
Vertical distribution of near-surface water vapor on Mars

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In this study we have applied a spectral synergy method in the retrieval of water vapor on Mars with measurements from nadir-pointing instruments. Water vapor column profiles were retrieved simultaneously with PFS (sensing the thermal infrared range) and SPICAM (sensing the near-infrared range) on Mars Express, yielding distinct yet complementary sensitivity to different parts of the atmospheric column. The synergy provides a rough resolution of the lowest part of the atmosphere and the vertical distribution of water vapor, which remains out of the scope of other observational techniques. Here, special attention is given to regions where atmospheric water might interact with the regolith, with extra focus on the sublimation of the north seasonal polar cap. The results show that the near-surface confinement is very strong, and indicate a north-to-south wave-like structure in the amount of near-surface water not reproduced by the Mars Climate Database, and also hints at a detached vapor layer below the aphelion cloud belt.