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Interhemispheric comparison of cross-polar cap potentials

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Cross polar cap potentials in the polar ionospheres are important physical parameters showing magnetospheric conditions depending on solar wind energy input, energy dissipation in the magnetosphere and strength of plasma convection in the magnetosphere, etc. The potential drop at northern hemisphere and one at southern hemisphere is thought to be identical in the zero's order approximation. However, it is not clear whether they are always completely the same values or not because of the existence of difference in ionospheric conductivity in both hemisphere due to seasonal difference, the effect of dipole tilt angle, and asymmetries in phenomena in a variety of spatial scales between both hemispheres. In the past, some possible seasonal differences have been discussed with statistical analyses mainly using satellite data, and a recent study using SuperDARN data pointed out that an effect of dipole tilt angle on the differences, but no comprehensive physical understanding has been made yet. We here use SuperDARN data simultaneously obtained at both hemispheres from 1999 to 2006 and try to obtain essential physical understanding of this potential differences especially on dependencies on interplanetary magnetic fields, geomagnetic activities, seasons, dipole tilt angle, and substorm phases, and so on. We first show the initial results of this interhemispheric comparison this time particularly on whether the two simultaneous values show any statistical differences, and whether there exist any examples where large differences exist and discuss the possible reasons if any in detail.

Keywords: SuperDARN, Cross polar cap potential, interhemispheric, symmetry, asymmetry, polar ionosphere