We use our 3D multi-fluid MHD model to simulate the interaction of the solar wind with non-magnetized planets; Mars in particular. We set the lower boundary to 100 km and consider photo and electron impact ionization as well as charge exchange processes. We use a grid resolution of 10 km in the ionospheric region. We observe new physical processes due to the decoupling of the individual ions. We also calculate the escape fluxes and compare our results to observations (MGS, Viking, MEX).