

Hydrothermal Activity Involving Ultramafics Along the Mid-Atlantic Ridge.

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Outcropping of ultramafics on the Ocean floor was thought to exist only along Fracture Zones (FZ). Sampling these rocks away from FZ during Leg 37 (1974) and 45 (1976) of DSDP on the Mid-Atlantic Ridge (MAR) remained unexplained. Further occurrence of these rocks was documented by off axis drilling during Leg 82 (1980). Ultramafic rocks were then sampled at many locations along the rift valley walls of the MAR. Consequently, direct exchange between the ocean and mantle rocks through fluid circulation is a major process associated to the construction of slow spreading ridges. Lowering the rock density, serpentinization is part of axial constructional processes. The reaction involves large production of hydrogen transported by fluid circulation to the ocean. The two hydrothermal sites developing on ultramafics discovered on the MAR, the Logachev site at 14°43'N and the Rainbow site at 36°13'N, confirm this type of direct exchange between the Ocean and the Mantle on a slow spreading ridge.

The knowledge of this type of exchange at zero age on the MAR allows to consider likely processes to take place on sedimented ridges, including the early opening of an ocean and associated sedimentary basins. These processes involve interactions of hydrothermal fluids between the oceanic substratum and the above sedimentary layers:

- Hydrogen reaction with sediment, either hydrocracking of the organic matter or (and) developing the Fisher Tropsch reaction to produce hydrocarbons from carbonates.

- Precipitation of sulfides within sedimentary layers as already observed on a sedimented zero age ridge crest (Leg 169 of ODP).