Developing a Soil Organic Matter Management Tool for Swiss Farmers

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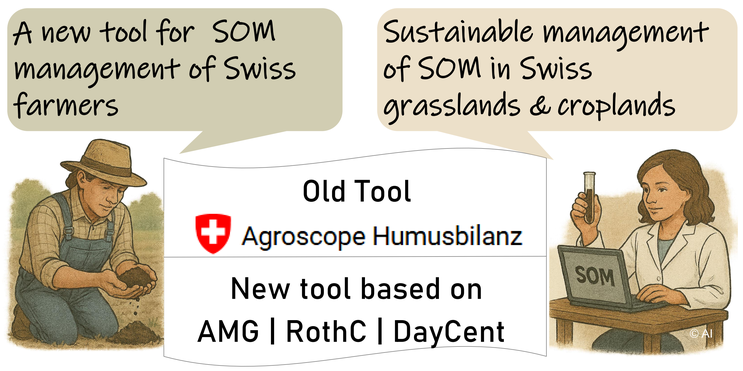
Background

The sustainable management of Soil Organic Matter (SOM) helps secure long-term soil health.
In Switzerland, humusbilanz.ch is a tool designed to assist farmers in managing SOM at farm scales.
In recent years, our understanding of SOM dynamic processes has deepened.
We aim to enhance the Swiss SOM management tool by leveraging established SOM models, such as AMG, RothC, and DayCent.

Objectives



Model Basis

AMG: Yearly SOC Model

Required data:
- Weather (Tmean, Precip, ET)
- Pedological (clay, CaCO3, pH, soil C/N, initial SOC)
- Management (crop yield, manure, irrigation, tillage)

SOC pools = Fresh + Active + Stable

RothC: Monthly SOC Model

Required data:
- Weather (Tmean, Precip, ET)
- Pedological (clay; initial SOC)
- Management (Plant C input, manure)
- Soil vegetation coverage

SOC pools = DecomPM + ResisPM + MicroBIO + HUM + InertOM

DayCent: Daily SOM (C+N) Model

Required data:
- Weather (Tmax, Tmin, Precip, …)
- Pedological (soil texture, SOC for soil temp)
- Management (crop, cultivation, mineral fertilizer, manure, harvest, irrigation)

SOC pools = Active + Slow + Passive

Workflow

Test Phase
SOM simulation & calibration based on site-specific data

Validation of grid data

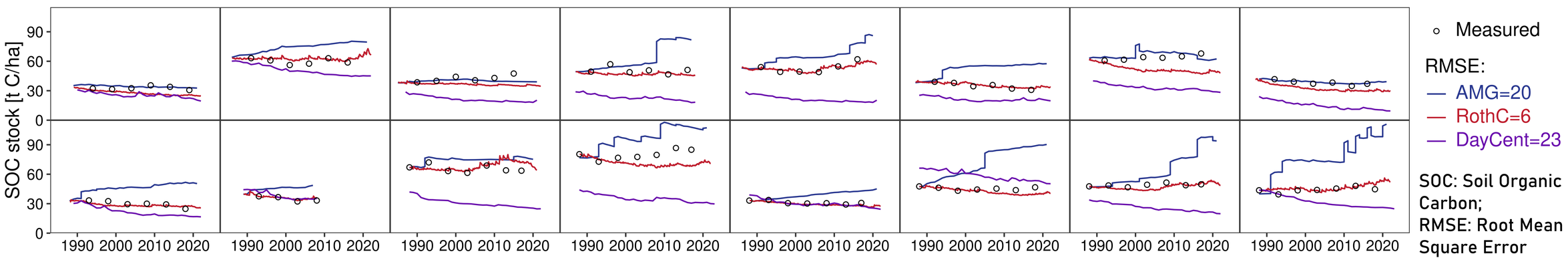
Public Phase
Farmer tool for parcel-specific SOM management based on public grid data

Light version: Preloaded + little farmer data
Heavy version: Preloaded + detailed farmer data

Summary

- Simulate SOM dynamics using models at different time scales.
- Evaluate the impact of agricultural practices on SOM dynamics.
- Provide a parcel-scale SOM assessment tool for Swiss farmers.
- Foster sustainable SOM management.
- Support Swiss national agricultural goals.

Preliminary Results for the Test Phase of Copland Sites (Uncalibrated)



SOC: Soil Organic Carbon;
RMSE: Root Mean Square Error

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