

Field line dipolarization and currents in the ionosphere: A case study

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Ionospheric current associated with the field line dipolarization event (1200 UT, 10 August 1994) is studied using ground magnetometer data of 30 ground stations from Alaska, Alberta, Manitoba and to Labrador, as well as using plasma measurements from LANL geosynchronous satellite at the Alaskan sector. Results from the ground magnetometer data are as follows:

- (1) On the ground, there appeared inflection points in the latitudinal profiles of the vertical component. This finding infers that the peak of the ionospheric currents, either eastward or westward, existed at the latitudes of the instantaneous inflection points.
- (2) In the first ten to fifteen minutes of the dipolarization onset, the most poleward inflection point moved in latitudes rapidly from 68N to 75N. The Pi2 amplitudes in auroral zone exhibited the largest ones (40nT peak-to-peak).
- (3) After the poleward inflection point has reached to 75N, the inflection point to the south, corresponding to Westward Electrojet, shifted from 65N to 68N. The Pi2 amplitude reduced to halve.
- (4) The inflection point in the southernmost latitudes, though no significant motion in latitudes was observed, disappeared in one hour after the onset.
- (5) During a rapid expansion of the most northward inflection point, the downward FACs were observed in the eastward sector of the onset. They propagated eastward away from the onset longitudes.

The present ground magnetometer observations support the results from the in situ plasma measurements at geosynchronous orbit that the field line dipolarization is composed of the parallel shrinkage along the field lines and simultaneous perpendicular stretching in dawn-dusk direction.

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