

**Publication****Reliability and quality of water isotope data collected with a low-budget rain collector****Journal Article (Originalarbeit in einer wissenschaftlichen Zeitschrift)****ID** 2633405**Author(s)** Prechsl, Ulrich E; Gilgen, Anna K; Kahmen, Ansgar; Buchmann, Nina**Author(s) at UniBasel** [Kahmen, Ansgar](#) ;**Year** 2014**Title** Reliability and quality of water isotope data collected with a low-budget rain collector**Journal** Rapid communications in mass spectrometry**Volume** 28**Number** 8**Pages / Article-Number** 879-85

Low-budget rain collectors for water isotope analysis, such as the 'ball-in-funnel type collector' (BiFC), are widely used in studies on stable water isotopes of rain. To date, however, an experimental quality assessment of such devices in relation to climatic factors does not exist.; We used Cavity Ring-Down Spectrometry (CRDS) to quantify the effects of evaporation on the  $\delta(18)\text{O}$  values of reference water under controlled conditions as a function of the elapsed time between rainfall and collection for isotope analysis, the sample volume and the relative humidity (RH: 31% and 67%; 25 °C). The climate chamber conditions were chosen to reflect the warm and dry end of field conditions that favor evaporative enrichment (EE). We also tested the performance of the BiFC in the field, and compared our  $\delta(2)\text{H}/\delta(18)\text{O}$  data obtained by isotope ratio mass spectrometry (IRMS) with those from the Swiss National Network for the Observation of Isotopes in the Water Cycle (ISOT).; The EE increased with time, with a 1L increase in the  $\delta(18)\text{O}$  values after 10 days (RH: 25%; 25 °C; 35 mL (corresponding to a 5 mm rain event);  $p < 0.001$ ). The sample volume strongly affected the EE (max. value +1.5L for 7 mL samples (i.e., 1 mm rain events) after 72 h at 31% and 67% RH;  $p < 0.001$ ), whereas the relative humidity had no significant effect. Using the BiFC in the field, we obtained very tight relationships of the  $\delta(2)\text{H}/\delta(18)\text{O}$  values ( $r(2) \geq 0.95$ ) for three sites along an elevational gradient, not significantly different from that of the next ISOT station.; Since the chosen experimental conditions were extreme compared with the field conditions, it was concluded that the BiFC is a highly reliable and inexpensive collector of rainwater for isotope analysis.

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