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Comment

## ***Interactive comment on “The influence of dynamic vegetation on the present-day simulation and future projections of the South Asian summer monsoon in the HadGEM2 family” by G. M. Martin and R. C. Levine***

**Anonymous Referee #2**

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Review of: MS No.: esd-2012-32 The influence of dynamic vegetation on the present-day simulation and future projections of the South Asian summer monsoon in the HadGEM2 family. Author(s): G.M. Martin and R.C. Levine

General Comments

This study presents an analysis of the South Asian summer monsoon (SASM) as simulated by the HadGEM2 family of climate/Earth System models. The authors pay particular attention to the importance of the representation of vegetation and dust emissions,

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both in current and future climates. The paper is well written and argued. However, I believe that in its present format it falls between two stools. On the one hand, it is a comprehensive description of the SASM in a bunch of similar but different models, on the other it is a sensitivity study on the importance of vegetation and dust on the simulation of the SASM. I firmly believe that within the content there is an advancement of scientific understanding worthy of publication but I would argue that the authors consider reformatting so that the conclusions are presented more simply and coherently. (If the number of figures could be reduced as well that would be welcome. Pouring over 22, often multi-panel maps, makes for quite a demanding read!). Therefore, my comments below are concerned less with scientific issues but more with points on presentation.

Specific comments:

(1) Section 2. I would recommend the authors consider re-naming and editing Section 2. You describe model integrations here not experiments. It would be beneficial to introduce the model configurations here too. I appreciate you reference the HadGEM2 Development team but for the purposes of this paper it would be useful to tell the reader what are the important scientific differences between them; i.e. how is vegetation represented in the models? How is vegetation “prescribed” in HadGEM2-A(O)? Is it seasonally-varying?

(2) Is it necessary to present the results of HadGEM2-CCS?

(3) Sections 4.1 and 4.2 The impact of dust emission is a very interesting indirect vegetation effect but seems to get a little lost amongst discussion on the effects of vegetation locally (4.1) remotely (4.2). I do not have a solution for this but encourage the authors to consider editing these sections.

(4) I think the paper would benefit from greater discussion on how these results affect our understanding of the SASM in the real – not simulated – world. Also, there is no mention of missing land-surface processes that might be important. Recent studies

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have shown that the increase in the use of irrigation by agriculture has affected vegetation cover which has impacted on near-surface temperatures and rainfall (Roy et al. JGR, 112, D21108, 2007 and Lee et al. Int. J. of Climatol. 29, 573-581, 2009). Some discussion of whether the models have the potential to capture this effect or not would be welcome.

Technical corrections:

(1) Figures 9, 10, 11, 12, 13, 14, 15, 16, 18, 21 are missing the (a), (b), (c), (d) labels.

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Interactive comment on Earth Syst. Dynam. Discuss., 3, 759, 2012.

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