Revisiting Titan's exosphere and atmospheric evolution after Huygens

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An overview of Titan's complex exospheric environment after Huygens is presented. Temperature profiles inferred during the descent of the Huygens probe indicate that atomic hydrogen can reach blow-off conditions under certain circumstances. We apply a time-dependent numerical algorithm which solves the system of hydrodynamic equations numerically. The mass and momentum conservation equations are rewritten in their characteristic form, and are integrated by applying Godunov's method. Stability of the numerical scheme is achieved by determining an adequate time step subject to the Courant-Friedrichs-Lewy condition at each time interval. A stationary solution is obtained as a result of time relaxation of nonsteady solutions starting from the initial steady-state profiles with small perturbations. We compare the atomic hydrogen density distribution and escape rates for the Jeans and hydrodynamic conditions. Furthermore, we discuss the evolution of Titan's atmosphere based on the in-situ measured enrichment of ^{15}N isotopes.