

Spectroscopic Observations and Model Calculation of the Lunar Sodium Atmosphere

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Small bodies such as Moon and Mercury, are known to have surface bounded exosphere (SBE), which is collision-free tenuous atmosphere. It is important to investigate its production mechanism because will be useful for understanding of the space weathering process. Among others, the Moon is the most pertinent target for studying SBE because we can observe distribution of its atmosphere relatively easily from the ground. The particles composing the atmosphere are thought to be generated by four source mechanisms that are various in terms of source and release velocities for each source.

Ground based spectral observation of lunar atmosphere was carried out at the Iitate Observatory using a combination of a 60cm telescope and a 1m spectrograph, to obtain resonantly scattered D lines of sodium. Our observation characterized by a wide field of view along slit length (~300 arc sec), which covers altitude of ~600km from the lunar surface. We arranged this range within the region upward from the surface vertically.

Our model was developed by using of Monte-Carlo method, and was made agree with observation as varying the source late of four processes. As a result, the largest late was that of (Photon-Stimulated Desorption) and this suggests that the main mechanism providing particles for lunar atmosphere is PSD. We need to compare source late of PSD with time-series of solar UV flux since there could be direct correlation each other.