

水星大気密度の時間変動 Temporal variability of exospheric sodium density

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Mercury's atmosphere is very thin and it is also called "surface-bounded exosphere". In the detected species, e.g., H, He, O, Na, Mg, K, and Ca, Na emission (NaD) is the brightest and has been most frequently observed. Solar-photon-stimulated desorption, sputtering by impacting solar particles, and meteoroid vaporization are considered to be the source processes of Mercury's sodium. However, the primary process among these three processes is unclear as yet. The resonance scattering constitutes exospheric emission. The NaD emission is well suited for study by ground-based observations because of its high intensity. Past observations have shown that the temporal variation and north-south asymmetry of intensity of sodium emission.

We have observed Mercury sodium exosphere at the Haleakala Observatory in Hawaii since April 2011. The observations were performed using a 40 cm Schmidt-Cassegrain telescope, a high-dispersion spectrograph, and a CCD camera. We determined the temporal variation of the sodium density using the observational data. It is possible that the temporal variation of the sodium density is caused by variation of solar wind magnetic field if solar wind ion sputtering is the primary source process of Mercury exosphere. To verify this assumption, we checked the temporal variation of solar wind magnetic field observed by MESSENGER, and then we compared these variations with our observational result.

In this presentation, we show our observational results and discuss the dominant source process.