Mars, including the thickness and structure of the crust, the composition and structure of the mantle, and the size of the core. It accommodates two independent, 3 axis seismometers: an ultra-sensitive Very Broad Band (VBB) oblique seismometer and a miniature, Short Period (SP) seismometer. Both seismometers, and their respective signal preamplifier stages, are mounted on a common structure which can be precisely leveled thanks to 3 tunable length legs.

They are isolated from weather by an aerogel thermal blanket and WTS (wind shield) and connected by a flexible cable tether to the E-box, a set of electronic cards located inside the Lander thermal enclosure.

In order to reach the required level of performances, the 3 VBBs are accommodated inside a vacuum container. Unfortunately, after the environments tests at instrument level in 2015, one of the container's feedthroughs was found to be leaky, inducing non-conformances on some of the major science requirements. The SEIS instrument could then not be delivered and the INSIGHT launch was reported to 2018.

By the time of the IAC 2017, the instrument will have been delivered to Lockheed Martin, and integrated to the INSIGHT lander which reuses extensively the cruise bus and the Entry-Descent and Landing System of PHOENIX, which performed a successful mission on Mars Northern terrains in 2008.

After giving an outline of the INSIGHT mission, with a focus on the SEIS activities on Mars, this paper will give a detailed presentation of the SEIS instrument, and will present the new development plan that was implemented following the launch report.