Natural Enrichment of Ferruginous Products by Weathering, Hunchun Basin, China

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The Hunchun Basin, China is suffering from combinative pollution; natural enrichment of Fe & Mn and anthropogenic contamination of Cd originated from phosphate fertilizer and F leached from coal and ash. In order to evaluate the extent of natural enrichment, it is neccessary to investigate the stability of Fe-Mn mineral phases and their existing status, weathering rate of source materials, and characterization of soil properties throughout the whole Hunchun Basin. We sampled groundwater and surface water and selected stream sediments, profile soils and surface soils. The source-rock deduction using water samples revealed the granitic weathering. Although the Fe concentration levels of total digestion showed lower levels than world sandy soil, iron of partial extraction using 0.1N nitric acid had a good correlation with other heavy metals. This implies that the anthropogenic contaminants (Cd, Cu, and Pb) behavior with ferruginous weathering products. From the sequentially selective dissolution method using sodium pyrophosphate (*p*), oxalate (*o*), and dithionite (*d*), Si, Al, and Fe are dominant in *d* and *p* fraction, and Mn is *o* and *p* fraction and so on, respectively. Based on this result, existing phases and status of Fe and Mn are distinctly different, and abundance of amorphous Mn phases made thermodynamic calculation difficult. Application of these ferruginous weathering

products to understand basin development revealed that the first terrace of the Hunchun River is more active than the second terrace, which is inducted from the higher value in Fe_d/Fe_t. Amorphous iron phases are controlling phases of iron from saturation indices. These phases are hindered to more stable phases by high contents of smectite and gibbsite, amorphous opaline produced from rice roots, and organic phosphate pesticides or fertilizers. Therefore, in the future, it is inevitable that ecological and environmental problems related to the iron phases probably occur in drinking water supply in this area, especially first terrace.