

## **Resolving the mystery of deep roots: combining water stable isotopes with next generation technology - Isodrones**

Initiative: Freigeist-Fellowships

Bewilligung: 01.08.2017

Laufzeit: 5 Jahre

Projekt-Website: [www.isodrones.com](http://www.isodrones.com)

A fundamental question for hydrologists and ecologists is how water moves through ecosystems. However, key aspects are currently neither completely understood nor quantifiable. One of those is the functioning of deep roots. Despite of their global occurrence, buffering function during droughts and thus, implications for predicted climatic changes, deep roots are rarely considered in the management of water resources. The goal of this project is to develop a framework for quantifying the impact of deep roots on the water balance. We challenge current research gaps by developing a holistic approach for explaining why, how, and by which magnitude deep roots extract water from soils and groundwater. For achieving this, advances in isotope-based methods in ecohydrology will be used in concert with novel opportunities provided by specialized drones (UAV-unmanned aerial vehicle) for highly resolute imagery and sample collection from the canopy. This integrated approach of above- vs. belowground techniques in a high spatiotemporal resolution enables understanding feedbacks between vegetation and its water sources. Ultimately, this project will help to improve our knowledge of the functioning of plants under different climatic conditions and could alter the perception of vegetation within the hydrological cycle. Hence, it might open a new avenue for ecohydrological research.

### **Projektbeteiligte**

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### **Open Access-Publikationen**

**Tracing plant source water dynamics during drought by continuous transpiration measurements: An in situ stable isotope approach**

**Thermal imaging of increment cores: a new method to estimate sapwood depth in trees**

**Challenges in studying water fluxes within the soil-plant-atmosphere continuum: A tracer-based perspective on pathways to progress**

