

THOR Fluxgate Magnetometer (MAG)

Rumi Nakamura (1), Jonathan Eastwood (2), Werner Magnes (1), Christopher, M. Carr (2), Helen, L. O'Brien (2), Yasuhito Narita (1), Christopher H. K. Chen (2), Gerhard Berghofer (1), Aris Valavanoglou (1), Magda Delva (1), Ferdinand Plaschke (1), Emanuele Cupido (2), and Jan Soucek (3)

(1) Space Research Institute, Austrian Academy of Sciences, Graz, Austria (rumi.nakamura@oeaw.ac.at), (2) Department of Physics, Imperial College London, London, UK, (3) Institute of Atmospheric Physics, Czech Academy of Sciences, Praha, Czech Republic

Turbulence Heating ObserveR (THOR) is the first mission ever flown in space dedicated to plasma turbulence. The fluxgate Magnetometer (MAG) measures the background to low frequency magnetic field. The high sensitivity measurements of MAG enable to characterize the nature of turbulent fluctuations as well as the large-scale context. MAG will provide the reference system for determining anisotropy of field fluctuations, pitch-angle and gyro-phase of particles. The design of the magnetometer consists of two tri-axial sensors and the related magnetometer electronics; the electronics are hosted on printed circuit boards in the common electronics box of the fields and wave processor (FWP). A fully redundant two-sensor system mounted on a common boom and the new miniaturized low noise design based on MMS and Solar Orbiter instruments enable accurate measurement throughout the region of interest for THOR science. The usage of the common electronics hosted by FWP guarantees to fulfill the required timing accuracy with other fields measurements. These improvements are important to obtain precise measurements of magnetic field, which is essential to estimate basic plasma parameters and correctly identify the spatial and temporal scales of the turbulence. Furthermore, THOR MAG provides high quality data with sufficient overlap with the Search Coil Magnetometer (SCM) in frequency space to obtain full coverage of the wave forms over all the frequencies necessary to obtain the full solar wind turbulence spectrum from MHD to kinetic range with sufficient accuracy. We discuss the role of MAG in THOR key science questions and present the new developments during Phase A such as the finalised instrument design, MAG relevant requirement, and new calibraion schemes.