

## ***Interactive comment on “Atmospheric mercury speciation dynamics at the high-altitude Pic du Midi Observatory, southern France” by X. W. Fu et al.***

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RC- Reviewer's Comments; AC – Authors' Comments

RC: The manuscript entitled “Atmospheric mercury speciation dynamics at the high-altitude Pic du Midi Observatory, southern France” by Fu et al., reported atmospheric Hg measurement data during one full year at a high altitude site in Southern France. GEM, PBM and GOM were monitored simultaneously using a well known Tekran speciated Unit. Meanwhile, CO and aerosol concentrations in the air were also monitored. The data qualities were well controlled. The authors analyzed in depth the events with high PBM and GOM concentrations. The authors found that High PBM events in cold seasons were mainly related to intrusions from the upper troposphere over temperate

and sub-arctic North American and Arctic regions as well as the middle troposphere over the temperate North Atlantic Ocean and Europe, and that high GOM events were attributed to in situ production in the middle and lower free troposphere over the subtropical North Atlantic Ocean. This finding is of great importance for our understanding the global cycling of Hg in the atmosphere. The manuscript was well written and is easily understood. The manuscript should be published with minor revision. Major comments: The measurement technique used is the state of art method. However, the authors should add a paragraph in the introduction section about the limitation of Tekran 2537/1130/1135 system. This can be easily done by moving some of the information in section 2.2 to the introduction part.

AC: We thank the reviewer very much for providing comments on our manuscript. We studied these comments carefully and made revisions on the revised manuscript by addressing all of the comments.

We agree with the reviewer that it is important to introduce the limitation of GOM and PBM measurements using the Tekran speciated system. Many recent studies have shown the potential artifacts and environmental interferences can affect GOM and PBM measurements. The method limitation was introduced thoroughly in this study and we also suggest it may not significantly affect the findings in the present study. However, method limitation is not the major objective in the present study and we suggest it is better to keep the method limitation in Materials and Methods section.

RC: Minor comments: Line 106: source points should be “point sources” Line 140: O3 should be O<sub>3</sub> Line 312: “significant” should be “significantly” Line 462: “other factors other” should be “other factors”

AC: We checked the English writing errors carefully throughout the manuscript, and the errors mentioned above were corrected.

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Discussion paper

