



Variation of the auroral oval size and offset from the Spin-Scan Auroral Imager

Daniel Wagner and Ralph Neuhäuser

Friedrich-Schiller-University, Astrophysical Institute and University-Observatory, Germany (wagner.d@uni-jena.de)

An independent reconstruction of the geomagnetic field (location of poles and field strength) is possible with historically observed aurorae if the behavior of the auroral oval as function of solar activity is understood. Therefore we investigated the size of the oval as well as the offset from the geomagnetic poles for different magnetic activity levels described by the Kp-index. The Spin-Scan Auroral Imager mounted on the Dynamics Explorer 1 satellite provides image data from 1981 to 1991 which was used for this purpose. Geometrical analysis of each image, transformed to quasi-dipole coordinates, gives the center of the oval and its radius. To minimize the uncertainties, the results in different Kp-intervals were averaged. The results show a linear dependence between Kp-index and radius and a nearly constant shift of the oval center towards the midnight sector of around 4° .

Currently, we derive the Earth magnetic field strength and pole location from ground-based aurora observations of the last two centuries to compare with the directly measured geomagnetic field. For days with geomagnetic storms, we compare the aurora oval as measured with the satellite with ground-based aurora observations. Next, we plan to use historically observed aurorae for an independent reconstruction of the geomagnetic field for previous centuries.