Carbon biogeochemical cycle in the impounded Wujiang River, China

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Wujiang River is a major hydropower source for China□s massive West-to-East Power Transmission Project. A series of reservoirs were constructed along it and now it becomes a typical impounded river. We have seasonally determined the $\delta^{13}C$ values of dissolved inorganic carbon (DIC), particulate organic carbon (POC), and phytoplanktonic carbon (PPC), and related hydro-chemical parameters to understand the carbon biogeochemical cycle in the impounded Wujiang River.

Soil organic matter and aquatic phytoplankton are the possible contributors of riverine POC. $\delta^{13}C_{PPC}$ showed a perfect linear relationship with $\delta^{13}C_{POC}$, suggesting that POC was mainly derived from phytoplankton. With the development of reservoir after damming, riverine heterotrophic ecosystem is transformed to autotrophic one, and phytoplankton becomes the dominant contributor of POC. pH values in the reservoir waters were generally larger than 8, indicating a predominance of bicarbonate in DIC. HCO_3^- concentrations decreased while the $\delta^{13}C_{DIC}$ and $\delta^{13}C_{POC}$ increased in the surface water of the reservoirs. And with the increase of phytoplanktonic biomass, algae assimilate more inorganic carbon and thereby exhibit more positive $\delta^{13}C$ value. So, photosynthesis is one of the main processes that affect $\delta^{13}C_{DIC}$ and $\delta^{13}C_{POC}$ in the surface water. Compared to the surface water before dam, DIC in release water showed the deficit in ^{13}C when thermal stratification developed. Release water is from deep water of reservoir and $\delta^{13}C_{DIC}$ values decrease with water depth as photosynthesis declines and respiration increase. Thus, respiration, which makes the DIC pool enriched in ^{12}C, is the other main process affecting $\delta^{13}C_{DIC}$ in the reservoirs. Compared to DIC, POC showed larger fluctuations in $\delta^{13}C$ values because phytoplankton had more influences on $\delta^{13}C_{POC}$ than that on $\delta^{13}C_{DIC}$ during the transformation of inorganic carbon into organic carbon. Our results demonstrated that river damming has important impacts on riverine carbon biogeochemical cycling.

Multiple generations of granitic magma in the West Kunlun, NW China: Implications for crustal melting and mantle-crust interaction at an active continental margin

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Active margins along accretionary orogens are considered to be major sites of the formation of juvenile continental crust [1], but subduction processes also produce crustal recycling and differentiation rather than growth [2]. West Kunlun is a large accretionary orogen formed by long-standing subduction, arc-continent collision and closure of Paleo-Tethys between the south margin of the Tarim Block and western portion of the Himalayan-Tibetan orogen from the early Paleozoic to the early Mesozoic. Two major granitoid belts based on geochronology data were identified, the early Paleozoic suite and the early Mesozoic suite. Mafic magmatic enclaves are abundant in most of these granitoids. There is a strong mantle component to these rocks, and imply production of the rock series has involved mixing between mantle and crustal magma components. The source characterstics of granites and zircon Hf isotope characteristics indicated that the West Kunlun granitic magma was formed on the base of continental crust. Recycling of older continental crust, and of Mesoproterozoic crust in particular, appears to be an important process in the evolution of the orogenic continental crust of West Kunlun between early Paleozoic and Mesozoic. There is not of pronounced new crust formed and formation of the West Kunlun orogen in the outboard of the ancient Tarim margin related with Paleo-Tethys subduction. Such processes may represent an advancing orogen.

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