Geochemical assessment in environmental assessment of human settlements

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Introduction and Methods

Environmental assessment of human settlements (EAHS) has two types in different levels, one is strategic environmental assessment(SEA), another is environmental impact assessment of project(EIA). From Geochemical perspective, EAHS reveal the relationship between human health and environmental characteristics or changes[1]. It use Geochemical principle and method to Evaluation the environmental quality of human settlements, and also to predict the environmental change(figure 1).

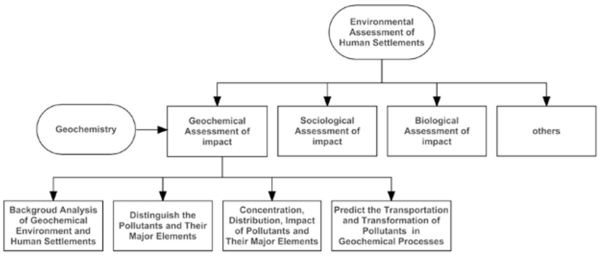

Figure 1: Relationship between EAHS and geochemistry.

The focus of assessment is to confirm the geochemical factors in environment. It base on comprehensive analysis of environmental characteristics and human settlements' characteristics. Then, relative indexes would be selected for EAHS. Assessment establish on evaluation of the selected indexes. Finally, it proposed protective measures of environmental engineering, and conclusions of EAHS would be made.

Geochemical analysis is an important basis for EAHS. Environmental impact formed by the Interaction between geochemical environment and human settlement. Strategic environmental assessment (SEA) of human settlements proposes more promptly support in policy and technology for environmental protection.

[1] Yuguo *et al*.. (2006) *Journal of Earth Sciences and Environment* **28**: 81-86.

Redox-sensitive controls on the Proterozoic nitrogen cycle

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Primary production in the Proterozoic ocean is thought to have been strongly nutrient limited, with a range of hypotheses focusing on lack of phosphorus, nitrogen and/or trace metals. It has been argued that phosphorus lost its controlling role as ultimate limiting nutrient, and that all nitrogen could have been drained from the ocean by denitrification in the transition from anoxic to oxic conditions [1], resulting in a feedback maintaining low atmospheric oxygen, and ecological constraints on eukaryote diversification. However, high rates of nitrogen fixation in contemporary anoxic basins and during Phanerozoic OAEs suggest enhanced nitrogen fixation can compensate [2].

Here we use a spatially structured biogeochemical model, GENIE, to examine the role of the nitrogen cycle in controlling ecosystem productivity and ocean redox state. The physiological cost of nitrogen fixation is considerably reduced in low oxygen environments [3], hence nitrogen fixation can maintain production in a mixed anoxic/oxic regime at a level set by P as the ultimate limiting nutrient.. Extensive denitrification is predicted, with small NO_3 and NH_4 reservoirs and a short N residence time ~ 300–500yr.

Spatial redox structure influences the expression of isotope fractionation, hence scenarios could potentially be constrained by N isotope data [4].

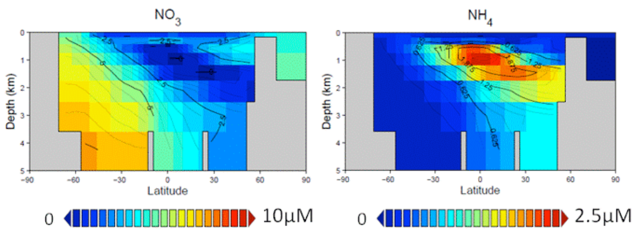

Figure 1: Meridional sections for [NO_3] and [NH_4] in mixed oxic/anoxic regime.

[1] Fennel *et al*.. (2005) *Am. J. Sci*. **305**, 526–545. [2] Kuypers *et al*.. (2004) *Geology* **32**, 853. [3] Großkopf & Laroche (2012) *Front. Microbio*. **3**, 236. [4] Beaumont & Robert (1999) *Precamb. Res*. **96**, 63–82.

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