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Mercury's Na and Ca tail: MonteCarlo model and data comparison

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Here we present a time-evolving MonteCarlo model of the Sodium and Calcium exosphere of Mercury, which includes several different sources and a rotating planetary surface.
We compare our model with either ground- and space-based observations of the Sodium and Calcium exosphere and tail to evaluate the effectiveness of each source process. In particular, we focus on the recent MESSENGER observations of the Sodium and Calcium tail.
We find that including a source process whose effectiveness is proportional to the precipitation of solar wind protons, such as chemical sputtering or proton-enhanced diffusion, is necessary to explain most of the available Na observations in a quantitative way. Hence, we accurately reconstruct the local precipitation of solar wind protons at the time of observation, including the Interplanetary Magnetic Field, to better simulate the Na, and Ca, and Ca+ exosphere and tail.
We also find that, to reproduce dawn-dusk asymmetries, we need to include the rotation of Mercury's surface in the model.