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Mars Exploration – missions current and future (3A)

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RESULTS OF THE SEIS AND APSS INSTRUMENTS ONBOARD THE INSIGHT MISSION

Abstract

On November 26th 2018, the InSight spacecraft successfully landed on Mars after a 6-month travel. After a long deployment and commissioning phase, the SEIS (Seismic Experiment for Interior Structure) instrument was ready to monitor seismic events on the Martian surface of Elysium Planitia, coupled with the APSS (Auxiliary Payload Sensor Suite) weather station equipped with a magnetometer, wind sensors, and a pressure sensor. The InSight mission goal is to characterize 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. Its nominal duration of two years (2019-2020) has yielded unprecedented results with the detection of the first martian seismic events ever recorded, and the in-depth characterization of its atmosphere with the best weather station ever deployed on Mars. InSight has collected an outstanding amount of high quality measurements that the scientific community will keep analyzing for many years. The extended mission has started and will cover years 2021 and 2022. The paper will describe the results from the SEIS and APSS experiments on Mars since landing, as well as the challenges of operating those instruments. Energy is more and more limited for payloads on Mars due to a significant amount of dust accumulated on the solar panels and many dust storms in the Martian atmosphere. A new activity has been decided for the extended mission in 2021 which consists in burying the SEIS tether with Martian regolith collected locally thanks to the robotic arm, in order to reduce the seismic noise from that subsystem. Activity's preparation, testing, results, associated challenges and lessons learned will be presented. Moreover, the paper will address the challenges faced carrying operations with COVID-related constraints, as operating a seismometer on Mars from home is an unsettling situation. Finally, management of solar conjunctions periods during which communication between Earth and Mars is unavailable will be addressed.