Ea-P005 Room: Lounge Time: June 25 17:30-19:00

Ionospheric absorption in the polar cusp/cleft associated with changes of solar wind dynmic pressure

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By the use of the imaging riometers at Ny-Alesund (NYA) and Danmarkshavn (DMH) in the arctic region, and Zhongshan (ZHS) in Antarctica, conjugate features of daytime ionospheric absorption at the polar cusp/cleft are examined for specific changes of solar wind plasma and interplanetary magnetic field. One type of the absorption spikes was identified between ZHS and NYA, associated with a steep increase during high solar wind dynamic pressure in the afternoon sector (13h-15h MLT), and was localized at a small-scale extent of <200 km. Another type of the absorption spikes was identified at the three stations, associated with a sudden pressure increase after prolonged quiet state in the noon time sector (11h-13h MLT), and is estimated to expand by a large-scale more than several hundred km.

The solar wind flow around the Earth's magnetosphere is by no means a stady state but is characterized by major changes of its magnetic fields and plasma velocity as well as plasma density. This causes the interaction of the solar wind with the Earth's magnetosphere. Besides substorm processes occuring in the nightside magnetosphere, a response of the dayside magnetosphere by sudden changes of the solar wind conditions is another major dynamic feature of the solar wind interaction with the Earth's magnetosphere.Magnetopause current layer perturbations associated with pressure pulse of the solar wind and magnetic merging (reconnection) result in localized increases and decreases, respectively, of the local magnetopause current density. From current continuity at the boundaries, field-aligned currents (FACs) flow into the auroral ionosphere,carrying magnetospheric electrons into the ionosphere. Thus the ground-based auroral observatins in the dayside polar cleft/cusp region have provided important information of the transfer on momentum and energy from the shocked solar wind to the magnetosphere and polar ionosphere.

However, auroral observations have limitations to climate and sunlit conditions. In stead of auroral observations measurement of ionospheric ansorption of cosmic radio signals using riometer is available for detecting auroral particle precipitation. Particularly, it is an unique advantage that conjugate riometer observation between the inter-hemispheric high-latitude stations is possible during a whole year.

This report is a first report to present conjugate features of daytime absorption events in the polar cusp/cleft region,

By the use of the imaging riometers at Ny Alesund (NYA) and Danmarkshavn (DMH) in the arctic region, and Zhongshan (ZHS) in Antarctica, conjugate features of daytime ionospheric absorption at the polar cusp/cleft are examined for specific changes of solar wind plasma and interplanetary magnetic field (IMF). One type of the absorption spikes observed was associated with a steep increase during high solar wind dynamic pressure and synchronized spike-type IMF excursions in the afternoon sector (13h-15h MLT). The afternoon absorption was identified between the hemispheric stations of ZHS and NYA, and the absorption region was localized at a small-scale extent of <200 km. Magnetic field compression associated with the steep solar wind pressure increase would intensify and localize upward field-aligned currents(FACs) near the afternoon convection reversal boundary, which would carry energetic electrons drifting in the closed magnetosphere into the cleft ionosphere. Another type of the absorption spikes was associated with a sudden pressure increase and synchronized IMF excursions after prolonged quiet state in the noon time sector (11h-13h MLT). The noon absorption was identified at the three inter-hemispheric stations, and the absorption region is estimated to expand by a large-scale more than several hundred km. Magnetic field compression associated with the sudden pressure increase would intensify upward FACs near the open-closed boundary in the large-scale convection, which would carry magnetospheric elecrons populated near the cusp equatorward boundary into the cusp ionopshere.