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Monitoring the tail current contribution to the Dcx index with NOAA/POES satellites: differences between CME and HSS driven storms

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It is well known that, in addition to the ring current, also other current systems like the magnetopause currents and the tail current have a significant contribution to the Dcx index. While the effect of the magnetopause currents are typically removed by correcting for the solar wind pressure, the effects of the tail current are less well understood and have received less attention. Still, some recent studies have shown that the tail current can have a significant and even a dominant contribution to the Dst index at least during the main phase of moderate storms.

We have developed a semi-empirical model that expresses the Dcx index as a sum of ring current, tail current and magnetopause contributions. In the model, the tail current is monitored by observing the location of the night-side isotropic boundary of energetic protons using the MEPED energetic particle instrument onboard NOAA/POES satellites. We briefly present here the model paying particular attention to the tail current and the solar wind parameters driving it. We apply the model to a set of magnetic storms driven by coronal mass ejections (CME) and high speed solar wind streams (HSS), and discuss the differences in the tail and ring current response between these two drivers.