

Interactive comment on “Rapid meridional transport of tropical airmasses to the Arctic during the major stratospheric warming in January 2003” by A. Kleinböhl et al.

Anonymous Referee #2

Received and published: 29 December 2004

The paper by Kleinböhl et al. presents measurements of the airborne submillimeter radiometer ASUR during the major warming event in late January 2003. The interpretation of the measurements implies rapid transport of air masses from the tropics and the measurements are used to infer transport timescales for this process. The description of the measurements and the discussion of the dynamical background are clear and easy to follow. The figures are all helpful and clear.

The paper nicely shows how the effect of dynamical processes can be seen in the measurements from ASUR and hence, how these measurements can be used to find inter-

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esting transport effects that otherwise could be overlooked. But stratospheric transport processes on the timescales discussed here can easily be directly studied with trajectory calculations. Since this paper is really focussing on the rapid transport of air from the tropics to high latitudes, trajectory calculations that directly show this transport have to be included in the paper. These trajectory calculations would also give the transport time scales in a much more direct way than the model calculations in section 4 of the paper. The arguments in section 4 are based on a simple model of linearized ozone chemistry. This approach is not state of the art and I have considerable concerns that it is not precise enough to allow good quantitative statements. It would be quite easy to run a box model with full stratospheric chemistry along calculated back trajectories from the locations of the measurements. Any potential issues with the initialization of such model calculations are less severe than the potential problems with the linearized chemistry.

In summary I think this is an interesting paper that has the potential to make a significant contribution. But since it is focussing on the transport from the tropics, a more direct way to look at this transport with trajectory calculations is needed. These calculations are also required to support the conclusions about the transport timescales. Section 4 is not state of the art and needs improvements, e.g. by using a box model with full chemistry.

Interactive comment on Atmos. Chem. Phys. Discuss., 4, 7121, 2004.

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