

## Supply of sodium atoms to the regolith on the Moon

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Small bodies in the solar system, such as the Moon and Mercury, are known to have surface bound exosphere (SBE), which is collision-free tenuous atmosphere. SBE is produced by particle release from the surface soil, though the details of release mechanism are not well understood. Because the Moon doesn't have an intrinsic magnetic field, the Moon is the most suitable target to investigate the SBE. Proposed production mechanisms of SBE on the Moon include (1) photodesorption by the solar photons, (2) sputtering by solar wind particle, (3) thermal desorption by solar heating of the lunar surface, and (4) vaporization of micrometeorites. Production mechanisms (1), (2), and (3) are thought to depend on the solar zenith angle. Therefore the release rate of SBE will also depend on latitude on the Moon.

Sodium atom which is a component of the lunar SBE has long been observed because of its large cross section for the sunlight. Volatile sodium is thought to be depleted in the lunar history because the Moon is believed to be created in very hot condition. It is possible that meteor impacts have been continuously supplied sodium atoms for 4.6 billion years. Micrometeorite impacts will not accumulate sodium atoms on the lunar surface because the amount of the sodium lost from the lunar surface by micrometeorite vaporization is larger than the amount of sodium atoms contained in a micrometeorite. It is possible to solve this problem by investigating time change of the amount of sodium atoms contained in the lunar surface and that of release amount of sodium atoms by studying the history of meteorite flux.

On the other hand, when the remaining amount of sodium atoms measured in the Apollo samples is compared with the release rate of sodium atoms determined from observations, it is expected that the sodium atoms are depleted at low latitudes. However, the Moon is releasing sodium atoms continuously even now. This means that there exist some supply of sodium atoms or diffusion of sodium atoms from the inner soil. We will study on the condition to maintain the release of sodium atoms from various aspects such as mixing of the surface soil by meteorites, supply of the sodium from the outside, and examination of the remaining amount of sodium atoms at low latitudes.