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Interactive comment on "iGen: the automated generation of a parameterisation of entrainment in marine stratocumulus" *by* D. F. Tang and S. Dobbie

Anonymous Referee #2

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General comments:

This paper offers an interesting case study of the iGen parameterization generator applied to a 2D model of marine stratocumulus. However, the details of the behaviour of both iGen and the resulting parameterization are lacking. This paper needs major revision before it can be accepted for publication.

Specific comments:

1) The rationale for using a 2D cloud-resolving model instead of a 3D model is not provided. Are there technical challenges applying iGen to 3D models? As stated in Sect. 3.1, iGen is used on a single model realization and not a large ensemble. Sect. 5 notes that it took 28 days to process on a rather underpowered PC. One assumes

that it was the 6 hour 2D CRM simulation that was being analyzed and this needs to be explicitly stated in the text. There should also be discussion of what numerical cost can be expected from analysis of a 3D run. This would serve to explain why a 2D model was chosen for analysis with iGen. For example, how long is the 6 hour CRM run on this PC without the iGen wrapper and analysis?

Of interest to the reader is how iGen would perform on complex problems and there is very little information provided. Given the aggregate nature of the input and output fields and similar source code morphology in the 2D and 3D CRMs, it is not clear why an extra spatial degree of freedom would by intractable on a PC, if indeed that is the case.

2) Figure 4 shows a time dependent total entrainment but the discussion in Sect. 3.1 refers to the wrapped model output being the average over the last 4 hours of the 6 hour simulation. It is unclear from the text and caption what Figure 4 is showing since it is not a set of constants for the six parameters specified on lines 16 through 19 on page 981. It appears that this is the instantaneous model output unrelated to iGen analysis. This should be made clear in the text. The actual iGen results should be explicitly included in this section.

How does the ensemble simulation described in Sect. 3.1 contribute to the error bounds provided by iGen? According to the companion paper ("iGen: a program for the automated generation of models and parameterisations"), iGen provides an error bound, yet this value is not given. Is the ensemble spread larger or smaller than the iGen error bound for?

3) As in Sect. 3.1 it is not clear what the iGen output was in Sect. 4. Figure 5 must refer to the instantaneous CRM output (this should be made explicit in the text and caption). How does the spread between the different curves compare to the iGen error bounds on the reference simulation?

4) How does the iGen analysis depend on the duration of the simulation and domain?

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Sections 3.1 and 4 include some discussion of the uncertainty of the CRM but there is no analysis of the behaviour of iGen. Was the choice of a six hour reference simulation justified by convergence of the iGen machine parameterization? Here convergence can include some bounded variation for different integration times. Would iGen be highly sensitive to changes in geometry? For example, would the duration of the model integration need to be changed significantly. In other words, does iGen exhibit sensitivities unrelated to the physics of the CRM but related to the source code analysis process? The paper is about iGen and not the CRM so such questions should be at the very least discusssed when iGen is applied to a complex system.

Interactive comment on Geosci. Model Dev. Discuss., 4, 971, 2011.