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# Time Variability of the CO2 Snow Depth on the Martian Polar Caps

**Jeng-Jong Jian**, Wing-Huen Ip
Institute of Astronomy, National Central University, Taiwan (d909003@astro.ncu.edu.tw)

The polar caps of Mars play an important role on the atmospheric structure and dynamics of this volatile-rich planet. The Mars Orbital Laser Altimeter (MOLA) , an instrument on the Mars Global Surveyor, provided detailed mapping of the topography , surface roughness and the height of volatile deposits. Using the MOLA topography data collected over one Martian year (1999-2001), we have studied the temporal elevation change and the seasonal cycle of the carbon dioxide frost on the northern and southern polar caps .The temporal variations of the thickness of the CO2 frost deposit have been found to be in general agreement with the results of general circulation models. The recent results from the Mars Orbiter Camera (MOC) on Mars Global Surveyor (MGS) have further enabled the study of small-scale features during the expansion or recession phase of the polar caps. We have produced two-dimensional mapping of the seasonal CO2 frost thickness variation for four Ls(300, 30 , 120 ,180 degree). We set the height of Ls=120 equal to zero in the north hemisphere and Ls=300 equal to zero in the south hemisphere. Elevation changes mean subtracting Ls=120 from another Ls data in the north and subtracting Ls=300 from another Ls data in the south. At high latitudes (above 80 degree ) in the north at Ls=300 the elevation changes from 0.75 to 0.9 m and about 0.37 to 0.52 m at the opposite Ls of 120 in the south. The longitude-averaged elevation changes are larger in the north (above 71 degree) than in the south for the same Ls. Using the elevation changes we can calculate the volume of condensation or sublimation of the polar caps. The total volume of condensed CO2 in the north at Ls=300 is on the order of 2.52ąÑ1018 cm3 and 1.23ąÑ1018 cm3 in the south at Ls=180.