

Interactive comment on “Analysis of a rapid increase of stratospheric ozone during late austral summer 2008 over Kerguelen (49.4° S, 70.3° E)” by H. Bencherif et al.

Anonymous Referee #2

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This article analyses a total ozone increase observed in mid-April 2008 in ozone soundings and column ozone measurements over Kerguelen in the southern mid-latitudes. Using satellite observations from OMI and MLS assimilations by the MOCAGE model, as well as high-resolution PV advection by the MIMOSA model, the contrasting origins of air masses in the lower and mid stratosphere are deduced: polar origin at 475K and subtropical origin at 700K.

Although the paper is thin on new science, it has the merit of presenting and clearly interpreting new observations in an area where atmospheric measurements are scarce. The paper is mostly well-written. I however would recommend some revisions that

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would considerably help in presenting the results.

1) Uniformisation of the mapped data. To help the reader, I think polar maps as in Figure 3 should be used throughout, for example on Figure 4 and 5, with similar set of dates. The authors could show, in addition, a zoomed plot with MIMOSA, as a separate figure. 2) The authors present a careful analysis of their observations, but the discussion section would benefit in drawing analogies with known similar situations. In particular, similar contrasting transport in the low and mid stratosphere are found during summertime low ozone episodes at mid-high latitudes of both hemispheres (Orsolini et al, QJRM, 2003; Jackson, cited, 2007). These would be opposite situations (polar air aloft and low latitude air below), but the analogy is worth to highlight. 3) Some information on the summer to winter transition and the autumn build-up of the vortex would be useful to show when in the seasonal cycle these measurements were taken. Perhaps in connection with Figure 2, to relate it to the O₃ seasonal cycle. 4) The use of ECMWF data in Figure 4 is hardly necessary, or the authors should justify why it is used. The MIMOSA model is driven by ECMWF fields, and has been shown to reproduce filaments observed –more coarsely- in the ECMWF analyses. ECMWF ozone seems hardly necessary unless it is integrated more with Figure 2 and shown as in Figure 3,5.

Minor comments p5;l7. Specify “at that altitude” p5;l35. The characteristics of the assimilation run, relevant for this study ought to be clarified a bit more. The MOCAGE CTM is said to be driven by Arpege. Is the GCM run in assimilation mode ? or is the CTM driven off-line rather by ECMWF analyses? Please clarify.

p7; l5-11: section is long, could be simplified p7; l25; no need to mention a trend here. There is an increase in total ozone p7; l30. Use of word “global” is misleading here (Same on p8;l13). “On the global” could be removed p8;l15. Remove “pretty good agreement”. Give percent estimate p9;l8. Unclear sentence starting with “It can be seen. . .”. Rather: “There are some filamentary structures extending from polar regions to the subtropics. . .” Figure 2a,b should be combined in one, as there is much overlap.

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Figure 1. Hard to distinguish the curves corresponding to latitude bins 15-25S and 75-85S. Use colour, different symbol or thickness.

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