Geochemical characterizations of the observations well in the west of Yunnan Province China.

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The observed geochemical anomalies related to earthquakes are usually attributed to the alteration of groundwater in the circulating system under the action of increasing crustal stress before and after earthquakes. Most anomalies are explained by the mixture of waters from different aquifers caused by aquifer breakage and migration of deep fluid along a active faults during the action of tectonic stress increasing.

In this study, the geochemical characteristics of the water in the observation wells were found out by geochemical methods. The source of abnormal substances was determined, and the relationship between the observed anomalies and the surrounding earthquakes was determined.

The results show that the salinity of observation wells and hot springs in western Yunnan are very high.Meanwhile, Na nd HCO_3 were the main ions.However, the observation wells and surface water in southwest Yunnan are of low salinity.The main ion contents were Ca, Mg and HCO_3.The results of hydrogen and oxygen isotopes show that both surface water and shallow groundwater isotopic compositions are located near the G.M.W.L. But the observation well and the hot spring water all have certain deviation. According to the calculation results of Na-K-Mg triangle diagram, Longling hot spring belongs to fully mature water, Tengchong Rehai spring and Tengchong Hehua spring belongs to partial equilibrium water.The hydrogen and oxygen isotopes of the three water samples were also far from the G.M.W.L. It is also proved by the hydrogen and oxygen isotopes exchange with the surrounding rock.Other surrounding water was found in areas of immature water.

According to the second-order difference results of calcium ions, magnesium ions and bicarbonate ions of Yunnan-17 Observation Wells showed large high-frequency jumps and high-value fluctuations before the major earthquake.This indicates that there is a certain change of water-rock reaction rate before the major earthquake, which leads to a large change in the second-order difference results of the ions.