



Groundwater Recharge and Flow Regime revealed by multi-tracers approach in a headwater, North China Plain

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Groundwater recharge is a crucial hydrological process for effective water management especially in arid/ semi-arid regions. However, the insufficient number of specific research regarding groundwater recharge process has been reported previously. Intensive field surveys were conducted during rainy season, mid dry season, and end of dry season, in order to clarify comprehensive groundwater recharge and flow regime of Wangkuai watershed in a headwater, which is a main recharge zone of North China Plain. The groundwater, spring, stream water and lake water were sampled, and inorganic solute constituents and stable isotopes of oxygen 18 and deuterium were determined on all water samples. Also the stream flow rate was observed. The solute ion concentrations and stable isotopic compositions show that the most water of this region can be characterized by Ca-HCO₃ type and the main water source is precipitation which is affected by altitude effect of stable isotopes. In addition, the river and reservoir of the area seem to recharge the groundwater during rainy season, whereas interaction between surface water and groundwater does not become dominant gradually after the rainy season. The inversion analysis applied in Wangkuai watershed using simple mixing model represents an existing multi-flow systems which shows a distinctive tracer signal and flow rate. In summary, the groundwater recharged at different locations in the upper stream of Wangkuai reservoir flows downward to alluvial fan with a certain amount of mixing together, also the surface water recharges certainly the groundwater in alluvial plain in the rainy season.