

Additional comments on ESSD-2019-154 (Vulcan US emissions)

I appreciate that our research community focuses on emissions products. Definitely we need those efforts, globally and nationally! I also like that ESSD plays a helpful role in promoting, certifying and sharing those products.

Unfortunately, for several reasons, this most-recent Vulcan product as submitted and as described fails to meet many requirements and expectations for ESSD. In several comments below I echo and emphasize points made by reviewer #2. As chief editor for ESSD for more than 10 years, I hope I offer useful and well-informed viewpoint.

Note: I read both this paper and the prior (Hestia) publication in ESSD.

Overall, I find very little about data, methods, validation, etc. to give a reader / user confidence. I find the registration requirement at ORNL unacceptable. I repeat, in the strongest terms, the recommendation of reviewer #2: read the guidelines!!! (<https://www.earth-syst-sci-data.net/10/2275/2018/>)

Reader has no idea of sequence or versions. Hestia based on Vulcan? Vulcan builds on lessons learned from Hestia? This version, apparently Vulcan 3.0, improves on which prior version(s)? What improvements? How do the authors confirm improvements? Does the reader need to go back to Nature papers in 2002?

What external sources? How accessible? How reliable? Near the end the authors write “depending upon support and the availability of data sources described in this study”. Will availability prove problematic? For all sources? Specific sources?

Manuscript needs two tables. First, a clear sequence of prior and related products leading to Vulcan 3. Do not make readers guess or search. Provide reliable up-to-date links. If not open access, make them (all) open access. Second, a clear comprehensive list, in table form, of all sources. Perhaps 50 or more, no matter. Let readers know what you used, what version you started from, with active certified links to all sources. Most users do not want to try to follow every step, but authors must nonetheless provide exact guidance and source information.

This reader / editor does not like the “Vulcan’Science’Methods’Documentation,’Version’2.0” It gives no information about date or version. In too many cases it appears to derive from 2002. That .pdf has undergone no review, no critical reading, etc.; it looks like a lab report. Users will not find it useful or reliable. I also read at least partial overlap between manuscript and lab report. If useful, put it all in the manuscript.

Speaking of Hestia, I find only one mention accompanied by a single citation. Why, in Figure 10, do they not show an LA example? No discussion, intercomparison, etc. Meanwhile, Hestia clearly specifies “Hestia-LA data product are supplied by output of the Vulcan Project” (<https://doi.org/10.5194/essd-11-1309-2019>) Do the author intend a series of Hestia-cityname products, apparently isolated from Vulcan manuscripts? Also apparently substantial text overlaps between that document and this? What did our similarity test show?

I find efforts to compare with ODIAC unsatisfactory. What does figure 9 tell me, quantitatively and reliably? Nothing. Because authors have not provided confidence trail for development of Vulcan 3, a snapshot comparison to ODIAC proves meaningless. What product works well for what purposes, with what uncertainties, and why? Can we assign differences to night light data in one but not the other? By how much would that impact? Which product needs what improvements? As a data journal, ESSD needs to ensure readers can ask and answer such questions. How does this work contribute to that discussion?

I find too many proprietary tools and legend errors. Figure 5: Copyright Ó National Geographic Society. Figure 6 (where authors have reversed the line colors: red designates months (not years) while purple designates years (not months): Copyright © Esri. Figure 10: ArcMap™ by Esri using the World Imagery basemap layer (Copyright © Esri). Proprietary copyrighted tools and sources are not acceptable in ESSD!

Other reviewers have pointed out many technical errors. I find the entire manuscript unreliable with key information hidden or inaccessible.

With many months of effort and persistent cooperation by authors and reviewers, ESSD helped those authors bring the EDGAR product into a successful published product. I believe ESSD can and should do the same here, with the first step being to recognize and acknowledge current substantial deficiencies. ESSD = open access. Vulcan = not (yet).