**Geoscientific
Model Development
Discussions**

Interactive comment on "FAMOUS, faster: using parallel computing techniques to accelerate the FAMOUS/HadCM3 climate model with a focus on the radiative transfer algorithm" *by* P. Hanappe et al.

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Received and published: 12 August 2011

We would like to thank the reviewer for his detailed review of the document and for his positive comments. The comments greatly helped to improve the text. We address all of them below and we will upload the revised manuscript as a supplement to our reply to the second reviewer's comments.

Specific comments:

RC: The description of methodology in section 4 relates how the first step in restructuring the radiation algorithm was to translate the code from Fortran to C, but does not explain why this step was deemed to be necessary. The reader deserves a full explanation as to why this step was undertaken. How much of the work could have been done in Fortran?

AC: We agree that a better explanation is needed. Page 1277, line 17 is rewriten as: *"We rewrote the original Fortran code in the C programming language. This choice was imposed on us by the technical constraints as discussed further in Sect. 4.3."*

We further modified Sect 4.3 as follows:

"The initial hardware platform that we targeted in this project was the commercial version of the PlayStation 3 game console. Because no Fortran compiler existed for the SPEs, we were compelled to translate the radiation code to C. An additional motivation for this translation was the good support that most C compilers provide for the vector data types and SIMD instructions, as discussed in Sect. 4.5. Some support for SIMD instructions is provided by commercial Fortran compilers on other platforms but they also require significant code changes."

Minor and technical comments:

RC: In the abstract, it is a little confusing as to what the speed-ups relate to. For example, the abstract says "... the new radiation code runs ... on graphics processors more than 2.5 times faster than the original code". This is strange, given that the original code was in fortran and hence does not run on graphics processors without some modification. My comment is a criticism about the language used in the abstract,

not about the body of the paper, which does give sufficient information to clear up these ambiguities.

AC: We agree. The abstract now reads: *"On Intel-compatible processors, the new radiation code runs 4 times faster. On the tested graphics processor, using OpenCL, we find a speed-up of more than 2.5 times as compared to the original code on the main CPU."*

RC: In the second paragraph of section 3, the last sentence does not explain why simplifying the logic of the main CPU and additional processors should help to remedy "the slowing down of the computation due to the latency of the data transfer to and from memory". Some attention should be given to the logical construction of this paragraph.

AC: We have adapted the phrasing to establish the link more clearly: *"To reduce this bottleneck on the CELL, the choice was made to simplify the logic of the main CPU and use the freed-up space to incorporate additional small processors that have direct access to low-latency, on-die memory."*

RC: Last sentence of section 4.2. What does "quasi identical" mean?

AC: We agree that the phrasing is not precise. We modified the sentence as follows: "We ran a 120 year simulation and compared the statistical properties of the results against a reference run (see discussion in Sect. 5.2).

RC: Section 4.4, second paragraph. "Former vector machines can efficiently...". Consider re-phrasing this. Perhaps "Vector machines, formerly more widespread than today, can...". Or just drop the word "former" altogether.

AC: We agree. The proposed change has been integrated.

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