Low energy ion observation by Mercury Magnetospheric Orbiter: MMO

Yoshifumi Saito[1]; Yoshifumi Saito BepiColombo/MMO Mercury Plasma/Particle Consortium[2]

[1] ISAS; [2] -

   According to the previous satellite observation (Mariner10 fly-by), Mercury has a magnetosphere with its own strong intrinsic magnetic field. In order to elucidate the detailed plasma structure and dynamics around Mercury, an orbiter MMO is planned to be launched in 2012 as a joint mission between ESA and ISAS/JAXA. For measuring low energy ions, MMO/MPPC (Mercury Plasma/Particle Consortium) has proposed two sensors, MIA(Mercury Ion Analyzer) and MSA(Mass Spectrum Analyzer). MIA measures energy spectrum of ions around Mercury as well as solar wind ions. MIA is a toroidal top-hat type electrostatic analyzer with dynamic range as wide as 10^6. In order to realize the wide dynamic range, electrical sensitivity control and attenuation grid are applied at the same time. MIA will be developed by ISAS/JAXA and MSSL. MSA measures mass discriminated energy spectrum of ions around Mercury. Since the measurement of heavy ions (ex. sodium ions) in Mercury"""'s magnetosphere is very important, the mass resolution of MSA should be high. MSA is an LEF-TOF (Linear Electric Field-Time Of Flight) mass spectrometer that can realize the mass resolution as high as 40. MSA will be developed by CETP, ISAS/JAXA, MPS, and BIRA-IASB. In order to minimize the effect of the spacecraft potential, MIA and MSA are installed at the corner of the spacecraft. Since the response time of Mercury"""'s magnetosphere with respect to the solar wind variation is about 10 times faster than that of the Earth"""'s magnetosphere, the time resolution of the instruments on MMO should be high. Highest possible time resolution is realized by installing MIA and MSA on the spacecraft 90 deg. apart from each other. The thermal environment around Mercury is so severe that the thermal design of the instrument is very important. Each sensor should have its own thermal shield in order to minimize the thermal input and to maintain the sensor temperature within an acceptable range