TNA2 Report 2012
Facility AU-MSL dusty wind tunnel

Two TNA2 experimental visits were performed in 2012 to the AU-MSL facility.

One visit lead by Ganna Portyankina took place in the period 19/3/2012 – 23/3/2012
One visit lead by Ulrich Kueppers took place in the period 14/6/2012 – 18/6/2012

These activities will be summarized below.
The requested duration of each visit was 5 days, the actual duration was 5 days.

Experiment Title; Opacity, fracture stress and depth of translucent CO_2 ice
Leader; Ganna Portyankina
Co- investigator; Klaus-Michael Aye

In this continued investigation of a previously only theorized phase of solid carbon dioxide with improved cooling plate design and ice deposition procedures it was possible to form transparent CO2 ice over a wide variety of temperatures and CO2 partial pressures characterising its phase stability.

Layers as thick a 20mm were produced such that with the use of a unique LED based light source and an optical spectrometer (irradiance meter) it was possible to perform detailed optical transmission studies of the ice layer and thereby quantify its opacity (transparency). Similaraly it was possible with a specialised gas over pressure system it was possible to perform structural strength tests of the ice layer and set limits to its fracture stress.

Experiment Title; Laboratory Simulation of Gas-Pyroclastic Flows
Leader; Ulrich Kueppers
Co- investigator; Guilhem Douillet

Extensive mechanical modifications were necessary to the wind tunnel facility in order to allow the high wind/high pressure flow testing to be achieved. Initial testing of a pyroclastic dust/sand dosing system was successful in generating a concentrated and highly turbulent particulate suspension.
Using an advanced high speed camera system (with several thousand fps) single grain trajectories were studies during flow transport.

Interesting variations in dust/sand deposition were observed downwind and particulate deposition samples were collected for particulate sizing analysis. It was clear that the typical saltation behavior of sand grains during conventional Aeolian transport was not occurring and that a novel turbulent flow driven deposition/re-entrainment process was instead taking place.

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