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Tail reconnection in the global magnetospheric context: Vlasiator first results

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The key dynamics of the magnetotail have been researched for decades, and been associated with either three-dimensional (3D) plasma instabilities and/or magnetic reconnection. We apply a global hybrid-Vlasov code, Vlasiator, to simulate reconnection self-consistently in the ion-kinetic scales in the noon-midnight meridional plane, including both dayside and nightside reconnection regions within the same simulation box. Our simulation represents a numerical experiment, which turns off the 3D instabilities but models ion-scale reconnection physically accurately in 2D. We demonstrate that many known tail dynamics are present in the simulation without a full description of 3D instabilities or without the detailed description of the electrons: While multiple reconnection sites can coexist in the plasma sheet, one reconnection point can start a global reconfiguration process, in which magnetic field lines become detached and a plasmoid is released. As the simulation run features temporally steady solar wind input, this global reconfiguration is not associated with sudden changes in the solar wind. Further, we show that lobe density variations originating from dayside reconnection may play an important role in stabilising tail reconnection.