



A quantitative model of the lunar sodium emission

M. Sarantos (1) and R.M. Killen (2)

(1) Heliophysics Science Division, NASA GSFC (2) Dept. of Astronomy, Un. of Maryland

The proposed sources for the Moon's diffuse exosphere include photon-stimulated desorption (PSD), ion sputtering and micrometeoroid impact vaporization. We extend results of an earlier study, which correlated ground-based observations of sodium emission with coincident in-situ plasma data obtained by Lunar Prospector (June 7-16, 1998), to all published sodium intensity measurements not associated with an identified meteor shower. Daily averages of the solar UV flux and ion flux are employed as predictor variables for PSD and ion sputtering, correspondingly, while impact vaporization is assumed constant. Constrained regression and optimization techniques performed on these data show that the primary effect of ion impact on the surface of the Moon is not direct sputtering but rather an enhancement of the PSD efficiency. A possible mechanism for this effect is ion-enhanced diffusion. The implications for the supply of exospheric volatile species of the Moon and Mercury will be discussed.