Geophysical Research Abstracts
Vol. 19, EGU2017-5415, 2017
EGU General Assembly 2017

Dynamics of trace elements in shallow groundwater of an agricultural land in the northeast of Mexico

Abrahan Mora, Jürgen Mahlknecht , and Arturo Hernández-Antonio
Centro del Agua para América Latina y el Caribe, Tecnológico de Monterrey, Monterrey, Mexico (abrahanmora@itesm.mx)

The citrus zone located in northeastern Mexico covers an area of 8000 km2 and produces 10% of the Mexican citrus production. The aquifer system of this zone constitutes the major source of water for drinking and irrigation purposes for local population and provides base flows to surface water supplied to the city of Monterrey ([U+F07E] 4.5 million inhabitants). Although the study area is near the recharge zones, several works have reported nitrate pollution in shallow groundwater of this agricultural area, mainly due to animal manure and human waste produced by infiltration of urban sewers and septic tanks. Thus, the goals of this work were to assess the dynamics of selected trace elements in this aquifer system and determine if the trace element content in groundwater poses a threat to the population living in the area. Thirty-nine shallow water wells were sampled in 2010. These water samples were filtered through 0,45 μm pore size membranes and preserved with nitric acid for storage. The concentrations of Cd, Cs, Cu, Mo, Pb, Rb, Si, Ti, U, Y, and Zn were measured by ICP-MS. Also, sulfate concentrations were measured by ion chromatography in unacidified samples. Principal Component Analysis (PCA) performed in the data set show five principal components (PC). PC1 includes elements derived from silicate weathering, such as Si and Ti. The relationship found between Mo and U with sulfates in PC2 indicates that both elements show a high mobility in groundwater. Indeed, the concentrations of sulfate, Mo and U are increased as groundwater moves eastward. PC3 includes the alkali trace elements (Rb and Cs), indicating that both elements could be derived from the same source of origin. PC4 represents the heavy trace elements (Cd and Pb) whereas PC5 includes divalent trace elements such as Zn and Cu. None of the water samples showed trace element concentrations higher than the guideline values for drinking water proposed by the World Health Organization, which indicates that the analyzed trace elements in groundwater do not pose any significant threat to the population living in this area.