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Laboratory precipitated Mg-Calcite compared to authigenic carbonate formed at mud mounds (Costa Rica/Nicaragua Fore Arc)

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More than 100 mud mounds have been identified in the Costa Rica/Nicaragua forearc area at water depths between 1000 and 2000 m. A striking feature of these mounds is a coverage by consolidated carbonaceous sediment. These carbonates are cemented and are often consist of Mg-calcite, with varying $MgCO_3$ content. Their geochemical and mineralogical composition varies and can reflect near surface diagenesis or deep fluid signatures.

Formation of carbonates under laboratory T-controlled conditions with similar mineralogical and geochemical characteristics compared to natural samples should give essential information about deep fluid-sources, formation temperatures, diagenesis and the temporal variations under which the natural carbonate concretions have been formed.

Mg-Calcite crystals have been precipitated from oversaturated Ca^{2+} and Mg^{2+} solutions in the temperature range of 20 – 80^{o}C. X-ray diffraction pattern of the artificial calcites is similar to a variety of natural samples. In the artificial calcite, the Mg content varies between 2 and 4 % for low Mg-calcites and 5 to 18 % for high Mg-calcites. The crystal structure and the particle size of the synthesized material, as also the presence of amorphous phases in the samples, have been examined with scanning electron microscopy and infrared spectroscopy. Temperature-related oxygen isotope fractionation were determined by IR-MS. Fluid and mineral partition coefficients were determined by ICP-OES/MS. A natural mud mound system in Costa Rica

fore arc (Mound 12) is described and authigenic carbonate formation is interpreted including new laboratory results.