

Interactive comment on “On the structural changes in the Brewer-Dobson circulation after 2000” by H. Bönisch et al.

Anonymous Referee #2

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This is a carefully thought out and thorough piece of work. The idea that it is necessary to refer to changes in the structure of the Brewer-Dobson Circulation rather than just to changes in its strength is an important one. It is relevant to chemistry-climate modelling studies and dynamical studies alike. I would recommend publication subject to the comments below.

Major comments:

p28404: On this page you detail the spatial resolution of the observational data. On p28406 you explain the need to consider observations in the same month in each year due to the seasonal cycle in the distribution of N₂O. It is also the case that tropical upwelling (referring here to the residual circulation) has a strong semidiurnal

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cycle. Please also include comments as to what was done to take account of this.

Currently all text on Figure 5 actually refers to Figure 6, and all text on Figure 6 actually refers to Figure 5. Please either swap the figures or the text around.

Minor comments:

p28401, lines 21–22: It is noted that a “temperature drop” is consistent with an “intensified Brewer-Dobson Circulation”. This important point makes sense because the BDC is wave-driven. I think this is worth a comment, since the wave-driven nature of the BDC is not mentioned explicitly until the following page.

p28402, line 25: Following “leaky” you might consider referencing:
Neu, J. L., and R. A. Plumb, 1999: Age of air in a “leaky pipe” model of stratospheric transport. *J. Geophys. Res.*, **104**, 19243–19255.
The leaky nature of this “transport barrier” is also relevant on p28409, line 23.

p.28405, lines 14–16: Please comment on the statistical significance of the elevated post-2000 lower stratospheric ozone signal.

Figure 2: Why the change in colour scheme from red and yellow lines to blue and red lines at 100hPa? If this is to separate troposphere and stratosphere please make a comment to this effect in the figure caption.

Typographical errors:

p.28403, line 21: data set → data sets

p.28413, line 21: has been identified → identified

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