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Atmospheric Chemistry and Physics Discussions

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.

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General Comments

The authors consider aspects of stratosphere-troposphere exchange based on a detailed analysis of a single event. Since a meaningful quantification of STE based on individual events is probably impossible, the authors rightly focus instead on the irreversible nature of the mixing of various structures during the event. To this reviewer, an interesting aspect of the present study is that it provides an example of how balanced, quasi two-dimensional smaller scale dynamical processes lead to irreversible transport – in particular, the shearing and advection of the subtropical streamer. Accurate

analysis of this motion including ageostrophic circulations would require high resolution, limited area modeling, probably beyond the scope of the present paper (although perhaps a reduced version of Meso-NH-C on a smaller domain could be useful). On the other hand, the RDF technique appears to be a useful way of extracting some small-scale details from the coarser resolution fields; the use of this technique might be extended further.

The representation of tropopause folding is a difficult 4D visualization problem. Rather than showing many plots, cross sections, and datasets, however, I believe the presentation would be greatly improved by instead focusing on one or two sequences of images from a single data set. Since the model (Meso-NH-C and ECMWF) resolutions are clearly inadequate to capture the detailed structure found in the flight observations, I suggest using plots based on RDF for ALL of the discussion in sections 2 and 3, both for description of the fold evolution and for all comparisons with the flight observations. (The validity of RDF should first be established in a methods section earlier in the paper.) For example, figures 4-9 could be replaced with one or two horizontal and vertical cross sections of RDFPV at selected times.

In the same way, the presentation would benefit from a reorganization and a drastic reduction of the text. The main focus of the paper needs to be emphasized more. All description of models, datasets and techniques (much of section 2.1) should be in a self-contained methods section. Many of the details presented in Section 2.2 – anything that is not essential to the main focus of the paper – would be better omitted. Focusing in this way will greatly improve the impact of the paper.

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