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Detailed microphysical model for Martian water ice clouds driven by a 3D GCM

C. Verhoeven (1), F. Daerden (1), N. Larsen(2), N. Mateshvili (1), D. Fussen (1), D. Akingunola (3), J.C. McConnell (3), J.W. Kaminski (3)

(1) Belgian Institute for Space Aeronomy BIRA-IASB, Brussels, Belgium, (2) Danish Meteorological Institute, Copenhagen, Denmark, (3) York University, Toronto, Canada

We present simulations of a new detailed one-dimensional microphysical model for Martian water ice clouds. Two types of particles are considered: dust, and dust coated with ice. The size distributions are discretized using fixed bins. The microphysical processes taken into account for the formation and evolution of the clouds are nucleation and condensation/sublimation. The vertical transport is defined by sedimentation and eddy diffusion. The dust distribution is initialized using the size-dependent Conrath formula. The MARSBOX simulations are driven offline by the three dimensional Global Circulation Model (GCM) GM3 (or GEM-Mars). In particular, we use the model's pressure, temperature and water budget at every timestep (1/24 sol). MARSBOX calculates the mixing ratio of condensed and gas-phase water, the ice and dust particle number densities and composition, and the optical thickness of the clouds. Model calculations of the cloud optical thickness are compared to UV nadir observations from SPICAM onboard Mars Express.