



## **An upgraded European Mars Simulation Wind Tunnel Facility**

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We present the European Mars Simulation Wind Tunnel facility, a unique prototype facility capable of simulating a wide range of environmental conditions, such as those which can be found at the surface of Earth or Mars. Under the MeteoMet (Metrology for Meteorology) project the wind tunnel facility is to be used for the testing, development, calibration and comparison of meteorological instrumentation and sensor systems under a wide range of environmental conditions, specifically with regard to wind flow, temperature, pressure and humidity.

MeteoMet focuses on the traceability of measurements involved in climate change. Improving the robustness and reliability of atmospheric measurements will e.g. require improved calibration procedures and facilities for ground based observations. Using the wind tunnel as a calibration facility has required initial detailed measurements of wind flow, temperature, pressure and humidity which have determined the performance of the wind tunnel and resulted in modifications to improve the stability and uniformity of these parameters.

The facility consists of a 50 m<sup>3</sup> environmental chamber capable of operating at low pressure (0.02 - 1000 hPa) and cryogenic temperatures (-130°C up to +60°C). This chamber houses a re-circulating wind tunnel capable of generating wind speeds up to 25 m/s and has a dust injection system that can produce suspended particulates (aerosols). It employs a unique LED based optical illumination system (solar simulator), an advanced network based control system and laser based optoelectronic instrumentation for quantification and monitoring of dust suspension and deposition as well as wind speeds.

The wind tunnel is accessible to international collaborators and space agencies for instrument testing, calibration and qualification. The wind tunnel has been financed by the European Space Agency (ESA), the Aarhus University Science Faculty and the Villum Foundation. The work was carried out with funding by EURAMET and the European Union.