Poleward boundary of auroral bulge and plasma sheet flow reversal region location during substorms

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Data from the Geotail spacecraft situated in the night side plasma sheet during 1996-1997 were used to select events of the tailward-to-Earthward fast plasma flow reversals. A subset was extracted including those events when the UV auroral images were available from the Polar satellite. The Polar data supported by ground-based observations showed that the auroral substorms were in progress during the flow reversal events. For every moment of the flow reversal observations we determined the auroral bulge poleward boundary latitude at the meridian of the Geotail footprint and compared this latitude with the Geotail location in the magnetosphere. We found that within the range of 10-30 R_E the auroral bulge latitude increases proportionally to the reversal region distance from the Earth. Moreover, tailward (Earthward) flows have a tendency to be observed when Geotail footprint is poleward (equatorward) of the poleward edge of bright auroras. This agrees with the idea that reconnection is the source of discrete auroras during substorms.