Effects of solar wind conditions on the plasma wake within a polar crater: preliminary results

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Abstract. As the solar wind sweeps horizontally past a shadowed lunar crater it simultaneously diffuses toward the surface through an ambipolar process, forming a plasma wake (e.g., Figure 1). Importantly, the resulting electric field structure diverts solar wind protons toward the cold crater floor where they may represent a source of surficial hydrogen. We present a handful of two-dimensional kinetic simulations exploring the range of wake structures and surface particle fluxes possible under various background plasma conditions.

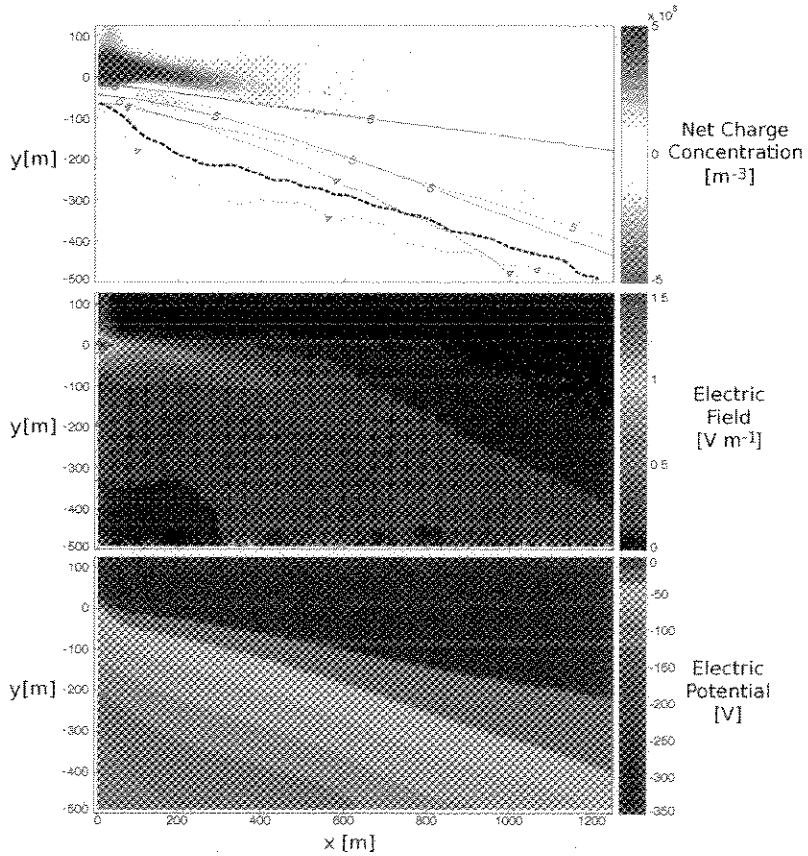

Figure 1: Simulated lunar crater wake under typical solar wind conditions for a 500 m deep step-like crater. *(Top)* Net charge concentration [colored lines represent $\log_{10}$(concentration) for the respective species; black dashed line is the height at which the Debye length is half the crater depth). *(Mid.)* Electric field. *(Bot.)* Electric potential.