Aneriabical oxidation of methane (AOM) induced authigenic minerals formation in Shenhu area, South China Sea

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Anaerobic oxidation of methane (AOM) is the predominant process in methane-rich marine environment. This reaction will result in distinctive mineral precipitations and mineral assemblages with Fe-sulfide, variety of carbonate and sulfate minerals.

Our study area is located in Shenhu area, the northern passive margin of the South China Sea where cabonate chimneys and gas hydrates samples were found in the last ten years. we study authigenic minerals from collected samples of carbonate and core sediments in Shenhu areas. The results show that the carbonate chimney are composed of variable contents of high Mg calcite, ankerite, dolomite, clay minerals and quartz and feldspar. The carbon isotope value of carbonate are from -40.2‰ to -38.7‰ . Pyrites in core sediments mainly present as spherular and pyritohedron shapes with framboidal core and elongated crusts or octahedron pyrite, and variety of microcrystal morphology. Marcasite and nano-graphic carbon are also associated with the pyrite spherules. Gypsum occurred as cabbage-like, dumbbell or round, a unusual association of 'worn' pyrite and authigenic gypsum were found in the sample. The sulfur isotope of pyrite are from -30.7‰ to +39.4‰ and gypsum are -20.7‰. All these mineral features and sulfur and carbon isotopes values are interpreted to results from bacterially mediated pyrite and gypsum formation in an environment of cold seeps or gas hydrates.

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