

The paper describes the GPU parallelization of LICOM3, good parallel speed ups and good scalability toward a large number of GPUs has been obtained. The paper focusses on GPU programming and code optimization rather than model development (in this case scope ocean model). However, given the scope of the journal, I would advise to include some introduction of components/program modules of LICOM3 in terms of ocean dynamics. Furthermore, there are too many inaccurate or incorrect language usage, the paper needs to be corrected by a native English speaker.

Detailed comments/questions:

Figure 5, Super linear speed ups are observed for some tracer and readyc from 384 to 768 GPUs. What are the reasons?

Section 6. Conclusions contains many detailed discussions, the detailed discussions should be in 5. Discussion, and only briefly summarize the main conclusions in 6.

Line 16, explain "3-dimensional parallelization"

Line 69, model's best computing performance? Do you mean only the best or fastest results are reported?

Line 160, What are "GPU space nodes"?

Line 169, What is "Ocean block distribution"? Describe.

Line 170, The description is too much in terms of code execution steps (loops). Describe tracer, barocline and barotropic in terms of sub-models of ocean dynamics.

Line 179, "The results are the time running one model month", do you mean: The time reported is the wall clock time of running one model month?

Line 214, "the 3-D parallelism is implemented", what is 3-D parallelism? please elaborate

Line 259, "equivalent to one step", one step of what?

Line 261, "we then rewrite the data reading strategy and do parallel scattering for ten different forcing variables", needs more explanation.

Line 263, What is "the core-process"?

Line 389, What are "The dynamic core and physic packages"?

Some minor corrections:

Line 20, Change "can still obtain an increasing," to "can still be increased to"

Line 60, Change "is supported by" to "provides support for"

Line 81, Change "preparing" to "in preparation"

Line 109, Change "totally" to "in total,"

Line 111, grammar

Line 112, Change "are suitable for" to "require" or "demand"

Line 154, Remove "including"

Line 164, Change "earlier" to "ago"

Line 196, Change "grids were united " to "grid points are grouped"

Line 217, "parallel" to "parallelize"

Line 223, "parallel" to "parallelization"

Line 245, "Variable" to "Floating point" or "Arithmetic"

Line 259, "updated" to "increased"

Line 269, Change "0.2-0.3 SYPD will require too much" to "at a speed of 0.2-0.3 SYPD it will take too long"