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Water isotopes and the ecohydrology of fog in the Central Namib Desert: Initial results

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The Namib Desert on the southwestern coast of Africa is hyper-arid in terms of rainfall, but experiences up to 100 days of fog each year. This fog is a more regular and potentially more plentiful source of water than the highly seasonal rainfall, which averages 20-80mm/yr. Several studies have demonstrated fog use strategies of Namib biota, and the mechanism for fog uptake has been shown for three plants endemic to the Namib (*Stipagrostis sabulicola, Trianthema hereroensis, Arthraerua leubnitziae*). This study uses stable isotopes of water (fog, rain, groundwater, soil water, plant water) to determine the amount of fog water used by nine common species in the Central Namib, notably including the enigmatic and very long-lived *Welwitschia mirabilis*. Initial results confirm a large discrimination between the fog (-0.6‰ δ^{18}O, 2.1‰ δ^{2}H) and groundwater (-6.1‰ δ^{18}O, -38.9‰ δ^{2}H). Soil water (10 to 100cm) exhibits typical evaporative enrichment, and plant water variably shows an integration of these three water sources. Fog is not important for direct soil water recharge, but very shallow roots of some plants can sequester fog deposited in the early morning before it is removed by evaporation. Correlations among fog utilization, δ^{13}C and δ^{15}N of plant and soil material will also be presented and compared with relationships found along precipitation gradients in the Namib, the Kalahari Desert and the west coast of Australia.