Paper ID: 88307
oral
student

IAF SPACE EXPLORATION SYMPOSIUM (A3)
Mars Exploration – missions current and future (3A)

Author: Mr. David Reid
University of Bristol, United Kingdom

Prof. Karen Aplin
University of Bristol, United Kingdom
Dr. Nicholas Teanby
University of Bristol, United Kingdom

INSIGHTS ON MAGNETOMETER OBSERVATIONS OF MARTIAN DUST DEVILS

Abstract

NASA's InSight mission launched in May 2018 and landed on the surface of Mars in November of the same year. With a final mission duration of 1440 Sols, this spacecraft provided a wealth of scientific data. Amongst its payloads was the first and only sensor to measure the magnetic field from the surface of Mars – the InSight Fluxgate Magnetometer.

On Mars, atmospheric dust rises higher than on Earth due to the lack of tropopause and presents challenges for solar power generation on the surface of the planet. Dust is key to the Martian climate, absorbing sunlight and accentuating the airflow. There is also speculation of electrostatic discharge and a global electric circuit on Mars, though yet this is unconfirmed.

By combining the magnetometer dataset with pressure, wind velocity, solar panel current, and seismic data from several of the other sensors on InSight, the magnetic field emissions of dust devils can be studied. This paper presents an overview of trends observed in the statistical analysis of nearly 2800 dust devil events. Following this, a preliminary analysis of the magnetic field of dust devil events is compared to the background. In a typical Sol (in this case, Sol 239 - July 29/30, 2019), the background magnetic field at InSight's landing site is -925 nT, with a mean surface pressure of between 600 and 750 Pa. Analysis of 8 dust devil events yields +0.1 nT vertical magnetic field change at the event's closest approach, with a median core pressure drop of 0.5 Pa.