Microbial ecology linked to serpentinization processes and related carbonation at the Old City hydrothermal field.

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The discovery in 2000 of active microbiomes associated with the alkaline hydrothermal field of Lost City near the Mid Atlantic Ridge [1] went far in changing our vision of the conditions under which life can thrive on our planet and perhaps on others as well. Up to now, no other similar hydrothermal field (HF) was reported along the ocean ridge system making Lost City unique.

Here, we present the microbial communitiy structure and ecology of the Old City hydrothermal field (OCHF), the first Lost City analogue discovered in 2016 in the melt-poor eastern end of the South West Indian Ridge (Cruise ROVsmooth, RV Pourquoi pas?; P.I. M. Cannat, IPGP). While Lost City and other described hyperalkaline hydrothermal fields (e.g. the ophiolitic Prony [2] and the Cedars [3] HFs) actively discharge hydrothermal fluids with pH up to 11.9, at OCHF the weak and diffuse discharge through carbonate-brucite hydrothermal chimneys is associated with an important mixing with seawater leading to average pH of 8.2. However, the juvenile porous chimneys harbor relatively important biomasses (ranging from $9x10^7$ to $6x10^8$ 16S rRNA gene copies/g of minerals) largely dominated by Bacteria (25 times more represented than Archaea). The difference in microbial community structure observed between chimneys reflects variable mixing between serpentinization influenced hydrothermal fluids enriched in hydrogen and reduced carbon compounds and marine water infiltrations.

Despite the full oceanic influence of OCHF and its geodynamical context close to Lost City, OCHF archaeal communities sustained by hydrothermal endmember fluid are dominated by Methanosarcinales related to The Cedars ophiolite's phylotype rather than the Lost City type. This hence opens questions on the environmental factors that structure serpentinization based microbial communities.

[1] Kelley, D.S. *et al.* (2001), *Nature* 412, 145-149. [2] Quémeneur, M. *et al.* (2014) *Environ. Microbiol. Rep.* 6, 665–674. [3] Suzuki, S. *et al.* (2013), *Proc. Natl. Acad. Sci.* 110, 15336–15341.