

火星境界層の高解像度LES実験

High resolution Large eddy simulation on Martian planetary boundary layer

*西澤 誠也¹、小高 正嗣²、高橋 芳幸³、杉山 耕一朗⁴、中島 健介⁵、石渡 正樹²、竹広 真一⁶、八代 尚¹、富田 浩文¹、林 祥介³

*Seiya Nishizawa¹, Masatsugu Odaka², Yoshiyuki O. Takahashi³, Ko-ichiro SUGIYAMA⁴, Kensuke Nakajima⁵, Masaki Ishiwatari², Shin-ichi Takehiro⁶, Hisashi Yashiro¹, Hirofumi Tomita¹, Yoshi-Yuki Hayashi³

1.理化学研究所計算科学研究機構、2.北海道大学、3.神戸大学、4.宇宙科学研究所、5.九州大学、6.京都大学
1.RIKEN Advanced Institute for Computational Science, 2.Hokkaido Univ., 3.Kobe Univ., 4.ISAS, 5.Kyushu Univ., 6.Kyoto Univ.

A large-eddy simulation (LES) on Martian planetary boundary layer has been performed to examine structure and characteristics of turbulence in the layer and their dependency on experimental resolution. SCALE-LES, which is an LES model for large domain and high resolution experiments developed in RIKEN AICS (<http://scale.aics.riken.jp/>), is used in this study. Spatial resolution is swept from 100m to 5m. Domain size is about 20km in horizontal and vertical. Horizontal boundary condition is double periodic condition. Heating rate calculated by an offline one-dimensional experiment (Odaka et al. 2001) is used instead of explicit calculation of the radiative transform process.

Well-known features of the boundary layer, such as hexagonal structure of convective cells and the -5/3 energy spectrum, are reasonably simulated. Dependency of several physical quantities at 14:00-15:00 local time, when the boundary layer is almost mature, on the resolution is analyzed. We found that vertical heat flux and variance of vertical velocity of resolved component show convergence or systematic tendency with the resolution. Convective vortices are developed and most of them are located near the upward reasion.

キーワード：火星境界層

Keywords: Martian Planetary Boundary Layer