

***Interactive comment on “Tracers and traceability: implementing the cirrus parameterisation from LACM in the TOMCAT/SLIMCAT chemistry transport model as an example of the application of quality assurance to legacy models” by A. M. Horseman et al.***

**Anonymous Referee #2**

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The manuscript focuses on the description of development techniques for models and their application on a specific model complex. Thus the paper has two major objectives: 1. introduction of software engineering tools and quality control on a generalised level and 2. presentation of a new model tool to investigate cirrus clouds. Though I'm not an expert in this field, the software engineering tools seem to be suited to me for model developers to standardize and optimize their model design and test procedures. The model complex is the implementation of a cirrus parameterisation (LACM) in a CTM

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(TOMCAT/SLIMCAT), both components have been described in the literature separately. Nevertheless it's worth to describe the combined tool here, in particular in the context of the software engineering tools.

I have some difficulties with the validation section: My expectation for such a paper is twofold: Either to develop a strategy in a more general sense, how such a validation should be done, or a comprehensive test of the specific model, or both. Unfortunately, the authors do not treat both issues very deeply and refer to upcoming papers in the latter part, so the value of these sections for the reader remains below what could be possible.

I recommend publication of the paper after revisions. However, I would encourage the authors to improve the validation section in order to increase the significance of the paper to the community.

Specific comments:

Page 1301 lines 8 – 20: The text might suggest that so far only a few GCMs have implemented a nucleation scheme and that this is the first CTM to which such a tool is added. It might be worth to mention at least one example for a CTM, e.g. Spichtinger and Gierens, ACP, 2009.

Figure 1: In order to reflect the discussion in the text, this figure could become more illustrative to group boxes according to 'Requirements', 'Testing' and 'Design'. Also the term 'Revision/configuration control' should appear.

I'm wondering whether the 'design' task could be explained in the manuscript as well with an own section

Page 1309 'Model requirements': The authors do not pick up the term 'user requirements' from chapter 2 anymore. Do you consider the first four bullets as user or software requirements? If the later ones, what are user requirements in your specific case? Is it worth to add frequency of time steps (even if kept flexible) or spatial resolution as

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user requirements?

Section 4.3-5 Validation: The comparison with data remains rather vague and not quantitative. Are the authors satisfied here to provide evidence that 'the results can be considered reasonable' (p 1315, l 1) and to refer for a more detailed analysis to subsequent papers? They should at least give their rationale why they have chosen the two examples in 4.4. and 4.5, and how this choice can be regarded as a strategic one. For a full validation, I expect a more quantitative comparison between simulations and observations, sensitivity tests and comparison with other model tools ('why is our model an improvement?').

Page 25, line 25: Since 2000, the tropics have been examined in a large number of balloon, aircraft and satellite experiments, so it can't be regarded as 'not well sampled' anymore. Nevertheless, the SCOUT-O3 data are suited to be used here.

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Interactive comment on Geosci. Model Dev. Discuss., 2, 1299, 2009.