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Venus-solar wind interaction in a hybrid plasma simulation model

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We present a study of the plasma interaction between Venus and the solar wind. In the study we use a computer simulation model to interpret recerently acquired in-situ data by the Venus Express spacecraft. The numerical simulation is based on a 3-dimensional hybrid model, which consists of particle ions, a charge neutralizing massless electron fluid and non-radiative electrodynamics. This arrangement makes it possible to study self-consistently coupled ion kinetics and electromagnetism in a global planetary scale. In the model, the Venusian upper atmosphere and exosphere are modelled as a perfectly conducting ionospheric medium and hydrogen and oxygen photoion production. Given the upstream conditions and the spatial planetary ion distributions the model provides, for example, the escape rates of the atmospheric ion populations and the geometry of the interplanetary magnetic field draped around the planet. Here the model is used to study ion observations from the ASPERA-4 plasma instrument and magnetic field measurements from the MAG magnetometer on Venus Express.