COMPARING BIOMARKERS FOUND IN MODERN MARGIN AND THE FOSSIL ALPINE OCEAN CONTINENT TRANSTION

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Studies of modern hydrothermal vents suggest that serpentinization can support hydrogen-driven microbial biosystems including methanotrophic biosystems. Are such bio-systems locally restricted to hydrothermal vents or are they more pervasive, being linked with the geology of serpentinized mantle in the subsurface? Understanding this relationship could help us to understand the global importance of hidden sub-surface bio-systems, the fate of methane and the carbon cycle.

The ocean-continent transition (OCT) of magma-poor rifted continental margins provides an opportunity to investigate this question. Samples of the International Ocean Discovery Program (IODP) from the Iberia Newfoundland margin and the fossil Alpine OCT exhumed during collisional orogeny were compared and then examined for the presence or absence of methanotrophic biomarkers within serpentinized exhumed mantle. Hydrocarbons are present in samples from the Tethyan OCT, including the Totalp unit (Mateeva et al., in press), the Tasna nappe and the Platta unit of the Eastern Swiss Alps and Chenaillet in the Western Alps. Hydrocarbons also occur in modern samples from the Iberian and Newfoundland margins both in the serpentinized mantle and the overlying lithologies.

The dominant hydrocarbons in ancient and modern environments are *n*-alkanes ranging from C_{15} for the modern margin and from C_{16} from the Alpine OCT to C_{32}, low molecular mass polynuclear hydrocarbons (PAHs), hopanes as well as pristane and phytane. The lithologies from the Alpine OCT and a sediment sample from Iberia margin are also characterized by steranes including 20R and 20S αββ isomers from C_{27} to C_{29}, as well as 20R and 20S diacholestanes.

The distributions of biomarker hydrocarbons, which occur in trace amounts, are consistent with a marine origin but there is no evidence for an extensive methanotrophic bio-system associated with the serpentinization. We have not, so far found evidence of methanotrophy and therefore, suggest that such a biosystem may not be pervasive in serpentinization zones, and that it may occur only under special environmental conditions (e.g. hydrothermal vents).

Mateeva, Ts., Wolff, G., Manatschal, G., Picazo, S., Kuzsnir, N., Wheeler, J., (in press). Preserved organic matter in a fossil Ocean Continent Transition in the Alps: the example of Totalp. Swiss Journal of Geoscience Special Volume Alpine Workshop – Briançonnais.