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Subsurface hydrological activities control the soil water isotopic characteristics

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Soil profile beneath the alpine meadow.

The investigation of the stable isotopic characteristics of soil water is an important aspect of current hydrological research, particularly in the study of subsurface hydrological processes. However, there are several different soil water extraction methods to get isotopic information, which does not assure the reliability of the tested stable isotopic values.

In an article recently published in *Vadose Zone Journal*, researchers collected samples of precipitation, bulk soil water (BSW) collected by the cryogenic vacuum extraction method, mobile soil water (MSW) collected by the zero-tension soil lysimeter method, and hillslope runoff in an alpine meadow hillslope influenced by permafrost to investigate the hydrological functioning of thawing soil water.

The team found that the BSW and MSW in the hillslope showed different stable isotopic characteristics, and the stable isotopic values of the lateral subsurface flow were close to the MSW in the same soil layer.

The team concluded that the depleted spring snowmelt formed tightly bound soil water and left BSW depleted. The mixing between precipitation and soil water left MSW isotopically unchanged. The high variation of MSW fraction in BSW led to the high temporal variation of BSW. Subsurface flow could be better represented using the MSW rather than the BSW samples.

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Xiao, X., Zhang, F., Li, X., Wang, G., Zeng, C., & Shi, X. (2020). Hydrological functioning of thawing soil water in a permafrost-influenced alpine meadow hillslope. *Vadose Zone Journal*, 19, e20022. <https://doi.org/10.1002/vzj2.20022>

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