

Cisotop: A new stable isotope approach to examine turnover of organic compounds in the vadose zone

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The knowledge of the geochemical processes, taking place in the vadose zone, is important because they have a direct impact on the protection and quality of surface- and groundwater [1]. However, the understanding of leaching, retention and turnover of dissolved organic matter (DOM) in the under saturated zone is still insufficient [3]. The goal of the Cisotop project is to develop new methods and gain knowledge, usable in prediction of human activities affecting the quality of ground- and surface water. The Cisotop project includes fieldwork and laboratory studies using modern soil geochemical tools combined with state-of-the-art stable isotope methods (gas isotope EA-IRMS). The overall aim is to develop a method to differentiate $\delta^{13}\text{C}$ signatures from various pools of soil DOM, including plant litter and animal manure. The method development phase relies on a number of different experiments, used on various soil types, amongst are numerous C-extraction approaches and corresponding analyses of the isotopic signatures. The method will undergo testing using soil cores excavated from field sites, which have experienced changing crop cultivation; preferably, a crop history including C₃-C₄ plant shift – as this will yield distinct isotopic signatures [2]. The method will also be tested using computer-based modelling to assess the reductive capacity of organic matter in the vadose zone.

Keywords: Stable C isotopes, vadose zone, dissolved organic matter (DOM), C₃-C₄ crop shift.

References

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