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First results of the ISSI workshop on the comparison of 1D photochemical models of Titan atmosphere

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The coexistence of many models of the photochemistry of Titan, developed independently, raises the question of their cross-validation. These models get more and more complex with the inclusion of additional chemical processes to assimilate Cassini's discoveries [1]. There is presently no consensus on their various input parameters, and it becomes increasingly difficult to compare outputs from different models.

A team of experts has been funded by ISSI and gathered in march 2009 for a first workshop on photochemical model intercomparison. Five models were represented, four 1D models and one 3D model: Lara96 [2], IPSL05 [3], MD09 [4], DLH08 [5] and TGITM [6].

The goals of this intercomparison are: (1) to understand the differences in the different codes results; (2) to obtain the same output when feeding the codes with the same inputs, and if not, understand why; (3) to understand the limits of using 1D codes to analyze observations; (4) to determine the 2nd order processes; and (5) to propose a roadmap to improve predictivity of photochemical models.

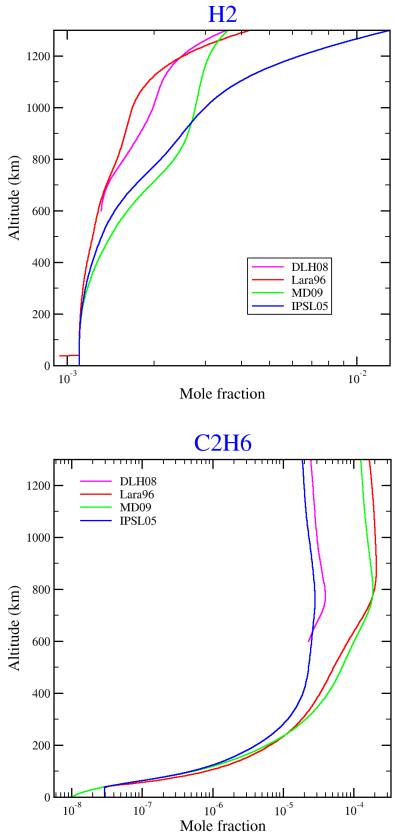

Figure 1. Comparison of H_2 and C_2H_6 profiles recovered by different codes using identical physical parameters.

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A step by step approach has been followed. In a first step, all models were run with a common set of physical conditions (temperature profile, Eddy diffusion, total pressure and boundary conditions). Large discrepancies in the simulated profiles for major species were observed, pointing to the dominant role of the chemical model (Fig. 1). The models were then run with identical photo-dissociation rates, and runs with identical chemical schemes are the target for the next workshop.

We will present the striking results and preliminary conclusions of this first inter-comparison session.

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