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Comment

## ***Interactive comment on “Accuracy of analyzed temperatures, winds and trajectories in the Southern Hemisphere tropical and midlatitude stratosphere as compared to long-duration balloon flights” by B. M. Knudsen et al.***

**Anonymous Referee #2**

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Review of Knudsen et al., “Accuracy of analyzed temperatures, winds and trajectories in the Southern Hemisphere tropical and midlatitude stratosphere as compared to long-duration balloon flights”, ACPD, 6, 7499-7518

General comments:

I think this could be a useful paper for the scientific community. However, I think it still needs a lot of work before it is suitable for publication in ACP.

In my view, the main shortcoming of the paper is that it does not have a clear statement

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of its motivation. The title does give a clue, but the text does not. For example, at least the abstract, introduction and conclusion should include a description of the motivation of the paper and a description and motivation of the HIBISCUS project.

Furthermore, I find a lot of the discussion confusing and difficult to set in the context of the paper. For example, it is not clear to me why the paper discusses Arctic trajectories (section 5).

Finally, the paper needs clarification in several places, details of which I give in the specific comments section below.

Specific comments:

P. 7500, line 5 and following: A description of the HIBISCUS project and a motivation for the paper are needed.

Line 24: Equador -> Ecuador

P. 7501, lines 4-9: Acronyms should be identified here and elsewhere in the paper.

Lines 17-18: What is the motivation for comparison of the ERA-40 re-analyses against the balloon flights?

Line 19: A description of HIBISCUS and a motivation of the paper are needed.

P. 7502, line 4: Is the special issue in preparation as indicated in footnotes 1-2 or is it a special issue to which this paper has been submitted? Reading the paper I got the impression that it had not been submitted to the HIBISCUS special issue.

Line 9: stay-> stayed

Lines 12-13: Are the errors quoted random errors?

Line 19: "As expected"? Is this obvious? Perhaps a brief explanation would help.

Line 25: "to 0.1 K" -> "as 0.1 K". I think this makes it clearer that the bias is estimated as 0.1 K (as I understand the text).

P. 7503, lines 5-6: I do not understand the text. As I interpret it, only night-time measurements from MIR are meaningful (I presume this means useful to the study), so that implies day-time measurements are not meaningful. As night-time measurements are not going to be used in the present study, presumably day-time MIR measurements will be used, which as suggested above are not meaningful. Please clarify.

Lines 16-17: “Operational analyses in 2004 and are used at 6 hourly”

Lines 24-27: Why the difference in the way the trajectory calculations are done?

P. 7504, line 3: Presumably you mean the ECMWF operational analysis?

Line 10: When you say “started already in 1998” do you mean the problem was already known then, or changes in the system caused it to appear then. Could you say what caused the problem?

Line 20: “north of 30S”: do you mean between the equator and 30S? Is the zonal velocity under discussion that of ECMWF?

Line 23: Why do the ECMWF analyses not capture the inertia-gravity waves? Is this a resolution issue?

P. 7505, line 7: I think it is better to say: “vertical motion of the trajectories is taken account of.”

Line 9: Identify what you mean by “tropical reservoir”.

Lines 13-15: Explain your statement. From the figure, I see the trajectories are smoother than the BP4 trajectory. Is this (partly) due to the relatively coarse resolution at which the trajectories are implemented (see section 3)?

P. 7506, line 1: Is the assumption about the autocorrelations reasonable? Has it been tested?

Line 3: The shadings do not overlap for durations  $> 10$  days. Please comment.

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Lines 5-8: What data assimilation scheme is used by NCEP/NCAR? Your statement suggests they do not use 4d-var.

Lines 11-12: I do not understand the statement “Épressure permanently below 10 hPaÉ”

Line 13: First discussion of Arctic trajectories in the paper (unless I have missed something). Why bring them in to the discussion? Why the comparison between the tropics and the Arctic? The title of the paper refers to the Southern Hemisphere.

Lines 18-21: I do not understand the steps in the argument. Please clarify.

Lines 21-23: The trajectory error should be defined earlier in the section (e.g. when discussing Fig. 4).

Lines 26-29: Why discuss the Arctic trajectories? Is it for comparison against tropical trajectories? I find the discussion confusing.

P. 7507, lines 13-14: Quantify the trajectory errors discussed here and later in the paragraph. For example, quantify the statement: “Éare in fact close to the errors in the Arctic”.

P. 7508, conclusions section: There is no motivation for the paper, and no discussion of the HIBISCUS project. How are results useful to the scientific community?

Lines 13-14: Why the comparison against the Arctic?

Line 15: Is comparison against ERA-40 discussed in the paper? Section 1 suggests that this will be done in a future paper. A motivation is needed for discussing ERA-40 here - perhaps comparison between ECMWF operational analyses and ERA-40 as part of future work.

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Interactive comment on Atmos. Chem. Phys. Discuss., 6, 7499, 2006.

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