Luke
NATURAL RESOURCES
INSTITUTE FINLAND

# Sustainability of boreal, mixed crop and livestock farming under changing climatic conditions

Narasinha Shurpali and Several Luke Colleagues

# Luke in brief

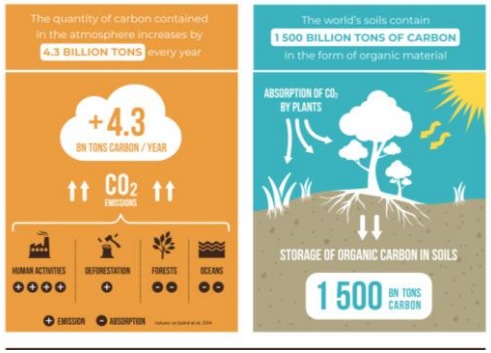

**22**
**locations**

**1337**
**employees**

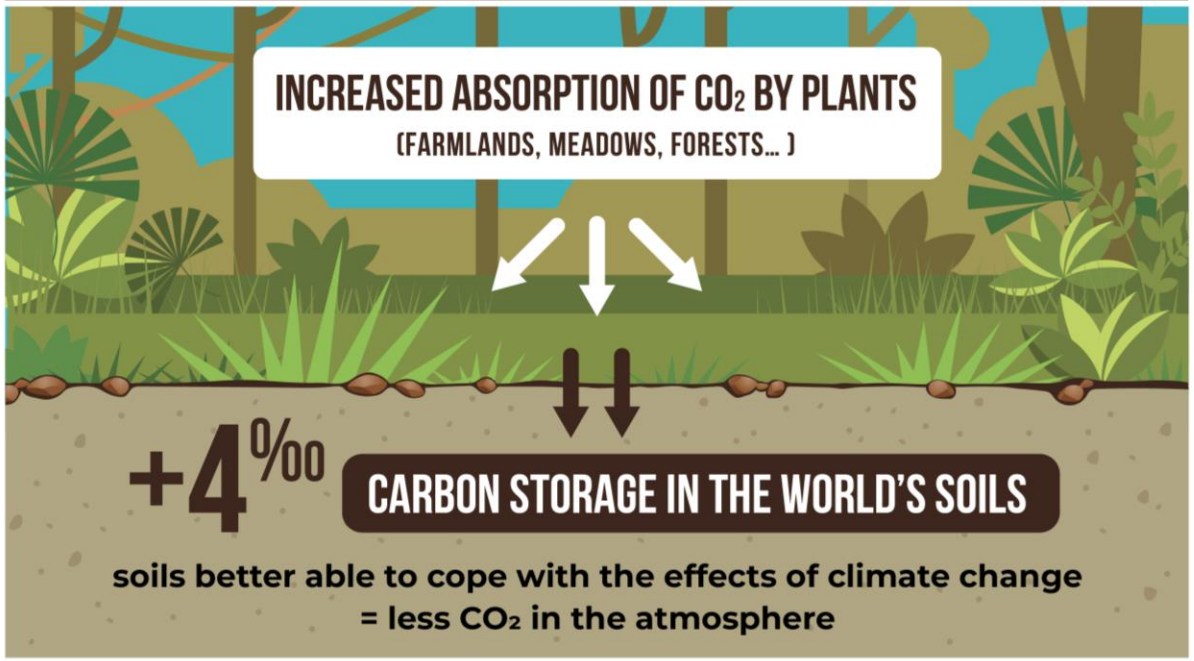
**133 M€**
**turnover**

# 4 PER 1000

## CARBON SEQUESTRATION IN SOILS FOR FOOD SECURITY AND THE CLIMATE




While pursuing the indispensible effort to decrease drastically the green house gases (GHG) emissions due to human activities, increasing soil organic carbon sequestration could make a substantial contribution to GHG mitigation efforts. A theoretical annual increase of the world soil organic carbon stock by 0.4% of its value would be larger than the 2015 annual increase in $CO_2$ in the atmosphere, which is a major contributor to the greenhouse effect and climate change: **this is the origin of the "4 per 1000" title of this initiative.**



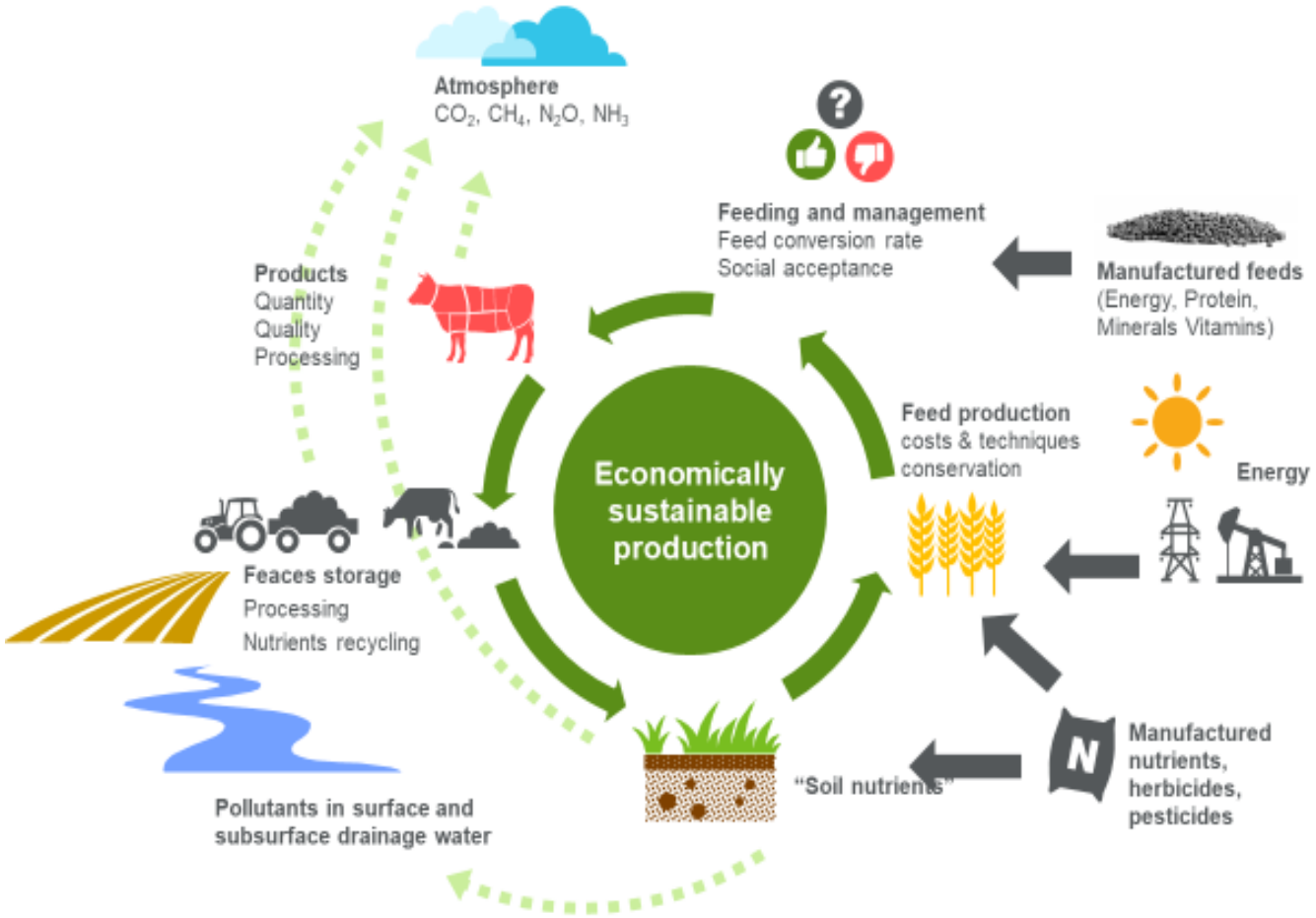

## HOW CAN SOILS STORE MORE CARBON?

**The more soil is covered, the richer it will be in organic material and therefore in carbon. Until now, the combat against global warming has largely focused on the protection and restoration of forests. In addition to forests, we must encourage more plant cover in all its forms.**

- Never leave soil bare and work it less, for example by using no-till methods
- Introduce more intermediate crops, more row intercropping and more grass strips
- Add to the hedges at field boundaries and develop agroforestry
- Optimize pasture management with adapted grazing periods and rotations
- Restore land in poor condition e.g. the world's arid and semi-arid regions
- Improve water and fertilizers management and use organic fertilizers and compost

# Green Deal Going Local

# A multidisciplenary team of scientists – agronomy, crop physiology, biogeochemistry, soil science and microbiology, animal sciences, statistics, modelling, digital technologies, socio-economy







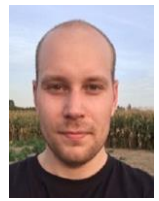










Maaninka
North Savo region
Milk and Beef Production – Second largest producer in Finland

866 dairy farms in the region

324.3 million L of milk in 2020

# The research projects carried out at Luke Maaninka aim at

- Promoting sustainable and resource efficient grass production
- Strenghtening GHG,C sequestration and nutrient cycling res earch and providing excellent data for modelling
- Undertaking major Luke Agrifood (including Infratstructure) development projects in collaboaration with industrial partners and farmer organizations

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# Understanding the mechanisms behind the ecosystem sink for nitrous oxide (ENSINK)

Narasinha Shurpali, Hem Raj Bhattarai, Petra Manninen and Ville Nieminen

**NUMA Luke Maaninka**

# Dairy and beef industries in Finland: Progressing pathways to carbon-neutrality by 2035 (NC-GRASS)

## Nappaa Hiilestä Kiinni Program

**Presented by Narasinha Shurpali**
**Luke Maaninka**

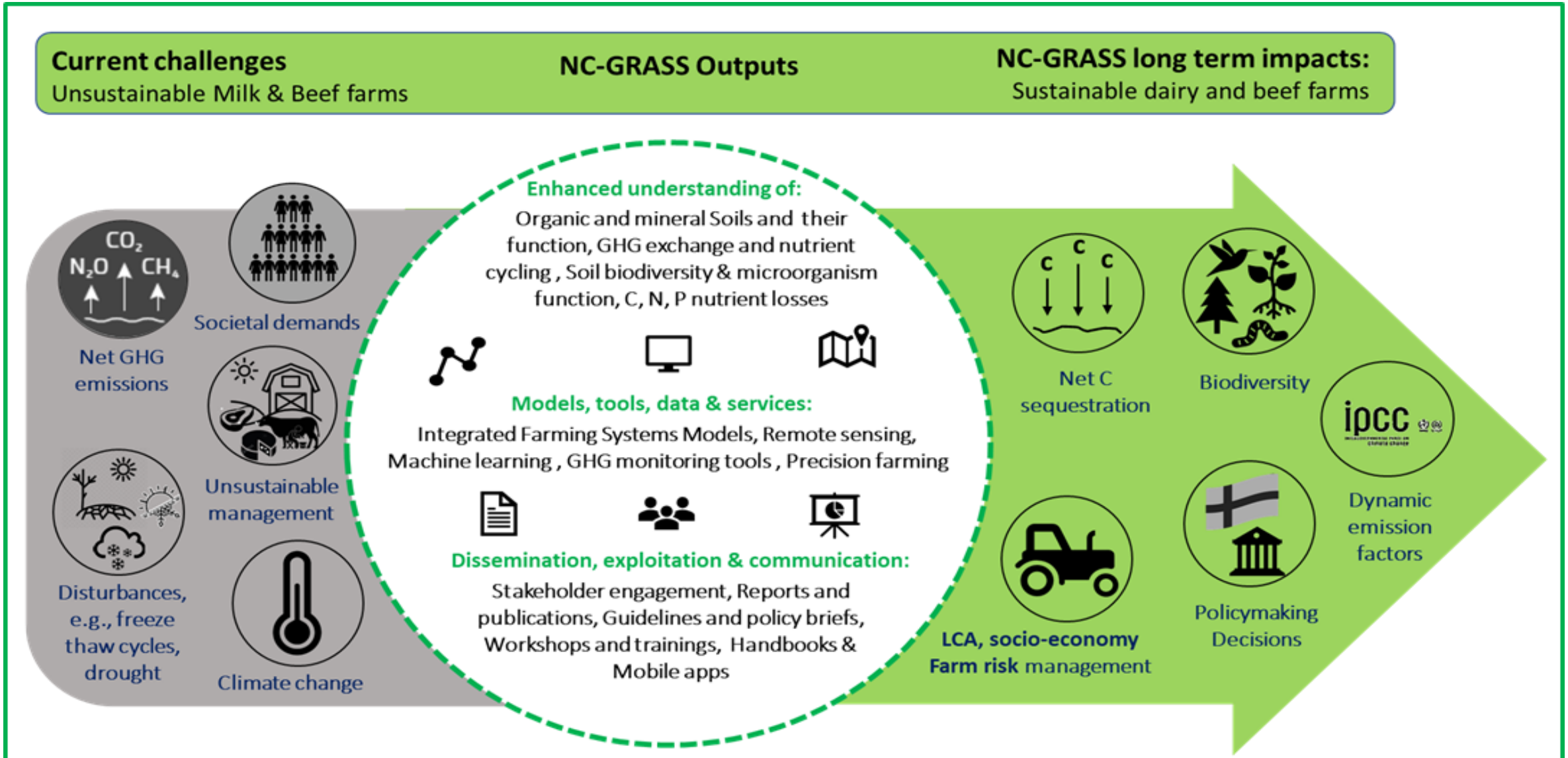



Figure 1: Concepts of NC-GRASS as a living lab showing the current challenges, project outputs and its long-term impacts

# RICH DATA SITES

RUUKKI - 2
MAANINKA – 3
Qvidja
Viikki
Jokioinen
Another mineral soil site (recent – FMI)

# Anttila – Collaborative Projects

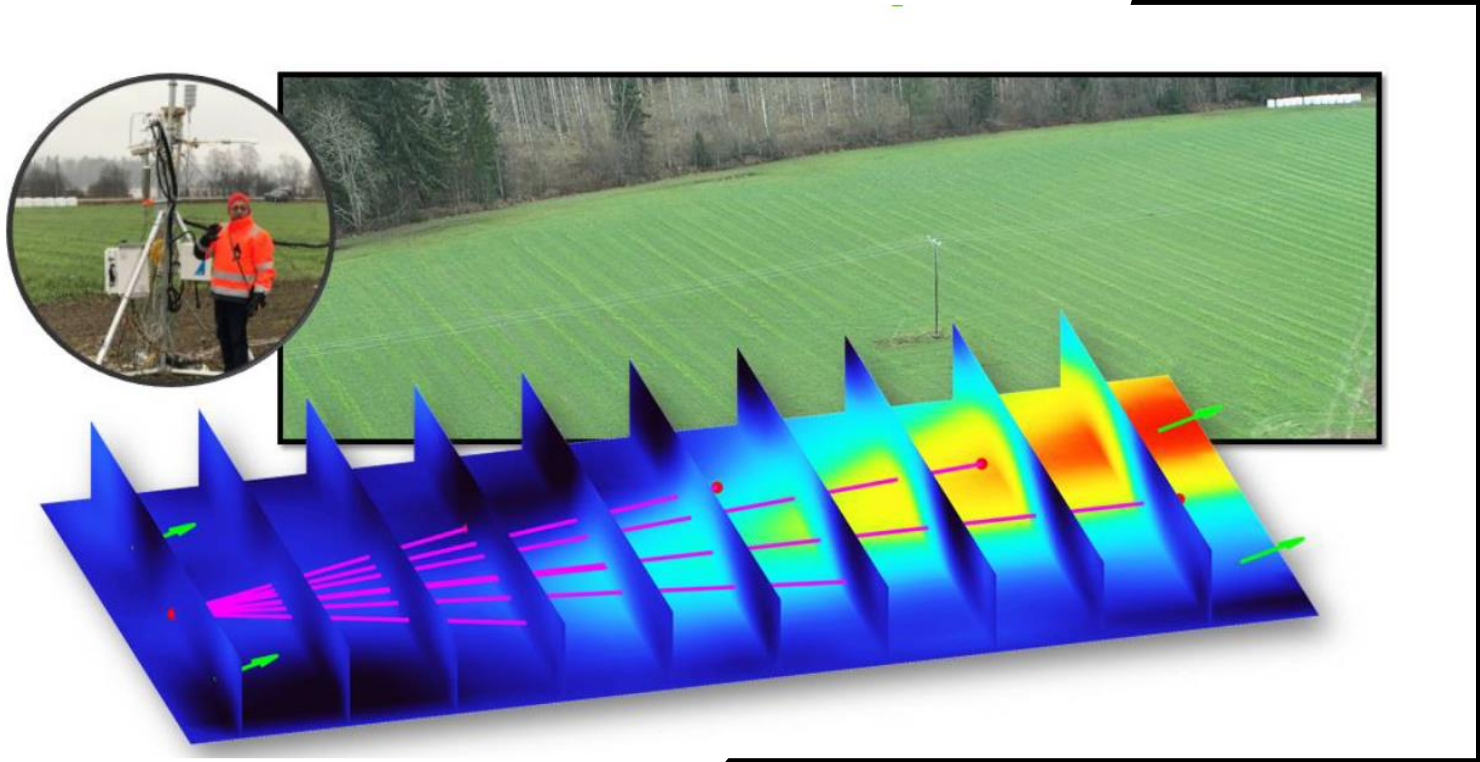
ENSINK (Academy of Finland)

NC-Grass (MMM - Luke, UEF, UH, FMI, MML)

ORMINURMI (MMM – Luke UEF)

Peltotomo (Pohjois-Savon liitto – UEF, Luke)

RehuDrooni (EAKR)



# Pappilansuo

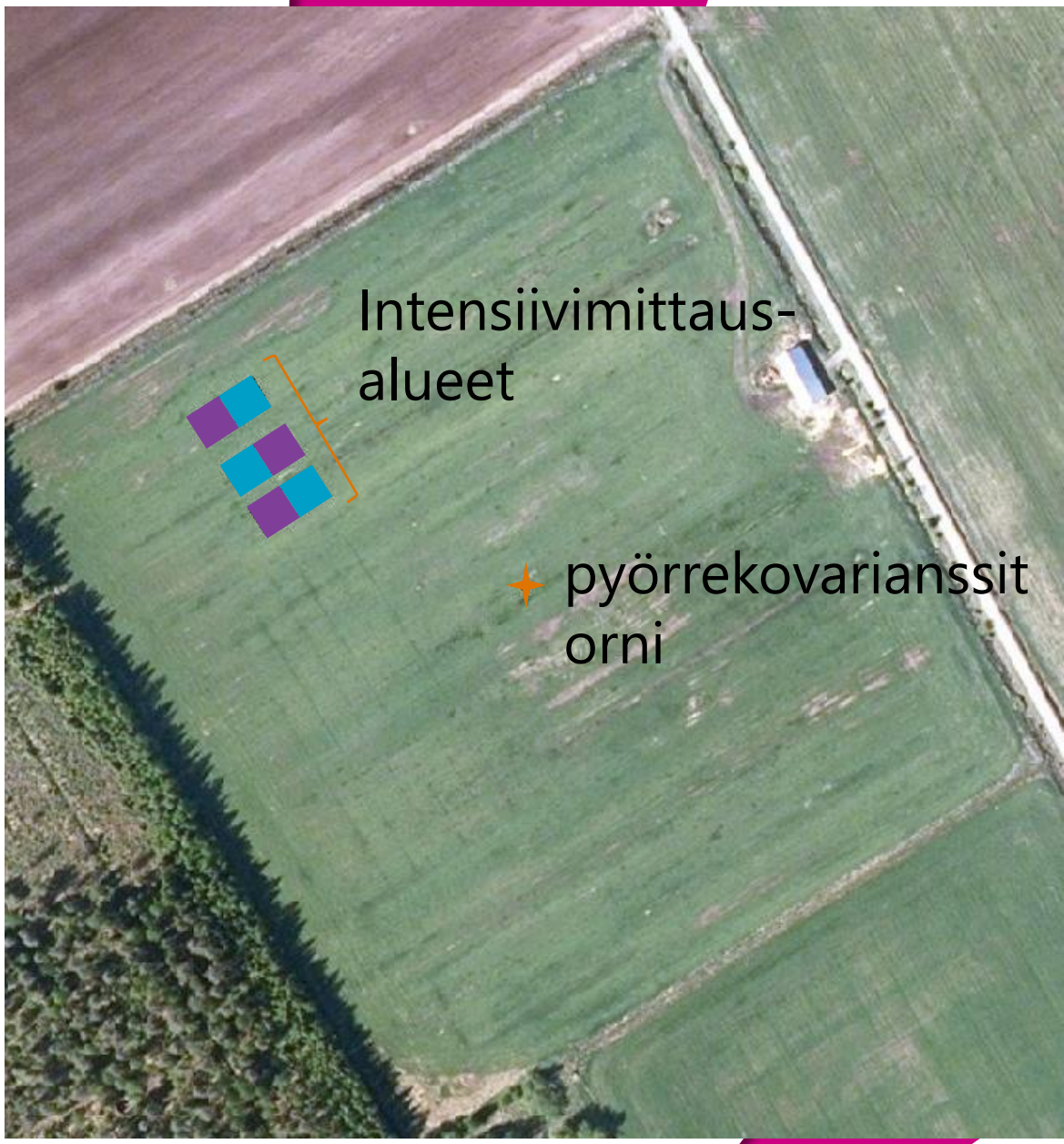
Organic soil

Eddy covariance and Chambers

To understand the impact of spring

Vs Autumn grass harvesting

**Current status**

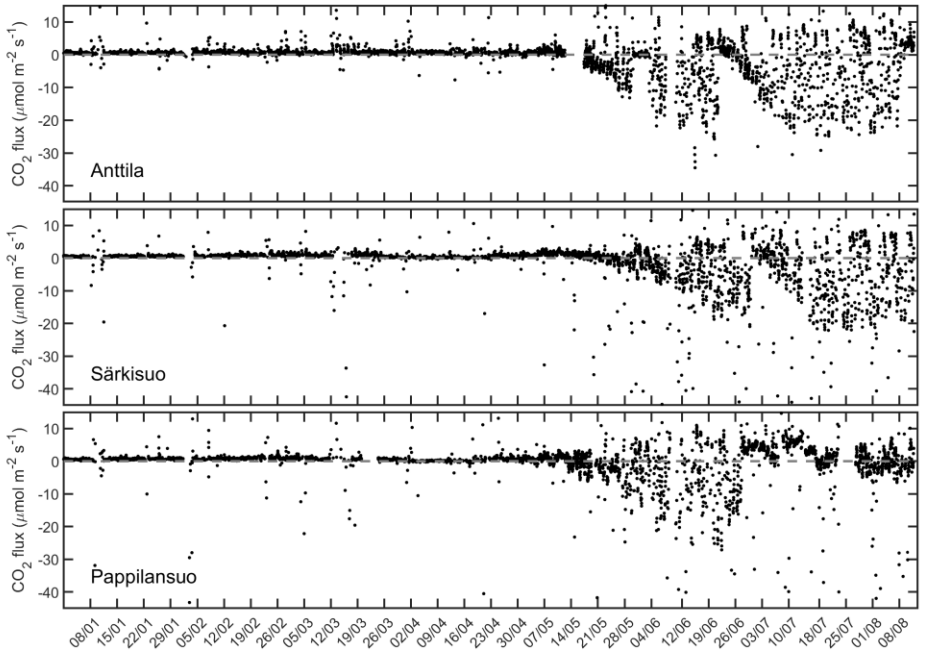


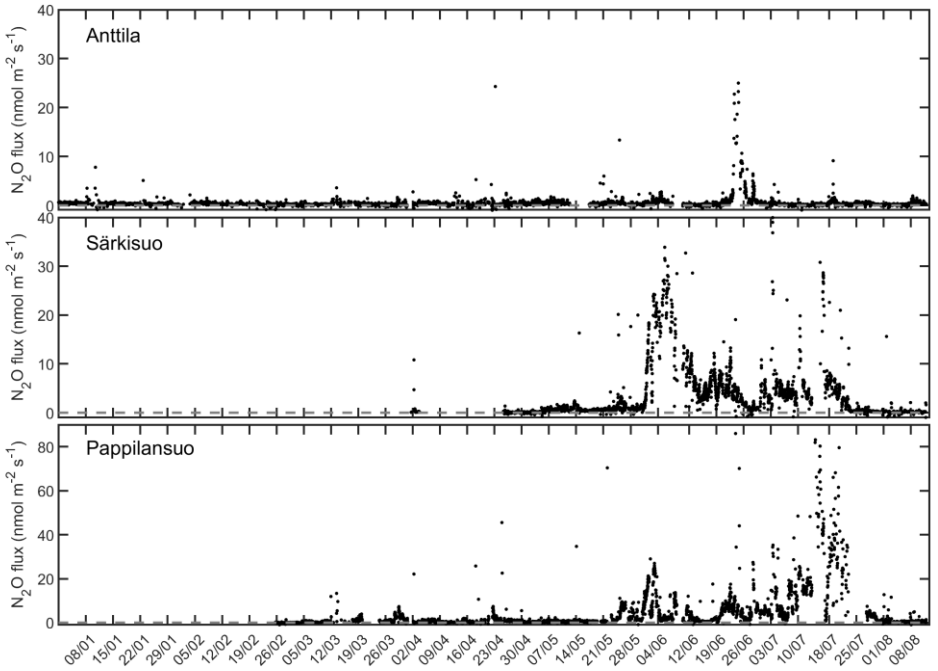
# Särkisuo – Experiment

Peat soil site

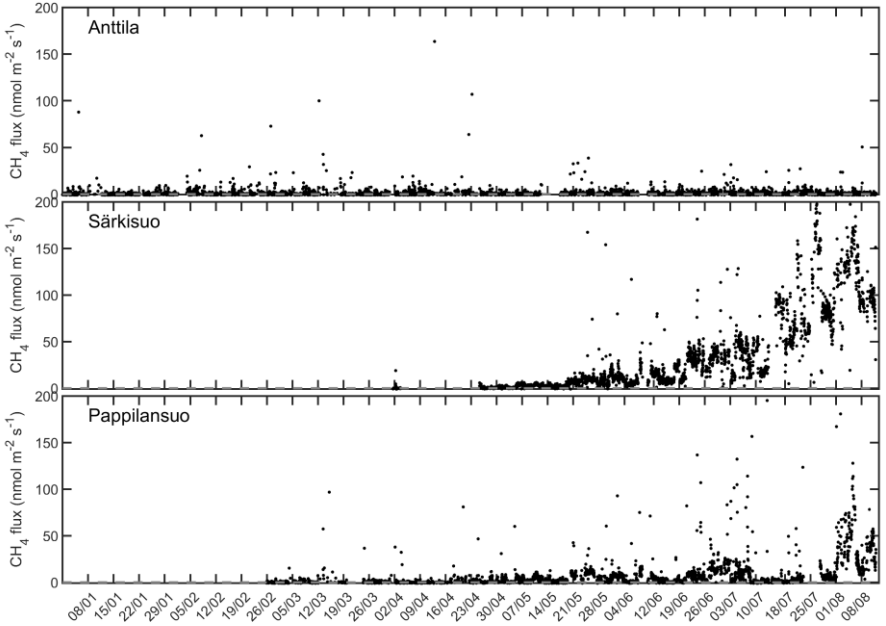
manipulating water table level, impact on GHG emissions, fodder quality and quantity for animals

**Current status**




GHG measurements using eddy covariance technique from grasslands on mineral and organic soils in the Maaninka region




**Measuremets help us in understanding the atmosphere – biosphere interactions and assist farmers with adopting best agricultural amanagement practices under changing climatic conditions.**

# You can find us online

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