

SPACE EXPLORATION SYMPOSIUM (A3)
Mars Exploration – Part 1 (3A)

Author: Dr. Ramon P. De Paula
National Aeronautics and Space Administration (NASA), United States, rdepaula@hq.nasa.gov

Dr. Bruce Banerdt
United States, william.b.banerdt@jpl.nasa.gov

Mr. Tom Hoffman
Jet Propulsion Laboratory - California Institute of Technology, United States, tom.l.hoffman@jpl.nasa.gov

AN OVERVIEW OF NASA'S NEXT MISSION TO MARS: – THE 2016 INSIGHT MISSION –
INSIGHT: [INTERIOR EXPLORATION USING SEISMIC INVESTIGATIONS, GEODESY AND HEAT
TRANSPORT]

Abstract

This paper will give an overview of NASA's next mission to Mars, the Interior Exploration using Seismic Investigations, Geodesy and Heat Transport (InSight). InSight is a lander mission planned for launch in March 2016, the spacecraft a copy of NASA's Phoenix launched in 2007. InSight's science is an investigation of the terrestrial planets that will address fundamental issues of planet formation and evolution with a study of the deep interior of Mars. This mission will seek to understand the evolutionary formation of rocky planets, including Earth, by investigating the crust and core of Mars. InSight will also investigate the dynamics of any Martian tectonic activity and meteorite impacts and compare this with like phenomena on Earth.

NASA will launch InSight in March 2016, landing on Mars in September 2016. The InSight lander will be equipped with two science instruments that will conduct the first "check-up" of Mars in its more than 4.5 billion years, measuring its "pulse," or internal activity; its temperature; and its "reflexes" (the way the planet wobbles when it is pulled by the Sun and its moons). The science payload comprises two major instruments: the Seismic Experiment for Interior Structure (SEIS) and the Heat Flow and Physical Properties Package (HP3). SEIS is a sensitive French (CNES)-built seismometer to detect "Marsquakes". It will take precise measurements of quakes and other internal activity on Mars to help understand the planet's history and structure. HP3 a German(DLR)-built drill nicknamed "The Mole" that burrows up to five meters into the Martian crust for thermal measurements. This self-penetrating heat flow probe will measure how much heat is coming from Mars' core. In addition, the Rotation and Interior Structure Experiment (RISE) will use the spacecraft communication system to provide precise measurements of planetary rotation. Through these instruments, scientists should be able to deduce the structure of Mars, which is currently a mystery. InSight will spend roughly two years (720 Earth days or 700 "sols" Martian days) investigating the deep interior of Mars. The first science return is expected in October 2016. The prime mission ends in September 2018. The paper will present a summary of the science, the spacecraft, and operations.