

***Interactive comment on “Now you see it, now you don’t: impact of temporary closures of a coal-fired power plant on air quality in the Columbia River Gorge National Scenic Area” by D. A. Jaffe and D. R. Reidmiller***

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**General Comments:**

This paper exploits long term, frequent ambient monitoring to deduce the effects of a particular coal-fired power plant on air quality in the Columbia River Gorge by examining the change in air quality during periods of plant shut down. It is an excellent demonstration of how monitoring can be used to substitute for an economically or technically infeasible experiment (in this case, shutting down a major regional power plant),

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and also presents an opportunity to compare the observed air quality increment associated with the power plant with that predicted by modeling its effects.

While the case in point is of limited interest outside the Pacific Northwest region of the United States, the methodology is widely applicable, and thus the paper addresses global interests.

Overall, the work appears to be carefully done and well documented. There are, however, some aspects of the presentation that could bear improvement. These are noted below, and are not intended as a rejection of the quality or the validity of the work, but suggestions for improving the paper.

**Specific Comments:**

1. The Abstract contains too much background material, and should be revised to focus on describing the “found experiment,” noting the salient technical and methodological components of the work, and briefly highlighting the major findings. The other material, such as the legal requirements, should be addressed in the Introduction section.
2. The Introduction section should be reorganized to better separate the presentation of the purpose and the methodology of the paper from the history and local conditions in the Columbia River Gorge and surrounding region. Making two separate sub-title sections would be appropriate.
3. The four science goals should be re-ordered to follow a natural priority:
  - “Can we use emissions data from the Boardman plant to quantify its contribution to PM<sub>2.5</sub>”... is the obvious lead question – but I recommend it be restated as “Can we use emissions variation over time from the Boardman plant to quantify its contribution to PM<sub>2.5</sub>”...
  - “What can backtrajectories tell us”... should be re-stated to be more specific, reflecting interest in determining the power plant’s contribution to high PM<sub>2.5</sub> days (implicit in section 3.2 and Table 2).

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- “How do these results compare to the previous work”. . .
  - “Has there been any trend in PM2.5 concentrations”. . . is most relevant to the current analysis in the context of increasing or decreasing impact of the Boardman plant (e.g. by changing plant usage, altered SO<sub>x</sub> or NO<sub>x</sub> aerosol conversion rates, etc.). The text in Section 3.5 suggests that the change is not large enough to be detected in visibility in the CRG (the underlying motivation for the monitoring). If there is a significant trend, or if others (e.g. Malm, 2002) have suggested there is, this discussion should be enlarged to show the analysis and point to causes of any discrepancy between reports; if not, the authors may choose to eliminate this entirely.
4. The authors should address and resolve the implicit contradiction between their critique of the model results in “Columbia River Gorge Air Quality Study, Science Summary Report, Pitchford et al., 2008”, which performed poorly because of the use of large grid wind fields, and their use of the coarse grid wind fields in the HYSPLIT re-analysis data base used to construct back trajectories.
  5. The paper mixes metric and english units (e.g. "short tons"); please clarify or use only metric units.

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