**Atmospheric
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Interactive
Comment

Interactive comment on "Residual circulation trajectories and transit times into the extratropical lowermost stratosphere" *by* T. Birner and H. Bönisch

Anonymous Referee #2

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This paper describes analysis of residual mean streamline and transit times (which is calculated by backward trajectory method). Main purpose of this paper is to separate the stratospheric circulation into two branches, one is shallow circulation branch (time-scale of days to a few months) and the other is deep circulation branch (time-scale of several months to years). "Aspect ratio" and "minimum pressure visited" are also used to separate stratospheric circulation. Annual mean and annual cycle fields are mainly discussed for these branches.

General comments

I agree with the existence of two branches in the stratospheric circulation. However,

because of distance of path, it is natural that transit times differ between in high latitudes and in midlatitudes. I would like to know what causes the two branches and annual cycle of the two branches in detail (e.g. experienced annual cycle of the stratospheric circulation, strength of circulation, wave-breaking point and/or characteristics of waves).

Specific comments

Section 2 In this study, backward trajectory is calculated from linear interpolations of monthly mean fields for smooth change in circulation. Backward trajectory calculated from daily fields is different from that calculated from the linear interpolation fields. How about transit times and lowest pressure visited? Do they depend on the calculation method? Please explain shortly.

Section 3.3 In figures 6-8, annual cycles of transit times and aspect ratio are expressed by percentage deviation. It is natural that percentage deviations of transit time in high latitudes is quite smaller than that in midlatitudes because annual mean transit time in high latitudes is quite longer than that in midlatitudes (50% of seasonal variation in high latitudes means about 2 years deviation!). In addition, aspect ratio in midlatitudes depends on the entering latitude into the stratosphere. Thus, it's not clear that annual cycles of transit times and aspect ratio in high latitudes are smaller than that in midlatitudes. Anyway, I suggest you draw not only percentage deviation but also anomalies of transit time and aspect ratio.

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 16837, 2010.

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