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Kinetic modeling of particle kinetics close to low orbit satellites¹ RICHARD MARCHAND, University of Alberta, JEAN-JACQUES BERTHELIER, CETP, CNRS, DAVID KNUDSEN, University of Calgary — Some satellites are equipped with ion analyzers capable of measuring ion distribution functions with very high sensitivity. This is the case, for example, with DEMETER, launched in 2004. Similar ion analyzers are also planned for Swarm, to be launched in 2010. The interpretation of ion distribution functions measured by ion analyzers onboard satellites often relies on the assumption that the surrounding electrostatic sheath does not significantly perturb the distribution of the incoming ions. Yet, observations show that electrostatic sheaths can significantly affect the distribution of particles in their energy, and in their direction. We use a three dimensional PIC code to simulate the interaction between ionospheric plasmas and satellites, using DEMETER and Swarm as examples. The computed resulting fields are used as input in a particle backtracking code to infer measured ion distribution functions, in terms of assumed distribution far from the sheath region. The results are used to interpret anomalies in DEMETER measurements, and assess possible similar implications on Swarm.

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