

Interactive comment on “Stratospheric intrusions induced by a Rossby Wave breaking and its interaction with the subtropical jet during PICO3 campaign” by A. Carré et al.

Anonymous Referee #3

Received and published: 30 November 2005

General Comments

This article documents four flights crossing stratospheric intrusions in the subtropics and simulates the intrusions using a variety of models. Qualitative comparison is drawn between the model results and the observations of ozone by an in situ sensor and LIDAR. However, it does not tackle the difficult problem of how observations from flights across one upper level trough and an older stratospheric streamer can be used to infer anything of a general nature about stratosphere-troposphere exchange. Even if the ozone distribution looks similar, this simply results from a reasonable representa-

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tion of adiabatic advection and does not imply that the exchange, which must involve non-conservative processes, has been modelled realistically. For example, the RDF reconstructions look good but are conservative unless changes along trajectories are modelled and therefore do not by themselves say much about STE other than it is slow. Perhaps if the comparison between model and observation could be made quantitative in this case study, it would give some guidelines on the ability of the model to simulate STE and quantify such fluxes throughout the atmosphere. Also, which physical processes are contributing to non-conservation of PV in the meso-NH model and ECMWF analyses and how much does each process contribute to STE in these case studies?

There were too many figures that look rather similar. There were also several sections through the same features. Also the text on the axes was far too small to be legible. Considerable work would be required to focus on figures that best demonstrate different points about STE. The text was rambling and mixed together methodology and details about models with the case studies in a manner that was hard to follow. The text would probably be easier to read if the methodology was discussed first and the discussion of case studies was much more focussed on a few figures.

I do not recommend publication of this article in ACP. It needs to be more focussed and attempt to be more quantitative, even if it is difficult.

Specific Comments

1. The title does not properly reflect the contents of the paper. “Interaction” between a Rossby wave and subtropical jet implies a paper about large-scale dynamics, whereas the focus of this paper is observations relevant to stratosphere=troposphere exchange.
2. “stratosphere-troposphere transport” could be “stratosphere to troposphere transport” to make clear that direction is implied. Similarly for TST.
3. Would omit the wind vectors from Fig. 1 because they are too small and are not

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used in the analysis or discussion.

4. The LIDAR observations in Fig. 5c appear to indicate that the subtropical stratospheric streamer (crossed at 15:20) is longer longer connected to the stratosphere. However, this is not a feature of the meso-NH simulation. Although the difference could be a result of displacement of the feature perpendicular to the flight path in the model, it is this type of difference that should be investigated in detail if any conclusions about STE are to be obtained.

Interactive comment on Atmos. Chem. Phys. Discuss., 5, 10301, 2005.

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