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Major ion chemistry and dissolved inorganic carbon cycling in a mountainous tributary of the lower Xijiang River, China

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Major ions chemistry and dissolved inorganic carbon system (DIC, mainly HCO3- and free gaseous CO2) in the Guanliang Catchment, a mountainous tributary catchment of the Lower Xijiang River, China, were examined based on a seasonal sampling in this study. The diverse lithological distribution in the study catchment provides the basic ideas to assess the effects of lithology variability on water chemistry and carbon biogeochemistry in river systems. Major ions and DIC concentrations in the catchment vary from 54mg/l and $\sim$0.37mM in the silicate-dominating regions to 344 mg/l and $\sim$3.8mM in the carbonate-dominating regions. pCO2 at all sampling sites are oversaturated in the wet season (June), ranging with a factor from 1.6 to 18.8 of the atmospheric concentration. While undersaturated in the dry season (December) at the upstream siliceous rivers with shallow depth and high cleanliness. δ^{13}C of DIC has a narrow range from -9.068 to -13.586$\%_{\circ}$, which is more depleted in the silicate regions than in the carbonate regions and slightly more depleted in the dry season (December) than in the wet season (June). The results suggest that lithological variability has a dominant control on spatial variations of water chemistry and carbon geochemistry in river systems, although impacts from other factors, such as topography, soil types, as well as human activities should be examined in the future work.