Interactions between inorganic ions, natural organic matter and iron oxides: Effects of particle size and charge distribution

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Both the humic acid (HA) and fulvic acid (FA) fraction of natural organic matter adsorb strongly to iron (hydr)oxide minerals such as goethite. The current study shows that the charge of HA in the compact part at the oxide-water interface needs to be partially separated from the electrolyte ion pairs in space. This separation can be attributed to the large size of the HA particles that limits their close access to the surface. In addition, the calculations also indicate that the positive ionic strength dependency of HA adsorption can be explained by the conformational change of HA particles with ionic strength.

Electrostatic interaction is an important mechanism by which adsorbed organic matter particles influence adsorption of inorganic ions to oxide surface. The charge distribution of both the adsorbed organic particles and inorganic ions influence their interaction. The stronger interactions between Ca and FA than between Cu and FA can be explained by the larger amount of positive charge that is located at the d-plane of goethite surface in the case of calcium. The charge distribution is thus a major factor in the proper prediction of the interactions of charged species at the metal (hydr)oxide surface.

Cenozoic extension in the Pearl River Delta region (South China): Evidence from structural geology and apatite fission track thermochronology

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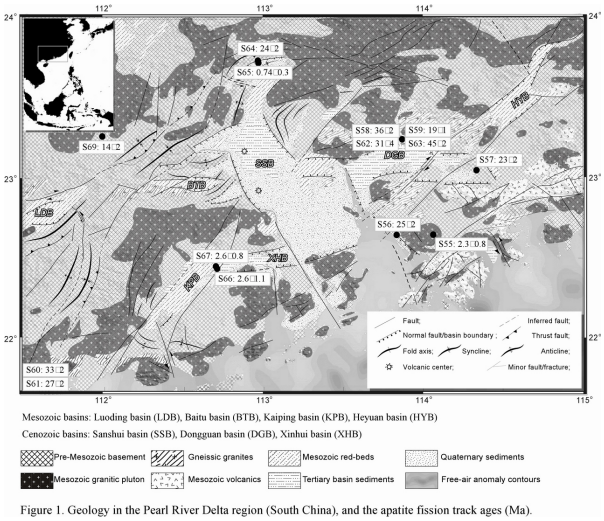

Figure 1. Geology in the Pearl River Delta region (South China), and the apatite fission track ages (Ma).

The Pearl River Delta (PRD) region is located in the coastal South China Block (SCB) which was rifted in the late Mesozoic-Cenozoic time. New morphotectonic and structural studies reveal a polyphasal extension in the PRD region, including one phase of extension in the NNW-SEE direction, consistant with but predating the opening of the South China Sea, and one phase in the ENE-WSW direction, which introduced NW-striking normal faults and probably a differencial uplift of the basement in this area. Apatite fission track (AFT) analysis were applied for 14 samples, including granite, paleozoic rocks and Mesozoic red beds. 9 samples yield apparent ages varying from from 14Ma to 36Ma with an average confined track length of ~14μm showing a distribution of unimodal frequency, roughly contemporary to the sea floor spreading of the South China Sea, indicating a rapid exhumation of the basement as a passive margin. These ages are much younger than the published AFT ages (43~68Ma) for the western basement, indicating a differencial exhumation process probably due to the polyphasal extension in the coastal SCB. The very young results (<3Ma) are interpreted as neotectonic influence, since some of the samples were collected near the active fault zones in this area.

Reference

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