Imaging Camera for Sodium atmosphere onboard MMO

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The Mercury has an alkali atmosphere whose nature is largely determined by interactions between the surface and magnetosphere. Sodium and potassium were recently discovered by groundbased optical spectrometers [Potter and Morgan, 1985].

Now we have proposed the Imaging Camera for Mercury Magnetospheric Orbiter on Bepi-Colombo mission. This camera is designed for imaging of fast-changing atmosphere of Mercury. Its sensitivity is about 92 electrons/bin/sample/10 Rayleigh and spatial resolution of 60 km is available. In this presentation, we will show the details about the scientific aims and instrumentation.

The Mercury has an alkali atmosphere whose nature is largely determined by interactions between the surface and magnetosphere. Sodium and potassium were recently discovered by groundbased optical spectrometers [Potter and Morgan, 1985]. Further investigations revealed that the sodium is usually not uniform over the surface, often concentrated near the polar regions, and changes its global distribution in a short time scale (< at least 1 day). It is supposed that physical/chemical processes due to the sputtering from the lithosphere by the magnetospheric particles is an origin for the alkali atmosphere. Recent groundbased observations also revealed that there is strong dependency of sodium concentration on local time, usually the sodium is enhanced in the dawn side. The sodium is originated from surface rocks; its abundance does not depend on graphical longitude, but on local time. This fact strongly supports that the sodium degasses from the surface through the interaction with the magnetospheric particles [Sprague et al., 1997]

Therefore, it is clear that measurement of sodium abundance in the Mercurian atmosphere is important not only for studying its origin, but also for understanding the interaction among magnetosphere, atmosphere, and lithosphere. On the other hand, plasma and magnetic field measurements on Mariner-10 found that time scale of Mercurian substorm is a few minutes, which is extremely shorter than that of the Earth. The groundbased technique does not provide us environment enough to further investigate the Mercurian substorms. Spacecraft is the best platform for us.

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