Two episodes of the Early Cretaceous magmatic activity in the Gan-Hang Rift, South China: *In situ* zircon U-Pb dating

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Results of *in situ* zircon U–Pb ages using high-precision dating methods (SHRIMP or LA-ICP-MS) are reported for magmatic activity in the Gan-Hang Rift, South China. The Gan-Hang Rift, trending at least 450 km in a NE-SW direction, is a part of a Mesozoic BRP (Basin and Range Province) in southeastern China, and is an important magmatic zone composed of both volcanic-intrusive complex and A type granites.

Zircon U–Pb dating of the volcanic-intrusive complex from Xiangshan basin, Center Jiangxi Province, provides insights into the extrusive and intrusive activity at Xiangshan, which took place within a short time span (135–137 Ma) [1-2]. SHRIMP zircon U–Pb dating for two A type granitic plutons (Tongshan and Damaoshan plutons) and a diabasic dike in the northwest of the Gan-Hang Rift shows that the granitic plutons and diabasic dike were emplaced in the Early Cretaceous (122–129 Ma) [3]. A zircon U–Pb dating on a newly discovered A-type granitic pluton in Baijuhuashan (126±3 Ma), western Zhejiang Province, was carried out recently [4]. Our new study concerns a volcanic-instrusive complex in Xinlu basin, western Zhejiang Province, which produced zircon U–Pb ages of 134–135 Ma. All these *in situ* zircon U–Pb dating results indicate that two major episodes of magmatic activity occurred in the Gan-Hang Rift. The first stage (134-137Ma) generated the volcanic-intrusive complex, which marked the onset of the extension. With ongoing extension the crust and lithospheric mantle became progressively thinned and formed the second stage of granitic plutons between 122 Ma and 129 Ma. These A-type magma in the Gan-Hang Rift were likely generated with the peak episode of an extensional tectonic regime during the Cretaceous in South China, perhaps corresponding to the rollback of the Pacific plate.

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Halogen profiles of pore waters from gas hydrate potential area offshore of SW Taiwan

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Variations of halogen concentra-tions (Cl^-, Br^- and I^-) and ammonium (NH_4^+) in pore water of marine sediments of selected sites were studied to help understanding the fluid source and the pathway of sulfate reduction in the potential gas hydrate area of offshore SW Taiwan, where has been characterized with very high methane flux [1, 2, 3, 4]. According to the concentration profiles (I^-, Br^-, CH_4, SO_4^{-2}, NH_4^+), we can classify those studied sites into four groups. In group-1, which represents background group, concentrations show no clear variations with depth. In group-2, rapid reduction of sulfate and significant increase in NH_4^+ and/or CH_4 are observed. In group-3, CH_4, I^-, Br^- and NH_4^+ all increase with increasing depth. Unlike group-2, NH_4^+ concentration increases faster than those in group-2. In group-4, the CH_4 concentration increases at depth, while there are only very low I^-, Br^- and NH_4^+ concentrations. Those category except group-1 indicated the mixing of in situ and deep source fluids.

Based on the stoichiometry ratio between sulfate consumption and DIC increasing from the profiles of the studied coring sites, we can summary the pathway of sulfate reduction for group-2 to -4 as followings: For group 2, which could represent the majority sites in offshore SW Taiwan, sulfate is mainly consumed by AMO process with methane from the depth. For group-3, sulfate is consumed by decomposition of local organic matters with very few fluid input from depth. For group-4, almost all sulfates are consumed by AMO process.

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