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Solar wind control of ionization enhancements in D Region during solar minimum as seen by the EISCAT Svalbard Radar

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EISCAT Svalbard Radar was operated in a continuous mode during the International Polar Year (IPY), with experiment start on 1 March 2007 and end on 29 February 2008. This period occured during the prolonged solar minimum time and was on the average geophysically very quiet. The incoherent scatter radar experiment was designed to cover the entire altitude range of the ionosphere, from D and lower E regions to the ionospheric F peak, reaching into the topside ionosphere. The low altitude IPY electron density data from backscattered power measurements, with 3 km range resolution and 2.25 km steps, start from the altitude of 45 km. The lowest altitude data is subject to variable sea and/or tropospheric clutter, but normally data is usable for altitudes higher than 70 km. This unique set of electron density data from a high-latitude station reveals repeated occurence of short lasting low-altitude ionisation enhancements and thus high-energy electron precipitation events, in spite of the generally geomagnetically quiet conditions. We compare the occurence of the high energy precipitation to sudden variations in the solar wind parameters, and specially with occurence of high-speed solar wind. By selecting a threshold for the occurence of the high-speed streams we make a superimposed epoch analysis of simultaneus electron density measured by the radar. This analysis suggests that the low altitude ionization enhancements are directly driven by the high-speed streams. Comparison between riometer data from Svalbard and mainland stations shows that precipitation is generally very localized and restricted to higher latitudes.