

GLOBAL RESEARCH ALLIANCE

ON AGRICULTURAL GREENHOUSE GASES

Country report : Switzerland

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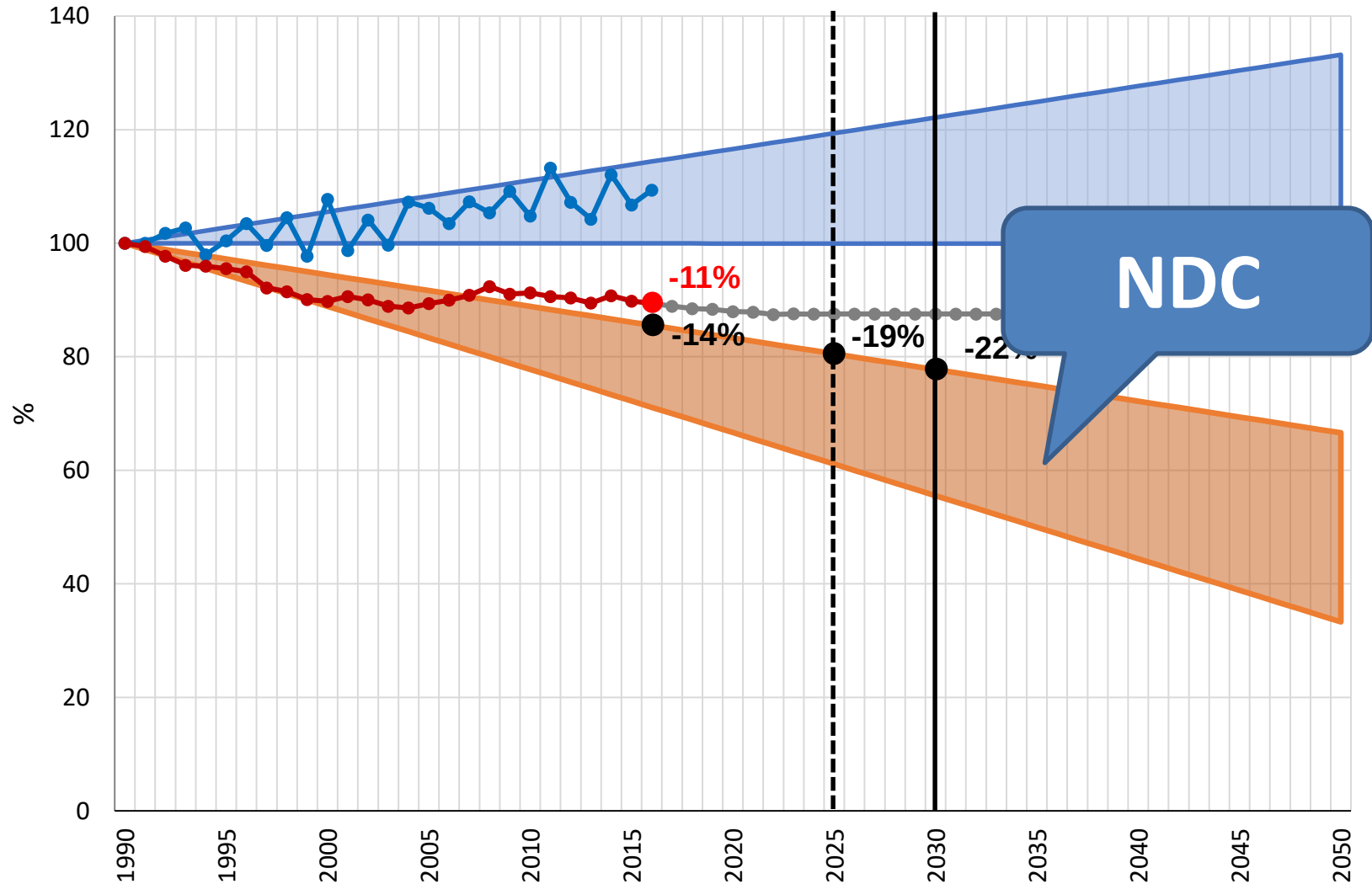
Presentation to IRG Annual Meeting
Wageningen, 03rd March 2020

Projects, initiatives and contributions to IRG's topics

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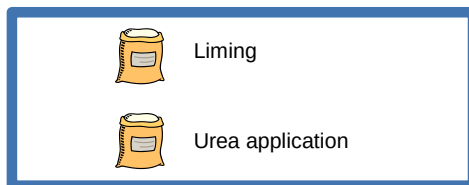
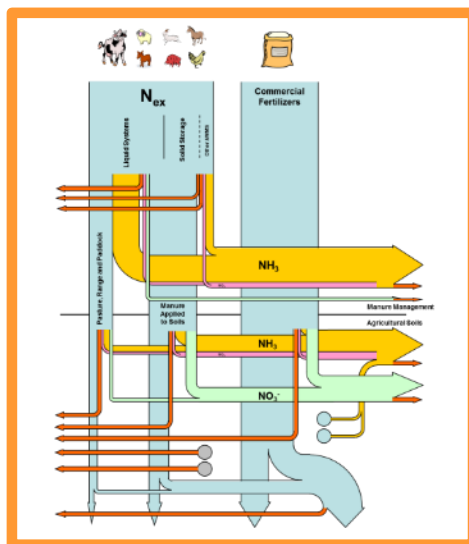
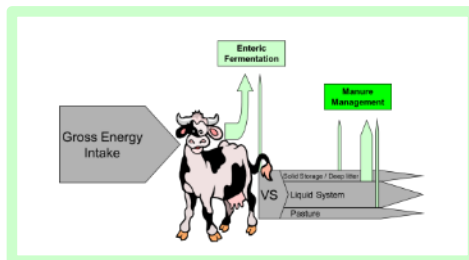
ON AGRICULTURAL GREENHOUSE GASES

Swiss Climate Strategy for Agriculture



Source: according to BLW 2011; FOEN 2018

Sources and Sinks of GHG-Emissions in the Swiss Food System



Direct Energy Use

LULUCF

Soil organic carbon modelling with RothC (mineral topsoils)

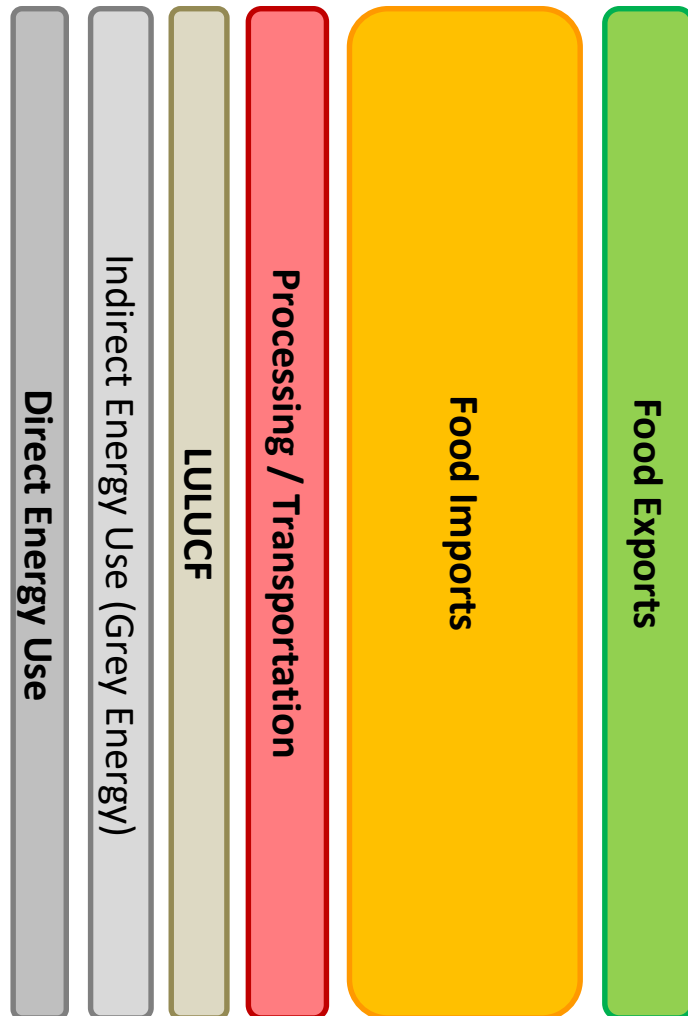
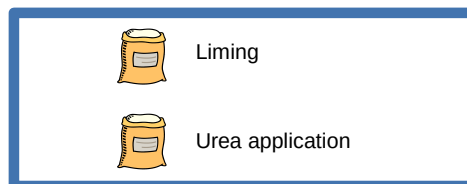
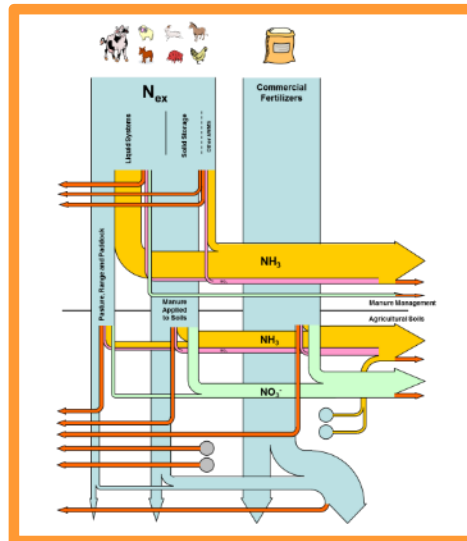
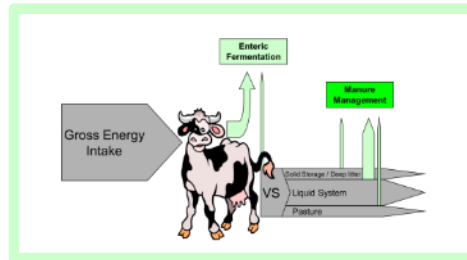


Wüst et al. (2019), A model-based carbon inventory for national greenhouse gas reporting of mineral agricultural soils. Agroscope, 2019.

Sources and Sinks of GHG-Emissions in the Swiss Food System



Pre-Chain Emissions



Impact of Diet-Scenarios

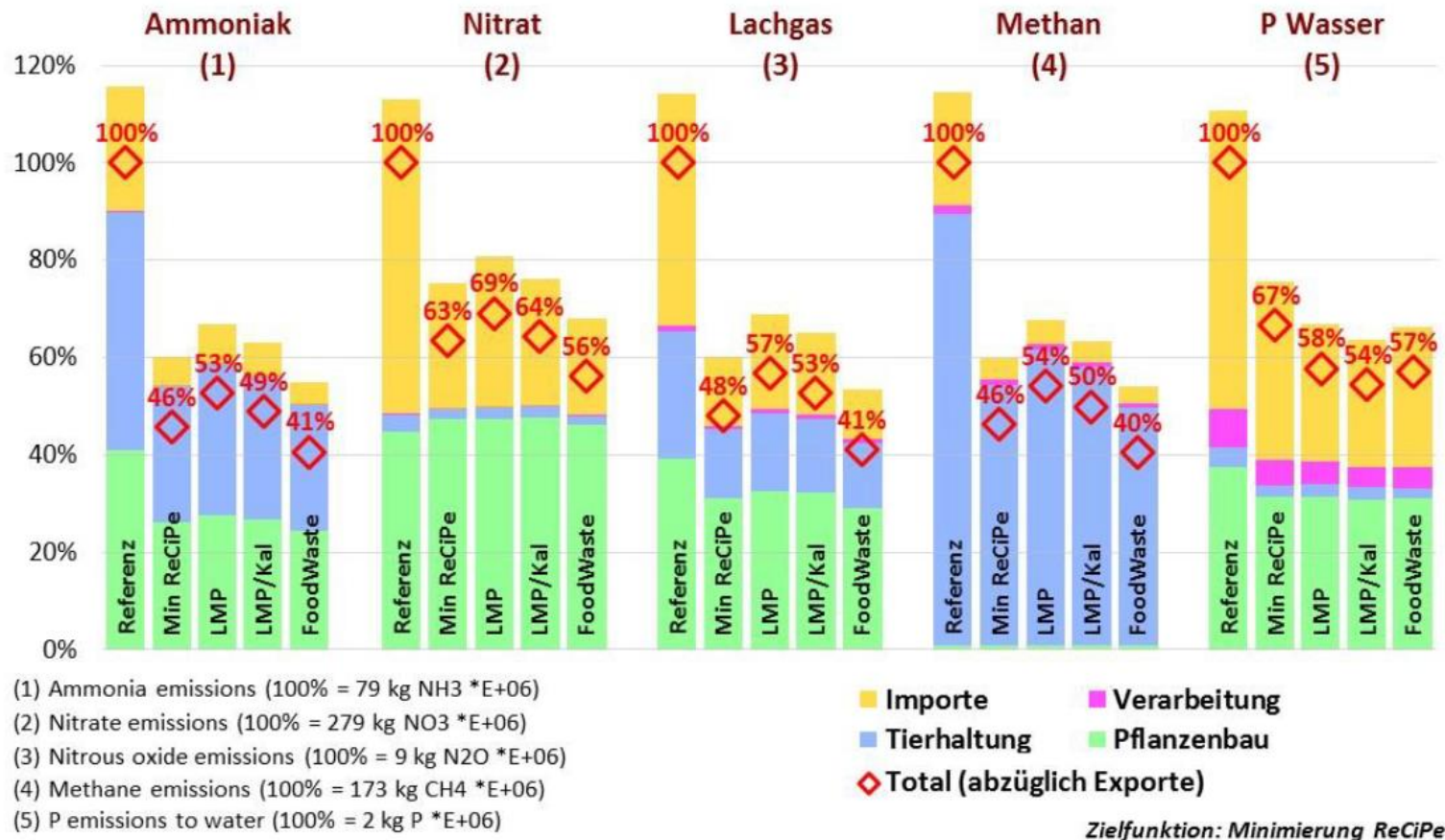


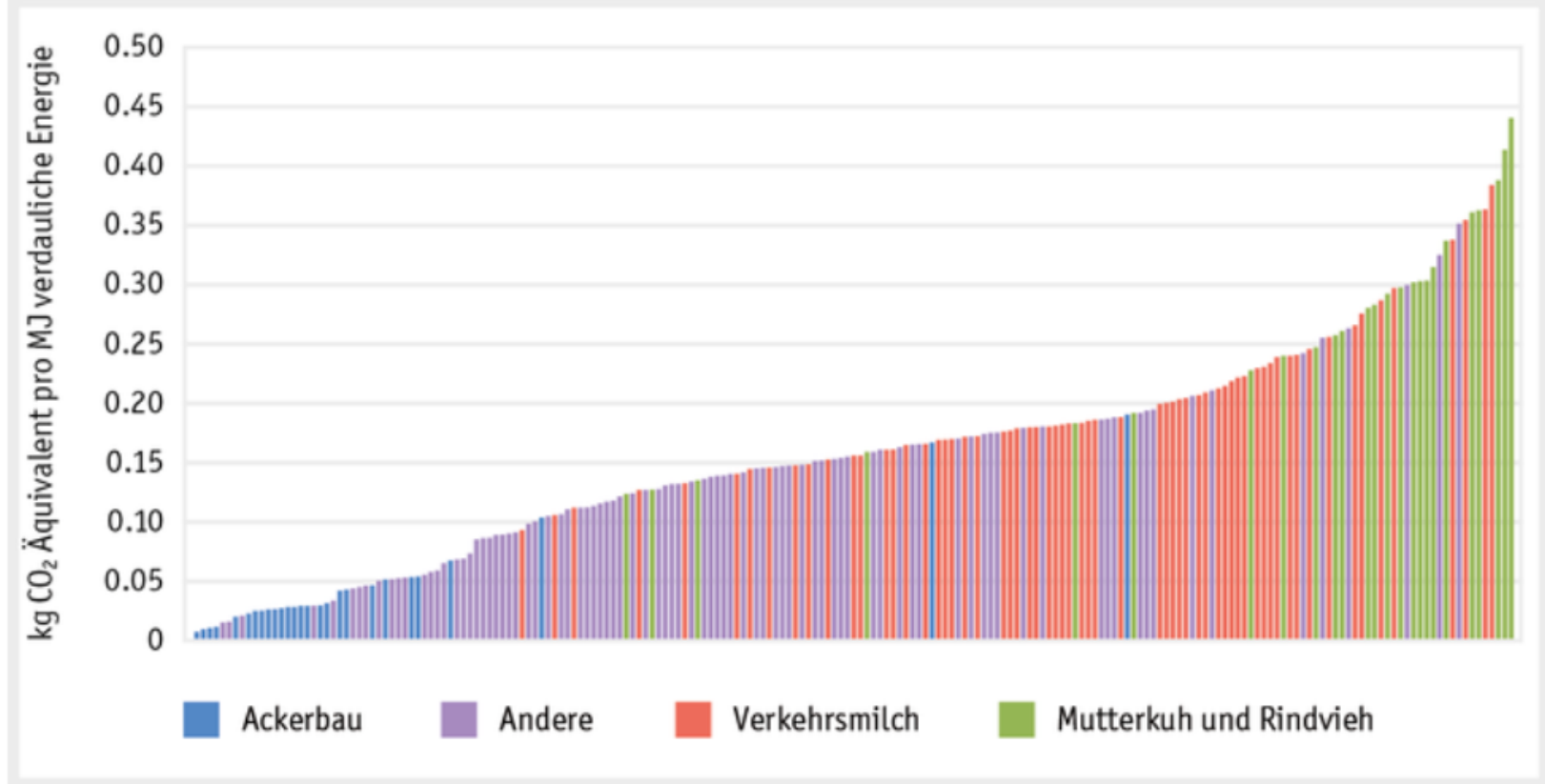
Abbildung 9: Emissionen Ammoniak, Nitrat, Lachgas, Methan, Phosphor (Referenz=100%)

- **Referenz** Aktuelle Situation
- **Min ReCiPe** Minimierung Umweltwirkung ReCiPe
- **LMP** → Rationszusammensetzung nach Lebensmittelpyramide
- **LMP/Kal** → Rationszusammensetzung und Energieaufnahme nach Lebensmittelpyramide
- **FoodWaste** → Vollständige Reduktion der vermeidbaren Nahrungsmittelabfälle beim Konsum

Source: Zimmermann et al. 2017

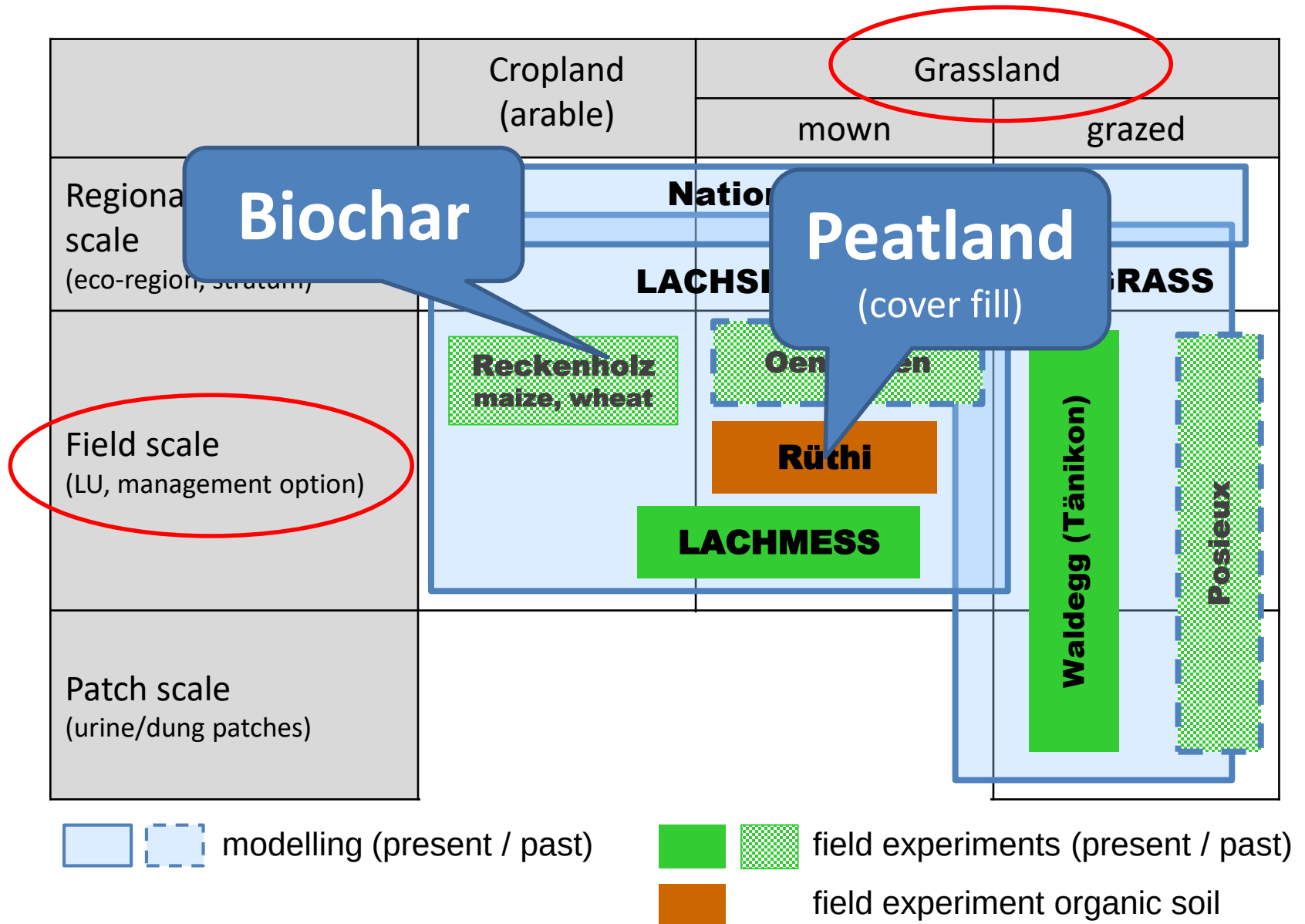
Farm GHG Balance

Treibhausgasintensität der AUI-Betriebe (Mittelwert der Jahre 2009 – 2013)



Quelle: Agroscope

N₂O Measurement and Modelling Activities

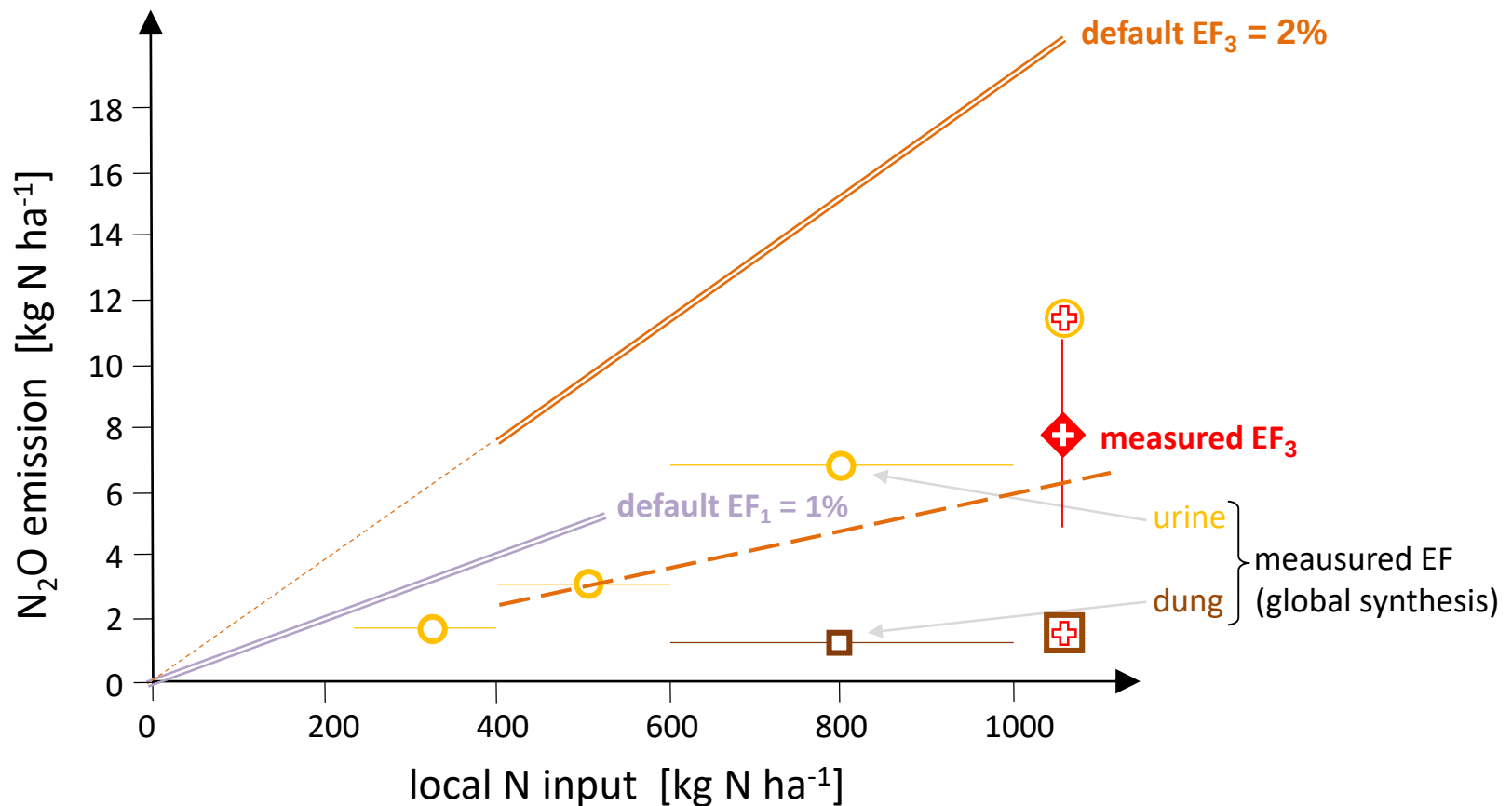


N₂O Measurement Methods

	Cropland (arable)	Grassland	
		mown	grazed
Regional/national scale (eco-region, stratum)			
Field scale (LU, management option)	 automated chambers  eddy covariance		
Patch scale (urine/dung patches)			 manual fast-box

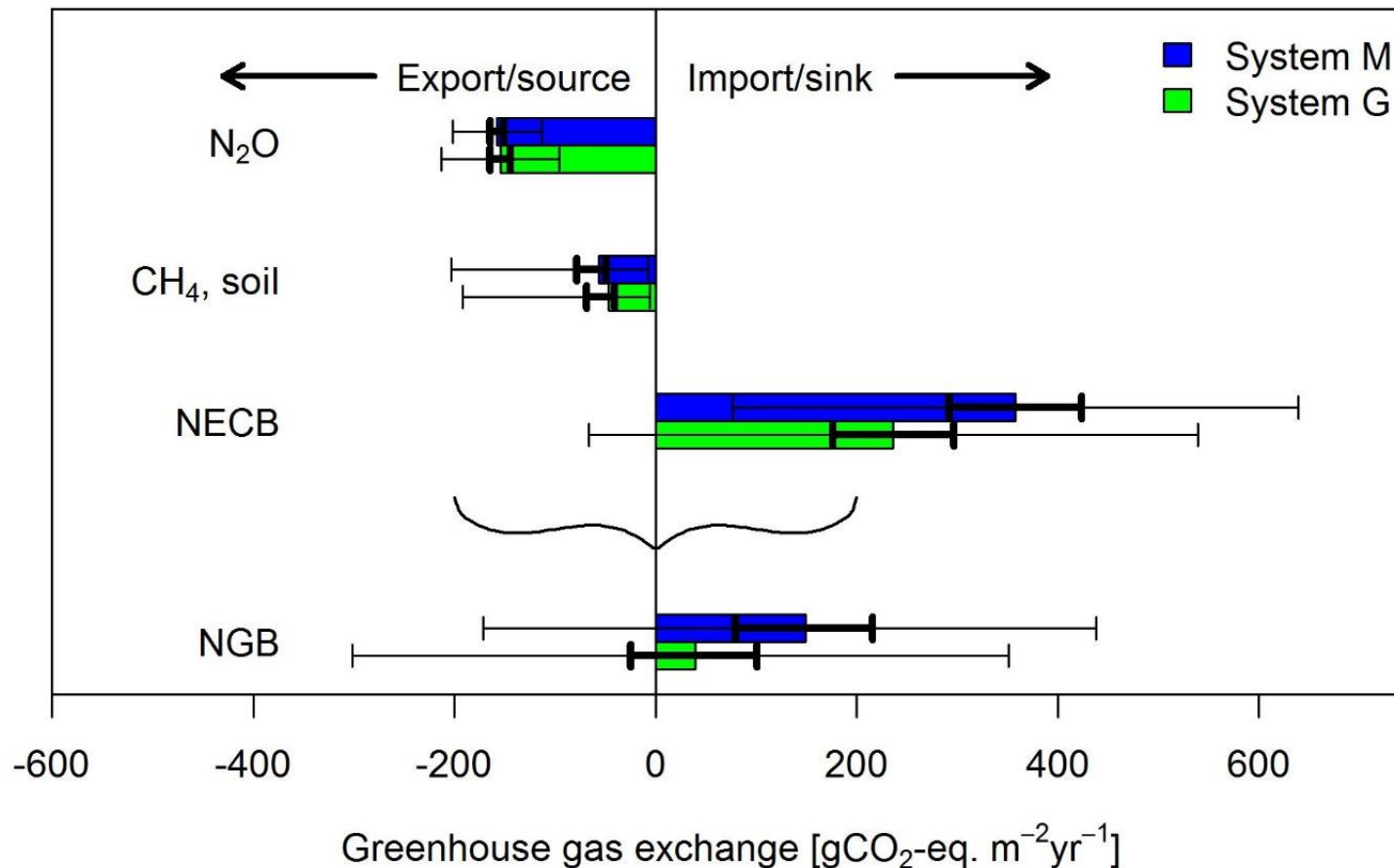
N₂O emission factors: models and observations

- Grazing related N₂O emission vs. local N input (excreta patch)
- IPCC default EF values & measurements

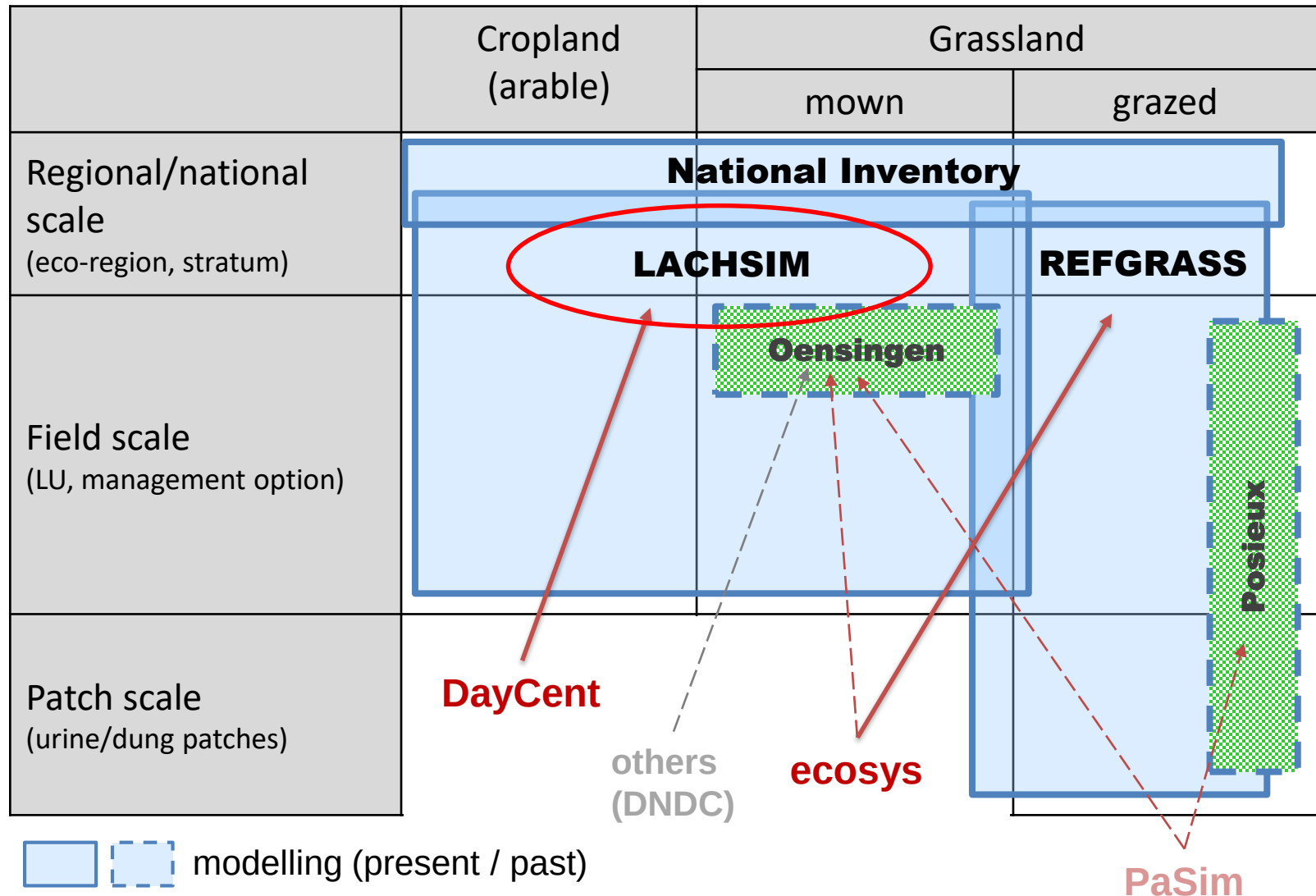


Net greenhouse gas budget (NGB)

- For the pasture ecosystem (excluding direct cow emissions)
- In terms of CO₂-equivalents, based on the relative global warming potential of CH₄ and N₂O



N₂O Modelling Activities



BLW 2011: Klimastrategie Landwirtschaft: Klimaschutz und Anpassung an den Klimawandel für eine nachhaltige Schweizer Land- und Ernährungswirtschaft. Bundesamt für Landwirtschaft (BLW). Bern, Schweiz.

Bretscher, D., Felder, D. 2015: Treibhausgasemissionen aus der Landwirtschaft. In: Agrarbericht 2015. Bundesamt für Landwirtschaft (BLW), Bern, Schweiz.

Bretscher D., Leuthold-Stärfl S., Felder D. und Fuhrer J. 2014: Treibhausgasemissionen aus der schweizerischen Land- und Ernährungswirtschaft. Agrarforschung Schweiz 5 (11+12), 458-465.

Felber, R., Bretscher, D., Münger, A., Neftel, A., Ammann, C. 2016: Determination of the carbon budget of a pasture: effect of system boundaries and flux uncertainties. Biogeosciences 13(10): 2959-69.

FOEN 2019: Switzerland's Greenhouse Gas Inventory 1990–2017: National Inventory Report, CRF-tables. Submission of April 2019 under the United Nations Framework Convention on Climate Change and under the Kyoto Protocol. Federal Office for the Environment, Bern.

Voglmeier, K., Six, J., Jocher, M., Ammann, C. 2019: Grazing-related nitrous oxide emissions: from patch scale to field scale. Biogeosciences 16(8):1685-703.

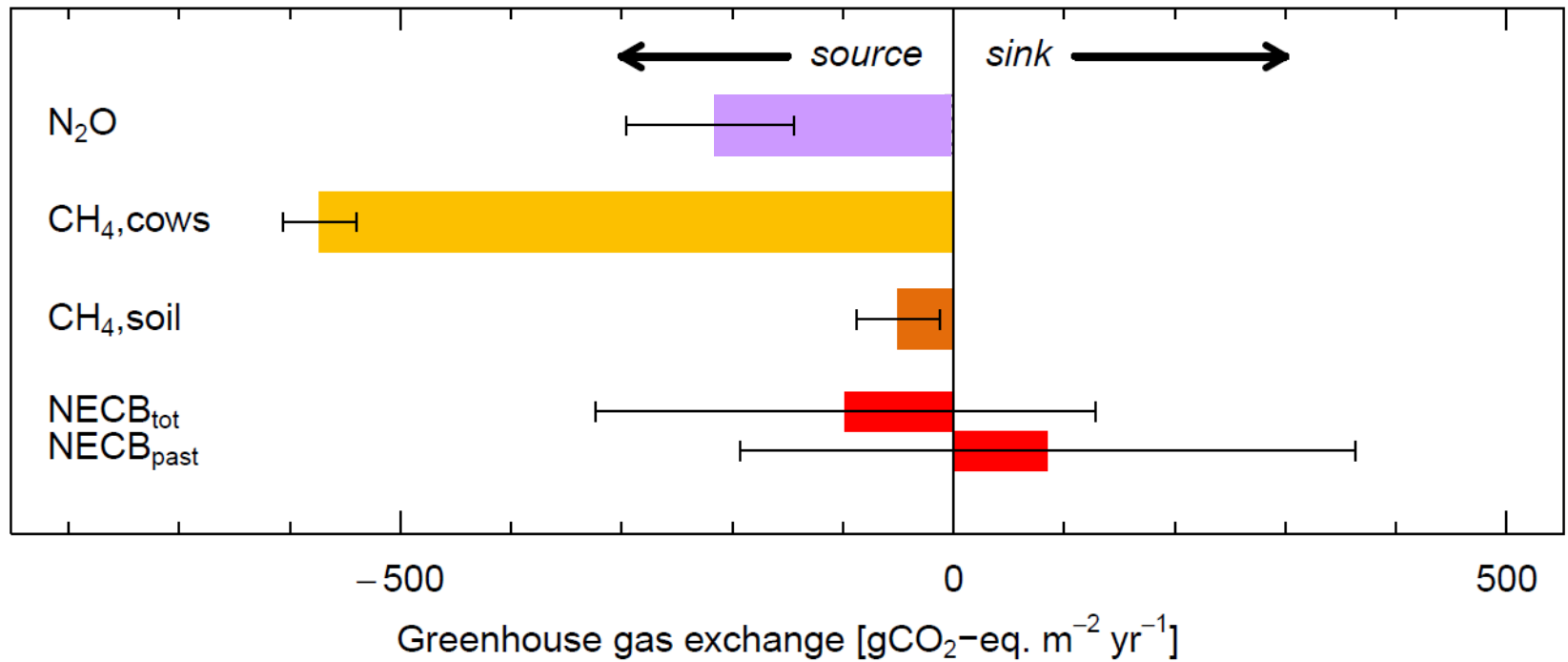
Wüst-Galley, C., Keel, S. G., Leifeld, J. 2019: A model-based carbon inventory for national greenhouse gas reporting of mineral agricultural soils. Agroscope. Zürich, Switzerland

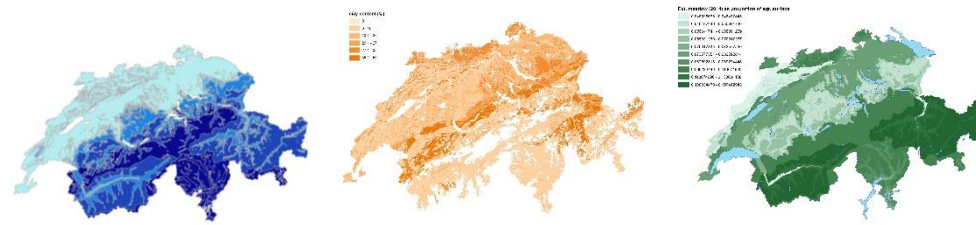
Zimmermann, A., Nemecek, T., Waldvogel, T. 2017: Umwelt- und ressourcenschonende Ernährung: Detaillierte Analyse für die Schweiz. Agroscope, Umwelt Nr. 55. Ettenhausen, Schweiz.

Thank you for your attention

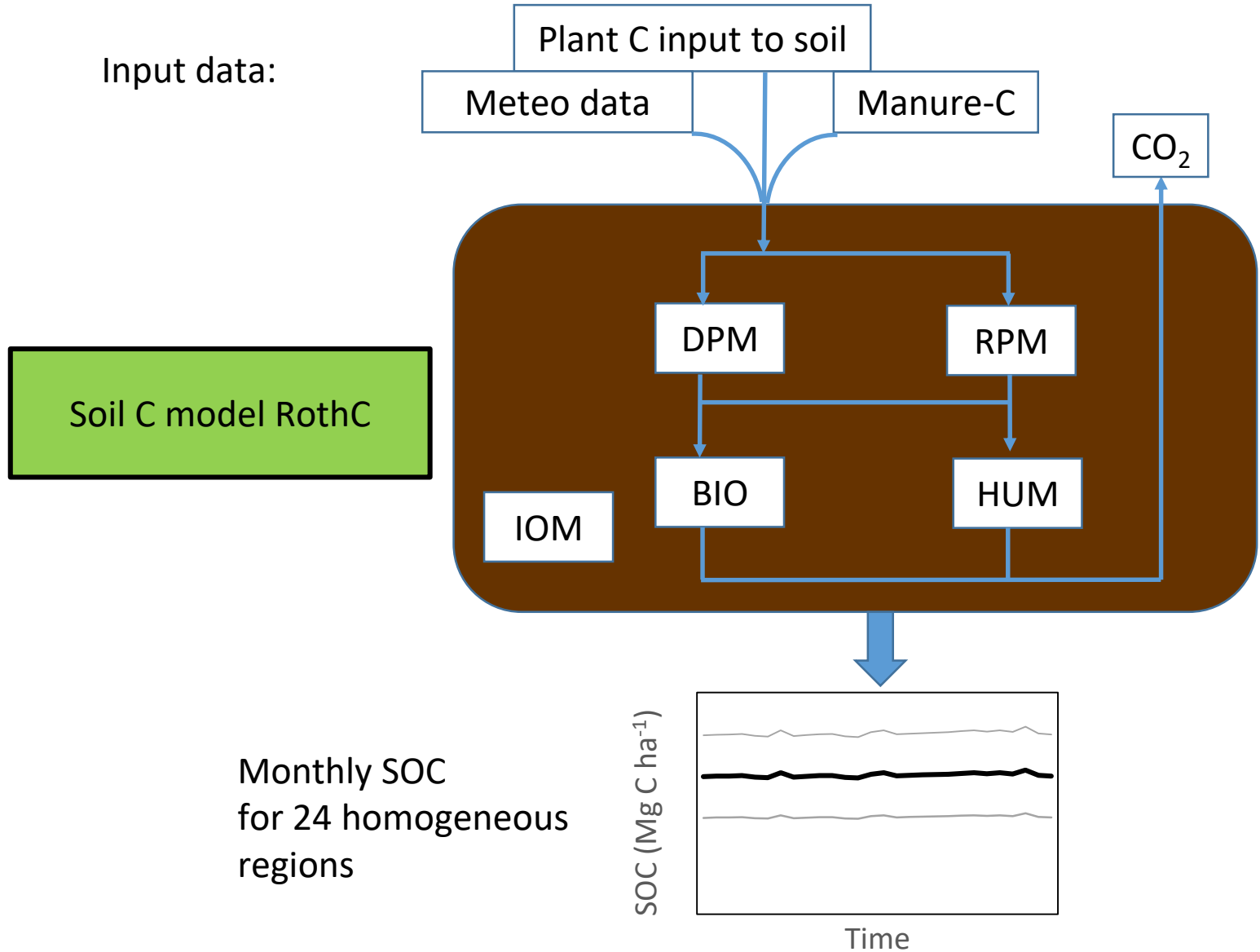
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Annual GHG budget of pasture (2013)

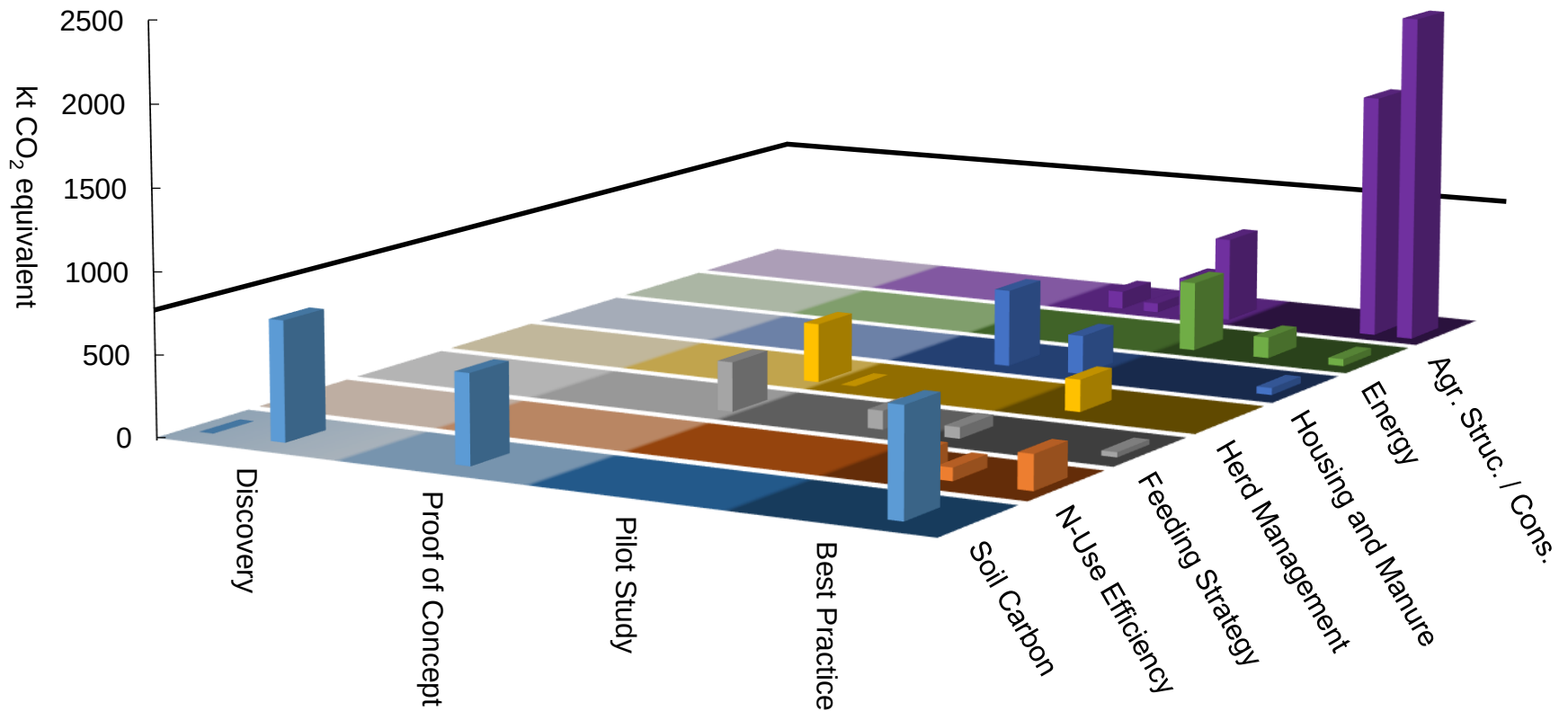




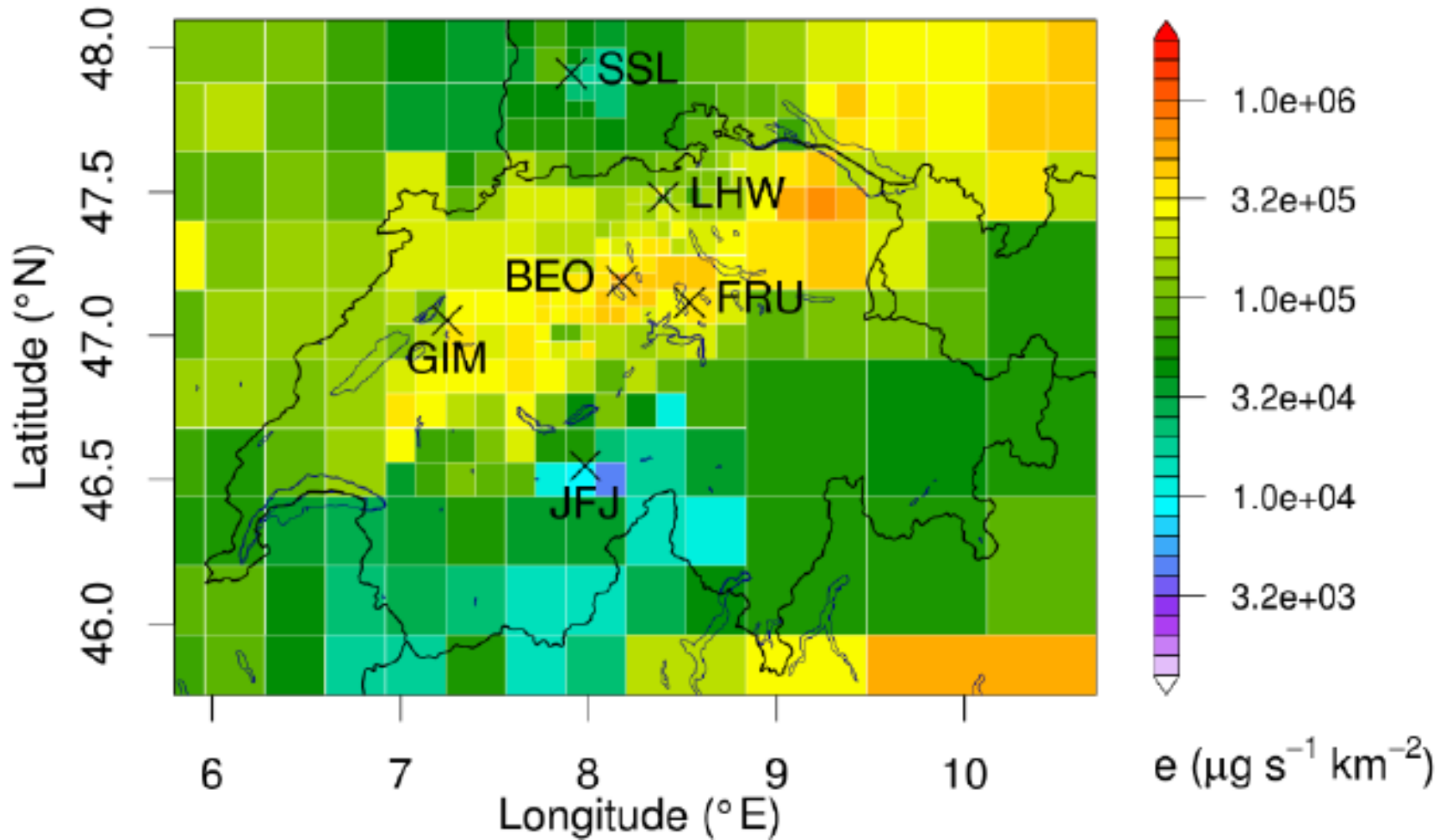
Input data:



GHG Reduction Potentials of Mitigation Measures



Verifizierung der CH₄ Emissionen



Verifizierung der CH₄ Emissionen

Zusammenfassend ergaben diese Sensitivitätsläufe gesamtschweizerische Emissionen von **200** ± 20 Gg/yr. Dieser Wert liegt leicht höher als der des STHGI, wie es 2013 für das Jahr 2011 rapportiert wurde (178 ± 28 Gg/yr), stimmt aber sehr gut mit dem Wert von **206** ± 33 Gg/yr für das Jahr 2013 überein, der in der revidierten Version von 2015 genannt wird (FOEN, 2015a).

H₄ m⁻² d⁻¹]

-1

x < 0

(≤ 1

(≤ 5

(≤ 10

x ≤ 20

x ≤ 50

■ 50 < x ≤ 100

■ x > 100



Die im MAIOLICA-Inventar vorgegebene **räumliche Verteilung** mit hohen Emissionen in den landwirtschaftlich dominierten Regionen und eher geringen Emissionen in den Ballungsräumen konnte ebenfalls **weitgehend bestätigt werden.**

ia & map source:
DEN
IO GEOSTAT
risstopo

Biochar

(Carbon Sequestration / N₂O)

Emissionsversuchsstall

Posieux Greenfeed

ETHZ Respiration Chambers

ETHZ Nina Buchmann

ETHZ Johan Six

FiBL

Opportunities, future actions and funding

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Here, list the opportunities and future actions already identified for your country (soil carbon sequestration, GHG inventories, ...) at different scale (field, farm, region, national, international ...)

Here, list the possible funding from your country for projects or initiatives in this field