

OBSERVATIONS OF STORM ENHANCED DENSITY (SED) OVER
NORTHERN EUROPE AND AMERICAN LONGITUDE SECTORS

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Storm enhanced density (SED) is formed by the large scale transport of plasma which occurs during geomagnetically active conditions. The forces underlying this transport are thought to be associated with electric field driven coupling processes which penetrate into both mid and equatorial latitudes. Its effects are evident in the redistribution of low latitude ionospheric plasma into mid-latitudes and its impact on equatorial electrodynamics during magnetically disturbed conditions. SED occurrence can also impact communication and navigation systems. SED is characterized by large gradients in electron density over a few degrees latitude and longitude. For some time now, SED has been observed in the American longitude sector appearing in global GPS TEC maps as plume-like structures of greatly enhanced TEC values. In this paper, we present the first examples of SED over Northern Europe as seen in global TEC maps during various seasonal and solar cycle conditions. Most of the observed cases of SED, but not all, which develop over Northern Europe continue to propagate westward over the American sector. Correlated DMSP ion drift measurements indicate the presence of the sub-auroral polarization stream (SAPS). A comparison is presented between the American and Northern European sector SED occurrences addressing the latitude and magnitude of the base of the SED plume. The results indicate that the SED strengthens as it propagates westward between European and American longitudes. Comparison between northern hemisphere Super-Darn convection maps and the TEC maps highlight the correlation between the westward propagation of the SED plume and the convergence of the two cell convection pattern.

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