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Atmospheric Chemistry and Physics Discussions



# *Interactive comment on* "Scavenging of biomass burning refractory black carbon and ice nuclei in a Western Pacific extratropical storm" *by* J. L. Stith et al.

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**Review of "Scavenging of biomass burning refractory black carbon and ice nuclei in a Western Pacific extratropical storm" by J. L. Stith et al.**

This paper provides a description of refractory black carbon (rBC), Ice Nuclei (IN), and ice crystal measurements in an extratropical cyclonic storm. The paper is well written, interesting, and appropriate for publication in ACP. The fact that IN concentrations are in agreement with ice concentrations is interesting and conflicts with other studies that

have invoked ice multiplication mechanisms (not verified by laboratory measurements) to explain ice concentrations that were apparently much higher than IN concentrations. I have a few relatively minor comments for the authors' consideration.

**Minor comments:**

1. To my mind, one of the most interesting result presented is the evidence (Fig. 7) indicating that multiple residual particles were produced for each ice crystal entering the CVI inlet (presumably due to shattering). This result is relevant for past studies (papers by J. Ström and colleagues) in which a CVI was used to measure ice concentrations based on the assumption of one residual per ice crystal. Also, composition measurements of ice crystal residuals behind CVI inlets have been used to infer IN composition. Perhaps the authors could mention this result of multiple residuals per ice crystal in the abstract. Also, when I read the instrumentation description (Section 2), I wondered about shattering in the CVI inlet and the possibility of multiple residual particles being produced. Perhaps this potential artifact could be mentioned in Section 2.

2. There is also potential for shattering producing artifacts in the 2DC measurements, particularly given the relatively low ice concentrations in the cloud. The authors state that the 2DC images indicate that the ice crystals were typically a few hundred $\mu$m in size. If appreciable concentrations of larger crystals were absent, then I suspect shattering was not a significant problem. Inclusion of a size distribution from the 2DS measurements would help with to resolve this issue, and, in any case, perhaps some discussion of the possibility would be appropriate.

3. As far as I could tell, the chemical analysis of IN were not mentioned in the abstract.

**Technical corrections:**

1. Page 582, line 20: "cloud" $\rightarrow$ "could"

2. Fig. 2, top panel: labeling the two curves would be helpful.



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3. Fig. 6, top: including a scale (e.g., a line indicating 100 $\mu$m) would be helpful.

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 567, 2011.



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