Geophysical Research Abstracts
Vol. 21, EGU2019-4907-1, 2019
EGU General Assembly 2019

Measuring fog precipitation and fog deposition in the Namib desert

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Non-rainfall atmospheric water input (NRWI) consisting of fog, dew and soil water adsorption is an important water source for fauna and flora in (semi-)arid environments. Its measurement is extremely challenging as it requires instruments that are accurate enough to detect even smallest amounts of water input of less than 0.1 mm. Microlysimeters, if regularly serviced, have been proven to provide robust and high precision data of NRWI. In the frame of the Namib Fog Life Cycle Analysis (NaFoLiCA) project, aiming to improve the knowledge of the temporal and spatial patterns of fog in the Namib region, three of nine stations of the FogNet measurement network have been equipped with pairs of microlysimeters (inhouse construction after Heusinkveld, 2006). Together with measurements of fog precipitation (FP) using Juvik-type passive fog collectors (cylindrical louvered screen) and standard meteorology measurements (temperature, humidity, wind and radiation), the amounts of NRWI for days with/without fog are analyzed. It is shown that days/nights without fog show a constant and persistent diurnal course of NRWI with deposition starting around sunset and evaporation starting shortly after sunrise. Deviations from this curve in microlysimeter data are used, in combination with FP measurements, to characterize more than 20 fog events during two intensive observation periods in SEP/OCT 2017 and FEB/MAR 2018 also with respect to evaporation during the following day. Fog events are analyzed with respect to duration, intensity and amount of FP and fog deposition. We found that the relation between FP and fog deposition is not straightforward and its interpretation needs further differentiation. However, preliminary analysis shows a good correlation between the smallest disdrometer dropsize distribution (< 0.25 mm) and fog deposition rates in microlysimeter data was observed during fog events, though disdrometers are actually not designed to measure fog precipitation. The inclusion of additional information from leaf wetness sensors and visibility sensors provided further insight in the nature of fog events.