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Numerical and analytical model of Mercury's exosphere: dependence on surface and external conditions

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A numerical and an analytical 3D model of the Hermean exosphere have been developed. The numerical model, which includes ion-sputtering, photon stimulated and thermal desorption from the surface of Mercury, is a Montecarlo single particle model using the full equation of motion giving a full 3D and energy distribution of different neutral species. In this study, we focus on the role of the source processes and external parameters such as the radiation pressure. Hence, we run several numerical simulations with different values of the physical quantities associated to the source processes or with different radiation pressure. To quantify the related variations of the exospheric density profile, the analytical model, with free parameters, is introduced; for each simulation run, a set of fitting parameters is obtained. The study of the variations of these model parameters shows the importance of taking into account different surface or external conditions while modeling the Hermean exosphere.