

Manuscript Title: Ice injected up to the Tropopause by Deep Convection: 1) in the Austral Convective Tropics by Dion et al.

We thank the two referees as well as the Co-Editor for this decision to publish the manuscript subject to minor revisions. We address the following answer to the minor revisions and we hope we have addressed appropriately the issues raised by the co-editor.

The co-editor's comments are repeated in the following paragraphs in blue and our responses appear in red. Copy of sentences or words changed into the paper are repeated and appear in yellow. Sentences or words deleted into the paper appear crossed-out and in orange.

RESPONSES TO THE CO-EDITOR :

Co-Editor Decision: Publish subject to minor revisions (review by editor) (18 Mar 2019) by Rolf Müller

Comments to the Author:

Dear Authors,

based on your revised version and based on the reviewers comments, I am happy to accept your paper subject to minor revisions. There is one remaining comment by referee #2 which I would ask you to consider in your revised/final version of your paper (it was only contained in the comments to the editor, not in the comments to the authors).

One detail: l. 23: "diurnal amount" is unclear. Do you mean " diurnal cycle of injection"?

Yes indeed, we changed the expression according to your suggestion line 23:

Next, the diurnal amount cycle of injection of IWC injected into the UT and the TL by deep convection is calculated by the difference between the maximum and the minimum in the estimated diurnal cycle of IWC in these layers and over selected convective zones.

Greetings

Rolf

Original comment:

4) line 127 'The MLS IWC sensitivity thresholds do not allow to detect low ice content such as cirrus outflow associated with convective events. MLS IWC sensitivity will mostly be able to detect ice from convective cores. Following Livesey et al. (2017), we will not consider IWC measurements less than 0.02 mg m⁻³.'

Comment: All the thin cirrus are missed. How does that impact the results ?

Answer:

This sentence was not clear enough and have been changed. The detection limit of MariCont ice concentration is 0.02 mg/m⁻³ in the TL whatever the origin/source of ice: convective cores or cirrus associated with convective events. Thus, cirrus are not missed.

The new sentence l. 127 is now l.135:

The MLS IWC sensitivity thresholds are 0.1 mg m⁻³ in the UT and 0.02 mg m⁻³ in the TL (Livesey et al., 2017) and will imply a small

under-estimation of the IWC measured values.

Furthermore, we changed according the detection limits values in the Tables 2 and 3.

New comment: The IWC in the UT and TL can go down to 10^{-3} - 10^{-4} mg/m³ (see Krämer et al., 2016, ACP, their Figure 2). So 'small under-estimation' is formulated too modest, since many cirrus are missed.

We deleted one word in the incriminated sentence (line 144):

The MLS IWC sensitivity thresholds are 0.1 mg m⁻³ in the UT and 0.02 mg m⁻³ in the TL (Livesey et al., 2017) and will imply an **small** under-estimation of the IWC measured values.