

# Influence of soil texture and degree of saturation on the equilibration time of water isotope in closed systems using direct $\text{H}_2\text{O}(\text{liquid})$ - $\text{H}_2\text{O}(\text{vapor})$ equilibration method

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# Introduction



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## ❖ Direct liquid-vapor equilibration (DLVE) method

✧ **Concept:** Equilibrating liquid water to vapor in a closed system

### ➤ *Advantages*

- minimum sample handling
- direct isotope measurement from the samples without the need of extracting the pore water
- comparatively low cost than other analysis methods
- high reliability

➤ *Research Question:* What is the impact of soil type and equilibration times on the isotope measurement?

# Methodology

- Samples are equilibrated at a constant temperature in a completely sealed and closed bag with headspace filled with dry air or nitrogen gas.



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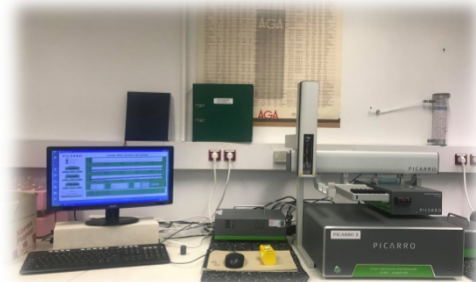


Resealable, airtight,  
collapsible, inflatable  
bags

Test sample (clay, silt,  
sand – 100% saturated)

Air

Prepared test  
samples (Tested at  
different time frames  
– 1 day up to 7 days)



*Analysis*

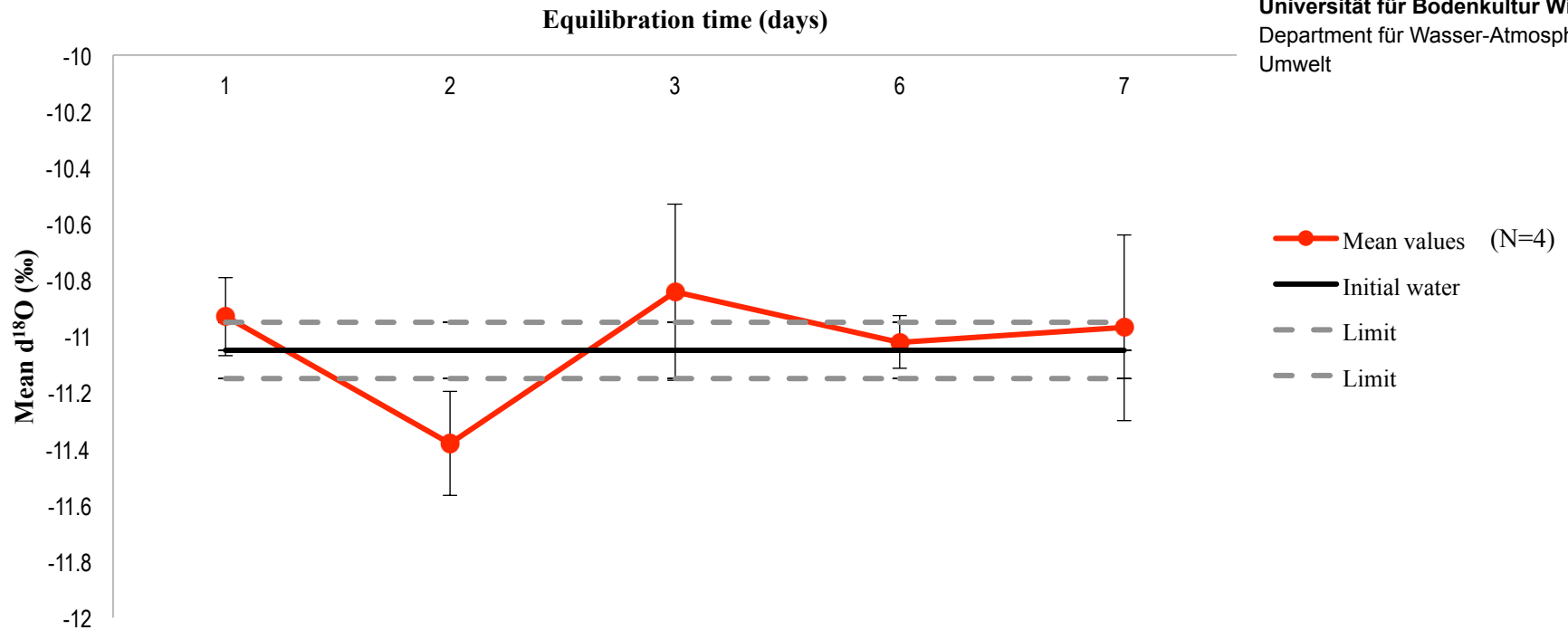
Laser spectroscopy (CRDS/OA-ICOS)

# Results for 100% saturated sodium bentonite (clay)



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## Mean $\delta^{18}\text{O}$ values against equilibration days



**Conclusion:** 100% saturated clayey soil takes only 1 day to reach isotopic equilibrium with the headspace in Ziploc bags and maintains the equilibrium condition up to 7 days in the bags



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# Thank you.

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