

## ***Interactive comment on “A meteorological overview of the ARCTAS 2008 mission” by H. E. Fuelberg et al.***

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Responses to Referee 1

General Comments

We have shortened the manuscript by combining Sections 3.3 with 3.4 and 4.3 with 4.4. These combined sections and the Example Sections have been shortened to omit unnecessary specifics, while retaining the major points. We also removed panels from some figures and their accompanying text.

Specific Comments

1) Merging the examples sections with the origins sections implies that the panels of

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the corresponding figures correspond with each other. However, the best example cases do not always correspond with the best trajectory and FLEXPART cases. We believe a compromise is a better alternative. Specifically, we have merged sections and shortened the discussions. We believe this makes the manuscript easier to read and achieves the reviewer's goals.

2) We certainly agree with the reviewer that comments about "local meteorology" would be informative. However, both reviewers also state that the manuscript is too long. Discussions about average temperature, surface wind speed, and impacts on the ice sheet on the ocean open leads would require considerable additional material. Since referee 2 did not mention these aspects, but both desire a shorter manuscript, we believe it is best not to lengthen the manuscript.

3) Section 3.2—We have added comments about the arctic front.

Section 3.4—We have added the link to the Norsk Institutt for Luftforskning (NILU) FLEXPART website in Section 3.3. That location seems better than Section 3.4.

Technical Comments

P18418—We have added the word "Lagrangian" to all references of FLEXPART where it was appropriate.

P18419 2nd paragraph—Comments about turbulent processes and mixing have been added.

P18420 L11—The reference has been added.

P18421 L6—The "Two, two-way..." sentence has been revised to avoid confusion.

L11—As requested, we now provide average WRF vertical grid spacings near the surface and tropopause.

P14822 & elsewhere—We have added "burning" in all cases. The phrases now read "biomass burning CO" and "biomass burning sources".

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P18424â€”We have added the following comment and references: “The injection heights for biomass burning emissions are subject to some debate. Labonne et al. (2007) concluded that most aerosols are injected within the boundary layer; however, Kahn et al. (2008) stated that at least 10% of wildfire smoke plumes reached the free troposphere. Our biomass burning emissions were released by filling each fire containing column with tracer particles from the surface to 1 km AGL. This altitude may be either too high or too low depending on local conditions.”

P18425â€”We have added the word “geopotential” to clear up any confusion. Our goal was to state Buys Ballot’s Law for how winds blow with respect to isobars or height contours. The sentence now reads, “Winds at this level blow approximately parallel to the contours, with greater geopotential heights to the right in the Northern Hemisphere.”

P18427 1st paragraphâ€”We have added comments about the storm tracks.

P18427 L8â€”We have added the Eckhardt et al (2004) reference as requested.

P18427 L18â€”The sentence now reads “...middle and upper troposphere”, as requested.

P18427 L20â€”We have rephrased this sentence to include the Cooper et al. (2001) reference.

P18427 L24â€”We have rephrased this sentence, as requested, and added the Danielsen (1968) reference.

P18436 L14â€”This sentence has been rephrased, and hopefully is now easy to understand. We have removed the term “split jet”.

P183437 2nd paraâ€”We have added a brief discussion about LNO<sub>x</sub> to this paragraph. This certainly needs to be included.

P18439 L29â€”We have greatly shortened both Examples sections. We now focus on what is happening at the time of the figure, and not on what has happened before or

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after which can only be seen in the animations.

Figures 4, 6, 16, and 17â€”Figures 4 and 16 have been improved by having a larger contour interval (fewer contours). They are now easier to see. We have strived to improve Figs. 6 and 16, but we cannot do a great deal since they were taken from the CDC web site.

Figure 7 captionâ€”We have modified the caption to improve its readability.

Figure 11â€”We have changed the figure to a polar stereographic projection

Figures 12 & 13â€”We believe it is easier for the reader if the panels are presented in the order they are described in the text. Our objective is to describe different types of pressure and transport patterns. In some cases, two variations of a general pattern are shown, and they do not always occur in chronological order. We have retained the original order.

Figure 13â€”We have improved the figure.

Figure 23â€”The figures are at a high resolution; however, they were too small to see their detail. We have made the figures larger.

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Interactive comment on Atmos. Chem. Phys. Discuss., 9, 18417, 2009.

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