

SUBMARINE HYDROTHERMAL ACTIVITY IN THE LESSER ANTILLES VOLCANIC ARC

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ABSTRACT

Chemical analyses of 193 sediment samples from throughout the Caribbean Sea have shown sporadic enrichments of Fe and Mn in the vicinity of the Lesser Antilles. This suggests that sea-floor hydrothermal discharges have occurred there and that such processes may still be active. A subsequent water and sediment sampling programme has confirmed shallow water submarine hydrothermal venting off the volcanically active islands of St. Lucia, Dominica, St. Kitts, Nevis, Montserrat and Saba. Analyses of vent waters collected at these sites show significant enrichments in minor elements over normal seawater values. Mn is enriched in nearly all the vent fluids sampled and iron is enriched in most of them, both these elements overlapping with the lower end of the range values found in the Hellenic Volcanic Arc. Zn values are all higher than seawater values and many are higher than those found in the Hellenic Volcanic Arc hydrothermal waters. As, V and Cu show sporadic enrichments relative to normal seawater values in some of the samples. The composition of the hydrothermal waters varies off island to island, which may in part result from the leaching of rocks of variable composition along the arc.

Our results suggest that there may be hydrothermal mineralisation at shallow depth beneath the seafloor in the Lesser Antilles Volcanic Arc, even though there are no such deposits known on the islands. Should further investigation confirm this, an assessment of the environmental effects of recovery is essential before mining could be considered.