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Global Signatures of Ion Acceleration near the Quasi-Parallel Bow Shock YU LIN, XUEYI WANG, Auburn University, SHEN-WU CHANG, University of Alabama in Huntsville — The Earth's bow shock is one of the most interested and studied collisionless shocks in space. It is believed that the scattering of field-aligned ion beams between upstream and downstream waves of the quasi-parallel shock leads to the acceleration of solar wind ions, via Fermi mechanism, and the diffuse ion distribution. In this study, we investigate the self-consistent ion energization and global ion signatures around the quasi-parallel bow shock using 3-D global hybrid simulations. First, transverse ion beam whistler waves and compressional waves are constantly present in the foreshock. The wave spectra show different characteristics at various distances from the bow shock. Second, the bow shock and foreshock ions possess a diffuse ion distribution with a non-thermal spectral break at energy $\sim$ 15-30KeV for cases with M_A = 5-9, and the differential ion flux evolves with the field-aligned distance to the shock by an e-folding distance of 3-9 R_E at various energy channels. Third, the diffuse ion distribution with energetic ions up to $\sim 10^2 KeV$ is also present in the broad region of the downstream magnetosheath. Finally, for the case in which the IMF geometry leads to a high-latitude magnetic reconnection, the coupling between the bow shock and the magnetospheric cusp in the particle signatures is examined. The bow shock is found to be a major source of the cusp energetic ions. In general, simulation results are in good agreement with satellite observations.

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