

BepiColombo MMO in the context of the Plasma Universe

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BepiColombo MMO is a future mission to Hermean Magnetosphere that will be launched in 2013 and will arrive at the target in 2019. Hermean magnetosphere, because of (1) the small intrinsic magnetic field of the planet, (2) small distance from the Sun, (3) the boundary condition that makes the planet's surface in direct contact with the plasma, and so on, has a unique position in the context of the comparative magnetosphere research. This triggers one's curiosity and motivation to understand Hermean magnetosphere itself. While this is indeed interesting, there is even a larger role that the data from MMO can play. Since the plasma instruments onboard MMO has unprecedented capability (2 sec resolution for particle detector, for example) for a planetary magnetosphere explorer, true comparison between observations at Mercury and at Earth is possible and meaningful. This allows one to step beyond the phenomenological argument that the past planetary studies have been more or less forced to make, and to proceed with a physical model, that is, to understand how a different parameter between the two planets affect the fundamental plasma process that one is looking at. The very basic difference between the two would be in the spatial scale, with the small Hermean magnetosphere likely to be sitting at the edge where an MHD argument is valid. Then, when, again, unprecedented high-quality data from the future Jovian magnetosphere mission (planned to be in 2020's via ESA-JAXA collaboration) will come in, we will be learning the plasma physics in the huge system. Combining the three together, we will be obtaining data-based understanding of space plasmas at three different settings. In other words, the next 20 years will be our golden decades to complete what we can do via in-situ measurements in contributing substantially to our understanding of the Plasma Universe. The message of this talk is that MMO is an indispensable step on the road towards this goal.