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Photo Electron Boundaries at Mars and Venus

M. Fränz (1), E. Dubinin (1), C. Martinecz (1), E. Roussos (1), J. Woch (1), R. Frahm (2), J.D. Winningham (2), A.J. Coates (3), Y. Soobiah (3), R. Lundin (4) and S. Barabash (4)

(1) MPI Sonnensystemforschung, 37154 Katlenburg-Lindau, Germany, (2) SWRI, San Antonio, TX, USA, (3) MSSL, London RH5 6NT, GB, (4) IRF, Kiruna, Sweden (fraenz@mps.mpg.de)

On the dayside of the terrestrial planets solar EUV radiation ionizes the neutral atmospheres leading to ionospheric layers with peak densities at altitudes between 70 and 150km above the planetary surface. For the non-magnetized planets Mars and Venus this layer forms the primary obstacle boundary to the solar wind, but magnetic fields induced by the solar wind flow increase the total plasma pressure above the ionosphere and move the effective boundary to altitudes above 500km where the magnetic pile-up boundary (MPB) forms. This boundary deflects the flow of solar wind ions and electrons. But the deflection and compression of the magnetic field leads to a third boundary between the ionosphere and the MPB: the photo-electron boundary (PEB), which is defined by the altitude which can be reached by ionospheric photo-electrons with energies below 50eV. This boundary defines the top end of the ionosphere and the dynamics of its location can be used to determine the reaction of the ionospheres to changing solar wind pressure and EUV radiation. The ASPERA-3 and ASPERA-4 experiments onboard the European Mars and Venus Express missions allow for the first time to determine the energy spectra of photo-electrons in the energy range 10-100eV with high energy resolution ($\Delta E/E = 7\%$). We use these data to determine the location of the PEB as a function of solar wind ram pressure and solar EUV intensity and discuss the relative importance of ionospheric and magnetic pressure for both planets.