

# ***Interactive comment on “CPMIP: Measurements of Real Computational Performance of Earth System Models” by V. Balaji et al.***

## **Anonymous Referee #2**

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In any scientific field, it is crucial to step back periodically from research to find community agreement on how to evaluate results. This is no different in the field of modelling: The hard work of numerous research groups has given us a plethora of earth system models, varying greatly in their underlying algorithms and their approach to exploiting parallel architectures. Yet thought was rarely given on how their performance can or should be compared.

This paper represents such a step back: It proposes a set of metrics which can be used to study the computational performance of models without introducing dependencies on computer platforms or programming paradigms. The importance of the contribution lies not in the metrics themselves, for practitioners in the field will recognise most of them for they are already (e.g., SYPD, ASYPD and CHSY) used in daily modelling discourse. It lies rather in the consensus of the authorship from numerous interna-

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tional institutions, which implies an agreement on the greatest common denominator. The metrics are common-sense, and their calculation and application has been documented in a straightforward manner. Moreover, the metrics are relevant in the framework of CMPI6. For all of these reasons the paper should be published at the earliest possible convenience.

One can still debate whether other metrics should be considered as relevant to our field. While the paper correctly suggests the increasing importance of energy metrics in HPC – in this case the JPSY and AJPSY metrics – perhaps it should also consider other evolving metrics, e.g., FTTSE [Bekas, C. & Curioni, A. *Comput Sci Res Dev* (2010) 25: 187]. This comment is meant to encourage discussion and promote the evolution of a more complete set of metrics. As mentioned, the strength of the paper lies in the agreement of many institutions on the presented set.

A few structural improvements could be made as part of a minor revision:

- 1) Explicit mention of spectral models should be made on p. 5, line 1. Spectral models are still in use and tend to have very different scaling behaviour than FD-, FV- or FE-based models.
- 2) Point 6 on p. 10 (lines 4-6) is not necessary to mention here. It is repeated in section 3.2 and need not be emphasised.
- 3) Given the caveats mentioned about dimensionality on p. 11, lines 6-7, why even mention the nominal Cartesian representation of  $N_X \times N_Y \times N_Z$  on p. 11, line 1?
- 4) There are several full sentences enclosed in parentheses (p. 12, lines 28-29; p. 14, lines 7-8; p. 15, lines 25-26; p. 19, lines 19-21). As a matter of style, it would be better to either (a) remove the parentheses if the authors feel these comments belong in the text, or (b) make them footnotes.

The paper is well-written and concise. Obviously great care has been taken in proof-reading. Still a small number of mistakes have slipped through.

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1) GMD allows authors to write in the variety of English of their choice:

We accept all standard varieties of English in order to retain the author's voice. However, the variety should be consistent within each article. When using Oxford spellings, please do so consistently. Whilst the vast majority of spellings are U.S. ("parallelization", "modeling", "characterize", "recognize", ...), the authors curiously use "centre" (8 occurrences, although 2 occurrences of "center"), and "summarised" (1 occurrence). Please use consistent American spellings, if this is your choice. 2) Various forms are used for "flops", such as "FLOP rates", "flop rates", and "flops". Please use one consistently.

3) While there is no consensus in writing manuals whether there should be a comma after "i.e." and "e.g.", it is universally agreed that there should be a full stop after each letter. Please correct the instances of "i.e" and "e.g".

4) The four points at the end of p. 2 / beginning of p. 3 are part of the sentence on p. 2, lines 31-32. Please terminate these with semi-colons rather than full stops.

5) Same point for the 4 points in the sentence on p. 8, lines 15-22.

6) p. 7, line 1: "such as the recent AVEC report do take it " should be "... recent AVEC report, do take it".

7) p. 7, line 12: "... maybe run in ..." should be "... may be run in ...".

8) p. 15, line 1: "In this case. it may be ..." should be "In this case, it may be ...".

9) "S-mode" and "T-mode" are defined (quite appropriately!) on p. 9, line 13, but are used as "S mode" (p. 19, line 8) and "T mode" (p. 16, line 10; p. 19, lines 28-29). Please use consistently.

10) p. 21, line 1: "core for core, the new machine ..." should be "Core for core, the new machine ...".