

BepiColombo: the next exploration of Mercury's environment

*Go Murakami¹, Hajime Hayakawa¹, Masaki Fujimoto¹, BepiColombo project team

1. Japan Aerospace Exploration Agency

Mercury has the weak planetary magnetic field stands against the intense solar wind in the close proximity of the Sun. Mercury's plasma environment is quite different in the parameters from the well-studied terrestrial magnetosphere. Thus Mercury's magnetosphere is one of the best targets to study plasma physics in planetary environments. In addition, recently many Earth-type exoplanets orbiting in habitable zones very close to cool stars (M-dwarfs). Such exoplanets are exposed to extremely strong stellar winds and ultraviolet radiations. Exploring Mercury which is the innermost planet in the solar system plays a key step to understand such extreme environment.

The first Mercury orbiter MESSENGER explored this region and discovered a wide variety of phenomena. For example, Mercury's magnetosphere is much more dynamic than one had predicted and substorm-like events with the time scale of minutes were observed. In addition, magnetic field measurements by MESSENGER suggests the existence of field aligned currents even though Mercury has no ionosphere. However, due to the highly ecliptic orbit with north-south asymmetry and limited capability for plasma measurements, many science topics still remain unsolved.

The next Mercury exploration mission BepiColombo, which is the international joint project between ESA and JAXA, will be launched in October 2018 and will arrive at Mercury in December 2025. The JAXA's spacecraft for BepiColombo, Mercury Magnetospheric Orbiter (MMO), is spin-stabilized with a rotation rate of 15 rpm and is equipped to study the space environment of Mercury. MMO is mainly designed for plasma observations with the complete package of plasma instruments consortium and is expected to extract essential elements of space plasma physics that become visible in the Hermean environment. In addition, ESA's Mercury Planetary Orbiter (MPO) also has several instruments for plasma measurements, so we can investigate Mercury's environment with two points measurements.

Both spacecraft will soon be ready for launch. Here we present the overview and current status of BepiColombo mission and how it will contribute to deepen our understanding Mercury's environment by addressing the puzzles raised by MESSENGER.

Keywords: BepiColombo, Mercury, Magnetosphere