



a study of the seasonal variations of the cryptic region on Mars using multi-spacecraft observational data

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The Martian polar caps are the most active areas on Mars. During the winter time, condensation process will lead to the formation of CO₂ ice layer to mid-latitude regions. On the other hand, sublimation of the CO₂ ice layer in the summer time will leave only the residual ice caps at the poles. The detail of the condensation-sublimation cycle is not fully understood. For example, the so-called Cryptic Region on the South Pole between 50° and 210° longitude is characterized by low albedo and low surface temperature. A complex of fan-shaped features and spider-like features of km-scale were found to be appeared and disappeared in a repeatable manner from cycle to cycle. Their formation is believed to be associated with the generation of CO₂ gas jets from subsurface high-pressure pockets. The fan-shaped and spider-shaped features are basically the imprints of surface wind pattern. We have used the high-resolution images from the Mars Orbiter Camera (MOC) and the MOLA topographic measurements from Mars Geophysical Surveyor to study the time distribution of these localized small-scale structures. We have examined the seasonal cycles of condensation and sublimation in the cryptic and non-cryptic regions by using the topographic data. We found that the fan-shaped features tend to appear in early Spring and the spider-shaped features in late Spring.