Geochemical Evidence for Existence of Inland Foraminifera in the Nihewan Basin, China

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From the first finding in 1970s, the findings of foraminiferal fossil assemblages in inland basins have been reported until now, tend to increase in the recent years. The debates on the depositional environment of foraminiferal fossils have become the hot of researches again in China.

Based on the trace element geochemistry and SEM of shells of Quaternary foraminiferal fossils from the Xiaodukou section in the inland Nihewan basin, the original geochemical information of shells were believed to be preserved well and could be used to reveal the geochemistry of contemporaneous water, although there existed some effects of burial diagenesis on the geochemistry of shells to a certain extent. The $^{87}Sr/^{86}Sr$ ratios of well-preserved Xiaodukou foraminifera were measured, giving a range of 0.711190±25 ~ 0.712018±14 apparently higher than the value of contemporaneous seawater (0.709087 ~ 0.709147) and similar to the value of the Sangganhe river which was proven to represent the value of the ancient lacustrine water.

The hyperbolic mixing models of $^{87}Sr/^{86}Sr$-salinity and $^{87}Sr/^{86}Sr$-Sr/Ca are useful to determine the mixing relationship between seawater and fresh water (Palmer et al,1989; Ingram et al,1993). The geochemical data of Xiaodukou foraminifera indicated that depostional water of microfosslis with slightly low salinities, was near to 0‰. Furthermore, the regionally geologic field work available gives no plausible evidence to explain how the ancient Nihewan Lake 300km far from the coastal line and at 500m elevation connected with sea from the viewpoint of tectonics (Chen et al, 1988). The result implies the contemporaneous environment where Xiaodukou foraminifera inhabited was an inland lacustrine environment and there was no seawater input to the depositional environment.

So, it is reasonable to conclude that Xiaodukou foraminiferal fossil assemblages belong to non-marine foraminiferal species. The occurrence of foraminiferas may be due to the brackish water because of tectonization-climate.

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Geochemistry of dissolved and suspended loads of the Xijiang River, China: Weathering processes and erosion rates

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This study focuses on the chemistry of the Xijiang River system, one of the major rivers in China, and constitute the first geochemical investigation of both suspended and dissolved loads of this river, in order to determine both chemical and mechanical erosion rates.

Discussion

Flowing in the south of China, the Xijiang River is the second largest river in China with respect to its discharge, after the Yangtze River. As compared with the other large rivers of the world, the river is characterized by high major element concentration. The dissolved major cations average 1.17, 0.33, 0.15 and 0.04 mmol l^{-1} for Ca, Mg, Na and K, respectively, and the total cation concentrations (TZ+) vary between 2.2 and 4.4 meq l^{-1}. The high concentration of Ca and Mg, high (Ca+Mg)/(Na+K) ratio (7.9), enormous alkalinity and low dissolved SiO_2/HCO_3^- ratio (0.05) in river waters reveal the importance of carbonate weathering and erosion and relatively weak weathering and erosion of silicate over the river drainage basin.

We propose a model based on mass budget equations, that allow the proportions derived from the different sources to be calculated. As a consequence carbonate and silicate weathering rates can be estimated as well as the consumption of CO_2 by weathering of each of these lithologies. Mechanical weathering rate are also estimated according to suspended load. Dissolved elemental concentration of the river waters are corrected for rain inputs (mainle oceanic salts), they provide specific chemical erosion rates of 85-110 and 6-8.6 t/km^2/yr for carbonate and silicate, respectively. The average atmospheric CO_2 consumption results from silicate and carbonate weathering over the drainage basin are 41_10^9 and 216_10^9 mol C /yr. Mechanical erosion rate is 208 t/km^2/yr.

Conclusions

The high denudation rates are mainly attributable to high relief and heavy rainfull. Acid rain affects south China, where its frequency may exceed 50% and the pH value of rainwater may be <4.0, result from SO_2 pollution in the atmosphere (Zhao and Sun, 1986). Acid rain in the drainage basin results in the dissolution of carbonates and aluminosilicates and hence accelerates the chemical weathering rate.

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