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Water ice cloud property retrievals at Mars with OMEGA:Spatial distribution and column mass

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Spectral images of Mars recorded by OMEGA (Observatoire pour la Minéralogie, l'Eau, les Glaces et l'Activité) on Mars Express can be used to deduce the mean effective radius (r_{eff}) and optical depth (τ_{i}) of water ice particles in clouds. Using new data sets for *a priori* surface temperature, vertical profiles of atmospheric temperature, dust opacity, and multi-spectral surface albedo, we have analyzed over 40 OMEGA image cubes over the Tharsis, Arabia, and Syrtis Major quadrangles, and mapped the spatial distribution of r_{eff}, τ_{i}, and water ice column mass. We also explored the parameter space of r_{eff} and τ_{i}, which are inversely proportional, and the ice cloud index (ICI), which is the ratio of the reflectance at 3.4 and 3.52 μm, and indicates the thickness of water ice clouds. We found that the ICI, trivial to calculate for OMEGA image cubes, can be a proxy for column mass, which is very expensive to compute, requiring accurate retrievals of surface albedo, r_{eff}, and τ_{i}. Observing the spatial distribution, we find that within each cloud system, r_{eff} varies about a mean of 2.1 μm, that τ_{i} is closely related to r_{eff}, and that the values allowed for τ_{i}, given r_{eff}, are related to the ICI. We also observe areas where our retrieval detects very thin clouds made of very large particles (mean of 12.5 μm), which are still under investigation.