

Interactive comment on “The Depth Limit for the Formation and Occurrence of Fossil Fuel Resources” by Xiongqi Pang et al.

György Pogácsás (Referee)

pogacsasgy@caesar.elte.hu

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General comments

The overall structure of the Xiongqi Pang et al “The Depth Limit for the Formation and Occurrence of Fossil Fuel Resources” article (<https://www.earth-syst-sci-data-discuss.net/essd-2019-72/essd-2019-72.pdf>) is fairly well structured and clear. The length of the paper is appropriate. The figures and tables are correct and good quality. The article is implemented by the Supplement (<https://www.earth-syst-sci-data-discuss.net/essd-2019-72/essd-2019-72-supplement.pdf>) and by the Data sets (<https://doi.pangaea.de/10.1594/PANGAEA.900865>).

Specific comments

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The colour diagrams on both the figures of the article and on the figures of the Supplement are really beautiful and very informative. The Supplement figures (Fig. S1-Fig. S5) illustrate the identification of the Active Source Rock Depth Limit (ASDL) within the Tarim Basin, Sichuan Basin, Ordos Basin, Bohai Bay Basin, and Songliao Basin using different indicators. Supplement Fig. S6. illustrates the distribution of proven hydrocarbon reserves versus depth (and their relationships with ASDLs and HRDLs) within the Tarim Basin, Junggar Basin, Sichuan Basin, Ordos Basin, Bohai Bay Basin, and Songliao Basin.

The article and the data sets are more or less consistent. The excel spreadsheets of the Data sets at <https://doi.pangaea.de/10.1594/PANGAEA.900865> (Fig.2.xlsx-Fig.9.xlsx) are strictly connected to the figures of the article as follows: Fig.2.xlsx to Fig.2; Fig.3.xlsx to Fig.3; Fig.4.xlsx to Fig.4; Fig.5.xlsx to Fig.5; Fig.6.xlsx to Fig.6; Fig.7.xlsx to Fig.7; Fig.8.xlsx to Fig.8; Fig.9.xlsx to Fig.9; whereas Fig.10 is connected both to Fig.8.xlsx and to the tables of the paper (Table 1. and Table 2). The Supplement figures referring to the Tarim Basin, Sichuan Basin, Ordos Basin, Bohai Bay Basin, and Songliao Basin, unfortunately are not corroborated by excel spreadsheets containing the data sets which were used for the construction of Fig. S1.-Fig. S5. Only in the case of the Junggar Basin figure (Fig.2) are available the excel spreadsheets (Fig.2.xlsx) at (<https://doi.pangaea.de/10.1594/PANGAEA.900865>) containing the geochemical data which were used to construct the diagrams on Fig.2.

The related Data sets at <https://doi.pangaea.de/10.1594/PANGAEA.900865> contain an enormous number of geochemical data but the structure of the data sets excel spreadsheets (Fig.xlsx) does not seem to be the luckiest one. Although the different geochemical parameters of a source rock samples are strongly connected, the geochemical data cube of the article is separated and segmented: H/C versus depth, S1/TOC versus depth, A/TOC versus depth, (S1+S2)/TOC versus Ro, (S1+S2)/TOC versus depth etc. It does not help very much to understand the petroleum generation in the six representative Chinese basins. To provide additional references concerning the

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petroleum systems of the Tarim Basin, Junggar Basin, Sichuan Basin, Ordos Basin, Bohai Bay Basin, Songliao Basin is strongly recommended. The article is focusing on questions related to depth limit of petroleum generation and occurrence. Geochemical data are definitely needed to answer these kind of questions and the paper itself seems to be appropriate to support the publication of the enclosed enormous geochemical data sets. Although question may arise concerning the need to use additional type (geology, geophysics etc.) of data as well to give even more precise answer concerning depth limit of petroleum generation within sedimentary basins. According to the article the Active Source Rock Depth Limit (ASDL) was studied basically by two more or less independent methods. The first one was a graphic method, constructing diagrams (H/C versus depth; A/TOC versus depth; S1/TOC versus depth; (S1 + S2)/TOC etc.) and "drawing dashed curve to envelope all the sample values and assuming the intercept of the dashed line on the vertical axis marks the ASDL". The second method applied linear equation as follows: $ASDL = 16202 - 2.63 \times HI - 139.46 \times HF$; "where, ASDL is the active source rock depth limit; HI is the hydrogen index value of the major source rock in a basin; HF is the average heat flow value of the given basin". In the case of the graphic method considerable uncertainty is related to the lack of ultra-deep wells why the drilled boreholes were terminated by some kilometres above the ASDL. In the case of the $ASDL = 16202 - 2.63 \times HI - 139.46 \times HF$ equation the main uncertainty is related to the facts that heat flow values of the sedimentary basins are geologic time dependent and the thermal maturation is not the only function of HI and HF value, but it depends on other factors (time etc.) as well. Oil companies and research institutes all over the world apply sophisticated methods for modelling the source rock maturation versus time and versus depth, besides geochemical data using subsidence history reconstructions, deposition history models, compaction history models, thermal history calculations and so on. It is assumed comparison of the graphic method based and the linear equation ($ASDL = 16202 - 2.63 \times HI - 139.46 \times HF$) based results of the article with results of source rock maturation versus depth and time modelling would provide even more precise expectations concerning the depth limit of the ASDL within

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the studied basins.

Technical comments Careful English language revision of the article by a native English college is strongly recommended.

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