Geophysical Research Abstracts
Vol. 18, EGU2016-7771, 2016
EGU General Assembly 2016


# Hydrochemical and isotopic characteristics of estuarial seawater and river water of Bailanghe in Laizhou Bay, China

Qiaofeng Yang (1,2), Suning Xu (3,1), Ruijiu Wang (3), Wenpeng Li (4), Zhiyi Wang (3), Junjun Mei (3), Zhilei Ding (1), Peijie Yang (5), Liangju Yu (6), Tieying Lv (7), Gang Bai (3), and Wei Kang (3)

(1) China University of Geosciences (Beijing), Beijing 100083, China, (2) Beijing Institute of Hydrogeology and Engineering Geology, Beijing 100195, China, (3) China Institute for Geo-Environmental Monitoring, Beijing 100081, China (xusn@mail.cigem.gov.cn), (4) Center for Hydrogeology and Environmental Geology Survey, CGS, Baoding 071051, China, (5) Shandong Monitoring Center of Geological Environment, Jinan 250014, China, (6) Yantai Institute of Coastal Zone Research, Chinese Academy of Sciences, Yantai 264003, China, (7) Sinosoft Co., LTD, Beijing 100190, China

In the study of seawater intrusion, seawater is usually taken as an end-member that mixes with other source(s). However, compared to standard seawater, the coastal seawater particularly that near the estuary, can be strongly influenced by the rivers into the sea and by coastal human activities. Their composition can be thus continuously changed and redistributed with space and time. Therefore, before investigating seawater intrusion in a certain area, it is essentially important to determine the features of the estuarine seawater (e.g. the mixture percentage between standard seawater and river water).

In this study, we aimed to gain a clear situation of the seawater intrusion in Laizhou Bay, Southern Bohai, China. The issue aforementioned was investigated by comparing the stable isotopic and hydrochemical composition of the marine and river water collected in this area. Samples investigated include 5 surface water samples collected at the downstream of the Bailanghe and 7 seawater samples near the estuary of Laizhou Bay. Inert tracers ($\delta$D, $\delta^{18}$O, Cl, Br) and reaction tracers (Na, Mg, $SO_4$, $HCO_3$, Ca, $NO_3$) are particularly analyzed. The major results are as follows: 1) All the river water samples fall below the Global Meteoric Water Line in the $\delta$D - $\delta^{18}$O diagram, reflecting evaporation of the upstream reservoir water. The seawater samples fall on the mixing line of standard seawater and the river water in the stable isotopic diagram. 2) The Cl-$\delta^{18}$O diagram indicates widespread dissolution of evaporate into the river, while high concentration of Ca and $HCO_3^-$, as well as the $SO_4^{2-}$ - Cl relation of the river water samples reflect the dissolution of $CO_2$ , carbonate and sulfate in the atmosphere and on the ground. 3) The Br/Cl ratios of seawater samples are closed to the marine ratios. This together with the plots of major ions vs. Cl suggest that the seawater samples are originated from the mixture of standard seawater and river water. Therefore, when referring to the mixing of river water and seawater, one means the solvents of these two end-members mix. This will cause the ratios of some hydrochemical components (i.e. Na, Mg, $SO_4$ and Br) vs. Cl, close to the marine ratios, because the main component of the mixture comes from seawater. By contrast, the ratios of Ca, $HCO_3^-$ and $NO_3^-$ vs. Cl, which are mostly derived from continental clasts, are higher than the marine ratios. This mixing mechanism also applies to the groundwater.