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Using complementary approaches to assess the vulnerability of organic matter to decomposition

Master project-45 credits

EBC, Department of Ecology and Genetics, Limnology

Master project background

Organic matter in soils, peat, and sediment are important global carbon sinks. Hence, processes that control its persistence and degradation are critical for the concentrations of atmospheric carbon dioxide and methane. Hence, it is important to understand how certain mechanisms change in importance along environmental gradients, examining the role of environmental and molecular constraints on OM degradation. Several methods have been proposed for the characterization of OM composition and vulnerability to decomposition. This project aims to combine two of these methods to develop a holistic understanding of how organic matter is decomposed across all ecosystems. These methods are the oxidation state and bulk energy availability in soils. The oxidation state addresses the likelihood for decomposition of organic matter to occur and the bulk energy represents the total potentially available energy for that decomposition.

Master project aims and description

In this master's thesis, the student will use elemental analysis in combination with bomb calorimetry to assess the potential for decomposition of organic matter across a broad spectrum of ecosystems. The main aim is to develop and refine methods using these two approaches to measure the oxidation state and bulk energy of soil organic matter. This work will complement a larger project assessing the controls of organic matter decomposition across terrestrial and aquatic ecosystems.

Methods

In this project you will participate in field sampling together with other members of the research group, and learn the following methods:

- Preparation of soils and sediments for laboratory analysis
- Bulk energy of soils and sediments using bomb calorimetry
- The oxidation state of soils and sediments using an Elemental Analyzer (C,H,N,O,S)

Qualifications/background

This will be primarily a laboratory based project and students from all backgrounds and identities are encouraged to apply. Students with an ecology background who are interested in biogeochemistry would be best suited to this project. The candidate should be highly motivated and proactive, have good communication skills and ability to interact effectively and work productively in a team.

Other information

Language: English

Proposed time: 4 – 6 months (ideally a 45 credit MSc project)

Location of research: Uppsala University, IEG, Limnology program (EBC)

Contact person

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