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HEMO – The Hermean Exosphere Model of Oxygen: A Comprehensive Model for Interpreting Data from the MESSENGER and BepiColombo Missions to Mercury EMMANUEL GROTHEER, University of Texas at San Antonio — A model, entitled Hermean Exosphere Model of Oxygen (HEMO) is presented. The main source processes that replenish the Hermean exosphere are ion sputtering, impact vaporization, photon stimulated desorption, and thermal desorption. Post-release, oxygen is affected by gravity, photoionization, photodissociation, and solar radiation acceleration. In addition, HEMO will incorporate a magnetosphere model to simulate ion trajectories both for sputtering and post-release. The sole in-situ data of oxygen, from Mariner 10, suggests a near-ground density of 4.4 E4 /cm^3. In this same paper, the sodium near-ground density is given as 1.7 – 3.8 E4 /cm^3 [Shemansky, 1988]. The HEMO simulations aim to illuminate why oxygen detection is difficult, when it should be more abundant than sodium, since oxygen should account for 60% of the Hermean crust [Killen et al., 2005]. The Hermean regolith is similar to the Lunar one, with some variations in species abundances. HEMO will run multiple times each for several representative sets of regoliths, Hermean orbital locations, and quiet and active Sun values. Results will be averaged to predict oxygen densities in Mercury's exosphere. The HEMO model results can aid in the interpretation of future oxygen data from the MESSENGER and BepiColombo missions to Mercury.

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