a high-speed CMOS image sensor for atmospheric imager in the BepiColombo mission

kentaro hikosaka[1]; Ichiro Yoshikawa[2]; Atsushi Yamazaki[3]; Hiromasa Nozawa[4]; Shingo Kameda[5]; kazuo Yoshioka[6]

[1] Earth & Planetary Sci,Tokyo Univ; [2] Univ. of Tokyo; [3] Planet. Plasma and Atmos. Res. Cent., Tohoku Univ.; [4] Rikkyo University; [5] Earth and Planetary Sci., U-tokyo; [6] Earth Planet Phys. Univ of Tokyo

The Mercury's Sodium Atmosphere Interferometer (MSASI) on BepiColombo will address a wealth of fundamental scientific questions pertaining to the Mercury's exosphere. Together, our measurement on the overall scale will provide ample new information on regolith-exosphere-magnetosphere coupling as well as new understanding of the dynamics governing the surface-bounded exosphere.

Discoveries of Na, K and Ca from the ground-based observations clearly arises that the regolith of Mercury releases a fraction of its content to the atmosphere. Some processes are proposed up to now as release mechanisms, e.g. (1) Photon-stimulated desorption, (2) Ion sputtering, and (3) Micro-meteoroid impact/vaporization. After the release to from the regolith, trajectories of neutral atoms are strongly affected by solar radiation as well as gravity of Mercury. Therefore, the shape and size of the atmosphere could change depending on True Anomaly Angle (TAA). We can present the variability of the spatial distribution of the Mercury atmosphere using the Monte Carlo simulation.

MSASI needs a high-speed image sensor with taking 50,000 times for 10 by 10 pixels. Up to now, we have examined a CMOS image sensor (Fillfactory Star-1000). The radiation environment around Mercury is very severe. Therefore we have examined degradation of the CMOS sensor after irradiation. In this paper, we will report the current status of our hardware development.