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Properties of IMF By-related Cusp currents

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With the abundance of high-quality from Oersted and CHAMP in their drifting orbits it has been possible to investigate the important high-latitude field-aligned current (FAC) and ionospheric current systems located in the noon sector at cusp latitudes in much greater details than possible at earlier missions like the Magsat (1979-80). The comprehensive statistical basis has now enabled the development of sophisticated models for the current distribution and intensities in dependence of seasonal, solar wind and magnetospheric parameters. However, there are still large uncertainties involved in using the new models primarily due to the lack of precise knowledge of the temporal and spatial development of the currents in relation to the highly variable solar wind parameters. Furthermore, the high-precision magnetic measurements made at high temporal resolution corresponding to spatial resolutions down to less than 100 m have demonstrated the occurrences of highly structured magnetic variations in the low-altitude Cusp region. The observed magnetic perturbations indicate structures of very intense but thin sheets or narrow filaments of mixed up- and downward currents up to several hundreds of uA/m2 embedded in large-scale FAC structures of only up to a few uA/m2. The intensities and locations of the fine-scale FAC structures are closely related to solar wind conditions. The presentation will focus on the properties of the IMF By-related cusp FAC currents and their properties on different temporal and spatial scales.