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Statistical field-aligned current maps determined from SuperDARN HF radar measurements of ionospheric vorticity

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A new technique has been developed to determine ionospheric vorticity from line-of-sight velocity measurements made by the SuperDARN HF radars. Using 6 years (2000–2005) of vorticity measurements from 6 SuperDARN radars in the northern hemisphere we have determined statistical maps of vorticity that cover the whole of the northern polar ionosphere. These results show that ionospheric vorticity is a good proxy for field-aligned current. We have also determined statistical maps for different seasonal and interplanetary magnetic field conditions. We compare these maps to those determined using other instrumentation.