The FACCE-ERA-Net Plus project “Climate smart Agriculture on Organic Soils” (CAOS)

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Farmed organic soils – greenhouse gas hotspots in Europe

Background

- Peatlands store a major share of the world’s soil organic carbon, but become strong greenhouse gas (GHG) sources when drained.
- Furthermore, drainage fosters soil degradation, land surface subsidence and water pollution.
- Current land use of organic soils in Europe is neither sustainable nor climate smart.

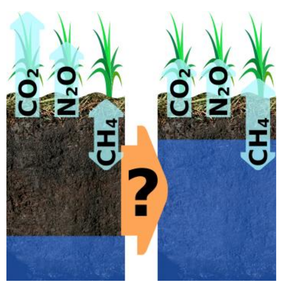

FIG. 1: Effects of active water management

Wet management systems – benefit from synergies

- Controlled drainage with active water management is a climate smart option for agricultural production on organic soils under current and future climatic conditions.
- Wet organic soils can be used as risk insurance in dry periods while reducing GHG emissions (Fig. 1).
- Wetness adapted crops with stable yields are needed to meet requirements for food, feed and bioenergy while being economically attractive.
- Proof by on farm-experiments and historical evidence of successful wet management systems is required.

Study Sites

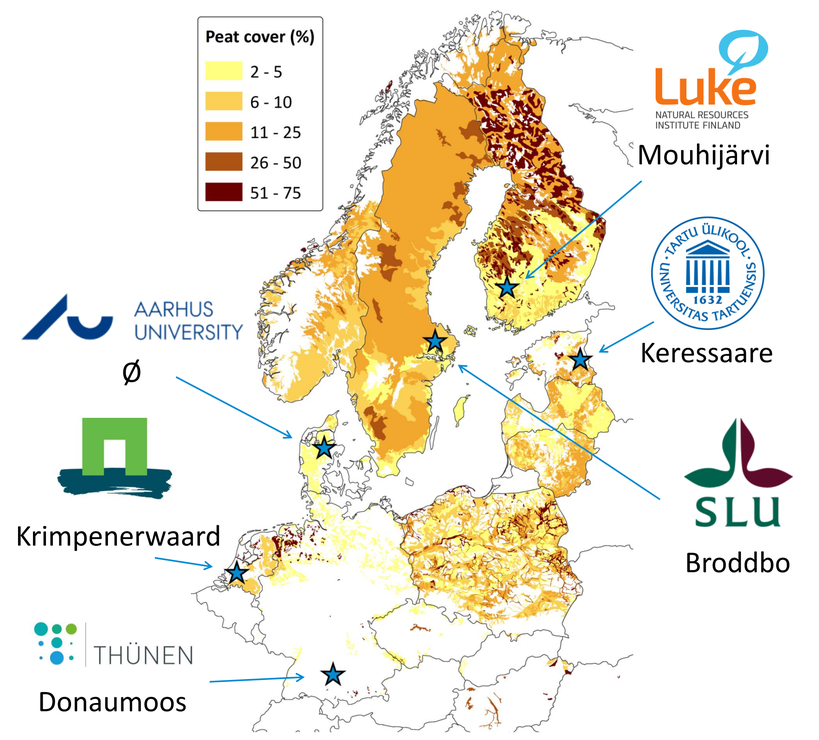

FIG. 2: The CAOS experimental sites. Background map: Peat cover in Europe, modified from Montanarella et al. (2006): The distributions of peatlands in Europe, Mires & Peat 1.

Project Aims & Tasks

FIG 3: Grazing on wet organic soils.

FIG 5: Profile of a peat soil degraded by tile drainage.

FIG 7: Ditch management by adjustable weirs.

Historical evidence

- Combining existing agro-economic data (Fig. 3 & 4) with soil quality (Fig. 5) and groundwater table measurements (Fig. 6) to identify historical evidence of climate smart soil and water management under diverse regional conditions.

Field experiments

- Field experiments with soil and water management testing different techniques of controlled drainage and subirrigation (e.g. Fig. 7):
  - Greenhouse gas measurements with manual closed chambers (Fig. 8)
  - detailed analysis of hydrology, biomass and soils
  - trafficability

Biogeochemical and economic data analysis

- Political, agronomic and socio-economic analyses: identification of barriers and incentives for wet management
- Determination of quantity and quality analysis of the harvested biomass used for food, feed or energy purposes.
- Integration of process-based water dynamic and crop growth models, statistical models of greenhouse gas mitigation and water quality and economic models to synthesize results and to evaluate the adaptation potential under climate change scenarios.
- Bi-directional involvement of stakeholders and practitioners (interviews, stake-holder workshops) to facilitate knowledge exchange within and across countries.

FIG 4: Grassland management on organic soils.

FIG 6: Groundwater level measurements in a wet grassland on bog peat.

FIG 8: GHG measurements with manual closed chambers.

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