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

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Fossil fuel resources play an important role in the modern life. As the increasing demand of hydrocarbon, how to streamline the exploration is of great significance. As is well known, the vertical distribution of hydrocarbon varies from several hundred meters to tens of kilometers, which can bring high risks to the oil and gas assessment and exploration. This paper introduces an innovative concept: Active Source Rock Depth Limits (ASDL), which defines the maximum burial depth for source rocks to generate hydrocarbon in sedimentary basins. The concept can significantly provide guidance for hydrocarbon assessment and exploration. Detailed examples from six major petroliferous basins in China have been presented. The method used to define ASDL is very solid, parameters applied in this paper like H/C ratios, "A"/TOC, "S1+S2"/TOC are

widely used in organic geochemistry. The result shows the existence of ASDL, and it is comparable across these basins regarding thermal maturity. Apart from the basins in China, the paper also shows the concept of ASDL is applicable to the basins all over the world, which strongly support the authors' idea. Moreover, the controlling factors of ASDL has been investigated in the paper and the authors point out the ASDL is mainly constrained by the heat flow of the basin and types of organic matter. Quantitative research in hydrocarbon geology has always been a challenging task, however, through geochemical and mathematical analysis, the quantitative relations between the above two controlling factors and ASDL is established in this paper, which is a good try. At the ending part of the paper, the authors come up with the idea that the petroliferous basin can be vertically divided into three parts based on HET, oil and gas supply limits, and each part has its own types of hydrocarbon reservoirs. The idea provide a more efficient way to target hydrocarbon reservoirs, which is very interesting and hopefully we can see more details about this in the future.

Honestly speaking, I believe the work of this paper is very innovative and the result is very solid, and it provides us with a new perspective when doing fossil fuel exploration, which definitely deserves to be published. However, I still have few suggestions and comments for this paper: 1.Geochemical data and hydrocarbon reservoir parameters from six representative petroliferous basins in China are quite enough. I am not sure whether the corresponding dataset for basins from worldwide is accessible, like Persian Gulf Basin, West Canada Basin, North Sea Basin. If one or few detailed examples of above mentioned basins can be presented, it would be the icing on the cake. 2.In the part of quantitative prediction of ASDL, the predicted ASDL can be expressed by HI and HF, where HI is the proxy of organic matter types. As we all know, there are some other parameters can represent kerogen type, why the HI is selected to established the quantitative relation in this paper? 3.In part 3.1, the average thermal maturity level is regarded as the identification criterion for ASDL in general geological settings. However, in part 3.3, the quantitative prediction of ASDL is express by active source rock depth limit. As is known, the thermal evolution of organic matter is a chemical

process and it is a function of time and heat. Therefore, I believe if we want express ASDL by depth, it is better to take the age of source rock into consideration when doing quantitative investigation. 4.In part 3.3, it seems that the HF used here is the value of nowadays. But HF varies in geological history and can be influenced by tectonic events. For example, the current heat flow in Basin and Range is high due to the recent tectonic extension. Therefore, maybe an average heat flow from the time when the source rock deposited to present is a better. 5.In conclusion 1 and 2, what is meaning of ASRL? Is this a typo or Does it represent something else?

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