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Global MHD Simulations of Jupiter's Magnetosphere: Study of the Ionosphere-Magnetosphere Coupling.

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We present a new MHD model of the Jovian magnetosphere with a consistent coupling between the ionosphere and the magnetosphere (obtained via the introduction in the MHD equations of ion-neutral collisions in an extended ionosphere). In addition, the mass-loading caused by the Io torus is included in the model via the inclusion of a production source term in the MHD equations. This model allows us to control the Pedersen conductance of the ionosphere and the amount of mass-loading in the Io torus. To demonstrate the accuracy of the model, we verify whether the position of the corotation break-down changes according to the theory (Hill, 1979) when these two parameters are changed. Our simulations show, as expected, that the corotation break-down occurs further from the planet for a higher Pedersen conductance or for a lower mass-loading.