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Geoscientific
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Discussions

Interactive comment on "QUAGMIRE v1.3: a quasi-geostrophic model for investigating rotating fluids experiments" *by* P. D. Williams et al.

P. D. Williams et al.

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We thank Dr David Ham for his full review, dated 27 October 2008, which will help to substantially improve the paper.

We will make the revisions to the paper recommended by him, as detailed below.

1. Numerical accuracy

Numerical convergence has been demonstrated, not in the published papers we have cited, but in the D.Phil. thesis of Williams (2003). We will add to the paper the following paragraph from the thesis.

In order to demonstrate insensitivity to the numerical parameters, comparative runs were done with (separately) the hyperdiffusion coefficient decreased by a factor of 10,

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the Robert filter parameter decreased by a factor of 10 and the gridspacing doubled in both directions, but all other parameters unmodified. The equilibrated wave number was the same in each case, and the mid-radius wave amplitude and phase speed differed by at most 0.3%. We have therefore demonstrated that both rounding errors and discretization errors are small, and that the equilibrated state is insensitive to the values of the numerical parameters, implying that the model output gives an accurate representation of the true solutions of the continuous model equations.

2. Physics and equations

The aspect ratios of the laboratory annulus and the atmosphere are often—but not always—poorly matched. An exception is the 14-metre diameter Coriolis platform annulus in Grenoble. Our intention in the paper is not to justify this mismatch, but rather to accept that rotating annulus experiments are nevertheless widely used to study atmospheric and oceanic processes, and that numerical models of the annulus are required to help interpret the results.

We will delete “only minor approximations are made and” from the paper.

3. Code correctness

We will insert qualifying statements into the paper at the locations noted by the Referee, in order to make clear that the strongest claim it is ever possible to make is that there do not appear to be any significant errors in the code.

4. Typographic error

We agree that there is a error, which we will correct.

Interactive comment on Geosci. Model Dev. Discuss., 1, 187, 2008.