



Research Using the European Mars Simulation Wind Tunnel Facility

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We present details of a recently completed European simulation wind tunnel and some of the preliminary (and planned) research projects which use this laboratory facility.

This simulator is capable of re-creating the environmental conditions at the surface of Mars and complements several other large scale simulation facilities at Aarhus University in Denmark.

It is accessible to international collaborators and space agencies for instrument testing, calibration and qualification. It has been financed by the European space agency (ESA) as well as the Aarhus University Science Faculty and the Villum foundation.

It will be used for the multi-disciplinary scientific study of (among others); aerosol formation and transport (on Mars and Earth), granular electrification, magnetic properties, erosion, cohesion/adhesion, water transport, UV induced mineral alteration and bacterial survival. Some of the first research investigations have already been carried out using this facility. In one study the formation of solid carbon dioxide has been performed (under Mars simulation conditions) with the aim of studying its physical properties. In another the generation of dense dust aerosols has allowed (spectrally resolved) opacity measurements. The testing of various prototype sensors, for Mars exploration, has also been performed.

The facility consists of a 50m³ environmental chamber capable of low pressure operation (0.02 - 1000 mbar) and cryogenic temperatures (-130 °C up to +60 °C). This chamber houses a re-circulating wind tunnel able to generate wind speeds up to 25m/s and an automated dust injection system has been developed to produce suspended particulates (aerosols). It employs a unique LED based optical illumination system (solar simulator) and an advanced network based control system. Laser based optoelectronic instrumentation is used to quantify and monitor dust suspension and deposition. This involves a commercial Laser Doppler Anemometer and specially developed instrument prototypes constructed at Aarhus University.

European researchers may be eligible for financial support to carry out experiments using this facility through the Europlanet (EU, FP7) Trans National Access program.