

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

Anonymous Referee #2

Received and published: 2 July 2008

This paper presents new results from the Whistler site for the INTEX period and an analysis in terms of the degree of dust/sulfate/organics in the observed aerosols. The analysis is supportive of previous work (cited) that describes the Asian aerosol in terms of a varying mixture of these components. The paper compares two specific aerosol transport events, one in late April and the other in mid-May 2006 and conclude that the April event had a significantly larger dust component, compared to the May event. While I think this conclusion is probably correct, I feel that the analysis is somewhat weak and a bit dis-organized. The authors attempt to pull together data from Whistler, aircraft and Crater Lake Oregon into a coherent picture. This is a worthwhile effort, but it needs to be done in a more uniform manner. These are my suggestions:

Figure 5: Is the particle number on a log scale? Is there any measure of dust in these

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profiles? In the text you state for the April 25th profile: "Above 3km the fine particle aerosol was almost completely dominated by sulfate." yet in text, you describe this event as dust dominated....

In Figure 7: I agree that the airmass probably picked up local/regional pollution. I suggest you look at other tracers such as ozone and water vapor for evidence of boundary layer air. While the trajectories shows subsidence, this is rather surprising given the cyclonic pattern.

Table 1 is rather confusing. I suggest the caption indicate "Crater Lake Oregon and Whistler fine particle data" and the columns in the table clearly indicate which is which.. Since the Crater Lake data is 24 hours and Whistler samples are 48 hours, is this a fair comparison? Do you expects "events" at Crater Lake to be similar in timing and composition to ones observed at Whistler? The authors convey the perception that the April event is dominated by dust (e.g. "High dust/low sulfate" in table), but the SO₄/Ca ratios is 4.7, suggesting that SO₄ still plays an important role. Is it possible to estimate the dust mass concentration from the Ca data? The text claims that the 0.14 ug/m³ is one of the "largest 4-5 events", but this certainly is not apparent from Figure 9.

Some additional questions that might be useful for strengthening this analysis:

1) What is the variability of sulfate vs Ca? Is it correct that dust shows greater variability compared to sulfate due to source variability? 2) What is the role of precipitation removal during transport? 3) What is the significance of the northerly vs southerly transport pathways shown in Figure 4? Does the southerly route usually come with more precip and more local/regional pollution (eg the May event)? Does the northerly route come with more ozone due to subsidence? 4) Figure 6 shows the lidar 532/607 ratio. What is the significance of the ratio? Would dust show a different ratio due to its different size characteristics? Examples?

So overall, I think this is a very useful dataset and the authors are on track for a good analysis. However I would like to see the analysis go into more detail, be better orga-

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nized and more clearly presented.

Detailed comments:

Page 10277, lines 26 through 27; Asian sulfate aerosol enhancements are shown to be greatest in Washington State and South British Columbia with a maximum 24-h enhancements reaching approximately Reference?

Page 10278, line 10, Consider referencing article by Mian Chin published in ACP 2007, Atmos. Chem. Phys. Discuss., 7, 9013-9051, 2007www.atmos-chem-phys-discuss.net/7/9013/2007/

Page 10279, Methods – No gas measurements at Whistler?

Page 10279, lines 15, Chemistry is from bulk filter packs, collected every 48 h and analyzed for inorganic ions…Don't understand: is this a continuous measurement?

Page 10279, line 16, All particle sampling takes place through a heated stainless steel manifold. …. What is the temperature?

Page 10281, line 4: I don’t see the shift in size distribution from Figure 2. lines 24-28, Figure 4 shows…..Put this discussion it the figure caption.

Page 10283, line 8, (Walker et al., 2008) is not listed in the reference section.

Page 10283, line 9 (Zhang et al. (2008) is not listed in the reference section.

Page 10284, lines 25 through 28, It would be very helpful to know total PM2.5 and PM10 mass concentrations. Also can you calculate the dust mass concentration from Ca?

Page 10291, Table 1: Table needs clearer label and columns for Crater Lake data.

Page 10295, Figure 4, please explain the figure in the caption, see my comment on Page 10281.

Page 10299, Figure 8, The trajectory suggests cyclonic flow, yet the airmass arrives

S4353

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with subsidence. Seems surprising. Discussion?

Final note: Please make all text in Tables and Figure captions larger!

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

ACPD

8, S4351–S4354, 2008

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