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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Unprecedented strength of Hadley circulation in 2015–2016 impacts on CO_2 interhemispheric difference" *by* Jorgen S. Frederiksen and Roger J. Francey

Anonymous Referee #1

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This paper discusses the role of inter-hemispheric transport on inter-site gradient in carbon dioxide (CO2). They link the MLO-CGO CO2 concentration differences to the strength of Hadley circulation. As presented, I do not agree with the conclusions. Please see the Figure 1 of an unpublished manuscript and the associated text, provided as Supplement (PDF). Some additional comments are:

Pg2, Lines 10-13: I have some trouble to believe this interpretation. A lot of CO2 or XCO2 variations are flux driven, and land flux is governed by weather and climate. The interactions of fluxes and transport causes these XCO2 wave trains. So just using transport to explain XCO2 variabilities isn't acceptable.

Pg2, Lines 31ff : I strongly believe, these features in C_mlo-cgo should also be shown using other tracers, e.g., SF6, CH4, N2O and halocarbons.

The data are available at CSIRO, or NOAA.

At the least I would like to see an anslysis using these species in the supplement.

Pg3, Lines 8ff : I am attaching a mss draft of my own, which remained unpublished. Please check on Figure 1 and the related discussions. You will see how relevant is the flux for inter-site gradient modelling.

The rest of the discussion is fine, but irrelevant to MLO-CGO CO2 gradients unless the surface flux issue is resolved.

I meant to remain anonymous to avoid any personality clash. However, it is not possible to share the manuscript draft otherwise. Hope this is helpful.

Please also note the supplement to this comment:
https://www.atmos-chem-phys-discuss.net/acp-2018-203/acp-2018-203-RC1-supplement.pdf

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