

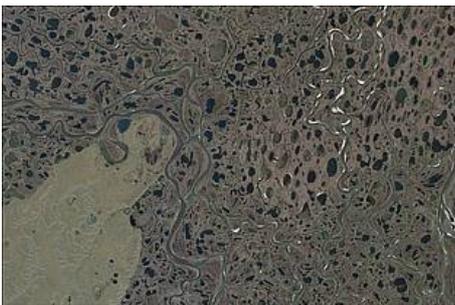
The Challenge



Yedoma cliff (Photo: Jens Strauss)

Arctic permafrost deposits are estimated to freeze-lock as much carbon in the atmosphere, allowing a potentially significant climate warming feedback loop when permafrost thaws and carbon is released as greenhouse gases. However, permafrost carbon pool estimates have high uncertainties and the dynamics of rapid permafrost thaw in a warming Arctic are poorly understood. None of these pools or rapid processes are considered in current Earth System Models so far.

Project Objectives



Landsat true color image (Photo: Landsat)

Data on the spatial distribution of soil carbon pools and their vulnerability to rapid thaw processes such as thermokarst is required to determine what, and how fast, climate feedbacks might result. PETA-CARB aims at quantifying the amount, distribution, and vulnerability of deep permafrost soil organic carbon pools, as well as how rapidly permafrost thaw impacts these carbon pools on various spatial and temporal scales, allowing projection of future interactions between the permafrost carbon pools and Earth's climate.

Methodology

The project combines [remote sensing based change detection](#) , mapping, and spatial data analysis for permafrost landscapes, quantitative field studies, and modelling of thermokarst processes to quantify the size and vulnerability of deep [permafrost soil carbon pools](#) to rapid thaw and resulting impacts. The three research topics are:

- (1) Systematic measurement of rapid permafrost thaw,
- (2) Characterization of deep permafrost SOC stocks and carbon accumulation rates, and
- (3) Quantification of deep permafrost SOC pools and vulnerability assessment.

Study Regions

We focus our [field expeditions](#) on different regions in Alaska (Arctic Coastal Plain, Yukon Kuskokwim-Delta) and Siberia (Lena Delta, Central Yakutia) that represent a variety of permafrost and environmental conditions. However, the scope of our project goes beyond these core study



Head:
[Prof. Dr. Guido Grosse](#)

Team:

[Dr. Jens Strauss](#)

[Dr. Anne Morgenstern](#)

[Dr. Josefine Lenz](#)

[Dr. Juliane Wolter](#)

[Dr. Ingmar Nitze](#)

[Dr. Sina Muster](#)

[Sebastian Laboor](#)

[Matthias Fuchs](#)

[Lydia Stolpmann \(U Potsdam\)](#)

[Michael Angelopoulos](#)

[Loeka Jongejans](#)

[Alexandra Runge](#)

[Julia Wiedmann](#)

[Torben Windirsch](#)

[Filip Matuszewski \(FU Berlin\)](#)

[Charlotte Haugk \(Uni Potsdam\)](#)



sites and will involve synthesis of data from other research projects and study sites that allow upscaling of results to regional to continental scales.

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PETA-CARB wordle (Graphic: Jens Strauss)

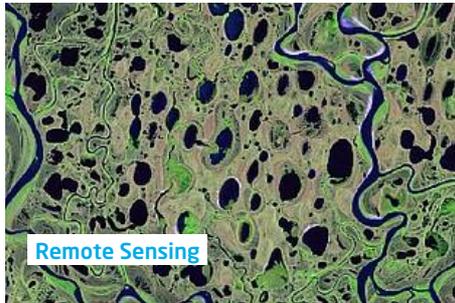
What is Permafrost?



Carbon

Carbon in Permafrost

Arctic landscapes, especially those underlain by permafrost, are threatened by climate warming and...



Remote Sensing

Visualize Changes

Temporal and spatial evaluation of remote sensing data makes it possible to investigate changes in...



Expeditions

Practical Research in the Field

Field work in remote permafrost regions of the Arctic and Subarctic is an important element of the...



News



PETA-CARB in the Media



Results

