

Preliminary analysis about internal relationship of mean PMSE at VHF and UHF bands

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Polar mesosphere summer echoes (PMSE) are very strong radar echoes primarily studied in the VHF and UHF wavelength range at polar summer mesopause [1-2]. The characters of PMSE at different frequencies are different, but they still have some relation, so their power relationship need to be studied deeply.

Here we analyze the relation with the data observed by European Incoherent Scatter Scientific Association (EISCAT) VHF and UHF radars on July 12, 2007. The power data are extracted from figure shown by RTG (Real Time Graph) software. The data for one hour from UT 08:00 to 09:00 are used to analyze the PMSE characters. Mean PMSE echoes intensity observed by EISCAT VHF and UHF radar in one hour are shown in Fig 1 and Fig 2.

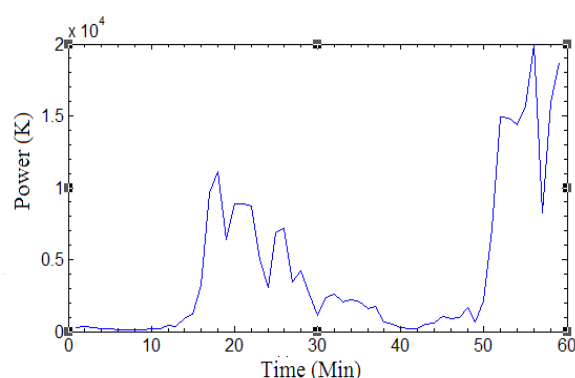


Fig 1. Mean PMSE echoes intensity observed by EISCAT VHF radar on UT 08:00-09:00

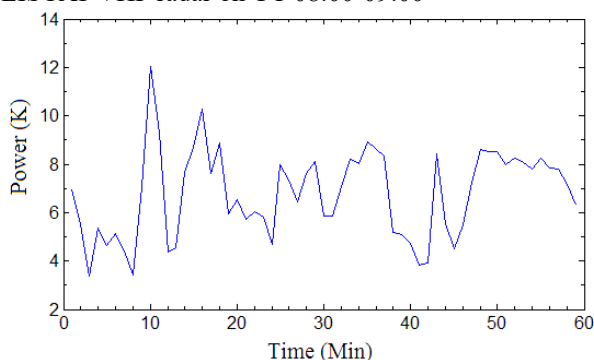


Fig 2. Mean PMSE echoes intensity observed by EISCAT UHF radar on UT 08:00-09:00

The correlation functions are used to find out their internal relations. Then we obtain their correlation coefficient: $R=0.26$. The parameter shows mean PMSE echoes characters at VHF and UHF radars in the hour do not have close relationship, the results may be affect by active modulation experiment and energetic particle precipitation. In order to get more scientific and comprehensive results, one hour data analysis is not enough. Now we need to reorganize the observations of the two radars and find out their intrinsic relationship by statistical analysis.

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References

- [1] Rapp M and Lübken F.-J. Polar mesosphere summer echoes (PMSE): Review of observations and current understanding, *Atmospheric Chemistry & Physics*, 4(4): 2601-2633, 2004.
- [2] Zhou S, Li H, Fu L et al. Preliminary study on active modulation of Polar Mesosphere Summer Echoes with the radio propagation in layered space dusty plasma, *Plasma Sci. Technol*, 18(6): 607-610, 2016.