



## Sources of the exosphere of the Moon and Mercury

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The Moon serves as the closest laboratory-in-space for studies of surface-boundary-exospheres (SBEs) in the solar system. In contrast to planets and moons that have relatively stable, long-lived atmospheres, the Moon and Mercury have transient atmospheres. Such atmospheres are produced and lost continuously as incoming photons and particles impact surfaces, liberating gases from both the impactor and the regolith on time scales ranging from hours to days. The major unknown in these exospheres is the relative importance of the different types of sputtering sources. Upcoming missions to Mercury can be enhanced by studies of such processes on the Moon where the database is more extensive than for Mercury.

There are common sputtering sources at both Moon and Mercury: the Sun's photons, the solar wind ions and electrons, micrometeors, and major meteor showers (assuming they occur on Mercury). For the Moon, there are additional sources of plasma impactors during the approximately four days per month when the Moon traverses the terrestrial magnetosphere; the energetic particle populations in the plasma sheet are different from those in the lobes, and both differ from the solar wind. Mercury has a tiny magnetosphere and thus a multiplicity of plasma sources may occur there as well. In this review, we will summarize how all types of sources have been observed and modeling for the Moon, and discuss implications for Mercury.