



Study of ionospheric parameters during polar mesosphere winter echoes using radiowave electron heating.

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Polar Mesosphere Winter Echoes (PMWE) are strong radar backscatters from altitudes between 50 and 80 km observed by VHF radars in the polar latitudes during winter time. They are seen when there is extra D-region ionization due to e.g. energetic solar protons or magnetospheric electron precipitation. Last 5 years there were many studies related to the properties, conditions and generation mechanism of PMWE, however for their complete and clear understanding more work is definitely needed. On the other hand, with studying PMWE we have possibility to learn about properties of their background, i.e. the polar winter mesosphere, the region, which is very difficult for diagnostics. Havnes (2004) proposed a new experimental method for probing ionospheric plasma during P(olar) M(esosphere) S(ummer) E(choes), called the PMSE overshoot effect. It is based on artificial heating of electrons in the PMSE region by HF radiowave with a special modulation pattern. It was shown to be capable of estimation of properties of background dusty plasma, electron temperature enhancement, and even of detection of the electron byte-outs. The method applied for PMSE conditions confirmed a presence of charged particles of a few tens nm size in the summer polar mesosphere. Recently this method was applied for winter conditions in the polar mesosphere where such particles composed of water ice are not expected because of higher temperatures. However, a weak overshoot effect was detected, and it was speculated to be indication of a presence of very small dust particles, likely meteoric smoke particles. We present the new results of experiments on November 24 and 27, 2006 where strong PMW(inter)E were detected with the European incoherent scatter (EISCAT) VHF radar (224 MHz) located near Tromso, Norway and the

Heating facility was used for the PMWE overshoot modulation.