Contribution of Numerical Simulations to Planetary Exploration Missions

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In the present symposium on planetary science 2016 held in Tohoku university, we are kindly provided to have an opportunity to have a joint session in cooperation with the SGEPSS subcommittees on computer simulations for solar, terrestrial and planetary sciences and the SGEPSS subcommittee on environment of airless bodies, moons, and spacecraft. As the kick-off in the session, we gave a talk on the contribution of numerical simulations to planetary exploration missions. In general, planetary exploration mission needs long period of time for the satellite to reach the target planets or satellites. For example, BepiColombo satellites which will be launched soon will reach Mercury in 2024 which is eight years from now. Meanwhile we had a space plasma seminar on the Mercury physics in Kyoto in 2005. However, since then, we have not continued the scientific discussion on the Mercury environment. It may be necessary to reboot the discussion and start simulation analysis before the BepiColombo satellites satellites reach Mercury in 2024. So far simulation researchers have obtained the results individually, not much rely on the satellite mission. Meanwhile planetary missions are on-going such as BepiColombo. To gain the maximum achievement in the planetary missions, it is widely recognized that numerical simulations are important and inevitable. Now, the issue is how we, STP simulation researchers will be able to be involved to the planetary missions. There seem two standpoints for simulation researchers: One is to be a member of a simulation group formed in each mission and perform mission-oriented simulations. That means that a strong relation should be created to the planetary mission. The other is to be an independent researcher who can freely choose a research target according to his interest from the scientific objectives of the missions. Practical standpoint for simulation researchers seems to be the latter one. Prior to the observation, it is ideal that each possible plasma phenomenon listed in the scientific objectives or previous works can be analyzed and revealed by numerical simulations, which can be also counted as the achievement from the mission side.