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Geoscientific Model Development Discussions

Interactive comment on "gpuPOM: a GPU-based Princeton Ocean Model" *by* X. Huang et al.

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Dear Referee #2:

Thanks for your inspiring comments. Your comments are highly helpful and enable us to significantly improve the quality of our manuscript. The following paragraphs are our point-by-point responses to each of your comments.

(1) "Figure 7 is poorly labeled. Units are missing. I assume SSH is contours, SST is colors, and currents are arrows, but it does not say. I would prefer for SSH and SST to be in two separate panels."

[Response]:

As you suggested, we will redraw the SSH and SST figures in two separate panels. At the same time, we will clearly label the figure and add the corresponding units in the

revised manuscript.

(2) "I don't follow the explanation of this speed-up in top of 7671. It says mpiPOM is memory bound, so CPU:GPU performance is 1:10. Is the remaining factor of 5 all due to memory optimizations? Are those the ones already described in the text?"

[Response]:

According to your feedback, we think that there is a little confusing in the explanation of CPU vs GPU speedup. Thus we will rewrite the following sentences in the Section 4.3 of revised manuscript:

"The approximate ratio of memory bandwidth between one Sandybridge CPU and one K20X GPU is 1 : 5, and the ratio of floating points performance between one Sandy-Bridge CPU and one K20X GPU is 1 : 10. Namely, if an application is strictly memory bound, one K20X GPU can compete with 5 Sandybridge CPUs. In addition, if an application is strictly computing bound, it can compete with 10 Sandybridge CPUs. As the mpiPOM is memory bound, according to the memory bandwidth ratio between the CPU and the GPU, our gpuPOM should provide equivalent performance to 5x8 = 40 CPU cores. Combining our careful memory optimizations, our final design achieves another performance boost of 25%, and one GPU provides similar performance to more than 50 Intel 8-core Sandybridge CPU cores. Compared with Intel Westmere 6-cores CPU, our results provide similar performance to more than 95 CPU cores."

(3)" In conclusion, list number of cores rather than 34 nodes, as the reader would not know the number of cores per node."

[Response]:

We will clarify the speedup and list the numbers of cores in the revised manuscript.

Thanks again for your valuable comments. We hope our response will make the manuscript better to understand.

Best wishes,

Xiaomeng Huang

Interactive comment on Geosci. Model Dev. Discuss., 7, 7651, 2014.