



2021 EU Conference on
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Biogeochemical model ensembles for policy-support in agriculture



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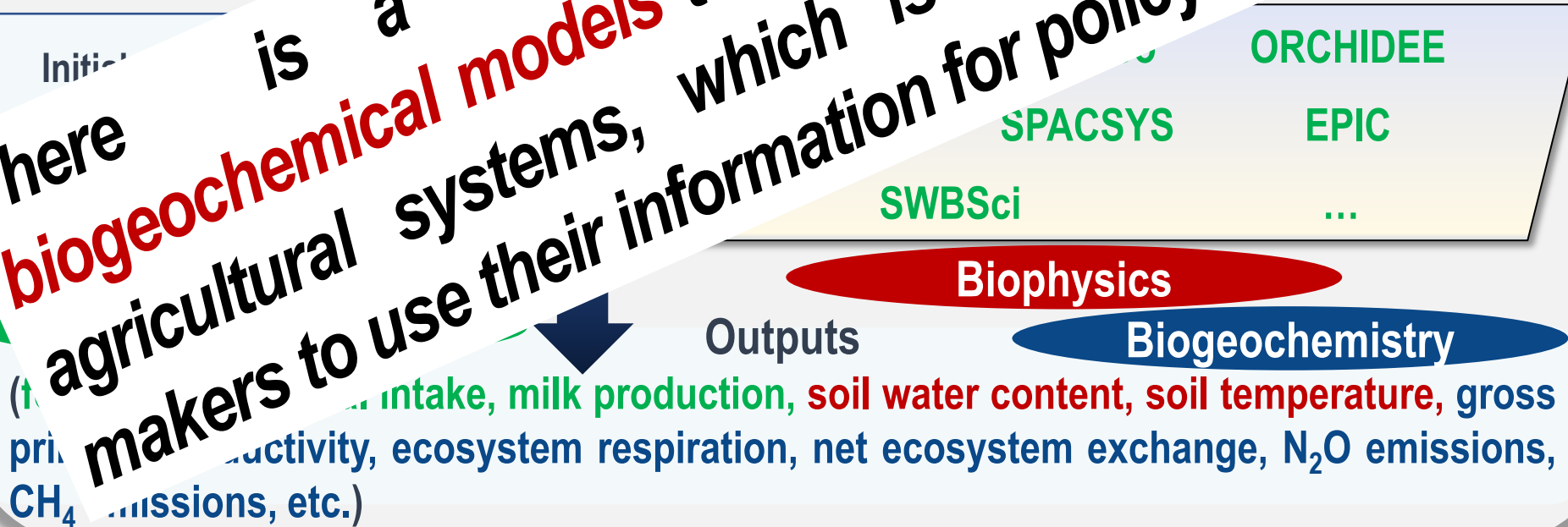
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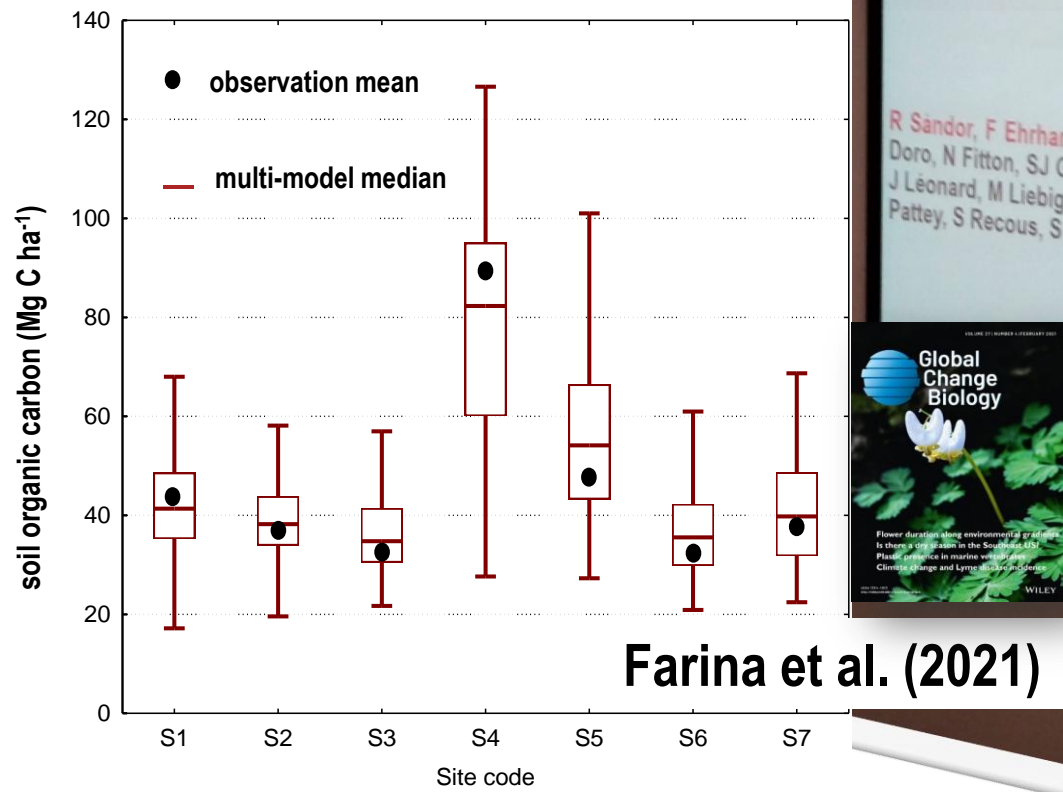
Systemic approach to agro-ecosystem modelling



There is a need for **greater confidence** in **biogeochemical models** to assess C and N balances in agricultural systems, which is necessary for policy makers to use their information for policy support.



In a policy perspective, international model inter-comparison exercises have shown the **potential of process-based biogeochemical model ensembles** to jointly estimate agricultural productivity and fluxes and stocks of nitrogen and carbon in agricultural soils.



Gianni Bellocchi

A multi-model assessment of C cycling and soil C sequestration in grasslands and croplands

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Global Change Biology

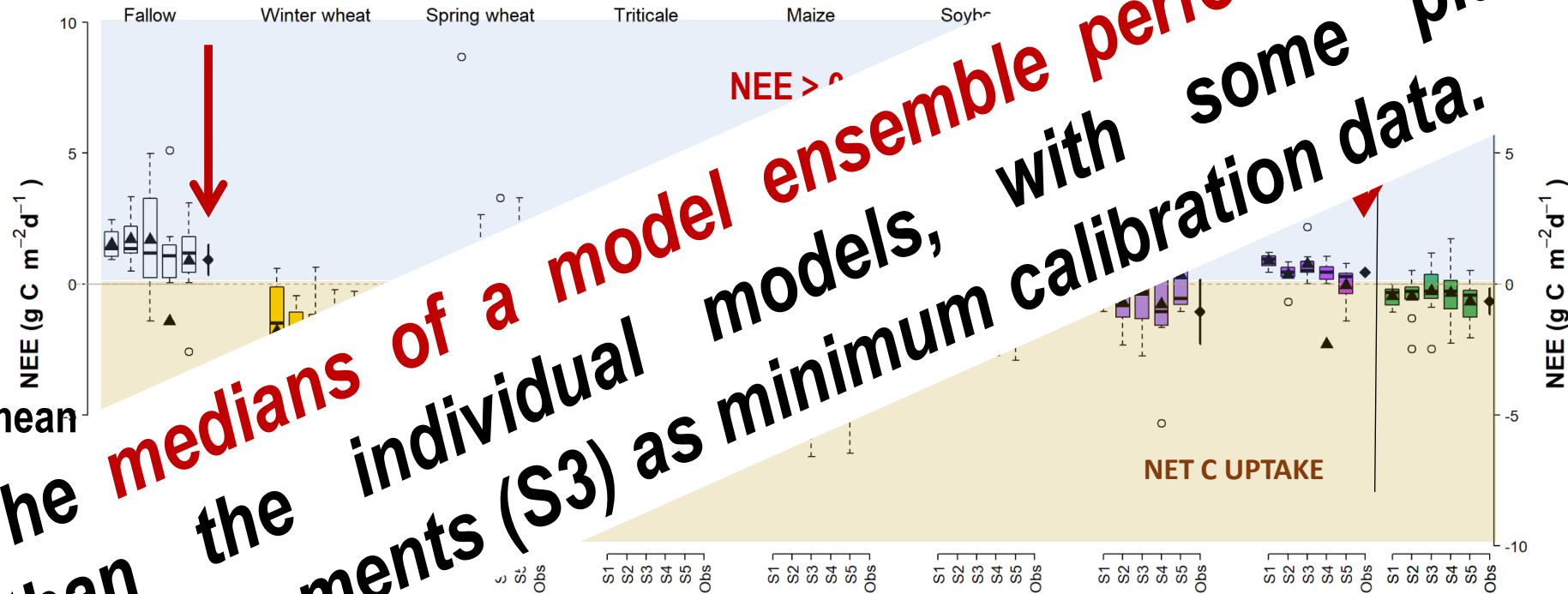
Carbon fluxes (net ecosystem exchange)

multi-model mean



multi-model median

multi-site observation mean



The medians of a model ensemble perform better than the individual models, with some plant measurements (S3) as minimum calibration data.

multi-model simu.

(different calibration

e.g. S3: with plant data;

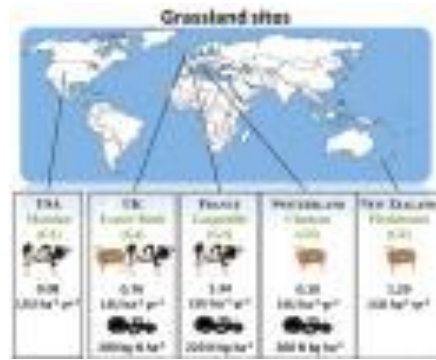
S5: with plant soil and flux data)

observations

Sándor et al. (2020)

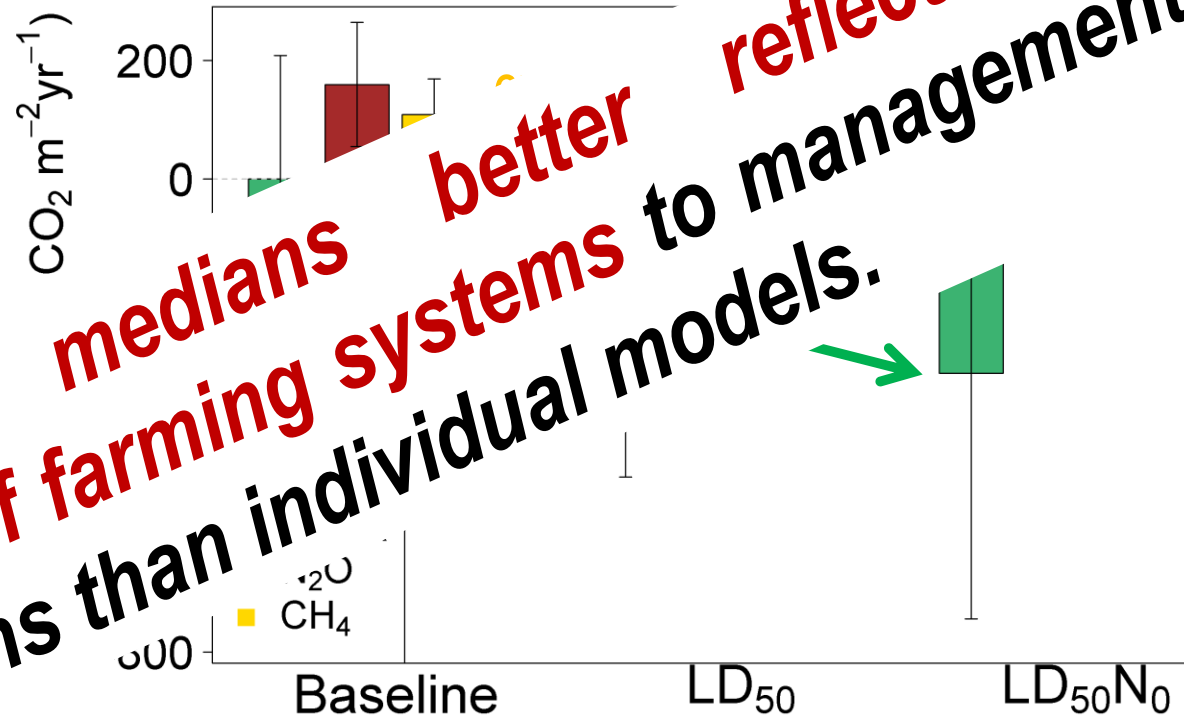


This is critically important for the implementation of model ensembles to identify the extent to which management interventions influence C-N fluxes and stocks before promoting food security and climate policies that alter agricultural practices to meet prescribed benchmarks.



Livestock density (LD)
From 100% LD (baseline) to 50%
Nitrogen (N)
(baseline) to 0%

Multi-model medians better reflect the response of farming systems to management adaptations than individual models.



Grassland mitigation options

Sándor et al. (2018)



There is evidence of what can reasonably be expected from the use of an ensemble of biogeochemical models in agriculture, which ...

calls for

integration into operational, multi-model decision-support frameworks

should aim at

guiding agro-environmental C- and N-smart policies, designed and adapted to farms and territories

