[JJ] Evening Poster | M (Multidisciplinary and Interdisciplinary) | M-GI General Geosciences, Information Geosciences & Simulations

[M-GI28]Development of computational sciences on planetary formation, evolution and surface environment

convener:Yoshi-Yuki Hayashi(Department of Planetology/CPS, Graduate School of Science, Kobe University), Masaki Ogawa(Division of General Systems Studies, Graduate School of Arts and Sciences, University of Tokyo), Shigeru Ida(東京工業大学地球生命研究所, 共同), Kanya Kusano(Institute for Space-Earth Environmental Research, Nagoya University)

Wed. May 23, 2018 5:15 PM - 6:30 PM Poster Hall (International Exhibition Hall7, Makuhari Messe)

Computer simulations have been recognized as one of the fundamental tools in understanding planetary formation, evolution and diversity of surface environment. However, is may be notified that the continuous development of computational abilities in recent years does not seem to be well utilized in improving numerical simulations in those fields; computational efficiency has been improved by 6 orders of magnitude compared from the early 90's, many of our simulations do not seem to catch up qualitatively and quantitatively such improvement. We propose here in this session to ask those who are interested in computational sciences of various fields not only of planetary formation and evolution but also of earth and planetary sciences in general to join. The aim is to discuss various scientific and technical aspects of our numerical simulations to improve our skills to fully utilize those development of computational resources that is realized or will be realized in near future as "K" to "post-K".

[MGI28-P04]Development of a rotaging sphrical convection model for solving atmopspheric motions of the Jovian planets

*Youhei SASAKI[1], Shin-ichi Takehiro[2], Keiichi Ishioka[3], Takeshi Enomoto[4] (1.Department of Mathematics, Kyoto University, 2.Research Institute for Mathematical Sciences, Kyoto University, 3.Department of Earth and Planetary Sciences, Kyoto University, 4.Disaster Prevention Research Institute, Kyoto University)

Keywords:Jovian planets, anelastic system

Banded structures and alternating zonal jets observed in the surface atmospheres of Jupiter and Saturn have attracted many researchers in planetary atmospheric sciences, however, satisfactory physical explanations and understandings are not yet obtained. In this study, we perform massive parallel numerical experiments treating both small scale convection and planetary scale flows simultaneously, solve fine structures of turbulent motions which have not yet been resolved by the previous numerical models so far, and try to illustrate dynamical origin of global scale structures of surface flows of Jovian planets.

For this purpose, we developed and parallelized an anelastic model of thermal convection in a rotating spherical shell considering basic radial density variation. The spectral transformation library used in this model was improved to introduce MPI parallelization not only in the latitude direction but also in the radial direction. As a result, we succeeded in increasing the number of parallel processes which had been limited by the number of latitudinal grid points, and more massive parallel numerical experiments became possible.