



Methane-related authigenic carbonates from the East Sea, Korea: Mineralogical and geochemical characterization

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Authigenic carbonates related to gas hydrates were discovered from the cores in the Ulleung Basin, East Sea. Carbonate concretions range from 3 to 6 cm in diameter, and display irregular shapes. The inside of concretions is sometimes porous and shows internal layering. Concretions are composed of aragonite or high Mg-calcite, or the combination of both. Calcite crystals are micritic and include planktonic foraminifers, diatoms, silt-sized, detrital quartz grains, and authigenic frambooidal pyrites. Ultra-textural examination reveals that acicular aragonites grew as cements between micritic calcite crystals, and this suggests that micritic calcite precipitated prior to acicular aragonite. Oxygen and carbon isotopic compositions of carbonate concretions range from +2 to +5 per mil (PDB) and from -44 to -39 per mil (PDB), respectively. These depleted carbon isotopic compositions indicate that the carbon source for the formation of authigenic carbonates were gas hydrates below, and the carbonates were formed by the oxidation of methane. Relatively narrow range of carbon isotope values, compared to those of other authigenic carbonates reported elsewhere, indicates similar diagenetic environments of formation for these concretions. Distinctive clusters of stable isotope values regardless of mineralogy imply that carbonate concretions formed in a closed-diagenetic system.