



MHD Study of the Solar Wind Interaction with Venus

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The solar wind interaction with Venus' ionosphere/atmosphere is studied numerically, using a multi-species global MHD model. This model is similar to the numerical model that has been successfully applied to Mars (Ma et al., 2004). Mass densities of protons and major ionospheric ion species (O^+ , O_2^+ and CO_2^+) are self-consistently calculated in the model by including related chemical reactions and ion-neutral collision processes. The simulation domain covers the region from 100 km altitude to 16 R_v in the tail. An adaptive spherical grid structure is used with a radial resolution of about 13 km in the lower ionosphere. Bow shock locations are well reproduced for both solar-maximum and solar-minimum conditions using appropriate parameters for each case. It is shown that the shock locations are further from the planet during the solar maximum condition because of both the enhanced solar radiation strength and the relatively small Mach number. The simulation results also agree well with the Venus Express observations, as shown by comparisons between model results with magnetic fields observed by the spacecraft.