Abstract

In this study, water samples collected from open and undefined water sources such as the Etaka and Ruacana waterfall and an artificial spring in the Cuvelai-Etosha Basin; as well as the boreholes, Atlantic Ocean and fog from the Kuiseb Basin were analysed for stable isotopes (Deuterium (δ2H) and (oxygen 18 (δ18O) and trace elements. Stable isotope ratios were measured using the Picarro L2120–i Analyser (Cavity Ring-Down Spectrometry method) and the trace elemental composition was assessed using the Inductively Coupled Plasma Mass Spectroscopy (ICP-MS).

Open water bodies of the Cuvelai-Etosha Basin were found to be enriched with heavy isotopes, and also plotted below the Global Meteoric Water Line (GMWL) towards the evaporation trend, which is indicative of high evaporation rates within the basin. The Kuiseb boreholes were depleted of heavy isotopes and plotted along Local and Global Meteoric Water Line, indicating direct recharge from precipitation and minimal, if any, evaporation effects. Trace elemental analyses indicated possible contamination of water bodies with high concentrations of Al and Fe, confirming the effect of sediment input in the flood prone basin (Cuvelai), and continual erosion/hard crust in the Kuiseb. Positive correlations with r^2 greater than 0.5, confirming increase in δ18O and δ2H with increase in trace elements including Strontium and Lithium in the Kuiseb basin, and Molybdenum (Mo) and Manganese (Mn) in the Cuvelai-Etosha Basin were also observed.

The results of this study will add to the existing isotope database hosted by the Hydrological Division of the Ministry of Agriculture, Water and Forestry (MAWF), and ultimately contribute to sustainable management of water resources by both MAWF and the Namibia Water Corporation (NamWater).