Modelling of sputtering at the surfaces of Mercury and the Moon: on the interplay of depletion and refreshing rates

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A better understanding of the particle release processes from Mercury's surface is considered as a prerequisite for the planned exospheric and remote geochemical surface studies of the SERENA instrument package on board of ESA's BepiColombo planetary orbiter MPO. The lunar environment represents a close test-bed in many respects and, hence, is included in our analysis of surface release for the sake of comparison. The formation and composition of the exosphere depends on various parameters, such as regolith porosity, binding energies and chemical composition of the surface materials. We focus on surface release processes due to solar wind driven sputtering and photon-stimulated desorption under consideration of depletion and recondensation/maturation of topmost surface layers. Overturn due to meteoritic gardening may serve as an important parameter in refreshing of planetary surfaces, assuring constant surface release rates.