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How do soil types affect stable isotope ratios of ^{2}H and ^{18}O under evaporation: A Fingerprint of the Niipele subbasin of the Cuvelai - Etosha basin, Namibia.

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Northern Namibia is a region with high population growth, limited water resources and a transboundary aquifer system where groundwater recharge and groundwater flow processes are not well understood. This study is an interdisciplinary approach within the frame of SASSCAL (Southern African Science Service Centre for Climate Change and Adaptive Land Management) to improve the understanding of links between hydrological, geochemical and ecological processes to locate areas that contribute to recharge a shallow aquifer system in the Cuvelai-Etosha basin.

Results of a field campaign are presented, conducted in November 2013 which is the first of a series planned between the years 2013 and 2016. Soil samples were taken in the semi–arid subbasin of the Cuvelai Etosha surface water basin before the rainy season. Potential evaporation, temperature measurements and infiltration tests were performed at two sites with different soil characteristics. Soil samples were taken under natural conditions to a maximum depth of 4 meters. Additionally to environmental isotope signals (stable isotopes ^{2}H, and ^{18}O and water of known isotopic composition (local groundwater) has been applied to the same plots. Soil samples were taken to a depth of 1 m with an interval of 10 cm after 24 and 48 hours for an investigation of evaporation impact on stable isotope ratios.

The soil water is extracted cryogenically from the soil samples in the laboratory and subsequently analyzed using a Picarro L2120-i cavity-ringdown (CRD) water vapor analyzer after vaporization. Results of the direct measurement of different soil types indicate that evaporation from a saturated soil can exceed potential evaporation from an open water surface[1]. This implies, alternative methods are needed for the determination of evaporation which will be discussed here.

[1]Brutsaert W.; Parlanget M.B. (1998): Hydrologic cycle explains the evaporation paradox. In: Nature (396), p. 30.