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Abstract

The Temperature and Wind Sensor (TWINS) is a payload instrument of the InSight lander for wind speed and direction measurement. The wind sensor (WS) is composed of two booms located on the lander platform, elevated slightly over the lander by a small structure . The booms are facing opposite directions to cover winds from all around the lander. Both are facing the solar panels to avoid any interference with the lander robot arm in its manipulations (mainly SEIS (Seismic Experiment for Interior Structure) deployment). The main goal of TWINS was to characterize wind speed to guarantee that the transport of SEIS from the platform to the ground was completely safe at the chosen deployment time.

TWINS is a heritage of REMS (Rover Environmental Monitoring Station) instrument for NASA Mars Science Laboratory rover. Based on REMS experience, all the electronics were carefully calibrated before the boom integration. The aerodynamic calibration was performed in the same facility as the REMS WS. This campaign has two purposes: verify the performances of both booms and acquire a complete calibration file to be used in the data retrieval process.

After landing on Mars, the Wind Sensor began an extensive commissioning phase, tuning the electronic parameters so as to achieve continuous non-saturated measurements throughout the sol. The sensors' sensing currents dynamically adapt to the ambient temperature conditions using a simple automatic parameter selection control.

TWINS has been functioning for over 1100 sols at Elysium Planitia, although not continuously, since power constraints have limited its continuous use after sol 708. The TWINS wind sensor has characterized the winds over more than a full Martian year. These measurements will be discussed, considering also the sensor's capabilities whilst analyzing its limitations and taking into account the perturbation of the lander body and elements on the measured flow.