Effective polar cap area and multi-station basis for Polar Cap (PC) indices

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The Polar Cap (PC) indices are useful indices for Space Weather forecasts and analyses. The PC indices have been used to monitor the interplanetary geoeffective electric field and solar wind pressure pulses, to analyze cross polar cap voltages, polar cap diameter, and general polar cap dynamics. Furthermore, the PC indices have been used to monitor auroral electrojet intensities, ionospheric Joule heating, and global auroral power, and to predict ring current intensities. For specific Space Weather warning forecasts the PC indices can be used to predict substorm development and the associated risk of power line disturbances in the subauroral regions.
The PC indices, PCN (North) and PCS (South), are derived from geomagnetic observations at Thule in Greenland and Vostok in Antarctica, respectively. In order to provide reliable forecast services based on PC indices, it would be advantageous to have available back-up suppliers of index values. The presentation provides an analysis of the effective area for useful PC index derivation and suggests observatories that could provide back-up data for PC index calculations should the primary sources fail due to instrument or communication problems.