



Estimated densities of the seasonal CO₂ polar icecaps of Mars

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Three years of radiometry data from the MOLA instrument on Mars Global Surveyor spacecraft have been used in conjunction with the tracking data on MGS to estimate the density of CO₂ on the martian icecaps. The radiometry data were used to develop a model of the changing sizes of the two seasonal icecaps and the altimeter was used to estimate the maximum seasonal elevation change. These models for each of the seasonal caps were introduced into the orbital determination process and the mass within each cap was estimated every 5 days with the constraint that changes in polar ice mass reflected the observed variations in atmospheric pressure at the Viking 2 landing site. The densities, derived from the volume of the ice cap model and the observed masses, showed a clear variation throughout the winter season at both poles with the densities in early Fall being lowest and slowly rising until the beginning of the period of sublimation in the Spring. The mean density was 525 kg/m³. The highest density was 1100 kg/m³. We interpret these variations as an indication that the accumulated CO₂ is steadily compacted as additional precipitation occurs through the winter season.