Storm-time tail current in the plasma sheet

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The spatial and temporal properties of the tail current during storm times are investigated on the basis of the total (kinetic+magnetic) pressure observed by the Geotail spacecraft. The observed total pressure values, a proxy of the local duskward tail current, during magnetic storms in 1996-2004 are classified by the storm phase and then are sorted by the simultaneously measured sym-H indices as well as by the position in the X-Y plane. It is found that the total pressure increases with |sym-H|at X > - 20 Re, while it shows no dependence on |sym-H|beyond X = -20 Re, indicating that the storm-associated enhancement of the tail current is limited to the near-Earth region. It is also found that the total pressure tends to be larger during the main phase than during the recovery phase for a same sym-H range on the dusk side of the near-Earth region. On the contrary, the total pressure has almost the same value for a given sym-H value for both the main and recovery phase. This result suggests that the tail current on the dusk plasma sheet contributes more to the sym-H depression during the main phase than during the recovery phase, while the dawn-side tail current would cause the sym-H depression of the same magnitude during the main and recovery phase. From the point of view of the plasma sheet structure, it is implied that the plasma sheet is likely to be thinner on the dusk side than on the dawn side during the storm main phase, showing a dawn-dusk asymmetry of the plasma sheet thickness.