A 2D numerical simulation of Martian atmospheric convection: comparison with a 1D model with parameterized convection

Masatsugu Odaka[1], Kensuke Nakajima[2], Masaki Ishiwatari[3], Yoshi-Yuki Hayashi[4]

[1] Mathematical Sciences, Univ. Tokyo, [2] Dept. of Earth & Planetary Sci., Faculty of Sci., Kyushu Univ., [3] Graduate School of Environmental Earth Science, Hokkaido University, [4] Earth and Planetary Sci., Hokkaido Univ.

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The structure of martian atmospheric convection simulated by a two-dimensional (2D) model is compared with that by a one-dimensional model (1D) incorporating parameterized convection.

Diurnal changes of convection layer in 1D and 2D models are qualitatively similar, although the depth of the layer at daytime in the 1D model is shallower than that in the 2D model. The vertical velocity scale realized in the 2D model agrees with the turbulent velocity scale in the 1D model diagnosed from the diffusion coefficient and the deapth of the convection layer as the mixing length.

This coincidence implies that the velocity scale obtained in the previous 1D studies in the literature is by an order of magnitude underestimated.