Tracing of energetic particles in the vicinity of Titan

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We present results from the application of a particle tracing software specifically developed to study the interaction of Titan with the surrounding magnetospheric plasma. By combining the output of hybrid plasma code simulations with the tracing software itself, we aim to further study the different ionization processes occurring at Titan with special emphasis on the role played by energetic ions and electrons. The tracing software is used to simulate the trajectories of particles entering the Titan environment from different positions with energy ranges similar to those observed by the Cassini MIMI/LEMMS detector and with different pitch angle distributions and thus be able to estimate the amount of particles that interact with the moon's atmosphere and those that escape the system due to magnetic and electric field perturbations or charge-exchange with the high-altitude exosphere. Additionally, a comparison of the results obtained with the observational data available from the CAPS, and MIMI instruments allows us to validate the results of the tracing software for those regions of Titan not sampled by Cassini at a given flyby. For this initial study, we show the first maps of allowed energetic electron and ion access (as a function of energy) at Titan's exobase, when magnetic and electric field disturbances in a reference Titan interaction region are considered. Similar maps will be used as input for ionization and energy deposition calculation in future steps of this project.