

Interactive comment on “Chemical characterization of fog and rain water collected at the eastern Andes cordillera” by E. Beiderwieden et al.

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This is a very good analysis of fog and rain water chemistry collected in a forested, tropical mountain site in Ecuador. The field collection and laboratory analysis is high quality, and the resulting data set will be important to a number of researchers conducting fog and cloud water research. The paper should be published after making minor revisions.

Specific Comments:

1. Please add a paragraph to the discussion section that compares these results with those of other studies. The authors list a number of studies of other mountain sites in the abstract, but then do not present a comparison with other studies in the discussion

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section. The chosen citations listed in the abstract are very appropriate, but a comparison needs to be developed in the body of the paper. In fact, I suggest that the citations be removed from the abstract all-together.

The authors state that an absence of liquid water content (LWC) measurements of the fog and precipitation prevented them from comparing their chemistry results to other studies. Unless the authors believe that some of the water in their collectors evaporated, then not knowing the LWC should not present a problem. Concentrations of ions in fog or rain are independent of how much precipitation actually landed in the collector. The results should be compared with other studies; this increases the importance of the contribution.

2. Abstract, line 19: The last statement of the abstract states that the continent samples exhibit higher concentrations of ions than the pacific samples, but unlike the main body of the text, it doesn't state that those differences are not significant. The information in the abstract should be consistent with what is presented in the paper.

3. p. 865, line 8: "The study site is within the inner tropical convergence zone (ITC)" Correct this statement to "intertropical convergence zone (ITCZ)." Since the ITCZ migrates north-south during the year, what is the position of the ITCZ relative to the study site at the time these samples were collected? Also, do the "air masses arriving from various directions [that] represent very different advection regimes" represent different air systems derived from the Pacific, which may be associated with westerly winds of the ITCZ, versus air systems influenced by the easterly trade winds? Hastenrath (2002) has a discussion of this phenomenon for Central America, and it would be interesting to know if it also applied to this study area. At the very least, please expand on the last statement of this paragraph by briefly outlining the different advection regimes that affect the study area.

4. p. 866, line 6: "A roof prevented rain from reaching the fog sample." Does this include wind-blown rain?

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5. p. 867, Section 2.4, Chemical analysis: In this section, include a statement that explains the accuracy and precision of the analyses.

6. p. 868, line 2-3: “Three fog samples, which were collected after extended non-foggy conditions, had to be excluded from further analysis” because they were attributed to have received dry deposition of particulates. Describe what is meant by “extended,” as this will help others planning similar research. Given that the fog collector was cleaned once per week, does extended mean more than a day?

7. p. 868, line 21: the winds “turned to their right-hand side before reaching the sampling site.” This is difficult to understand, because it depends on a point-of-view. Use a compass directional instead.

8. p. 869, section 3.3: In this comparison of continent and pacific samples, it is unclear whether the authors are comparing fog or rain samples, or both fog and rain samples. Extend this clarification to the headings for Tables 3 and 4.

9. p. 870, line 19: “For NH_4^+ and NO_3^- , the ratios are even higher.” The term “ratios” is unclear. To improve clarity, explain that the percentages of these ions are higher.

10. p. 871, lines 7-8: “The difference of chemical composition between continent and pacific fog water samples could not be detected as expected.” The paper does not explain anywhere what the expected differences were. Elaborate the discussion to present hypotheses proposing why different trajectory paths might have different precipitation with different chemistries. Were the pacific samples expected to have been influenced by marine aerosols (with higher chloride concentrations)? Were the continental samples expected to have been affected by biomass burning (such as was interpreted in Monteverde, Costa Rica, by Clark et al., 1998)? Are there other anthropogenic activities in the Amazon that might influence the precipitation chemistry? The fact that the different fogs are not significantly different in composition is an interesting result. The authors interpret that the pacific samples were continentally influenced as well; again what ions in the chemistry lead to this conclusion. This information is in

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the paper, but improved organization within the framework of a stated hypothesis will communicate the ideas more clearly.

11. p. 871, lines 19-21: This paragraph discussing the lack of LWC data can be eliminated.

12. p. 872, line 2: The publication year for the Bridges et al. citation does not agree with the reference in the Bibliography. Recheck citation.

13. p. 872, line 25: HCO_3^- is “bicarbonate,” not “hydrogen carbonate.” (See Drever, 1997).

14. p. 873, lines 15 - 18: Again, I disagree that the lack of LWC prevents the authors from comparing their data with the results of others.

Technical Corrections:

p. 865, line 22: “cool down adiabatically” can be changed to “cool adiabatically.”

p. 868, line 9: “These samples contained much higher ion concentrations that are associated with dry deposition” Need to say the concentrations were higher than something else. Clarify. Possible rewrite: “These samples contained high ion concentrations that are associated with dry deposition”

p. 869, line 3: “The dominating ions are the hydrogen ions” Change to: “The dominate ions are hydrogen ions”. The word “dominating” is misused for “dominate” in other places in the paper too.

p. 869, line 6: Replace “die” with “the.”

p. 873, line 6-7: “The comparison of continent and the pacific fog arrived at the result that the differences are not statistically significant.” Suggested rewrite: “A comparison of continent and pacific fog showed differences that are not statistically significant.”

p. 873, line 16: Change “hold” to “holds” for proper subject-verb agreement.

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References:

Drever, J.I. (1997) *The Geochemistry of Natural Waters*, 2nd edition. Prentice Hall.

Hastenrath, S. (2002) The intertropical convergence zone of the eastern pacific revisited. *International Journal of Climatology*, v. 22, p. 347-356.

Interactive comment on *Hydrology and Earth System Sciences Discussions*, 2, 863, 2005.

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