Geophysical Research Abstracts
Vol. 16, EGU2014-12183, 2014
EGU General Assembly 2014

SEIS/INSIGHT and Mars seismology: Development status and focus on the Impact detection

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The INSIGHT NASA Discovery mission will deploy in September 2016 a 3 axis Very Broad band seismometer and a 3 axis SP seismometer, as well as other instruments enabling the installation of a complete geophysical observatory recording seismic, heat flow, magnetic and geodetic signals, in addition to atmospheric wind, pressure and temperature.
We first present the science goals status of the SEIS experiment and its development status. The SEIS sensor assembly, which contains both the VBB and SP seismometer, will be deployed on the Martian ground by a robotic arm from a Phoenix-type lander platform and protected by a wind and thermal shield. The wind and thermal shield, a vacuum sphere for VBBs and a passive compensation system will achieve a very high protection of the seismometers against temperature and pressure variations, allowing the sensor to operate in the rough Martian thermal environment while reaching a detection threshold below 10(-9) m/s/s Hz(-1/2) in the VBB bandwidth and 10(-8) m/s/s Hz(-1/2) for the SP. A levelling system will allow the VBB to operate, while providing to both seismometer the best possible mechanical coupling with the ground motion. The SEIS instrument will be provided by CNES, which will coordinate a wide set of international contributors from the Institut de Physique du Globe de Paris, the Imperial College from London and the Open University, the Max-Planck Insitute of Lindau, the École polytechnique fédérale de Zurich (ETHZ), the Jet Propulsion Laboratory and the Institut de l'Aéronautique et de l'Espace from Toulouse.
We then illustrate the science goals by a focus on the capability of INSIGHT to detect either seismic or acoustic signals from impacts, with both the seismometers and the pressure sensor, and present both amplitude and occurrence expectation, based on comparative modeling between Mars, Earth and the Moon.