



Polar cap ionospheric convection and auroral currents during sawtooth magnetic bay events

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The relations between polar cap ionospheric plasma convection and field-aligned auroral currents have been investigated for a large number of well-defined magnetic bay or substorm occurrences during 1995-2005 on basis of ground-based magnetometer observations supplemented with data from the polar orbiting Oersted and CHAMP satellites. A particular group of events occurring during steady solar wind conditions has been isolated. This group comprises the so-called “saw-tooth” events of recurrent disturbances occurring during strong and steady forcing of the magnetosphere by the solar wind. During such steady solar wind conditions, depressions and enhancements of convection intensities and auroral currents still occur, sometimes even more pronounced than during average substorm conditions. When adjusted for the varying convection level, as expressed by the polar cap (PC) index, and for the direction of the transpolar currents, the disturbance patterns are remarkably similar during sequences of these events. The coordinated ground and satellite observations have provided the basis for a detailed study of the spatial and temporal development of related ionospheric and field-aligned currents. The implications of these results for the modelling of solar wind-magnetosphere interaction processes are outlined and discussed.