Winds at the Phoenix landing site

Wind speeds and directions were measured on the Phoenix Lander by a mechanical anemometer, the so-called Telltale wind indicator. Analysis of images of the instrument taken with the onboard imager allowed for evaluation of wind speeds and directions. Daily characteristics of the wind data are highly turbulent behavior during midday due to daytime turbulence with more stable conditions during nighttime. From Ls ∼77°–123° winds were generally ∼4 m s−1 from the east, with 360° rotation during midday. From Ls ∼123°–148° daytime wind speeds increased to an average of 6–10 m s−1 and were generally from the west. The highest wind speed recorded was 16 m s−1 seen on Ls ∼147°. Estimates of the surface roughness height are calculated from the smearing of the Kapton part of the Telltale during image exposure due to a 3 Hz turbulence and nighttime wind variability. These estimates yield 6 ± 3 mm and 5 ± 3 mm, respectively. The Telltale wind data are used to suggest that Heimdal crater is a source of nighttime temperature fluctuations. Deviations between temperatures measured at various heights are explained as being due to winds passing over the Phoenix Lander. Events concerning sample delivery and frost formation are described and discussed. Two different mechanisms of dust lifting affecting the Phoenix site are proposed based on observations made with Mars Color Imager on Mars Reconnaissance Orbiter and the Telltale. The first is related to evaporation of the seasonal CO2 ice and is observed up to Ls ∼95°. These events are not associated with increased wind speeds. The second mechanism is observed after Ls ∼111° and is related to the passing of weather systems characterized by condensate clouds in orbital images and higher wind speeds as measured with the Telltale.

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