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Mars-solar wind interaction in a global hybrid model: plasma waves and ion dynamics

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We discuss the solar wind interaction with Mars in a self-consistent, 3-dimensional global hybrid simulation, where ions are treated as macroscopic particle clouds moving under the Lorentz force and electrons form a charge-neutralizing fluid. In the model, ion populations include both the solar wind and planetary ions. We concentrate on the formation of plasma waves near Mars. Especially, we analyze properties of large-scale waves in the ion foreshock and their transmission in the magnetosheath. Further, we study the coupling of the waves with ion dynamics in the Martian plasma environment. We discuss the solar wind interaction with Mars in a self-consistent, 3-dimensional global hybrid simulation, where ions are treated as macroscopic particle clouds moving under the Lorentz force and electrons form a charge-neutralizing fluid. In the model, ion populations include both the solar wind and planetary ions. We concentrate on the formation of plasma waves near Mars. Especially, we analyze properties of large-scale waves in the ion foreshock and their transmission in the magnetosheath. Further, we study the coupling of the waves with ion dynamics in the Martian plasma environment. Finally, we compare these Mars simulations to our earlier global hybrid modeling of Venus and Mercury to investigate how the waves and ion dynamics depend on the distance from the Sun and the size of a planetary plasma environment.

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