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**ACP Editor**

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Object: Third revision of the manuscript acp-2014-235

Toulouse, 19 September 2014

Dear Dr Reeves,

Please find attached the third revision of the manuscript finally entitled “**Impact of the Asian Monsoon Anticyclone on the Variability of mid-to-upper tropospheric methane above the Mediterranean Basin**” by Ph. Ricaud and co-authors, together with the replies to the comments from the Editor.

We hope the revised manuscript meets the high scientific standard of the ACP journal to be accepted for publication.

Sincerely,

Philippe Ricaud

## Replies to the Editor

Version 17, 19 September 2014

Comments to the Author:

Dear Philippe,

Thank you for modifying your manuscript and providing a detailed response and list of changes. The paper is now acceptable for publication in ACP, subject to a few minor technical corrections and copy-editing.

1) In the new text added in line 154, I suggest changing the first sentence as follows. "We have collected the maximum amount of information available from satellite measurements along with model results in order to study the variability of tropospheric CH<sub>4</sub> over the MB and to assess the processes driving this variability". It is wrong to imply the maximum amount of information from the models.

→ Done.

2) I suggest rewording the following sentence as it is confusing: "The MOCAGE (Josse et al., 2004) chemical transport model (CTM), constrained by the ARPEGE meteorological analyses, should a priori give CH<sub>4</sub> vertical profiles more realistic than climate models over a specified period despite the fact that, due to the long lifetime of CH<sub>4</sub>, the short spin-up period (3 months vs. 12 years of lifetime) may impact its distribution." It might help to split it into 2 as it is quite long. It is not clear here what is meant by the a priori. Later in the manuscript there is the description of using the AIRS averaging kernels to calculate the MOCAGE profiles. Is this what you mean? The sentence needs improving for clarification.

→ Yes you are right, the term "a priori" is confusing, it is not meant to be "a priori profiles". We have clarified and split in two the incriminated sentence.

The MOCAGE (Josse et al., 2004) chemical transport model (CTM), constrained by the ARPEGE meteorological analyses, is expected to give CH<sub>4</sub> vertical profiles more realistic than climate models over a specified period. Nevertheless, the short spin-up period (3 months vs. 12 years of CH<sub>4</sub> lifetime) used in the MOCAGE runs may impact the CH<sub>4</sub> distribution.

3) Line 171, change "more adapted" to "better suited".

→ Done.

4) Line 74 "manufactures". Suggest changing to "manufacturing" or "industrial".

→ Done. We chose the term "industrial".

Regards,  
Claire