

IDIS Science Case: Titan Ion-Neutral chemistry: understanding observations and constraining models

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The present observations of Titan upper atmosphere by CASSINI indicate the presence of ion molecules which were not expected from any chemical models. This surprising observation highlights the need for the scientific community to reanalyze the key ion-neutral reactions in Titan's upper atmosphere, to understand if transport and dynamic are important in driven the upper atmosphere chemistry and to understand which are the main drivers of this chemistry. Actually, the coupling of complex chemistry model with even simple 1D transport model remains difficult. In order to make it possible, the identification of the key reactions is essential to mimic the composition of Titan ionosphere with simplified ion-neutral chemistry. Such an approach implies as an example the development of studies of sensitivity which key inputs are the reaction rates and their present uncertainty.

So far, modelers of Titan upper atmosphere are using both CASSINI data and available public laboratory measurements. Such an approach would greatly benefit of the expertise of laboratory experimentalists through an analysis of uncertainty of the main reaction rates and of a critical analysis of the relevance of the available data sets that is:

- a guideline through available data sets for specific application to Titan
- an access to CASSINI data

Laboratory experimentalists would benefit of a better understanding of the key questions on Titan ionosphere

- a guideline through the present CASSINI data sets to understand what information would help instrument teams to interpret their observations,
- a guideline through available models or results of sensitivity would lead to define new experiment to be done.

During this talk, I will present the different elements which would be needed to fill this gap between modelers and experimentalists and what kind of information IDIS could provide.