

Interactive comment on “High temporal resolution VHF radar observations of stratospheric air intrusions in to the upper troposphere during the passage of a mesoscale convective system over Gadanki (13.5° N, 79.2° E)” by K. K. Kumar and K. N. Uma

Anonymous Referee #1

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This manuscript discusses measurements from a VHF radar showing dynamical activity at the tropopause level. The authors interpret their results as a manifestation of a deep stratospheric intrusion associated followed by the generation of short gravity waves. Although stratospheric intrusion have already been detected in the tropics associated with tropical cyclones (Holland et al., 1984; Baray et al., 1999), it would be very interesting to display an association with a single MCS structure. The authors further suggest that the downdraft generates a subsequent gravity wave which propagate

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upward and downward from a source at 13-15 kmS.

The arguments and the analysis contained in the manuscript are however, very limited and fail to provide a convincing support to the claimed results and I have serious reservations against publication unless the authors are able to answer or rebut the following comments and questions.

- It is unclear for me how the authors distinguish in figure 1 what belong to the downdraft and what belong to the gravity wave. The downdraft at 17 km is followed by an equally intense updraft and the fact that intense updraft are not seen at lower levels cannot rule out the fact that we only see the propagation of a short gravity wave (especially in clear air). The propagation speed of about 4 m/s (5 km over 20 minutes) is within the admitted range for short gravity waves. It would require a sustained flux at the same speed to explain an intrusion.
- The uncertainty on the vertical velocity can be large in non homogeneous regions and should be assessed like in Astin (1997) or Choi et al. (2006).
- Such a deep intrusion induces a strong local heating and should affect more visibly the tropopause above.
- Traces of the intrusion should be visible on the water vapour channel of geostationary satellite images.
- Although, it is likely that a downdraft at tropopause level would induce stratosphere-troposphere exchange there is no independent data to support it and this cannot be presented as a result.

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