

Characteristics of the Preliminary Reverse Impulse (PRI) of the Geomagnetic Sudden Commencement of November 18, 1993

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We report here the first simultaneous observation of dip equatorial appearance of the PRI of SC in different local time sectors, using high-time resolution (3 sec) data. The study concerns the SC of Nov. 18, 1993. We find that the PRI manifested only in the forenoon sector very close to the magnetic equator. The PRI is not apparent at stations close to magnetic equator either in the noon or dusk sectors. The F-layer vertical plasma drift measurements close to magnetic equator in the dusk sector showed an impulsive decrease in ambient upward drift at the time of the PRI in the forenoon sector. We interpret the LT dependence of the PRI manifestation in terms of the relative contributions of ionospheric currents and FAC to DPi field that is superposed on the DL field.

We report here the first simultaneous observation of dip equatorial appearance of the preliminary reverse impulse (PRI) of SC in different longitude (local time) sectors, using high-time resolution (3 sec) data.

The study concerns the SC of November 18, 1993 that occurred against prolonged geomagnetic quietness. We find that the PRI manifested only in the forenoon (0911 MLT) sector very close to the magnetic equator.

At locations in the dip range 7-9 degrees on the same meridian, the PRI reduced in amplitude and led to a delayed onset of the main impulse (MI) of SC. The PRI is not apparent at stations close to magnetic equator either in the noon (1258 MLT) or dusk (1740 MLT) sectors. What is seen

instead here is a clear reduction in the rate of increase of H-component characteristic of MI coincident with the PRI in the forenoon sector. The F-layer vertical plasma drift measurements close to magnetic equator (dip 4 N) in the dusk sector showed an impulsive (duration 48 seconds) decrease in ambient upward drift (westward electric field) at the time of the PRI in the forenoon sector, and a conspicuously reduced upward drift during the MI of SC. We interpret the local time dependence of the

PRI manifestation in terms of the relative contributions of ionospheric currents and field-aligned currents to DPi field that is superposed on the DL field. At high latitudes in the afternoon sector (1411-1523 MLT), the nominal peak amplitude and peak time (duration) of the PRI increased with latitude from sub-auroral to polar latitudes, particularly over the range 66-76 MLAT. This result confirms the dominance of DPi over DL close to the polar region.