Response of the convection vortex in the afternoon sector and cusp plasma flow to the IMF change

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Contribution of ionospheric plasma flows in the day-side cusp to development of the large-scale convection electric field was investigated by applying the APL convection map model [Ruohoniemi and Greenwald, 1998] to the SuperDARN observation in the wide local time range (10-22 MLT) at 18-20 UT on November 17, 1996. The magnetic filed data from the CANOPUS and West Greenland magnetometer arrays are used for identifying the timing of convection flow changes.

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We discuss our observations in comparing with the MHD simulation result of Tanaka [1995] investigating the generation mechanism of the FAC. Tanaka [1995] showed that the driving force of the Region-1 FAC is not the interplanetary VxB electric field but the current generator ($J^*E < 0$) inside the magnetopause due to pressure gradient.For the southward IMF, the current generator in the high latitude side of the cusp drives the Region-1 current connecting to the dayside part of polar ionosphere. Our observational result that the convection vortex starts to develop at fixed point at 16 MLT is consistent with this simulation result. It is also suggested that it takes 4 minutes for the current generator for the southward IMF to overcome the current generator for the northward IMF.