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Time-Dependent dust accumulation on the Telltale fibres of the Phoenix mission

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The NASA Mars Mission Phoenix lasted 152 sols corresponding to L_S = 76° to 148° [1]. During this time wind speeds and directions were measured with the so–called Telltale wind indicator [2, 3]. The Telltale is a mechanical anemometer containing a lightweight Kapton tube suspended in Kevlar fibres. Wind speeds and directions were determined by analyzing the position of the Kapton cylinder in pictures taken with the Surface Stereo Imager (SSI).

Time dependent dust accumulation on the Telltale fibres was observed during the Phoenix mission. The amount of dust on the fibres was estimated by calculating a dust factor assuming exponential absorption through the dust loaded fibres with the sun almost in the line of sight of the Telltale. Alternatively, and in the laboratory, the dust load can be monitored using light source behind the camera system. On Mars, however, this situation was only reached at 3 AM, where very little Telltale data was obtained.

At the start of the mission ($L_S \sim 78^o$) the dust load is minor. The dust load increased at a steady rate until $L_S \sim 114^o$. On later sols, the fibres appear thinner, indicating that they have been partially cleared of dust. The removal of dust seems coupled with dust devil passing at the Phoenix landing site. The first major dust-devil days [4], were at $L_S \sim 112^o$ and $L_S \sim 120^o$, correlate with the removal of dust of the fibres. The behaviour appears to be more erratic hereafter, but there are clear indications of periods with accumulation and removal.

In this contribution we will present the data from Mars and compare with on-going simulation experiments performed at the Aarhus wind tunnel facilities [5].

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