



Characteristics of Hydrogeochemistry and Groundwater Quality in a Riverbank Filtration Site, Northeastern China

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Studies on hydrogeochemical characteristics and an assessment of the groundwater quality for drinking purposes were conducted in and around the riverside source field of Wuchang, Northeast China. Twenty-seven and twenty-three shallow groundwater samples were collected for measuring on-site parameters and major components in the years 2000 and 2014, respectively. In 2014, the average concentrations of major ions of shallow groundwater were found to be in the following order: $\text{Ca}^{2+} > \text{Na}^+ > \text{Mg}^{2+} > \text{K}^+$ for cations and $\text{HCO}_3^- > \text{SO}_4^{2-} > \text{Cl}^- > \text{NO}_3^-$ for anions. The spatial distribution patterns of K^+ and NO_3^- had no obvious regularity, whereas Cl^- and Na^+ showed similar spatial distribution patterns. Ca- HCO_3^- and mixed type water were the dominant hydrochemical types. The analysis of the SI values for minerals and the Gibbs plot illustrated that the concentrations of major components were mainly controlled by rock weathering, such as the dissolution of calcite, dolomite, halite, gypsum and aragonite, followed by ion exchange. Indicators, such as Total hardness (TH), Total Dissolved Solids (TDS), Cl^- , SO_4^{2-} and NO_3^- , were selected to assess the groundwater quality using a comprehensive evaluation method of dividing the groundwater quality into five classes: excellent, good, fair, poor and very poor water. The results showed that 7.4% and 34.8% of the total groundwater sample in 2000 and 2014, respectively, were unsuitable for drinking use, indicating that the shallow groundwater quality has gradually worsened in the past few decades. The concentration of NO_3^- was a major factor that influenced the observed groundwater quality changes.

Acknowledgments

This study was supported by the NSFC (No.41877355), Beijing Advanced Innovation Program for Land Surface Science, and the 111 Project of China (B18006).