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Seasonal dynamics of Martian water cycle based on OMEGA/MEX data: regolith hydtration and water vapor

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Observations of the atmospheric water vapor column and bound water spatial distribution and its evolution for more than 2 Martian years have been accomplished using mapping spectrometer OMEGA/Mars-Express data. To estimate the potential contribution of hydration process in the seasonal water cycle of Mars, variability of bound water distribution at the seasonal timescale has been searched for, and the results were compared with MGCM.
For bound water mapping, we applied the relative depth of 1.93 μm adsorption band as a synthetic spectral index. The derived maps for different seasons covering the period of observations reveal evident latitudinal variations, similar for all seasons, with bound water contamination increasing from equator to polar latitudes. At the same time, zonally averaged maps of bound water contents in Ls-φ coordinates did not reveal evident variations that could be attributed to seasonal migration of bound water. The comparison of these results with MGCM indicate that possible bound water seasonal migration does not play a crucial role in the water exchange between the surface and atmosphere. However, a possibility remains that such processes as adsorption-desorption cycle may contribute to buffering of the atmospheric water at the seasonal time scale.