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A 3D parallel model of Ganymede's exosphere

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Ganymede is a unique object : it is the biggest moon of our solar system, and the only satellite which has its own intrinsic magnetic field. Its surface is covered by water ice and by regolith. Some previous observations suggest that below its surface may exist an ocean of liquid water. The atmosphere of the planet is poorly known but should be composed essentially of water, hydrogen and oxygen (Marconi et al., Icarus, 2007). These atmospheric particles mainly originate from the surface thanks to sublimation of water-ice and sputtering, a process driven by the magnetospheric Jovian particles impacting Ganymede surface and leading to ejection of atoms and molecules into Ganymede atmosphere.
We developed a model of Ganymede's atmosphere based on a 3D Monte Carlo description of the fate of the ejected particles from the surface. This model has been parallelized allowing a much better statistical, spatial and temporal description of Ganymede's environment. This model includes the main sources of the neutral atmosphere and is able to calculate all its characteristics. It was successfully compared to the few known observations as well as to previous modeling. In this presentation, we will present the main characteristics of this model and what it tells us on Ganymede's atmosphere, in terms of spatial structure, composition, temporal variability and relations with both magnetosphere and surface.