

## ***Interactive comment on “Trans-Pacific dust events observed at Whistler, British Columbia during INTEX-B” by I. G. McKendry et al.***

**Anonymous Referee #1**

Received and published: 11 July 2008

Again this paper compares two specific aerosol transport events, first in April and the other in May 2006 and conclude that the April event had a significantly larger dust component, compared to the May event. Yet, the May event had a sulfate component.

This paper does illustrate the importance of the recent April 2006 dust storm with regards to a historical perspective. This is important information for addressing the research questions regarding the potential for larger magnitude dust storms with land use changes and the radiative impacts. This paper also illustrates the potential for weaker; dust storms to contribute sulfate. Yet, this paper does not illustrate the significance of this sulfate. How does this compare to current model estimations for sulfate?

I agree with the earlier referee's comment that this conclusion is probably correct, but

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the analysis is somewhat weak and a bit disorganized. These are my suggestions:

Comments:

1. Page 10279 line 18 How is the fog identified?
2. Page 10279 line 20 An Aerodyne high resolution; identify the manufacture
3. Page 10280 line 2 Since the PCASP data is used in this paper, a further discussion is required here. What is the PCASP size range? Spell out PCASP - The Passive Cavity Aerosol Spectrometer Probe - FSSP, and CPC. What is the characterization of the Cessna inlet? Less than 1 micron? This will help us interpret the results described on page 10282.
4. Page 10280 line 15 With regard to the HYSPLIT model, specifically which data set was used? What elevation did you use to represent Whistler? Did you run ensembles in HYSPLIT? Did these look similar?
5. Page 10280 line 20 and line 21 Zhou et al., 2007 should be 2008.
6. Page 10281 line 1 Need further evidence for the claim that the material had a modal particle diameter of 2 -3 microns. You could show a size distribution.
7. Figure 2 the second event (May 15 8211; 16) is not clear from this figure. It looks very similar to May 6th or May 11th, what cause these 8220;events8221;? Why are you getting 2 micron particles without a dust event?
8. Page 10281 line 20 with reference to the April 15 8211; 19 period identified by Zhou et al. 2008 and shown in figure 3. So, what changed in the meteorology that did not allow this dust to travel to Whistler? What is different about April 23-26 and May 15-16?
9. Page 10282 line 10 In the abstract and conclusion the April event is titled weak sulfate;, yet here it states on April 25, Above 3km, the fine particle aerosols was almost completely dominated by sulfate. This need to be clarified. Also does fine mean less than 120nm from the figure? Or the AMS cut-off of 1um?

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**ACPD**

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10. Page 10282 line 15 Need to define and 7610

11. Page 10282 line 20 larger needs to be defined as size, also fine needs to be defined. This will eliminate confusion. Also, I think the PSAP size distribution shift, would illustrate this point more clearly.

12. Page 10283 line 12 Leaitch et al, 2008 is missing from the reference list

13. Page 10283 line 14 the lidar imagery needs to be further explained. What does the ratio of 537/607 tell us about the size distribution of the particles? Also, why did you show the weaker; dust event in May? Is the lidar data from the April dust storm available? Why is this not discussed?

14. Page 10284 line 3 not sure about the reference to figure 7, I think this should be figure 8?

15. Page 10284 Section 3.4 Although Whistler and Crater Lake are at similar altitudes, they are a great distance apart. This should be noted and may account for the differences shown in table 1 (e.g. May 15 SO<sub>4</sub> of 0.81 vs 1.8). See further comments below

16. Page 10284 line 17 Zhao et al. 2007 should be 2008

17. Page 10285 line 3 to 5 appears to be the strong conclusion of the paper, giving the importance of this dust event in comparison to previous events.

18. Page 10286 line 13 McKendry et al., 2005 missing from reference list.

19. Table 1 From the table, differences between 0.93 ug/m<sup>3</sup> and 0.81 ug/m<sup>3</sup> at Crater Lake illustrate high; vs. low; sulfate. This needs to be further discussed, I believe you are using this reference only with regards to the Whistler location, as noted in the text, but this also needs to be illustrated in the table.

20. Section 3.4 and conclusion Overall, it appears to make conclusions regarding these events as weak vs. high sulfate episodes, there requires a discussion of the uncertainty

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and temporal resolution (were all these dust storms of the same length in days) of the IMPROVE data set.

21. The conclusions listed on page 10287 are vague. Do you have suggestions for how the different pathways attributed to the in SO<sub>2</sub>. Did the May air mass pass over an industrial region? Can you list specific possible meteorological or chemical processes that may account for the differences?

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Interactive comment on Atmos. Chem. Phys. Discuss., 8, 10275, 2008.

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