Earth Syst. Sci. Data Discuss.,
https://doi.org/10.5194/essd-2018-108-AC1, 2018

Open Access Earth System Science Data Discussions

Interactive comment on "Gridded maps of geological methane emissions and their isotopic signature" *by* Giuseppe Etiope et al.

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Received and published: 22 October 2018

R: Reviewer A: Author

(. . .) R: Inevitably there are shortcomings to this approach: âËŸA ′c the number of source references (published papers, reports etc.) is vast: most, but not all, have been utilised. Table S4, for example, is not complete. âËŸA ′c there is an enormous volume of data acquired by, for example, the petroleum industry, which has not been released to the public domain, so the data set cannot be comprehensive. âËŸA ′c such data sets are never complete. As soon as a compilation is completed, more source references appear. For the above reasons it would perhaps be appropriate to recognise this a 'provisional' attempt to evaluate global geological methane emissions.

However, I believe it be the only one available, and in its present form it is more than adequate to demonstrate the significance of geological sources of methane.

A: We agree with Reviewer#1, Table 4 (Submarine Seepage) may not be complete as it can only refer to published data (as indicated in Section 5.1); we cannot include unpublished or confidential data from petroleum industry. We outline, however, that the data, for our purpose, must only refer to methane emission into the atmosphere, not to data on gas flux at seabed or to the existence of submarine seeps. We doubt that oil industry is interested in estimating the flux of methane at the sea surface. We can however better clarify the point by rephrasing the following sentence in Section 5.1: A specific dataset. . ..(. . ...). . ...was developed based exclusively on published literature (Table S4 in the Supplement).

R: Are there plans to maintain and update the data set?

A: Yes, the dataset can be updated annually.

R: These comments do not detract from the value and usefulness of this data set. It is presented in a suitable format for use on GIS systems etc., and the paper adequately describes how the data set was generated. To the best of my knowledge the data set is unique, compiled in an appropriate manner from data of suitable quality. Rating: 2. It falls short of 1 only because of the shortcomings identified above.

A: Ok, but as explained above, we can only report published data, so how can Table 4 be a shortcoming? There is no choice. . ...

Specific comments:

R: p3 l20: four major categories: is it worth noting here that other sources (e.g. deep water seeps) do occur, but are less likely to be responsible for direct methane emissions to the atmosphere?

A. In Section 5.1 we clarified that deep water seeps are not considered because of the limited or nil impact to the atmosphere

R: P3 l23: Submarine (offshore) seeps: presumably this includes offshore mud volcanoes; if so this should be stated - if not they should have been included either here or in a separate category.

A: Yes, they include offshore mud volcanoes

R: P3 l26: diffuse microseepage: presumably this category is exclusively onshore – this should be stated.

A: Yes, this will be clarified at the beginning of Section 6.1

R: P4 l 24 onshore cells without OS, GM or MS sources?

A: No, only, OS and GM; all onshore MS cells have a value

R: P16 l24 The double-sided Grubs test should either be explained or a reference should be provided.

A: OK reference is going to be provided

R: P16 l28 “as limit” – or “as the limit”? OK

R: P25 l 14 (Table 5). The distribution of submarine seepages: “unknown % of global coverage (likely >80% ?)”. What does this mean? If this means that more than 80% of the global distribution of submarine seeps is accounted for in the data set, I strongly dispute this. I suspect that many more than 20% of existing seeps and seep areas remain undiscovered (or are discovered but unreported).

A: We outline again that we are referring exclusively to shallow seeps (<300-400 m below sea level), with impact in the atmosphere. We considered conservatively 80% with a question mark; would 60 or 70% be more realistic?

R: The Supplement is first mentioned on p4 l8 –instructions on how to access it should be provided here and on p20 l20.

A: Following the editorial rule, the access to the Supplement must be indicated at the

end of the manuscript. We did not know the doi during submission. It will be added in the revised final version.

A: We are going to address all minor technical comments.

We are very grateful to Reviewer#1 for the careful and positive review and comments.

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