

## ***Interactive comment on “Development and evaluation of an Earth-system model – HadGEM2” by W. J. Collins et al.***

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We thank Rachel Law for her valuable comments, and for identifying gaps that needed to be filled.

Specific comments. Anthropogenic emissions: The philosophy of this paper is to describe the HadGEM2 model structure. The model will be driven by different emission datasets according to the chosen experimental design. We have added a reference to the Jones et al. 2011 paper (in the text and caption to figure 2) which describes the emission datasets chosen for the Met Office Hadley Centre contributions to the CMIP5 project.

Methane figure: The wrong data had been used here (without interactive methane).

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This has been updated. The colour scale has been changed to emphasise the hemispheric differences, and the axis labelled with pressure. A figure comparing simulated methane against surface observations will be added to section 4.3.

Stratospheric methane: A comment on the Corbin and Law findings on stratospheric methane has been added. The impact of methane on stratospheric water is only included in the stratospheric resolving models (60 levels). This is now clarified in the text.

Inundation pattern: We agree that the original text here painted too rosy a picture of the model performance. We have added more comments on the differences between HadGEM2 and the satellite product, and have deleted the phrase "reproduces the overall geographical pattern".

Wetland pattern: We have added a comment in section 4.3 that discrepancies in the inundation fields also show up in the wetland methane emissions.

Seasonal maxima: Yes it is the location of the maxima that are consistent. This has been clarified in the text.

Aerosols: References for the DMS observations are now cited. Y-axes have been harmonized. The shading indicates the spread in the observations. No data on the spread was available from the Cape Grim reference.

Impact of interactive vegetation on surface climate: There was little impact of the interactive vegetation scheme on the surface climate as we described in the text. We will add a plot of surface temperature to section 5 to demonstrate this.

Technical Corrections: All technical corrections have been made.

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