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Investigation of Temperature Sheets Through Higher-Order Spectral Analysis

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Abstract

Temperature sheets have been observed in the lower stratosphere up to 20 km, with strong (positive) temperature gradients within very thin layers. These were observed from vertical profiles obtained from the Stratosphere and Troposphere (ST) radar located in Kolkata. The sheets tend to occur in groups and contribute to the regions of high static stability, inhibiting vertical air motion. Several experiments were carried out to understand the backscattering mechanism of the Very High Frequency (VHF) radar. Many experiments have reported the multiple layered structures at and around the tropopause regions, especially in the lower stratosphere, it is well established that these layered structures are due to presence of strong negative and positive temperature gradients, which is called as temperature sheets. In order to understand the nonlinearities associated with temperature sheets, Higher-order spectral analysis has been carried out on backscattered signals received from the Mesosphere Stratosphere and Troposphere (MST) radar. This approach allowed for a more detailed examination of the nonlinearities associated with temperature sheets. Therefore, this study proposes a new way of distinctly identifying temperature sheets and the process associated with them using Nonlinear Index based measurements.

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