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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Sediment records of highly variable mercury inputs to mountain lakes in Patagonia during the past millennium" *by* S. Ribeiro Guevara et al.

Anonymous Referee #2

Received and published: 12 March 2010

The paper "Sediment records of highly variable mercury inputs to mountain lakes in Patagonia during the past millennium" by S. Ribeiro Guevara et al., is, in my opinion, in good quality and should be accepted by Atmospheric Chemistry and Physics with minor revisions. The paper addresses relevant scientific questions within the scope of the special issue: atmospheric mercury for ACP. Particularly, the paper presents concentrations, fluxes, and potential sources of Hg in lake sediments for a Southern Hemisphere pristine area where previously reported data has been limited and to my knowledge, represents original and novel material. The title clearly reflects the contents of the paper. The abstract provides a concise and complete summary. The principal results of the paper are included in the abstract, which is easy to follow even before

reading the paper. Substantial conclusions are reached. Basically, the volcanic activity and extended fires could have generated the high levels, variations, and fluxes of Hg observed in the study region in pre-industrial times. In general, the methodology is sound and the data is sufficient to support the interpretations and conclusions. The description of experiments is sufficiently complete and precise to allow traceability of results, except that one issue might need to be clarified (see Specific comments). The authors give proper credit to related work and clearly indicate their own new/original contribution. The number and quality of references are appropriate. The overall presentation is well structured and clear. The language is generally fluent and precise, although some wording should be modified to make it read better (see Technical comments). Symbols, abbreviations, and units are correctly defined and used. No part of the paper should be reduced, combined, or eliminated.

Specific comments:

Page 25888, line 25, what are the background values? Please point them out.

Page 25888, line 29, because the authors mentioned a “more sensitive technique” they should point out which techniques were used in previous studies.

In section 2.2 (Methods), techniques for core dating should be described more clearly. Also, some references for dating techniques are not found in the reference list.

Technical corrections:

Page 25886, line 5, change “aiming at identifying” to “to identify”

Page 25886, line 8, change “considering that” to “because”

Page 25886, line 19 change “DW (dry weight)” to “dry weight (DW)”

Page 25886, line 28, change “a distinct increase of Hg concentrations was observed” to “distinctly increased Hg concentrations were observed”

Page 25887, line 1, change “is” to “might be”

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Page 25887, line 2, delete “to be considered”

Page 25887, line 11, change “sources” to “source”

Page 25887, line 12, change “have” to “has”

Page 25887, line 23, delete “also”

Page 25887, line 17, change “reached values compatible with locations exposed to moderate contamination” to “were compatible with those at locations exposed to moderate contamination”

Page 25887, line 27, change “to” to “with”

Page 25888, line 1, add “as” after “considered”

Page 25888, line 6, change “can have long-term effects also” to “can also have long-term effects”

Page 25888, line 11 and 12, change “since” to “because” and change “enclosed in” to “within”

Page 25888, line 13, change “Forest fires reduce drastically the pool of Hg in catchment soils, and releasing also biomass inventories, through elemental Hg volatilization to the atmosphere” to “Forest fires can drastically reduce the pool of Hg in catchment soils and release biomass inventories because of volatilization of elemental Hg to the atmosphere” Page 25888, line 16, change “after” to “by”

Page 25888, line 18, change “revealing” to “suggesting”

Page 25888, line 20, change “, another pathway that may contributes increasing. . . . . ” to “and might contribute to increasing. . . . . ”

Page 25888, line 21, change “Kelly et al. (2006) observed also in Lake Moab, Jasper National Park, Canada, that post-fire runoff mobilized a large short-term pulse of Hg.” to “Kelly et al. (2006) observed a large short-term pulse of Hg mobilized by post-fire

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runoff in Lake Moab, Jasper National Park, Canada”

Page 25888, line 23, add “study” before “region”

Page 25888, line 27, add “levels” after “background”

Page 25889, line 1, change “also other elements” to “other selected elements”

Page 25889, line 14, delete “as well as”

Page 25889, line 15 – 19, please reword this sentence to clarify it

Page 25889, line 20, change “the” to “this”

Page 25890, line 4, delete “selected” and add “located at” before “Llao Llao Bay”

Page 25890, line 7, add “area” after “surface”

Page 25890, line 20, delete “also”

Page 25890, line 25, change “Core lengths were 43 and 70 cm, respectively” to “Core lengths were 43 and 70 cm for Lake Moreno Oeste, and Lake TonËĞcek, respectively”

Page 25890, line 27, change “in” to “into”

Page 25891, line 5 and 6, the references : Joshi and Shukla, 1991; Robbins and Herche, 1993 are not included in the Reference list

Page 25891, line 12, specify the years for the reference(s)

Page 25891, line 12-17, I don’t understand this long sentence, please reword to clarify it

Page 25891, line 14, change “, determining” to “to determine”

Page 25894, line 11 – 12, change “Hg peaks alternate with low to intermediate values, with higher values ranging in concentration from 380 to 480 ng g$-$1, and in fluxes from 140 to 150 μgm$-$2 y$-$1.” to “Hg level varied dramatically, with the high concentrations

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and fluxes reaching 380 to 480 ng g−1 and 140 to 150 μgm−2 y−1, respectively."

Page 25894, line 17 – 19, change "Background Hg values range in concentration from 50 to 80 ng g−1, and in Hg fluxes from 7 to 10 μgm−2 y−1, while Hg peaks range in concentration from 300 to 650 ng g−1, and in Hg fluxes from 35 to 55 μgm−2 y−1" to "Background Hg concentrations and fluxes range from 50 to 80 ng g−1 and from 7 to 10 μgm−2 y−1, respectively, while Hg peak concentrations and fluxes range from 300 to 650 ng g−1 and 35 to 55 μgm−2 y−1, respectively"

Page 25895, line 22, delete "corresponding industrial pollution"

Page 25896, line 5 – 7, it is better to use one sentence to explain briefly why dense forest zones in the catchment area are an important source of Hg

Page 25896, line 16- 20, I still don't understand why the facilitated snow – to – air reemission could explain the higher Hg level in Lake TonËĞcek sediment, please reword to clarify this

Page 25896, line 7, add "in both lakes" after "over time"

Page 25897, line 9, change "was" to "were"

Page 25897, line 10, change "to" to "with"

Page 25898, line 4, what does "one of them" refer to? please specify the period this domain represents

Page 25898, line 7, delete "to"

Page 25898, line 12, change "1750m of altitude" to "the altitude of 1750m"

Page 25898, line 14, add "in both lakes" after "the high Hg records"

Page 25898, line 17 and 18, please specify which traces and reports of geothermal manifestations could be produced if geothermal activity might be extended to the study area

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Page 25898, line 20, change “previous to” to “before”

Page 25899, line 18, delete “also”

Page 25899, line 23, change “while” to “because”

Page 25900, line 6 – 8, please reword this sentence, the words “the more recent being the highest” are confusing.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 25885, 2009.

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