

Observation of surface locality on the Moon for production of lunar sodium exosphere with a 40cm telescope at Haleakala

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The Moon has a completely collision-free atmosphere with its surface pressure of about 10^{-17} times compared to that of the Earth. Previous studies showed that the lunar exosphere is consisted of He, Ar, Na, K, H, O. Among these constituents, Na and K have large resonant scattering cross sections, making ground-based observation of these atoms in the lunar exosphere relatively easy and a variety of observations has been made in the past.

Similar surface bounded exosphere does exist on Mercury. Production of the exosphere on Mercury looks to be dependent on its surface locality, and it is explained by local difference of the surface geology (e.g. Sprague et al., 1998). In addition, Kagitani et al. (2010) suggested local dependence on the lunar surface for production of lunar sodium tail based on the observation from Kaguya spacecraft. There is a surface geological difference between Lunar mare and mountain. There is more Na in Lunar mare than mountain, on the other hand, Lunar mountain were formed by meteoroid impacts, so Na particles are easy to be released. From this, we think that Lunar exosphere has local dependence for production.

We made observation of local dependence on the lunar surface for production of lunar sodium exosphere at 2 locations, one is Long. 90 deg. W Lat. 20 deg. N (mountain) and another is Long. 90 deg. W Lat. 20 deg. S (mare). The observation was continuously made at the summit of Mt. Haleakala with our 40cm Schmidt-Cassegrain telescope and a high dispersion Echelle spectrograph in the period of July 17-25, 2011. Results and the plan of next observations will be presented at the meeting.

Sprague et al., 1998, *Icarus*, 135, 60-68, Mercury: sodium atmospheric enhancements, radar bright spots, and visible surface features.

Kagitani et al., 2010, *Planetary and Space Science*, 58, 1660-1664, Variation in lunar sodium exosphere measured from lunar orbiter SELENE (Kaguya)

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