

## Comparison of two major sources of uncertainty in Titan ionospheric chemistry model

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### *Domain : Other*

Discrepancies between the outputs of different models and available data are difficult to assess in the absence of quantified uncertainties. In particular, modelling the chemistry of planetary ionospheres involves numerous physical and chemical parameters, which values are known from laboratory measurements with experimental uncertainty factors. These uncertainty sources should be accounted for in the modelling. In a previous study about Titan ionospheric chemistry [1] we reported the first detailed uncertainty analysis concerning the kinetics parameters of the ion-molecule reactions. We showed that uncertainties on branching ratios contribute significantly to the estimated uncertainties on ion densities. Neutral species were considered as a fixed bath in Titan's ionosphere. Considering that ion densities closely depend on the neutral atmosphere ([2],[3]), we expect an important impact of densities of neutral species on the uncertainties of ion densities.

In this work, we take into account both uncertainty sources, quantifying their respective contribution to the ion density uncertainties. Uncertainty propagation is performed by Monte Carlo sampling. In addition, we assess the sensitivity to three turbulent diffusion profiles for the neutral species, corresponding to the extreme profiles at high altitudes described in the literature.

- [1] N. Carrasco, R. Thissen, O. Dutuit, P. Pernot, M. Banaszekiewicz, 2006, *Planetary and Space Science*, Uncertainty analysis of bimolecular reactions in Titan's ionosphere chemistry model , accepted.
- [2] C.N. Keller, V.G. Anicich and T.E. Cravens, 1998, *Planetary and Space Science*, Model of Titan's ionosphere with detailed hydrocarbon ion chemistry , 46, 1157- 1174.
- [3] E. Hébrard, M. Dobrijevic, Y. Bénilan and F. Raulin, Consequences of chemical kinetics uncertainties in modeling Titan's atmosphere , in preparation.