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CAOS
Climate Smart Agriculture on Organic Soils

THÜNEN

The FACCE-ERA-Net Plus project 'Climate smart Agriculture on Organic Soils'

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Introduction

Farmed organic soils – greenhouse gas hotspots in Europe

- **Peatlands** store a major share of the world's **soil organic carbon** and are widespread in European countries.
- 80% of Europe's peat soils have been **cultivated for agricultural use** in the past centuries.
- **Drainage** is a precondition for classical agricultural production on organic soils, but fosters **soil degradation**, land surface **subsidence** and peat **mineralization**.
- Managed organic soils are the **largest sources of greenhouse gas** (GHG) emissions (e.g. CO2 and N2O) from agriculture in peat-rich countries.

Wet management systems – benefit from synergies

- Controlled drainage and active water management are **climate smart options** for agricultural production on organic soils under current and future climatic conditions.
- Wet organic soils can be used as **risk insurance for food security in dry periods** while active water and soil management will **improve trafficability**.
- **Wetness-adapted crops** with stable yield quantity and quality are needed to meet requirements for **food, feed and bioenergy**.
- Proof by **on-farm experiments** and historical evidence of **successful wet management** systems is needed.

Partners & Sites

- Johann Heinrich von Thünen-Institute Institute of Climate-Smart Agriculture
- Johann Heinrich von Thünen-Institute Institute of Rural Studies
- Stichting Dienst Landbouwkundig Onderzoek (DLO-Alterra) Soil, Water and Land Use Division
- Aarhus University Denmark Department of Agroecology
- University of Tartu Estonia Institute of Ecology and Earth Sciences
- Swedish University of Agricultural Sciences Department of Soil and Environment
- Natural Resources Institute Finland

Fig. 2: Regulated drainage ditch – N_2O flux measurement with closed chamber – drained peat soil – wheat production on organic soil

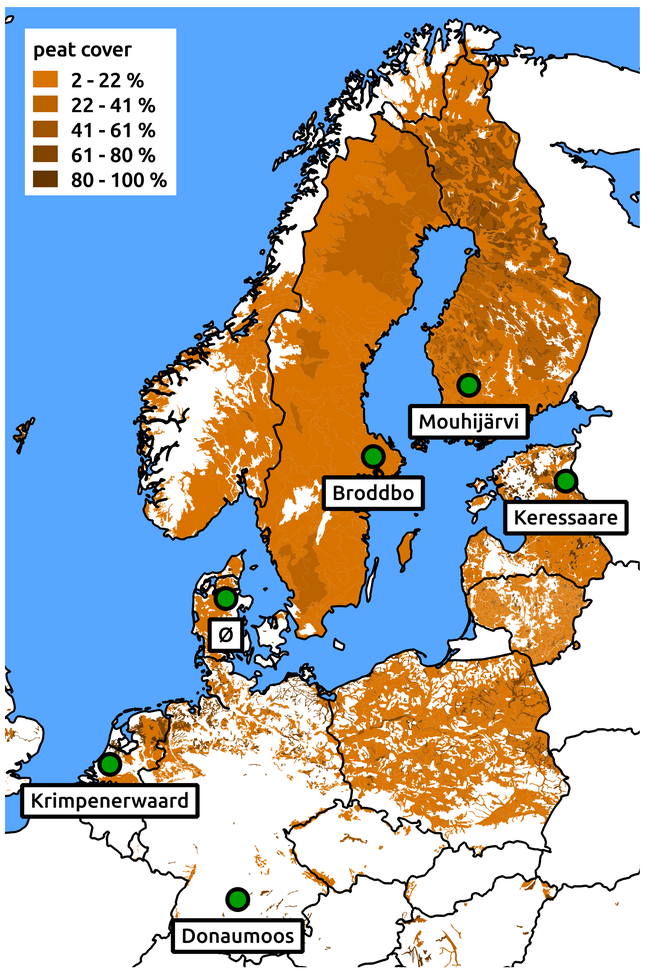

Fig. 1: The CAOS experimental site locations in Europe. Background map: peat cover in Europe (modified from: Montanarella et al., The distribution of peatland in Europe, Mires and Peat 1, 2006).

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Project aims & tasks

Derive the knowledge – spread the news

The CAOS project aims to **generate the knowledge** to design climate smart agricultural systems for organic soils adapted to the **diverse regional conditions** of Northern and Central Europe. CAOS will provide and distribute evidence that active management aiming at a better **control of groundwater levels**, improved **trafficability** and alternative **high productivity crops improves yield** stability and quality as well as **resilience to climate change** while providing strong **GHG mitigation** and improved soil and water quality.

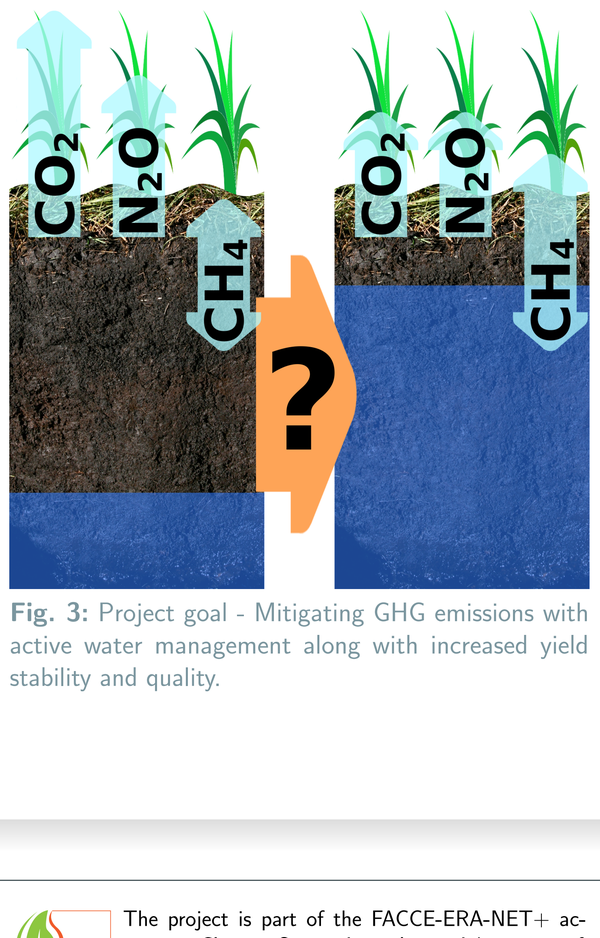

Fig. 3: Project goal - Mitigating GHG emissions with active water management along with increased yield stability and quality.

Project tasks – from ecology to economy

- Combining **historical agro-economic data** with soil quality and water table observations to identify historical evidence of **climate smart** soil and water management.
- **Field experiments** with soil and water management testing different techniques of controlled drainage and subirrigation combined with GHG measurements.
- **Economic and policy analysis** with focus on management options allowing the continuation of agricultural production.
- **Quantity and quality analysis** of harvested biomass used for food, feed or energy purposes.
- Integration of **process-based water dynamic** and **crop growth** models, statistical models of **GHG mitigation** and water quality and **economic models** to synthesise results and to evaluate **adaptation potential** under climate change scenarios.
- **Bi-directional involvement** of stakeholders and practitioners throughout the entire project to facilitate **knowledge exchange** across countries.

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