# ICES MICROPHYSICAL EVOLUTION ON MARS: OBSERVATIONAL CONSTRAINTS, SPECTRAL AND THERMODYNAMIC MODELING, EXPERIMENTAL APPROACH

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The annual water cycle on Mars is driven by the condensation/sublimation of water ice at mid and high latitudes. This seasonal exchange between atmosphere and surface greatly affects the atmosphere vapor content, which vary from less than 5 precipitable μm in winter to 60 μm in summer. GCMs are used to simulate the water cycle and some of their parameters are adjusted in order to fit the measurements of seasonal variations of atmospheric water and ice clouds. The role of H2O condensates have been neglected so far, because observational data were missing.

OMEGA data can be used to monitor these seasonal variations. They have permitted to find that a water ice annulus is present around the CO2 condensates. The origin of the water ice contained in this annulus is still under debate: is it mostly water ice initially contained in the CO2 layer that segregates at its surface during CO2 sublimation, or is there an additional cold-trapping process of watercoming from the atmosphere? Inversions of OMEGA spectra will be useful to study these microphysical processes as well as to retrieve the partial pressure of water vapor above the CO2 seasonal deposits in order to determine the quantity of water involved in the whole process.
Furthermore, experimental insights will give constraints on this phenomenon and give better estimates of the quantities involved. These experiments will be conducted with the Mars environmental cell CarboN-IR, which allows to study the CO2 sublimation process under martian conditions along with water ice presence in the cell.