

## ***Interactive comment on “The Brazilian developments on the Regional Atmospheric Modeling System (BRAMS 5.2): an integrated environmental model tuned for tropical areas” by Saulo R. Freitas et al.***

### **Anonymous Referee #2**

Received and published: 5 July 2016

The paper presents a description of the new developments in the last version of the BRAMS (Brazilian Regional Atmospheric Modeling System) model, so-called BRAMS 5.2. It consists in a unified version of the previously independent weather, carbon cycle and chemistry versions. The paper is well written and provide key elements for the documentation on the new features of the models.

Having said this, my opinion is that the paper needs clarification and improvements before it can be published in GMD.

Major comments: 1) In the text it is not always clear when the authors talk about version

C1

5 (even 4.2) or version 5.2. As the paper aims at describing version 5.2, in each subsection, it should be explicitly mentioned which version the new developpements refer to (it is sometimes recalled but not always). For example, section 2.1.2 page 5 l19. Is this new option is a new development of version 5.2 and absent in version 5?

2) I am also surprised that section 2.5, p21, discussing computing cost, shows comparisons between version 4 and V4.2 while we are talking about version 5.2 in the paper. I may understand that the new need for an increase number of cores for operational purpose leads to make the tests with a higher number of cores, but why with version 4.2 then?

3) There are several occurrences in the paper where the author almost do not describe the simulation presented in figures. They use sometimes some reference to avoid a long description but to me, the essential modelling setup should be given in a couple of lines, without making the paper substantially longer – especially when the references are in Brazilian journals, or in PhD. Manuscript in Portuguese. It is the case p17, l15-19 (for results presented in Fig. 11 and 12), p19 l15-20.

minor comments:

The typing of the units are is always coherent throughout the paper (use of “/” p9 l11, p14 l34 , no blank in gm-3 p9 l1), etc. Please recheck.

Page 3 line 15 : “we believe. . . “ This is only your opinion (this is probably mine too), but personal opinions do not have to appear here. This statement could be presented in a more objective way if you give arguments here or few elements of comparison with other similar models.

Page 4-5, section 2.1.1, and table 2. It would be interesting here to introduce typical computational cost change between each option given in table 2, especially for the Exner function prognostic equation – taking into account the full formulation or not. Page 4 line 11 “ which shall not discussed here ” to be replaced by “ which shall

C2

not be discussed here

Results in Figure 1 p6, l1-10. It is not straightforward to see the improvement of the new scheme here since the original result is not shown, though discussed in Freitas et al. (2012). I would recommend here to add a third panel showing the previous results.

P12 l16 discussing Fig 4. The conversion to pdf format of the figure makes figure unfocused for the axis labels. Please improve the resolution.

P13, l3-5. "The shallow scheme produces realistic..." Can you justify this statement with a reference or more quantitative elements?

P15, second paragraph about Figure 7. Is there a way on Fig 7 to illustrate that the GF+B2014 closure does a better job than the GF without the diurnal cycle closure? Fig 7 just illustrates the difference and the measurements discussed in the text to explain that GF+B2014 is an improvement should appear somehow in the Figure.

P17 l16-19: a short description of the model setup for the simulations presented in Fig 11 and Fig 12 should be given here. What do the vertical dashed lines mean in these figures? It should appear in the associated captions. I also recommend to write CCATT-BRAMS instead of CATT-BRAMS into the rectangle of the caption in each figure.

P17 section 2.3.2: same remark, a short description of the simulation should be provided here. Though it is explained in Carvalho (2010), this reference is a PhD thesis manuscript in Portuguese, not easily accessible to all the readers.

P17 section 2.3.3. l34-36 Here again a few more info about the model setup is needed here. P19 from line 15: A quick model setup is required. More info is given in Pavani et al., 2016 but not accessible yet, and in Portuguese. Fig 16 colour codes should be explicated or at least commented.

P20, section 2.4.2: I remember a possibility of computing air mass trajectory with previous version of BRAMS/RAMS. What is new here? It should be explained more clearly.

C3

P24 about Figure 23: can you explain more clearly what are each colour bar on the left side and on the right side? I could not find the information neither in the text, nor in the Figure caption.

P24 section 2.6.2. This very short section states that there is an improvement in the representation of the surface radiation budget. Could you give more details here?

P49 Figure 15 caption, l4. JULES instead of Jules.

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Interactive comment on Geosci. Model Dev. Discuss., doi:10.5194/gmd-2016-130, 2016.

C4