

This is a second round of review of the proposed GMD paper summarising the ESCAPE project. As the main conclusion from my earlier review of the initial version, I suggested to significantly reduce in scope and shorten the manuscript (50 pages, 30 figures). The length was clearly not the only deficiency, and the other two reviewers concurred. Yet, given the apt match between the ESCAPE project aims and the scope of GMD, the journal does seem to be a valid venue for promoting the project and allowing to give credit to its participants.

The current version is noticeably more readable, and indeed significantly shorter (28 pages, 13 figures), yet I still find that the work lacks some balance and style consistency. For instance, I doubt if the paper is a proper place to explain that one should care about index order in multi-dimensional loops or that temporary memory allocation should be done once and not within loops, or to verbosely enumerate parameters of new NVidia products (all on page 13). Similarly, I do not think there is any value in explaining to the readers that program performance benefited from removal of debug leftovers (p17/15-6) or to promote machine-learning-technology suitability of optical processors (p20/121-22). I recommend removing Figure 1 (if not, please reduce its resolution, currently page 5 weights over 2M, while the whole article pdf is less than 6M). Overall, please try not to limit further corrections to what is literally brought up in the reviews, but read through the whole text, and try to maintain a consistent style (e.g., passive voice vs. we-did narrative). Do not hesitate to shorten the paper even more.

Please also make sure that the abstract and conclusions convey correctly the main lessons learnt in the project and a take-home message from the paper. For example, DSLs and optical processors are not mentioned in the abstract. In the “Conclusions and outlook” section, I suggest to limit references to ESCAPE-2 to one single paragraph (perhaps the last one).

**The key remaining major concern is the necessity to deposit many of the referenced non-journal reports in persistent repositories. The current practice of solely providing links to pdfs on Google Drive with no metadata or guarantee of persistency is unacceptable (9 such references).**

Below, I’m listing more specific comments that might be useful.

- p1/16: what (in this context) “scientifically required” means? consider rephrasing
- p1/17: “algorithms should ... be ... resilient in case of ... software failure” – is it discussed, please elaborate what is meant here by software failure?
- p2/11: “is leading” or “was leading”? (puzzling given references to ongoing ESCAPE-2)
- p2/13: “under initiative FET-HPC” → “under the FET-HPC initiative”
- p2/14: “goal is” or “goal was” (as above)
- p2/14: “to next generation” → “to the next generation”
- p2/18: “nearly all” → “multiple”?
- p2/123: “\$US” → “US dollars”
- p2/128: “by so-called” → “by the so-called”
- p3/116: does “above” refer to resolution or location in the text, please rephrase
- p3/122: “thanks to” → “owing to”
- p3/124: “As this ... down,” → “Consequently,”
- p3/129: explain what a “highly varying kernel” is, generally it would be worth to introduce the notion of kernel in the paper
- p3/129: what is “scientific dependency”? (data dependency?)

- p3/129: “rather complex algorithms” - please be more specific
- p3/133: “algorithms and codes” → “algorithms and their implementations”
- p3/134: “scientifically and computationally well defined” - “well defined” reads like “well posed” and suggests that other components are not “well defined”, consider rephrasing
- p4/11: add “herein introduced” before first mention of Weather & Climate dwarfs?
- p4/17: comma after 2004
- p4/13: motives → motifs
- p4/124: runnable → standalone?
- p4/11: “dwarfs created” → “dwarfs developed” or even better “List of ESCAPE dwarfs”?
- p4/14-5: “For many of the dwarfs we created so called prototypes. Each prototype implementation ...” → “Prototype implementations addressing specific hardware were developed for selected dwarfs”?
- p5/12: “and DSL...” → “and two domain-specific language (DSL) solutions: CLAW and GridTools.”
- p5/12: add a final sentence mentioning usage of Fortran
- p6/112: “dwarfing” ??? (perhaps isolating)
- p8/119: comma after methods
- p8/125: “truncation” → “truncation error”
- p8/125: “very cheap direct solve” → “efficient direct scheme”?
- p8/116: comma after paper
- p8/128: comma after Otherwise
- p10/Fig3 caption: “is without ocean and waves” → “was run without ocean coupling”?
- p10/111: “overlap different parts of the model” → “enable concurrent execution of different model components”?
- p11/12 and p11/16: repetition of “parallelism exposed to the GPU”, avoid duplication and explain what it means
- p11/111: ensure listing is placed after “as follows” (or make it a figure)
- p11/11: “a factor 10”, rephrase using “tenfold increase of”
- p12/13: “a FFT” → “an FFT”?
- p15/111: please remove the “Also there is still room ...” sentence
- p17/15-6: please remove the “A few percent of ...” sentence
- p17/113: comma after CPU
- p18/12-4: suggest starting the section with the second sentence (“The fundamental...”)
- p20/11: “introducing known terms into the functions” – what terms, what functions?
- p20/115-19: explain that binary means black-white (right?), otherwise binary precision might sound confusing

- p20/121-22: remove the “The inherent ability ...” sentence
- p20/123: please mention that results from the optical processing tests will be discussed later, otherwise it seems that the subject is abruptly dropped
- p21/12: “is about 15 percent” of what?
- p21/19-10: please remove “There might still be a potential” sentence
- p21/113: rephrase not to repeat “necessary”
- p22/12: “this section” → “preceding section”
- p22/118-19: please remove “More work on”’ sentence
- p22/22: “physics equations”?, please rephrase
- p22/133: “scientific correctness” of dwarfs, implementations, hardware? (please limit the use of them/their/these)
- p23/14-5: “The paper gives” sentence sounds like a copy-paste from an abstract
- p23/132: Please make the “Comparing different methods...” sentence more specific
- general: please do not CAPITALISE Fortran – starting with Fortran 90 the all-caps name has been dropped

References (in general, be consistent: capitalise only the first word of a title; use proper journal name abbreviations):

- Asanović et al. 2006: www2 → www (both work, but people seem to cite the latter)
- Asanović et al. 2009: Comm. ACM
- Bénard and Glinton 2019: Q. J. Royal Meteorol. Soc.; add volume, pages
- Clement et al. 2018: remove ”on”
- Colavolpe et al. 2017: Q. J. Royal Meteorol. Soc.
- Colella 2004: if impossible to locate, mention in the text after whom cited
- Deconinck 2017a: use persistent repository (e.g., OpenAIRE, arXiv), **NOT A GOOGLE DRIVE LINK!**
- Deconinck 2017b: use persistent repository (e.g., OpenAIRE, arXiv), **NOT A GOOGLE DRIVE LINK!**
- Deconinck et al. 2017: Comput. Phys. Commun.
- Douriez et al. 2018: use persistent repository (e.g., OpenAIRE, arXiv), **NOT A GOOGLE DRIVE LINK!**
- Dziekan et al. 2019: GMDD → Geosci. Model Dev. 12, 2587-2606; doi:10.5194/gmd-12-2587-2019
- Feng et al. 2012: use full title (incl. ”work in progress”); capital letters in conf. name
- Flamm 2018: add publisher and report number (NBER Working Paper No. 24553)
- Glinton and Bénard 2019: Q. J. Royal Meteorol. Soc.; add volume, pages (or remove elsewhere)

- Johnston and Milthorpe 2018: use full title (incl. "Enhancing OpenCL...");
- Kaltofen 2011: add quotation marks within title as in the original; use booktitle "Numerical and Symbolic Scientific Computing" instead of book series "Texts & Monographs in Symbolic Computation"; add editor names; remove Vienna
- Katzav and Parker 2015: Clim. Change
- Krommydas et al. 2015: remove "chun" in the surname of second author; J. Signal Process. Syst.
- Kühnlein et al. 2019: Geosci. Model Dev.
- Macfaden et al 2017: Sci. Rep.
- Mazaauric et al. 2017a: use persistent repository (e.g., OpenAIRE, arXiv), **NOT A GOOGLE DRIVE LINK!**
- Mazaauric et al. 2017b: use persistent repository (e.g., OpenAIRE, arXiv), **NOT A GOOGLE DRIVE LINK!**
- Mengaldo 2016: use persistent repository (e.g., OpenAIRE, arXiv), **NOT A GOOGLE DRIVE LINK!**
- Mengaldo et al. 2018: Arch. Comput. Methods Eng.
- Messer et al. 2016: Int. J. High Perform. Comput. Appl
- Michalakes et al. 2015: is the "Tech. Rep. TN-484, NCAR, Boulder" correct? NCAR does not seem to list it, please use a (hopefully) more persistent url: <https://repository.library.noaa.gov/view/noaa/18654>
- Müller et al. 2017: use persistent repository (e.g., OpenAIRE, arXiv), **NOT A GOOGLE DRIVE LINK!**
- Müller et al. 2018: add volume, pages
- Neumann et al. 2019: Philos. Trans. Royal Soc. A; remove 20180 148
- Osuna 2018: use persistent repository (e.g., OpenAIRE, arXiv), **NOT A GOOGLE DRIVE LINK!**
- Robinson et al. 2016: Prace → PRACE; add doi: 10.5281/zenodo.832025; remove "- Evaluations on Intel MIC" ?;
- Schalkwijk et al. 2015: Bull. Am. Meteorol. Soc.
- Schulthess et al. 2019: Comput. Sci. Eng.
- Shukla et al. 2010: Bull. Am. Meteorol. Soc.
- Van Bever et al. 2018: use persistent repository (e.g., OpenAIRE, arXiv), **NOT A GOOGLE DRIVE LINK!**
- Wallemacq et al. 2018: correct author list (Wallemacq, P. and House, R.); use publisher's url instead of ResearchGate doi: <https://www.unisdr.org/we/inform/publications/61119>
- Wedi et al. 2015: add doi: 10.21957/thtpwp67e
- Wehner et al. 2011: J. Adv. Model. Earth Sys.
- Xiao et al. 2017: add doi:10.21957/g9mjjlgeq
- Zheng 2018: correct volume, pages, doi: Geosci. Model Dev., 11, 3409-3426, doi:10.5194/gmd-11-3409-2018

Hope that helps.