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Comment

***Interactive comment on “Molecular analysis of the microbial community structures in water-flooding petroleum reservoirs with different temperatures” by L.-Y. Wang et al.***

**Anonymous Referee #2**

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General comments: This paper (bg-2012-148) carefully studied about the bacterial and archaeal community structures in six water-flooding petroleum reservoirs with different temperatures (20 to 63 degree C). The microbial communities shifted from high-temperature (e.g. archaea: Thermococcus, Methanothermobacter, Thermoplasmatales, bacteria: Firmicutes, Thermotogae, Thermodesulfobacteria) to low-temperature (e.g. archaea: Methanobacterium, Methanoculleus, Methanocalculus, bacteria: Proteobacteria, Bacteroidetes, Actinobacteria), which was a valuable information for microbial petroleum researchers. Canonical correspondence analysis (CCA) revealed that temperature showed correlation with the microbial community structures. Furthermore, the physical, chemical, and geochemical characteristics (e.g.

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mineralization, ionic type, volatile fatty acids) of reservoirs also correlated with microbial community structures, and the syntrophic acetate oxidation demonstrated as the main methanogenic pathway in high-temperature petroleum reservoirs.

Specific comments: There are some suggestions for improvement of this manuscript.

1. The location of samples and characteristics of sampling spots (petroleum reservoirs) are critical to the results and conclusions. Information about the name of samples and physiochemical parameter were mainly listed in Table 1; however, there was little information about the sampling position. In order to help readers figure out the outline of samples and connect the results with the characteristics of samples more precisely, a brief statement or supplement information is suggested to be added in the section of 2.1 Collection of sample and nucleic acid extraction.

2. Authors stated the presence of physiologically diverse and temperature-dependent microorganisms in these subterrestrial ecosystems. Samples S1 to S6 were from different production oil wells, and the depth of sampling spots were different from 480 to 1490 meters. From Table 1, there was a high correlation between the depth and temperature. The temperature increased with the depth of sampling spots. Furthermore, authors agreed that the microbial population differs from one oil reservoir to another because of the variations in their physical, chemical, and geochemical entities (Discussion, line 3-4), therefore, it is necessary to sample a single oil reservoir with different depths. Based on the new results obtained from the same oil reservoir, the discussion between the relationship of temperature and community shift will be convincible.

3. This article focused on the effect of temperature to microbial community. The results showed clear difference of main bacteria composition between low-temperature and high-temperature. There were few discussions about the comparison between the results of this study with other related researches. Authors should strengthen this part with statements and a table, and try to find out the highlight of this study.

4. After obtaining some new results related to suggestions 2 and 3, it is possible to

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make substantial revision to the section of Conclusions.

5. Some of the references cited in this article are too old, and only about 30% of cited references are within 5 years. Since energy related researches are widely studied, authors should cite newer references.

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