DETERMINING THE LOCATION OF THE OPEN-CLOSED MAGNETIC FIELD LINE BOUNDARY FROM AURORAL IMAGES

NICOLA LONGDEN, Gareth Chisham, Gary Abel, Mervyn Freeman

British Antarctic Survey, email: nilo@bas.ac.uk

The boundary between open and closed magnetic field lines (OCB) in the Earth's magnetosphere delimits the region of open flux in the polar cap. A number of techniques exist for estimating the location of the OCB in the Earth's ionosphere. The most precise locations can be obtained from particle precipitation boundaries (PPB) measured by low-altitude satellites. However, these measurements can only determine a single point along the OCB. Satellite-based auroral imagers can provide complete coverage of the auroral oval and can be used to derive the global location of the OCB. Most techniques used to estimate the location of the OCB from auroral images require the characterisation of the intensity profile of the image by latitude. Such profiles can often be described as a Gaussian. However, at times, such as during substorm activity when the auroral oval may show signs of bifurcation, the intensity profile of the aurora can be more suggestive of a double Gaussian. We present the results of estimating the OCB from auroral images recorded by the three far ultraviolet (FUV) cameras onboard the IMAGE satellite during 2001. For each profile, it was determined whether the auroral intensities were better represented by a single or double Gaussian distribution, enabling the OCB to be estimated from a single image during all levels of geomagnetic activity. These OCB estimates are compared to those from other sources, such as PPBs detected by the low-altitude DMSP satellite. Using this calibration, the OCB estimates from the IMAGE data provide a time series of the poleward extent of the auroral oval throughout the year at all magnetic local times and opens up possibilities for studying processes at this boundary, such as measuring the magnetic reconnection rate as a function of time and space in combination with data from the Super Dual Auroral Radar Network (SuperDARN).

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Nicola Longden, British Antarctic Survey, High Cross, Madingley Road, Cambridge, CB3 0ET, UK, email: nilo@bas.ac.uk