

THE NEUTRAL CLOUD ENVIRONMENT IN THE SATURNIAN MAGNETOSPHERE

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From HST observations and the Cassini measurements, we know that the Saturnian system is immersed in a vast neutral gas cloud of water molecules and their dissociative products like OH, O and H. Most of the gas molecules originate from the plumes in the south pole of Enceladus. In addition, the ring system is an important source of oxygen atoms and molecules which can be injected into the distant Saturnian magnetosphere via scattering processes. Titan's exosphere is another major source of neutral gas composed of escaping H₂ and H, and probably CH₄. These neutral materials will be fed into the thermal plasma disk in the inner Saturnian magnetosphere. In this work, we will examine the structures and compositions of these separate gas clouds and plasma disc using an updated photochemical and plasma chemistry model with the latest plasma measurements from Cassini CAPS. In the model calculations, we have taken into consideration the orbital dispersal of water molecules and their fragments from photodissociation excess energy, charge exchange collisions and (hot) electron-impact reactions. A preliminary model of the thermal ion composition in Saturn's magnetosphere also will be described.

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