

Characterization of $\delta^{18}\text{O}$ and $\delta^2\text{H}$ tracers, and hydrological application in two mesoscale agricultural dominated catchments, Abay / upper Blue Nile basin, Ethiopia.

Stable isotope measurements of $\delta^{18}\text{O}$ and $\delta^2\text{H}$ in precipitation, springs and stream water were used to characterize, the spatial and temporal variation of isotopic composition along altitudinal gradient ranging from 2190-4001 m.a.s.l in the south of Lake Tana, Abay / Upper Blue Nile basin, Ethiopia. Furthermore, application of stable isotopes were used to investigate the mean residence time of water based on Sine wave regression approach and classical two component hydrograph separation in the Chemoga and Jedeb meso scale catchments. The isotopic $\delta^{18}\text{O}$ and $\delta^2\text{H}$ composition in precipitation exhibit marked seasonal variation, which suggests different sources of moisture that brings rainfall in the area. Moreover, the results of the isotopic analysis depict the amount and altitude effects are moderately responsible for changing the isotopic composition. It is noticed that isotopic composition over different seasons suggests different moisture sources are responsible for the variation in isotopic composition in the study area.

The results from the classical hydrograph separation show that, in both catchments Chemoga (73%) and Jedeb (79%) the total runoff are derived from the new water component. Consequently, in both catchments, short and comparable mean residence time of water having the age of 4.3 and 4.7 months were obtained in Chemoga and Jedeb catchments respectively.

High resolution sampling and long-term tracer in conjunction with hydrometric data will provide profound insight on hydrological functioning of these catchments. Therefore, further research work is needed for better understanding of the hydrological processes in these two meso scale and different meso scale catchments within the Abay / upper Blue Nile basin at various spatial and temporal scales.