

Determining the dew characteristics and sources in an alpine meadow of northeastern Qinghai-Tibet Plateau using hydrogen-oxygen isotope

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Abstract

Dew is closely related to the micro-use of water and to large-scale hydrological processes. Dew formation on grasslands plays a particularly vital role in maintaining the ecohydrological cycle, however, its characteristics and sources were rarely reported. Here, stable isotope for dew, ambient water vapor, soil water, plant water, creek water, and precipitation were tracked to determine the characteristics of dew from ecohydrological processes in the meadow. The structural equation model was used to investigate how environmental factors affect dew formation. The Mix SIAR model in R was used to determine the sources of dew, and explore the dew transport route of six species of the *graminoid-Kobresia* meadow in an alpine *graminoid-Kobresia* meadow in northern Qinghai-Tibet Plateau. Our results showed that the annual amount was about 37.92 ± 1.03 mm, accounting for 7.13% of precipitation. Both atmospheric pressure and temperature showed significant positive effects on dew formation, while wind speed had a negative effect. Evapotranspiration indirectly affected dew formation. The contribution rates of soil water, plant water, and ambient water vapor to dew formation were $48.20 \pm 5.46\%$, $38.30 \pm 5.07\%$, and $13.50 \pm 1.82\%$, respectively. The proportion of dew utilization by *graminoid* and *Kobresia* species showed no significant species differences, the mean value was $10.5 \pm 3.8\%$. Our statistical analysis determines the role of dew in an alpine *graminoid-Kobresia* meadow in the northern Qinghai-Tibet Plateau, which provides an improved understanding of dew formation based on a stable isotope technology.

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