Geosci. Model Dev. Discuss., 2, C99–C101, 2009
www.geosci-model-dev-discuss.net/2/C99/2009/

**Geoscientific
Model Development
Discussions**

Interactive comment on "An Intermediate Complexity Climate Model (ICCM) based on the GFDL Flexible Modelling System" *by* R. Farneti and G. K. Vallis

R. Farneti

riccardo.farneti@noaa.gov

Received and published: 7 July 2009

We thank the reviewer for his/her comments on the manuscript and detailed review. The following is a list of the reviewer's minor concerns and technical corrections, and our answers to his queries:

1) Specific Comments:

- Introduction: Thank you for pointing out the reference to Held(2005). It certainly does help in supporting our message.

- p.347, line 11: The referee is right in clarifying this point. We have stated more clearly

that Eq.(1) refers to the case in which no seasonal nor diurnal cycle are switched on, and we now say: *"Both a seasonal and diurnal cycle can be switched on in the model. However, the benchmark configuration is the one chosen to reproduce the observed annual and zonal mean top of the atmosphere (TOA) net shortwave flux, and in that case the solar flux is given by ..."*.

- p.347, line14: We rephrased the sentence, as it was clearly misleading. It now reads: *"For simplicity we also neglect solar absorption in the atmosphere, and we thus rely on surface albedo to represent the total planetary albedo."*

- p.348, line 2: Frierson 2007a shows that the parameterization of moist convection significantly affects the zonally averaged tropical circulation, and the response of the tropical general circulation to the inclusion of a simple convection scheme (Simplified Betts-Miller, SBM) is analyzed in details. Compared to the case in which large-scale condensation only (LSC) is used, the SBM convection scheme facilitates more poleward energy transport by the mean flow, a reduction in mass transport by the Hadley cells and a reduction in dependency on horizontal resolution. The overall result of adding the SBM scheme is a stabilizing influence over the Tropics. We believe our statement was not clear enough, and thus rephrased the sentence: *" ... the SBM convection scheme relaxes temperature and humidity to a specified post-convective reference profile. Frierson 2007a shows that the inclusion of the SBM scheme provides and overall stabilizing influence over the Tropics, with a greater poleward energy transport by the mean flow, a weaker mass transport by the Hadley cells and a reduction in the dependency on horizontal resolution."*

- p.348: We thank the Referee for the useful references provided. We have included some of them in the Introduction.

- p.351, line 12: The oceanic and atmospheric time steps are set by the different resolutions and parameterizations. We added the following: *'Time steps, both in the ocean and atmosphere, are functions of resolution and physical packages, and thus may vary*

accordingly to the experimental set-up.'

- p.351, line 22: The CPU usage of the atmospheric model, per processor, is much larger than that of the ocean in the Atlantic configuration. This is not surprising as the atmospheric domain is three times larger than the oceanic one. The B-grid dynamical core takes around 75% of the total atmospheric CP time, stressing the computational efficiency of the idealized physical parameterizations. Total CPU time and the partitioning between model components is a function of number of processors, grid size and resolution. In fact, in the Aquaworld configuration, CPU usage by the atmosphere and ocean is roughly equal.

- p.355: The referee raises a very good point. In fact, the moisture content is lower than observations and comprehensive models because of very dry land areas. The use of a constant albedo over land, together with a relatively high ratio of land-ocean coverage throughout the domain, generates low humidity contents over significant fractions of our land model, resulting in low levels of moisture content in the model climatology. This is corroborated by the Aquaworld simulations, where dry and latent energy fluxes are much closer to observational estimates. We have included the following sentence : *'A primary deviation from observational estimates is in the ratio between DSE and LE in the present configuration, which is about twice as much as in the observations of Trenberth and Stepaniak (2003), and is mostly due to lower humidity contents over land and the high land fraction.'*

2) Technical Corrections: all points taken.

Interactive comment on Geosci. Model Dev. Discuss., 2, 341, 2009.