Modeling of hyporheic zone of surface water - groundwater with 3S technology

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Hyporheic zone of surface water - groundwater is a mixture of surface water and ground water zone where the biogeochemical activities in the region are very strong. Moreover, this zone is mainly affected by natural factors and human factors. The physical, chemical and biological processes are often occurs within the hyporheic zone, and affect the water movement, solute transport processes and the process of biological activities. Massive algae blooms are one of the biggest problems that rivers/lakes/coasts face today in China. For example, before the Beijing 2008 Olympic Games opening, Qingdao Olympic Sailing Venue, the green algae covers a third of the sea off the city of Qingdao. Algae are often caused from high nitrogen containing components of untreated waste, and nitrogen is a detergent and the main ingredient in plant fertilizer. The hope Green Olympic Games and current situation make so many Chinese people unease. Rapid development of computer technology and geo-information technology provides an objective basis for truly integrated cross-disciplinary. Global Earth Observation System of aerospace, aviation and ground coordination with multi-temporal and spatial resolution has been more and more widely applied in geochemical, hydrological, ecological and environmental studies. With the advanced development of 3S technology (Remote Sensing, Geographic Information System, Global Positioning System), monitoring, measuring and modeling biogeochemical processes and its ecological function in hyporheic zone of groundwater and surface water is more visualized and reliable. This talk will focus on an overview of application of 3S on biogeochemical processes in hyporheic zone of groundwater and surface water in China with some preliminary modeling studies [1].

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Recycling subcontinental plagioclase-rich lower crust in the North China craton

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Foundering of eclogitic lower crust into the convecting mantle has been proposed to explain the unusually evolved chemical composition of Earth's continental crust. However, whether the granulitic lower crust is also removable remains unclear due to its relatively lower density. Here, we report a geochemical study of distinct phenocrystal clinopyroxene and silicic melt inclusions hosted by early Cretaceous high-Mg andesite (HMAs) from Shandong province, eastern North China craton, which suggests recycling of plagioclase-rich lithologies. Three types of clinopyroxenes are recognized. Type I and II clinopyroxenes show normal- and reverse zonation, respectively, and both are featured by clear negative Eu anomalies in their cores. Type III clinopyroxene occurs in a remnant poikilitic texture with a high-Mg# core, but with no Eu anomaly, and encloses low-Mg# olivine grains. Both olivine and clinopyroxene crystals of the andesite contain high-Si and low-Mg melt inclusions, which are enriched in alkali metals and have low Eu/Eu*, showing a nature akin to their host clinopyroxenes and HMAs. It is thus suggested that the HMAs were derived from lower-degree melting of recycling plagioclase-rich lithologies. These rocks are interpreted as granulitic lower crust returned into the convecting mantle, which then interacted with mantle peridotite via partial melting. If so, our scenario also provides a critical guide for making high-Mg andesite and continental crust and that the granulitic component input could play a key role in the subcontinental mantle heterogeneity.