EGU23-7641, updated on 19 Apr 2024
https://doi.org/10.5194/egusphere-egu23-7641
EGU General Assembly 2023

New observations showing temperature-wind interconnection during mesospheric inversion layer events

Philippe Keckhut, Alexis Mariaccia, **Alain Hauchecorne**, Mathieu Ratynski, and Sergey Khaykin
UVSQ, LATMOS-IPSL, SHTI, Guyancourt, France (keckhut@latmos.ipsl.fr)

It is known that propagation of atmospheric waves and their dissipation are responsible for the small and large disturbances governing the variability observed in the mesosphere (50-90 km). One of the main phenomena caused by these waves is the so-called mesospheric inversion layer (MIL) referring to a vertical layer of ~10 km where there is an enhanced temperature (15-50 K) lasting many days over thousands of kilometers in the mesosphere. Additionally, as perturbations in the mesosphere are crucial issues in aeronautics for the safe reentry of space shuttles or missiles, the study of MILs have aroused a large interest. However, the understanding of MIL's formation mechanisms is still not fully complete as MILs' impact on wind behavior has never been observed accurately in the middle atmosphere preventing to determine the shear profile or study how gravity waves propagate from the stratosphere to the thermosphere. Though numerous studies have suggested the important role of gravity waves in the MIL's apparition. For instance, Hauchecorne and Maillard (1990) have simulated MIL's formation by the breaking of gravity waves inside and above the MIL making decrease wind above the mesospheric jet, generating turbulence.

In this context, we report here, for the first time, an investigation of co-located temperature-wind observations in the altitude range 30-90 km during MIL events. According to these observations, the temperature inversion within the MIL is associated with a wind deceleration occurring in the same altitude range, confirming an inter-connection and arguing in favor of the role of gravity wave in the occurrence of MIL phenomenon.