Geophysical Research Abstracts, Vol. 9, 02424, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-02424

Detection of the Large-Scale TIDs associated with auroral activity using SuperDARN data

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Parameter variations for the dayside ionosphere as a result of the Large-Scale Acoustic Gravity Wave propagation were studied for the 17 Febuary 1998 substorm using measurements from the SuperDARN radar network. This substorm was characterised by a sharp peak in the AE index with the maximum of $\sim$900 nT. The source of this disturbance was located at the plasma convection throat and in the day cusp region. The location of the source was obtained from the studies of the combined dataset using high-latitude convection map, data from 4 DMSP satellites and the global network of gound-based magnetometers. Parameters of the two quazi-wave disturbances were deduced using measurements from 6 SuperDARN radars and the Goose Bay ionospheric station data. These parameters are: the wave periods of 1.5 hours and 2 hours; the velocity of $\sim$400 m/s and the wave lengths of 2200 km and 2900 km respectively. These disturbances were clearly registered as skip distance variations on Goose Bay and Kapuskasing radars. At the same time, these disturbances would be difficult to deduce from the ground-based ionospheric station data alone, because hmF2 variations were 10-40 km only and NmF2 variations were 10-20% only. Using inverse problem soution, it is demonstrated that the parameters of these ionospheric disturbamces are in a good agreement with the radar skip distance variations. It is demonstrated that SuperDARN radar network is a powerful instrument for the fine wave disturbance detection in the high-latitude ionosphere. This is particularly important for the daytime conditions, when the amplitude of wave variations associated with auroral activity is significantly smaller than at night.