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Biogeosciences Discussions

Interactive comment on "Organic signatures in Pleistocene cherts from Lake Magadi (Kenya), analogs for early Earth hydrothermal deposits" *by* Manuel Reinhardt et al.

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- Title. The title suggests more than the contents of the full article, since: 1) Cyanobacteria, Algae, Higher plants, ciliates, fungi and many bacteria and Archaea present in the Pleistocene setting were not present during the "early Earth", i.e. the (early) Archean 2) most, if not all, hydrothermal vents in the early Archean were at the bottom of the oceans, a setting very different from the Pleistocene setting investigated. The analogy is therefore limited to the syngeneity of immature and mature organic matter as a result of the hydrothermal pump hypothesis. -Extracts and Kerogens. The authors have analysed the extracts as such by GC/MS. High molecular weight compounds

such as Intact GDGTs or their lipid cores, polyesters, etc. (compounds expected to be present in these immature sediments in relative high concentrations), have been missed since the extraction method was not sufficient for extracting such compounds and/or they cannot be analysed by GC/MS. A more polar extraction method in combination with base- and/or acid hydrolysis of extracts and LC/MS analysis would have opened the analytical window very considerably. The kerogens obtained have not been hydrolysed either, so that non-extracted moderate polar, partly high molecular weight, compounds were not removed and analysed by GC/MS or LC/MS. This implies that the HyPy results of the non-hydrolysed kerogens may be biased by pyrolysis products of relatively polar, high molecular weight immature organic matter which is not the result of hydrothermal maturation. It's also possible that the "kerogen" contains high molecular weight compounds produced through sulfurization of immature functionalized low molecular compounds. I understand very well that the authors have limited themselves analytically. That's OK as long as the consequences of such a narrow analytical window is considered in the results and discussion paragraphs. -Stable carbon isotopes. Table 4 . Sample LM-1694 seems to have highly deviating isotope values. Why is that? A HyPy m/z 85 trace might be added to Figs 4 and 6. -UMC. The authors note the presence of a clear UMC in sample LM-1697. UMCs are often the consequence of bacterial biodegradation. In this case it's not clear when this happened, shortly after deposition or recently due to bacterial infection of the outcrop samples. A UMC is also recognized in some of the other samples. I suggest that the authors discuss this topic in more detail.

For future work related to "kerogen" analysis I suggest that the authors consider to apply Thermally assisted hydrolysis (TMH) in combination with GC/MS (see for example K.G.J. Nierop et al., J. of Anal. and Appl. Pyrolysis, 83, pp 227-231 (2008) instead of HyPy. I'm convinced that by applying this TMH method much more info will be obtained due to the release of functionalized compounds also indicating the mode of chemical binding to the macromolecular matrix, since it can be expected that in this particular case the so called kerogen may partly consist of GDGTs and many other

bio(macro)molecules.

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