



On symmetry of the Venus neutral hydrogen exosphere and PCW occurrence

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At Venus, a large part of the exosphere reaches out of the bow shock, which makes the planetary exospheric particles accessible to direct solar wind interaction. As a tracer of this interaction, the occurrence of waves at the local proton cyclotron frequency (PCWs) upstream of the bow shock was recently reported from Venus Express magnetometer observations; the observation positions had no preferred direction with respect to the motional solar wind electric field. The basic requirement for pick-up of protons and subsequent cyclotron wave generation is the availability of local neutral hydrogen. In this context, two types of results of hybrid simulations are considered. First, the distribution of escaping exospheric hydrogen as function of the velocity and direction of the escaping protons. Second, the distribution of Energetic Neutral Atoms (ENAs) from exospheric protons, generated after charge exchange, in terms of their density and compared to the local neutral hydrogen. The occurrence of any non-symmetry in the distribution of both populations (slow hydrogen and fast ENAs) with the motional solar wind electric field as well as the respective capability for possible PCW generation at pick-up are discussed. The hybrid simulation results are compared to the spatial distribution of the observed PCWs as reported from Venus Express, in order to shed light on possible generation mechanisms, either at initial ionization of slow hydrogen or at secondary ionization from exospheric ENAs.