

Interactive comment on “Global mass fixer algorithms for conservative tracer transport in the ECMWF model” by M. Diamantakis and J. Flemming

M. Diamantakis and J. Flemming

michail.diamantakis@ecmwf.int

Received and published: 2 April 2014

Dear Dr McGregor,

We would like to thank you for reviewing this paper and providing detailed corrections. We have incorporated all your comments (with two small exceptions as you will see below) in a revised version of our manuscript which we will resubmit.

MINOR COMMENTS/CORRECTIONS

1. L122 “MacGregor (2011)” to “McGregor (2005)”

Done

C233

2. L234 Remove the subscripts “jk” from phi_min L438

Done

3. Is it known which of the 150-hour distributions in Fig. 9 is more realistic?

The accuracy of available observation is not good enough to decide which of the modelled plumes is more realistic. Flemming and Inness (2013) have shown that there are considerable differences in the magnitude of SO₂ volcanic plume observations from different satellite instruments such as OMI, GOME-2 and SCIAMACHY for the eruption of Grimsvötn.

TECHNICAL CORRECTIONS

1. L1 “MFA” to “MFAs”

Done

2. L15 “is not “ to “not”

Done

3. L21 spelled as “parametrisation”, but L82 different spelling

Done - we now use “parametrization” everywhere in the text.

4. L25 “their location” to “its location”

Done - actually we have entered: “to the departure point location”

5. L42 Algorithms” to “Algorithm”

Done

6. L51 & L55 & L62 “MFA” to “MFAs”

Done

7. L75 You should say how many time steps

C234

Done - entered: "same number of timesteps (1440) ..."

8. L139 "correcting" to "to correct"

Done

9. L162 & L176 & L183 & L185 It would be better to use a different superscript than p (maybe upper-case P) to avoid confusion with pressure p.

Done - we now use beta

10. L190 "is a" to "produced a"

Done

11. L205 "Priestley" to "Priestley's"

Done

12. L213 & L214 "MacGregor" to "McGregor"

Done

13. L285 and caption to Fig 4. Should specify units of vertical axis

The vertical axis there has no units as it is the "model level number" as it is mentioned in the caption.

14. L292 I think you mean to say "see also Fig. 5"

Done

15. L308 "MF" to "MFA"

Done

16. L349 "10 forecast" to "10-day forecasts"

Done

C235

17. L427 probably replace "MF" by "MFA"

Done

18. L465 "up half" to "up to half"

Done

19. L468 "from ... applied" to "from applying the quasi-monotone limiter"

We have made the following change: "Noticeable impact was found from the type of quasi-monotone limiter applied"

We have found that when the quasi-monotone limiter is removed completely the cold bias is reduced. From the two types of limiter we tested, the less diffusive BS-limiter is better in terms of cold bias. This is consistent with Stenke et al where numerical diffusion of SL scheme is blamed to be one of the important contributing factors of the observed cold bias existing in some SL models.

20. L477 "results to" to "results in"

Done

21. L524 "MacGregor, J." To "McGregor, J.L. L525 "2011" to "2005"

Done

22. Caption of Fig. 6 should state that the contours show the zonal mean temperatures.

In the caption we have "...Difference of vertical cross-sections of zonally-averaged annual mean temperature fields".

Interactive comment on Geosci. Model Dev. Discuss., 7, 777, 2014.

C236