

## ***Interactive comment on “Bitwise identical compiling setup: prospective for reproducibility and reliability of earth system modeling” by R. Li et al.***

### **Anonymous Referee #1**

Received and published: 2 December 2015

#### General comments:

The authors present an innovative, quasi-automated method for determining the optimal compiler flags with which to compile Climate System Models (CSMs) or Earth System Models (ESMs). This is often no easy task for the modeler, given that a particular CSM or ESM may be used on many computational clusters having different chipset architectures with different compiler versions. Applying the authors' methodology to any CSM or ESM will result in code that is more robust and less susceptible to bugs in the compiler or other platform-specific errors. Also, the CosFiD software mentioned in the article is freely available on GitHub and is easily customizable.

C3149

However, this article suffers from consistently poor English usage. Some of the errors are pretty basic (i.e. incorrect choice of words, misspellings, and confusing run-on sentences). I found myself having to re-read several sections to make sure that I could fully understand.

I therefore recommend this article for publication in GMD after revisions to correct the many errors in English usage.

#### Specific comments:

p9825: L14: One can almost answer the question "why does POP2 obtain different simulation results when changing the optimization level from O3 to anything else" by looking at the Intel compiler manual. The -O3 option uses a very fast math library which sacrifices accuracy for speed.

p9830, L10: Is this the same bug mentioned in Table 9? Please clarify.

p9838: In Table 3, please give a brief definition (or cite to the appropriate reference) of what the "fast|precise|strict|source" options do. Also please define SIMD.

pp9843-9845: If possible, please give brief description of why the bitwise-identical compiling setups obtained with Intel Fortran Compiler v11 are not reproducible with later Intel compilers.

#### Technical corrections:

P9818, L3 "is essential technical supports": should be "is an essential technical support"

P9818, L5: replace "compiling setup" with "a compiling setup"

P9818, L10: replace "codes" with "code"

P9818, L19: "or risks": could probably be omitted

P9819, L4: "computer supports": maybe a better phrase is "computational

C3150

P9819, L5: consider putting parentheses around "such as high-performance computers"

P9819, L6: "evolvement" should be "evolution"

P9819, L7: "the model codes" could be omitted

P9819, L8: "for the usage of newer" could be "for compatibility with newer"

P9819, L10: "no more than installing new compiler version..." should be "just by installing a new compiler version..."

P9819, L14: replace "codes" with "code"

P9819, L15: omit "the codes in"

P9819, L15: "computing performance" could be "computational performance"

P9819, L18: replace "are generally different" with "generally differ"

P9819, L19: Break the sentence into two. For example "...corresponding implementations. On the other hand, different compiler flags..."

P9819, L20: "enables and disables" should be "enable and disable"

P9819, L23: replace "is about the" with "concerns"

P9819, L27: replace "between" with "among". Between is only used to compare 2 things.

P9820, L1: consider omitting "existing".

P9820, L1: replace "using an original compiling setup" with "obtained with a given compiling setup"

P9820, L3: remove the "about" from "is about the reliability"

P9820, L4: replace "codes" with "code"

C3151

P9820, L5: replace "codes" with "code"

p9820, L7: replace "there are still unknown bugs" with "there still can be unknown bugs"

p9820, L8: replace "with steadily increasing amount of code lines" with "with more and more lines of code"

p9820, L13: replace "concerned" with "investigated"

p9820, L16: replace "How to select compiler flags when using a compiler to..." with "How can compiler flags be selected to..."

p9820, L17: replace "there are a lot of choices of compiler flags" with "there are many possible compilation options to choose from."

p9820, L19: replace "find out" with "determine"

p9820, L23: replace "a lot" with "many"

p9820, L27: Put a period after (Liu et al 2015a). Start the next sentence with "But" instead of "while".

p9821, L1: replace "whether the compiling setups" with "whether compiling setups"

p9821, L15: replace "be across" with "extend"

p9821, L16: use "assist researchers" instead of "help researchers"

p9821, L26: replace "programed" with "programmed" (i.e. use 2 m's)

p9824, L1: replace "Through combining" with "By combining"

p9824, L2: replace "4000 compiler flags" with "4000 possible compiler flags"

p9824, L22: replace "the white color" with "white"

p9826, L14: could replace "part" with "portion"

C3152

p9826, L15: replace "objective files" with "object files"

p9827, L3: replace "For a code file that contains a large number of code lines" with "For a source file containing many lines of code"

p9827, L3: replace "we can divide" with "we can either divide"

p9827, L4: remove "code"

p9827, L5: add a comma after "new files"

p9827, L15: replace "Researcher" with "Researchers"

p9828, L9 and L10: replace "complier" with "compiler"

p9831, L5: remove "through"

p9831, L6: replace "long-time" with "long"

p9831, L7: replace "simulation results" with "results"

---

Interactive comment on Geosci. Model Dev. Discuss., 8, 9817, 2015.