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# Global scale simulation of northward IMF magnetospheric dynamics: Vlasiator results

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We present the first observations of magnetospheric dynamics under northward interplanetary magnetic field (IMF) conditions in a global hybrid-Vlasov simulation, using results from the Vlasiator code. Vlasiator treats ions kinetically, evolving ion distributions in three velocity-space dimensions; electrons are treated as a fluid. The simulation is run in two spatial dimensions. Several observational phenomena associated with northward IMF are reproduced: reconnection occurs at the high latitude lobe magnetopause, initially in one hemisphere and subsequently in both; the lobe reconnection process is bursty, resulting in the formation of flux transfer events (a structure topologically equivalent to that proposed under the single X-line mechanism, followed by flux ropes consistent with multiple X-line reconnection); a low level of magnetotail reconnection is present on the nightside (apparently triggered by the passage of a large flux transfer event at the magnetopause) which is followed by the growth of a ‘wedge’ of closed magnetotail flux. We compare this ‘wedge’ with the in situ observational signature of a transpolar arc, which is postulated to arise as a result of magnetotail reconnection, but in the case of this simulation it appears to be related to the removal of lobe flux and the 2D nature of the simulation run. Collectively, these observations allow us to investigate several aspects of solar wind/magnetosphere coupling.