

## Investigation of groundwater salinity in the Ziz Basin, southeastern Morocco, by using hydrochemical and isotopic tools

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This study investigates water quality in Ziz basin, southeastern Morocco.

TDS and majors elements show a linear trend which suggests the coexistence of two end-members: (1) saline end-member dominated by Cl, SO<sub>4</sub> and Na; and (2) fresh end-member dominated by Ca, Mg and HCO<sub>3</sub>. The main mechanisms of salinization are evaporation, dissolution of evaporates and carbonate formations within the study area.

Stable isotopes indicate that the High Atlas Mountains with high rainfall and low  $\delta^{18}\text{O}$  and  $\delta^2\text{H}$  values (-8.64 to -8.31 and -55.76 to -53.88) represent colder climate and constitute the major source of recharge to the basin. Also, the  $\delta^{18}\text{O}$  enrichment with respect to the Global Meteoric Water Line (GMWL) confirms that waters from downstream part have been diluted by shallow waters of meteoric origin.

**Keywords:** *Groundwater quality, Geochemistry, Isotopes, Salinity, Arid area.*

## Change of water cycle in the Changjiang (Yangtze river) catchment based on H/O isotopes

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The effect of the Three Gorge Reservoir on the water cycle and sediment transfer within the Changjiang catchment have been attracting great interests for its environmental significance. Data from Datong hydrologic station indicates the considerable decrease of sediment flux since 2003 due to the water impoundment of the Three Gorge Dam. Nevertheless, the relating water cycle in the catchment over the last ten years has rarely been studied.

H/O isotopes have been regarded as good tracers to identify different water sources for river/ocean, vapour and underground water. This study investigates the H/O isotope composition in the mid-lower Changjiang reaches (from Yichang to Nantong) in 2012 and 2013. The result based on the H/O isotope mass balance equation shows that the river discharge in Datong is roughly equivalent to the total flux of the mainstream at Yichang and of all the tributaries in the mid-lower reaches during the dry season, which means no or minor external input/output (underground water, precipitation) in the lower valley. Thus, the water contribution of each tributary to the Changjiang mainstream at Datong can be estimated quantitatively. The Changjiang upstream (above Yichang) contributes only ~24% to the total fluvial discharge to the East China Sea, while the Dongting Lake and Poyang lake contribute ~68% in together during the dry season. Additionally, a weekly observation near Nantong reveals that the storage and discharge of the Three Gorge Reservoir has exerted a great influence on the water H/O isotope composition in the lower mainstream near the river mouth, while tidal influence is minor. Deuterium excess parameter in the mid-lower Changjiang river water exhibits smaller variability in recent years compared to that observed before the construction of Three Gorge Dam, which implies that the water cycle in the Changjiang catchment has been considerably changed in recent years. Overall, the Dongting and Poyang lakes now play an important role in regulating the Changjiang water discharge to the East China Sea in dry season. The variations of H/O isotopes in the Changjiang river water into the East China Sea clearly indicate the damming effect.

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