

The hydrogen and oxygen isotopic compositions of precipitation in a forested watershed

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The stable isotopic compositions (δD and $\delta^{18}\text{O}$) of precipitation were firstly investigated from May 2012 to November 2013 in the Jinshui River basin of the South Qinling Mts., China. The local meteoric water lines (LMWLs) based on all daily and monthly precipitation-weighted data were defined as $\delta D = 8.32 \delta^{18}\text{O} + 12.57$ ($r^2=0.957$, $n=47$, $p<0.001$) and $\delta D = 8.11 \delta^{18}\text{O} + 11.59$ ($r^2=0.946$, $n=15$, $p<0.001$), respectively. The fluctuations of daily deuterium excess (d-excess) values indicated the mixing moisture sources from the monsoon circulation during the rainy season and the local moisture recycling during the dry season in the river basin. The monthly precipitation-weighted values of d-excess confirmed the moisture sources and determined the temporal variations in moisture supply for the river basin. The precipitation amount and temperature effects were found to be significant, with amount gradient of -0.06‰ mm for daily $\delta^{18}\text{O}$ variability and temperature gradients of $-1.51\text{‰ }^\circ\text{C}$ and $-0.44\text{‰ }^\circ\text{C}$ for daily δD and d-excess variability, respectively. However, the local precipitation was almost unaffected by subcloud evaporation due to high relative humidity during precipitation events. The results of this research provide an effective method for tracing the local water hydrologic cycle in the South Qinling Mts., China.