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Atmospheric Chemistry and Physics Discussions

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Interactive Comment

Interactive comment on "Stratospheric winds: longitudinal distribution and long-term trends" *by* M. Kozubek et al.

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General comments:

Overall: This a standard study of the distribution and trends of stratospheric winds. The analysis seems reasonable, but in my view, the paper is thin on the justification of the work. Why is it important?

Answer: The Introduction is broadened and now it includes also reasons why to study impact of solar activity on total horizontal wind, reasoning why we divided some investigated periods into two (before and after the mid-1990s, time of turnaround of ozone concentration), and reasons why to study longitudinal distribution of meridional wind. The meridional wind is important as the Brewer-Dobson circulation is its component.

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Interactive Discussion
Discussion Paper

In the beginning of this study the longitudinal distribution of meridional wind was only by-product of main investigation but now we consider the well-pronounced longitudinal structure of wintertime meridional wind at 10 hPa to be the most important result of our study.

Whether the paper is suitable for ACP is the decision of the editor, but before acceptance for ACP I would like to see a punchier paper, with more information on the justification for the work and the impact of the results, and further tests on significance. The authors could have repeated the tests of significance at 99% to test robustness of the results.

Answer: We added more information about our results and computed significance test at 99% level. Table 2 was changed to represent differences instead of absolute values. New Table 3 is included with all results (except one) significant at 99% level.

Specific comments:

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L. 5: I think the main point for using reanalysis data is that they provide a consistent dataset.

Answer: Thank you for your comments. It was added in the text.

L. 10: Why is this interesting? Please avoid subjective statements.

Answer: Subjective statements were deleted.

L. 12, 13: I suggest the authors use “dipole” and “quadrupole” instead of “two-core” and “four-core”.

Answer: After discussion with my colleagues we decide to use original terminology which is usually used in meteorology.

L. 23: Presumably this is an example of what can cause changes in the stratospheric

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wind?

Answer: We added more information about changes in the stratosphere, importance of the stratospheric circulation and its connection with climate changes.

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L. 2: I think more details should be provided about the importance of the stratospheric circulation and the impact of climate change on this circulation. References would be useful.

Answer: We added more information about changes in the stratosphere, importance of the stratospheric circulation and its connection with climate changes. References were added.

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L. 15: Why do you want to look at the meridional wind?

Answer: The meridional wind is very important but relatively little studied; the Brewer-Dobson circulation (i. e. transport of ozone from tropics to the polar regions) is also meridional circulation. Among others the results of section 3.3 support our interest in meridional wind.

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L. 3: Are you evaluating the ERA reanalyses by just looking at one site in Prague?

Answer: Mutual comparison of ERA-40, ERA-Interim and NCEP/NCAR reanalyses was done and they were also compared with Prague-Libus and two other stations (see Kozubek et al., 2014).

L. 24: Do you mean total horizontal wind?

Answer: Thank you for your comment. We added horizontal into the text.

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L. 1: What about significance at 99%?

Answer: We computed significance at 99% level. Only 4 out of 192 values in Table 1 were identified as significant so we decided to use only 95% level. But we found trends of wind speed in two cores at 10 hPa (Table 3) to be significant at 99% level (with only one exception). This information is added in the text.

L. 12: Do you mean geographical sectors?

Answer: Thank you for your comment. We added geographical into the text.

L. 23: Is 0-360oE correct?

Answer: Thank you for your comment. It was corrected in the text (0°-90°E).

L. 25: Behaviour of what? Please provide details.

Answer: Behaviour of wind speed. It was added into the text.

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L. 7: Why is this a physically plausible result?

Answer: The sentence was re-formulated and statement “physically plausible results” is no more used.

L. 13: What is the evidence that the two periods (25 and 17 years) are long enough for your analyses?

Answer: This sentence was reformulated into the text.

L. 15: What criterion do you use for a major sudden stratospheric warming?

Answer: The standard WMO definition is used for SSW. A note is made in the text.

L. 19: Please provide examples (with references) of these previous studies.

Answer: References were added into the text.

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L. 11: Please elaborate on your statement about results supporting the four core structure in winds.

Answer: Wind field is closely associated with distribution of geopotencial height because of dynamics reason.

L. 25: Are you results consistent with Holton-Tan, or provide insight into Holton-Tan?

Answer: Our results are consistent with Holton-Tan rule.

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L. 1: Why is this interesting? Please avoid subjective statements.

Answer: Subjective statements were deleted.

L. 19: The pitfalls of zonal mean averages are well-known.

Answer: This problem with zonal averages is well known but they are still used too often. That is why we would like to mentioned it in discussion. A note is made in the text.

L. 22: What do you mean by noticeable?

Answer: Noticeable was deleted.

L. 25: Why is this remarkable?

Answer: Remarkable was deleted.

Style comments:

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L. 24: in -> on.

Answer: Correction was made.

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Interactive comment on Atmos. Chem. Phys. Discuss., 14, 16387, 2014.

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