



Simulation of groundwater flow and evaluation of carbon sink in Lijiang Rivershed, China

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It is important to study water and carbon cycle processes for water resource management, pollution prevention and global warming influence on southwest karst region of China. Lijiang river basin is selected as our study region. Interdisciplinary field and laboratory experiments with various technologies are conducted to characterize the karst aquifers in detail. Key processes in the karst water cycle and carbon cycle are determined. Based on the MODFLOW-CFP model, new watershed flow and carbon cycle models are developed coupled subsurface and surface water flow models, flow and chemical/biological models. Our study is focused on the karst springshed in Mao village. The mechanisms coupling carbon cycle and water cycle are explored. Parallel computing technology is used to construct the numerical model for the carbon cycle and water cycle in the small scale watershed, which are calibrated and verified by field observations. The developed coupling model for the small scale watershed is extended to a large scale watershed considering the scale effect of model parameters and proper model structure simplification. The large scale watershed model is used to study water cycle and carbon cycle in Lijiang rivershed, and to calculate the carbon flux and carbon sinks in the Lijiang river basin. The study results provide scientific methods for water resources management and environmental protection in southwest karst region corresponding to global climate change. This study could provide basic theory and simulation method for geological carbon sequestration in China karst region.