

Contribution of the BepiColombo mission to inner heliospheric science

*Go Murakami¹, Yoshizumi Miyoshi², Kazumasa Iwai², Daikou Shiota³, Takeshi Imamura⁴, Iku Shinohara¹, Shinsuke Imada², Toshifumi Shimizu¹

1. Institute of Space and Astronautical Science, Japan Aerospace Exploration Agency, 2. Institute for Space-Earth Environmental Research, Nagoya University, 3. National Institute of Information and Communications Technology, 4. Graduate School of Frontier Sciences, The University of Tokyo

BepiColombo is the ESA-JAXA joint mission to explore Mercury with two spacecraft: "Mio" (Mercury Magnetospheric Orbiter: MMO) and "Bepi" (Mercury Planetary Orbiter: MPO). The two spacecraft were successfully launched by Ariane-5 launch vehicle from Kourou in French Guiana on 20 October 2018. Mio is fully dedicated to investigating Mercury's environment with a complete package of plasma instruments (particles, electric fields, and magnetic fields), a spectral imager of sodium exosphere, and a dust monitor. The trajectory of the BepiColombo spacecraft ranges from 1.2 AU to 0.3 AU including Earth, Venus, and Mercury flybys. During the cruise to Mercury, in addition to two spacecraft MMO Sunshield and Interface Structure (MOSIF) and Mercury Transfer Module (MTM) are all integrated together. Though the observation capabilities of some instruments onboard Mio and MPO are constrained due to the stacked configuration during the interplanetary cruise phase, BepiColombo can still contribute to inner-heliospheric science. For example, continuous monitoring of interplanetary magnetic fields and solar energetic particles can be achieved during the cruise phase. In the solar conjunction periods, the radio science instrument will perform the solar corona measurements by a radio occultation method. In addition to BepiColombo, NASA's Parker Solar Probe and ESA's Solar Orbiter are exploring the inner heliosphere at the same time. JAXA's Venus orbiter Akatsuki also has capabilities of radio occultations. These multi spacecraft explorations collaborated with ground-based observations and numerical simulations will play a key role to investigate the inner heliosphere. Here we present the overview and observation plans of BepiColombo for the interplanetary cruise phase and the proposals for collaborated studies with other spacecraft, ground-based observations, and simulations.

Keywords: Inner heliosphere, BepiColombo, Planetary exploration