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D region observations by VHF and HF radars to investigate Polar Mesospheric Winter Echoes

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Polar Mesospheric Winter Echoes (PMWE) have been observed by VHF radars for quite some years. Until now, most of the studies were focussed on either major events, that occurred during solar and geomagnetic severely distorted conditions or statistical parameters like their seasonal and interannual occurrence rates as well as altitude distributions were investigated. However, especially the origin of PMWE and underlying processes are still under debate and further observations aim to contribute to this question. Recent PMWE observations with the MAARSY VHF radar included experiments using multiple beam directions to investigate the spatial structure and evolution of PMWE. Within this study we present results of MAARSY radar observations of PMWE layers complemented by simultaneous measurements by the Saura HF radar, located less than 20km apart. Major products of the Saura radar are horizontal winds and electron density within the D region. These parameters are important for both the formation and visibility of PMWE. The spectral width and localization of VHF and HF radar echoes for the presence of PMWE are analyzed and compared in the context of turbulence. Furthermore, observations during the solar minimum for the season 2019/2020 appear to be a suitable period to deepen the investigation of background conditions, excluding intensive geomagnetic disturbances.