

Interactive comment on “Improving the inter-hemispheric gradient of total column atmospheric CO₂ and CH₄ in simulations with the ECMWF semi-Lagrangian atmospheric global model” by A. Agusti-Panareda et al.

Anonymous Referee #2

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The manuscript “Improving the inter-hemispheric gradient of total column atmospheric CO₂ and CH₄ in simulations with the ECMWF semi-Lagrangian atmospheric global model” by Anna Agusti-Panareda et al. describes a comparison of a tailored Bermejo and Conde mass fixer and the proportional mass fixer, the impact of the two mass fixers on the preservation of the CO₂ and CH₄ inter-hemispheric gradient, the influence of resolution on the mass conservation and performance of the mass fixers. The figures and tables are generally clear and well chosen. Overall the manuscript is clearly written, although there are technical corrections necessary to be fixed before publication. I recommend publication after these revisions have been carried out.

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Comments:

CO₂ and CH₄ are long-lived greenhouse gases, thus I suggest considering a longer period (probably the whole simulation period: 1st March 2013 to 30 April 2014) for analysis (Fig. 1-6, 8, 10-11) excepting comparison with Polarstern observations. The main aim of the paper is improving the inter-hemispheric gradient of total column atmospheric CO₂ and CH₄, however it is useful to study vertical cross sections or/and profiles of mass conservation error.

Technical comments:

Page 3, line 9: performace -> performance

Figures 3-6: no labels for TCCON FTS sites; TCCO₂, TCCH₄ should be replaced with XCO₂ and XCH₄ respectively.

Figures 7-10: CO₂, CH₄ should be replaced with XCO₂ and XCH₄ respectively.

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