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Reverse Polar Cap convection and effects on PC indices

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The convection of magnetospheric and ionospheric plasma across the polar caps relates to properties of the solar wind, primarily the velocity (Vsw) and the sign and magnitude of the Z-component, Bz, of the Interplanetary Magnetic Field (IMF). When Bz is negative (southward) or just small in magnitude, then the convection across the polar cap is antisunward with return flows in the morning and evening sectors of the auroral oval. When IMF Bz is strong and positive (northward) then strong sunward convection may develop in the central polar cap with return flows poleward of the usual auroral oval (NBZ conditions). In addition to depending on the strength of IMF Bz, the magnitude of the reverse convection relates to the ionospheric conditions varying with local time, season and solar cycle, and also to the geomagnetic field configuration. The ionospheric convection creates oppositely directed currents that generate the magnetic variations reflected in the Polar Cap (PC) indices. The immediate effect of reverse convection is to give negative values of the PC index. However, inclusion of reverse convection events in the data base used to derive the index coefficients has adverse consequences for the quality of the PC index. The presentation shall illustrate the properties of reverse polar cap convection and discuss the differing effects on the Northern (PCN) and Southern (PCS) indices.