Supplementary Materials

Local Meteoric Water Lines (LMWLs) representing the isotopic signatures of water (δ^2H:$\delta^{18}O$) were generated, showing a predictable linear relationship between the stable isotopes (SM1). We used samples of rain and dew that we collected at the research site, and compared their stable isotope analysis to a LMWL that we generated based on data reported in literature [1]. The following are the detailed methods and results of the LMWLs.

Water isotope analysis. Dew samples were collected before sunrise at the research site in the Negev desert, immediately sealed and stored at 4°C until analysis for δ^2H and $\delta^{18}O$ isotope composition at the Center for Stable Isotope Biogeochemistry at UC Berkeley [2,3]. Rain samples were collected in 2012 at each rain event. Isotope abundance in the water samples was determined by mass spectrometry. The natural abundance of the stable isotopes was calculated as:

$$\delta XXE = (XXR_{sample}/XXR_{standard} - 1) \times 1000 \quad (1)$$

where E is the element of interest, XX is the mass of the rarest and heaviest stable isotope for that element (^2H or ^{18}O for water), and R is the ratio of the abundances of the isotopes under investigation (e.g., $^2H/H$ or $^{18}O/^{16}O$). Due to the very small absolute number of the differences between samples and the standard (in this study, Vienna Standard Mean Ocean Water (VSMOW)) [3,4], the ratio is multiplied by 1000 to express it in per mil (‰), or parts per thousand. The resulting delta (δ) value is the ratio of rarest to most common (heavy to light) isotopes in the sample being analyzed. Positive values indicate that the sample has more heavy isotopes than the standard, whereas negative values indicate that the samples contain less heavy isotopes than the standard (Dawson and Simonin, 2011).

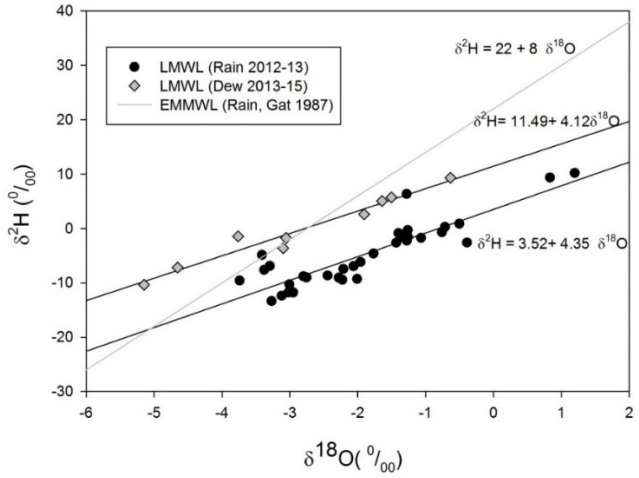

Figure S1. Local Meteoric Water Lines (LMWLs) generated from rain or dew samples. Dew samples collected from the site plotted here in a dual space graph represent the local water isotopic values for the Sede Boqer local meteoric water lines as compared to the Gat and Carmi [1] water line found northern in Israel, representing a wider scope of Metrologic conditions and rain gradient. Black circles represent the observed **Local Meteoric Water Line (LMWL Rain)** at the Negev region, produced from samples of rain we collected at winter 2012-2013 ($\delta^2H = 3.52 + 4.35 \times \delta^{18}O$)); Grey diamonds represent a **Local Meteoric Water Line (LMWL Dew)** ($\delta^2H = 11.49 + 4.12 \times \delta^{18}O$) from dew samples that we sampled in the Negev region. The grey line represents a local **Eastern Mediterranean Meteoric Water Line (EMMWL Rain)**. This is

a trend line ($\delta^{2}H = 22 + 8 \times \delta^{18}O$) that we calculated, based on the rain water line at the eastern Mediterranean arid regions [1].

References

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