



First estimates of the forward velocity of Martian dust devils from HRSC-images

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For the very first time the velocity of Martian dust devils across the surface could be obtained from images taken by the High Resolution Stereo Camera (HRSC) on board the Mars Express Orbiter. Dust Devils are temporal variable and moving vortices filled with dust. So far, only the very detection of these features was possible in orbiter or lander images. The analysis of dust devils can now be extended towards motion and velocity, and will therefore lead to a better understanding of their evolution and behaviour.

A total of twelve dust devils have been identified up to now in HRSC stereo images. They have been found in different regions on Mars (Arcadia Planitia, Thaumasia Planum and Syrtis Major). Local time in all cases was mid-afternoon, a time were you expect to see dust devils after the heating of the ground and overlying air which initialise the vortices.

For nine of them the forward velocity could be calculated. These values range from 15 to 27 m/s. These are apparently very high values with the assumption that dust devils move with the ambient wind (on Mars as well as on Earth) which is usually a few meters per second. There are two possible interpretations: first, assuming that dust devils move with the ambient wind, this component has to be considered at a higher value than the usually assumed 5 m/s. Second, if the ambient wind speed is still a few meters per second then it is not only this component which forces the dust devils to move forward. However, the statistics of nine dust devils is not sufficient to draw final conclusions on their motion across the surface and their behaviour, so we will search

for more examples to confirm these high values of the forward motion of the atmospheric vortices.

The three dust devils for which no velocity could be calculated were only found in the rear-view stereo image of one orbit, but not in the other stereo channels. This means that these vortices developed in the two minutes between the imaging of the nadir and stereo image which may indicate that dust devils develop and decay extremely rapidly and constitute themselves as very short transient atmospheric features.