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Geosphären-Biosphären
Wechselwirkungen

Mathematisch-Naturwissen-
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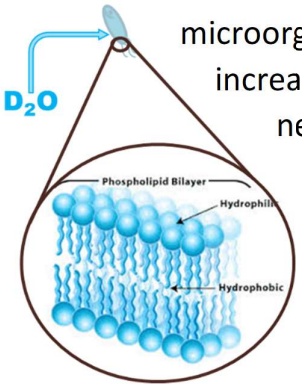
Fachbereich Geowissenschaften

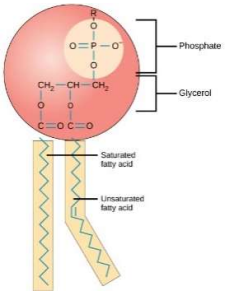
M.Sc. thesis project:

Analysis of a coupled ^{13}C and ^{2}H isotope tracing to reveal microbial growth dynamics in soil

Soil microorganisms play key roles in carbon (C) cycling, plant nutrition, and greenhouse gas production. Isotopic tracing provides powerful insights into microbial growth dynamics in soil, especially when combined with compound-specific analysis of biomarkers like phospholipid fatty acids (PLFA). Existing samples from an incubation experiment that combined ^{13}C (*data available*) and deuterium (^{2}H) (*data to be analysed*) labelling has proven that microorganisms not only invest available C in growth (reflected by an increase in PLFA abundance) but also in storage compounds (e.g. neutral lipid fatty acids – NLFA). **Dual-isotope analysis would reveal what controls this microbial resource partition in soil**, using besides glucose-derived ^{13}C also ^{2}H labelling of water **to distinguish growth and storage compound synthesis by microorganisms** that do not **directly use the added ^{13}C** but form **"new lipids based on old carbon"**.



The project would allow defining research questions to the dataset matching the experimental design; It is linked to in-depth analysis of data from gas chromatography-mass spectrometry (including isotope-ratio mass spectrometry); and interpretation of NLFA and PLFA data (microbial biomarkers) to understand microbial resource use under different C and nutrient regimes.



Required skills: the candidate should have a strong background in biological or soil sciences and be willing to deal with chromatographic datasets.

The duration of this master thesis will not exceed six months and offers great flexibility regarding working times but also location – as the data evaluation software can also be installed for a limited duration on a private computer.

In case of interest please contact Michaela Dippold of the Geo-Biosphere Interactions Group at ***michaela.dippold@uni-tuebingen.de***.