

# Global Carbon Fluxes Induced by Agriculture-Related Land-Use and Land Cover Change Activities

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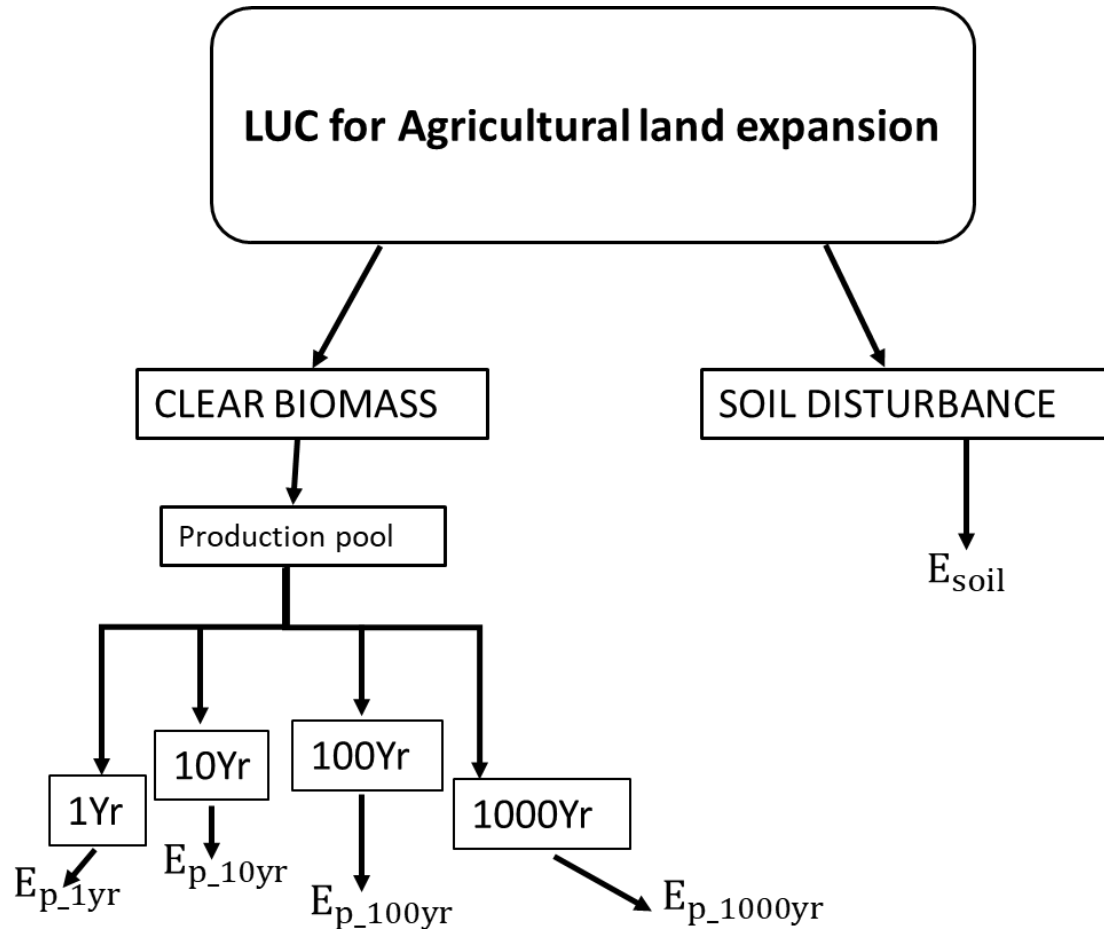
# Overall Objective

## Objective:

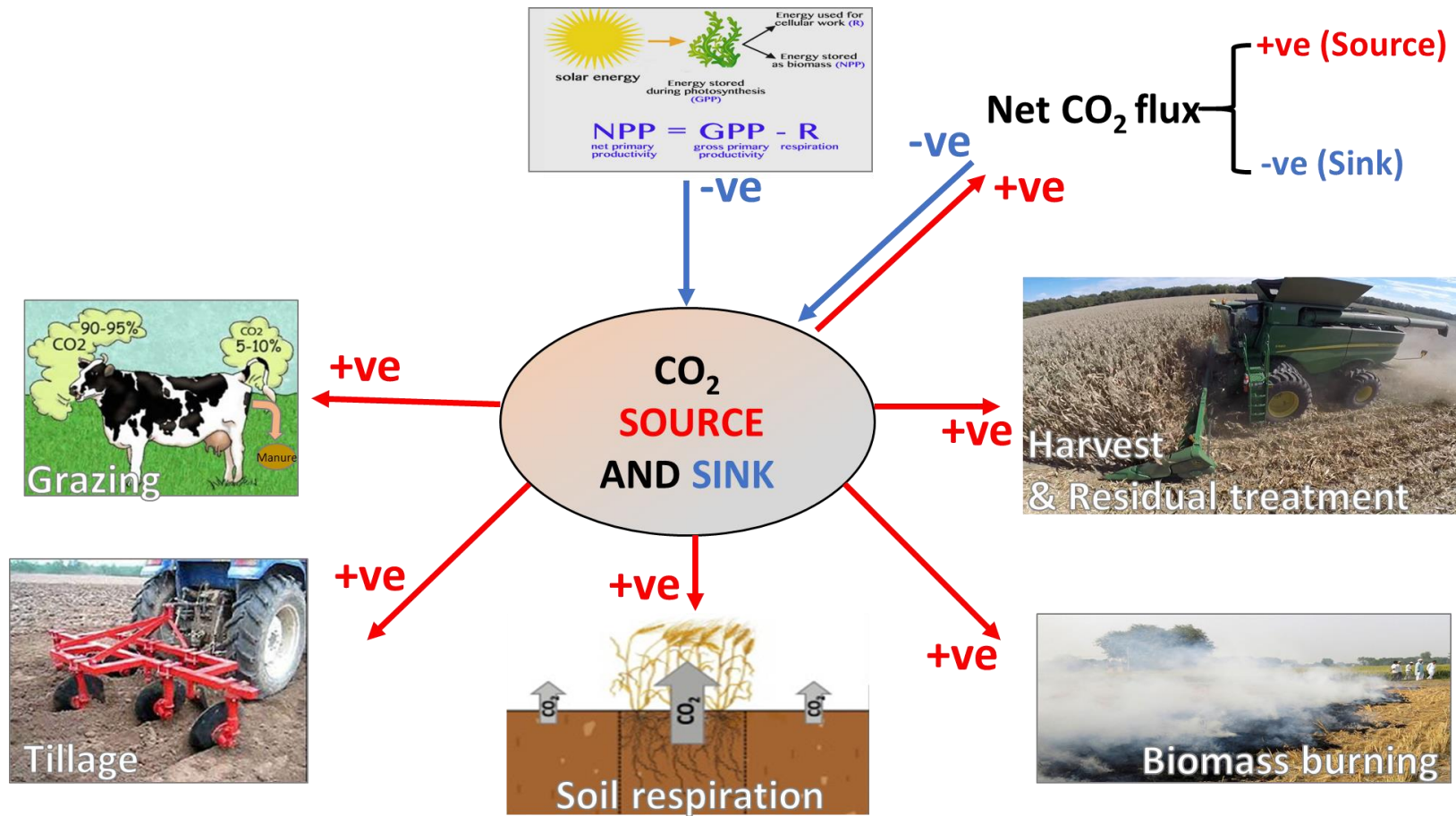
- Estimate the net carbon fluxes from agriculture-related land-use and land use change (LULUC) activities using a land surface model, ISAM
  - LU: farmland for food and feed production, including management (Referred here  $E_{\text{farm}}$ )
  - LUC: deforestation for and reforestation of agricultural land, and conversion of grasslands and pastureland to agriculture land or vice versa (Referred here  $E_{\text{luc}}$ )

# Framework: $E_{luc}$

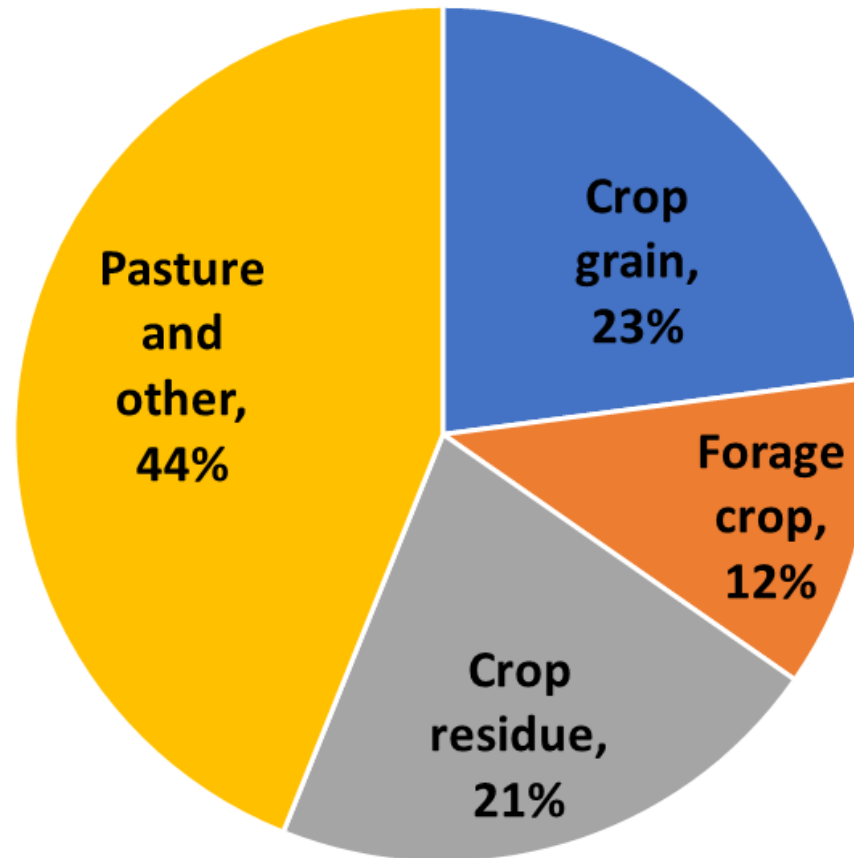
$$E_{luc} = E_{p\_1yr} + E_{p\_10yr} + E_{p\_100yr} + E_{p\_1000yr} + E_{soil}$$



# Framework: $E_{farm}$

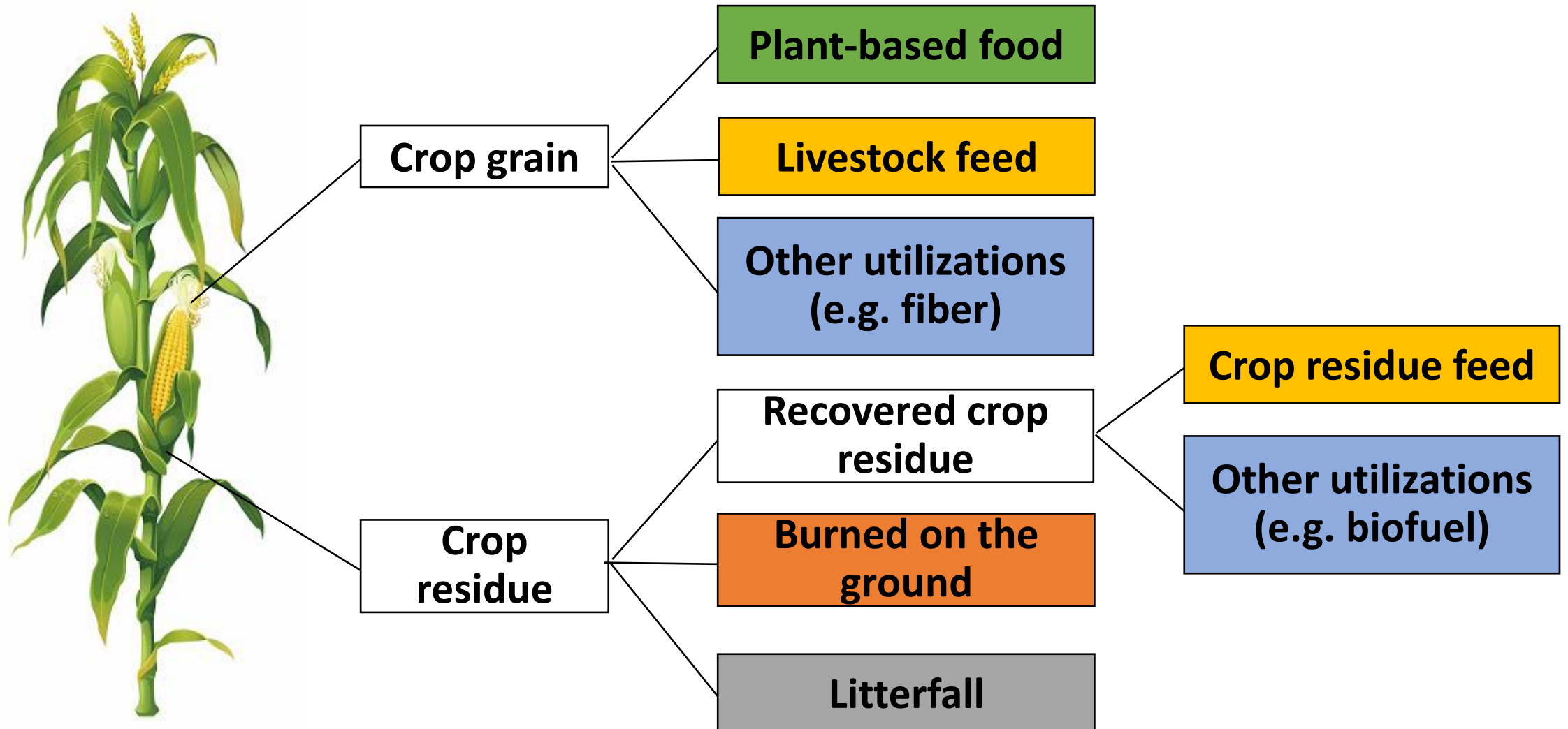


# Livestock Feed Demand

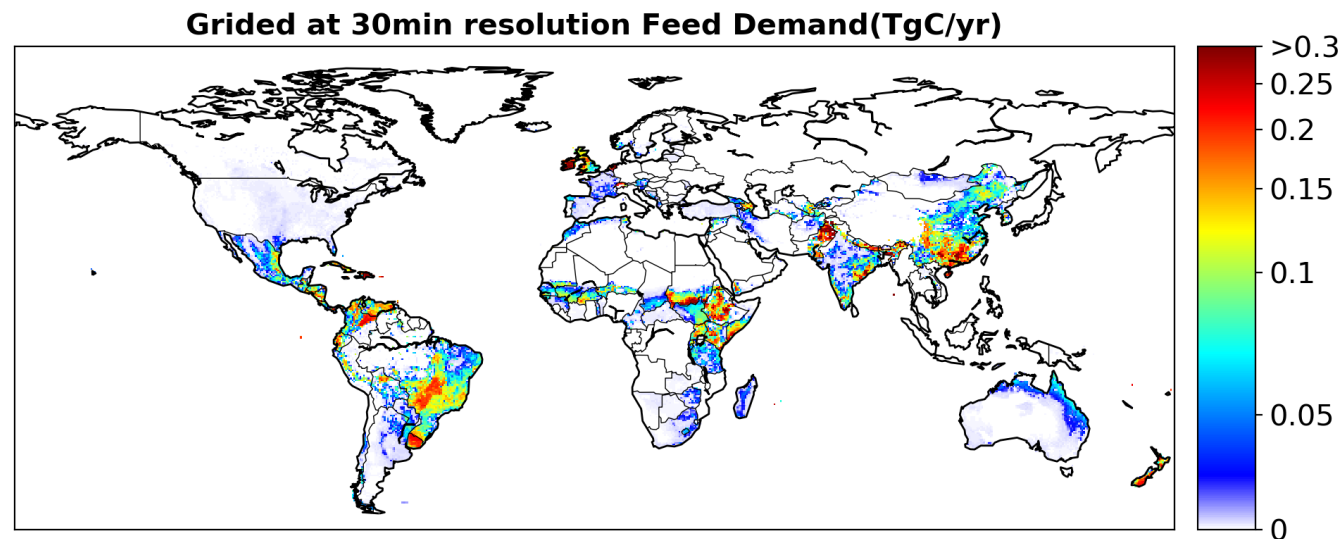
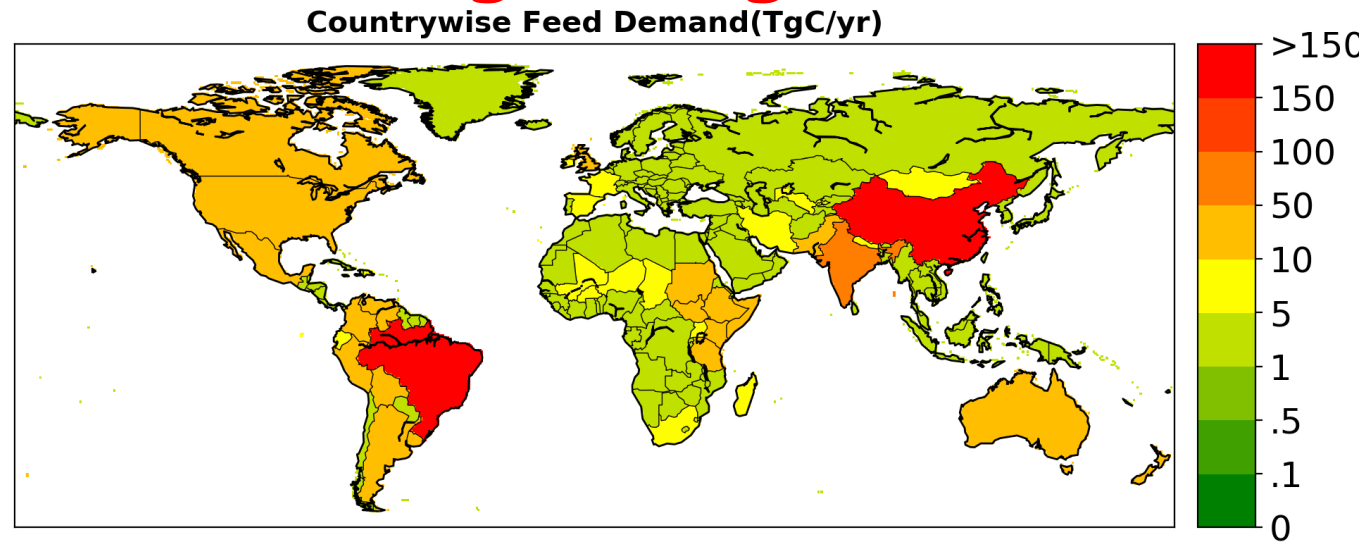


**Total livestock feed demand  
2,450 Tg C/yr**

# Implementation of land management practices into ISAM model: cropland

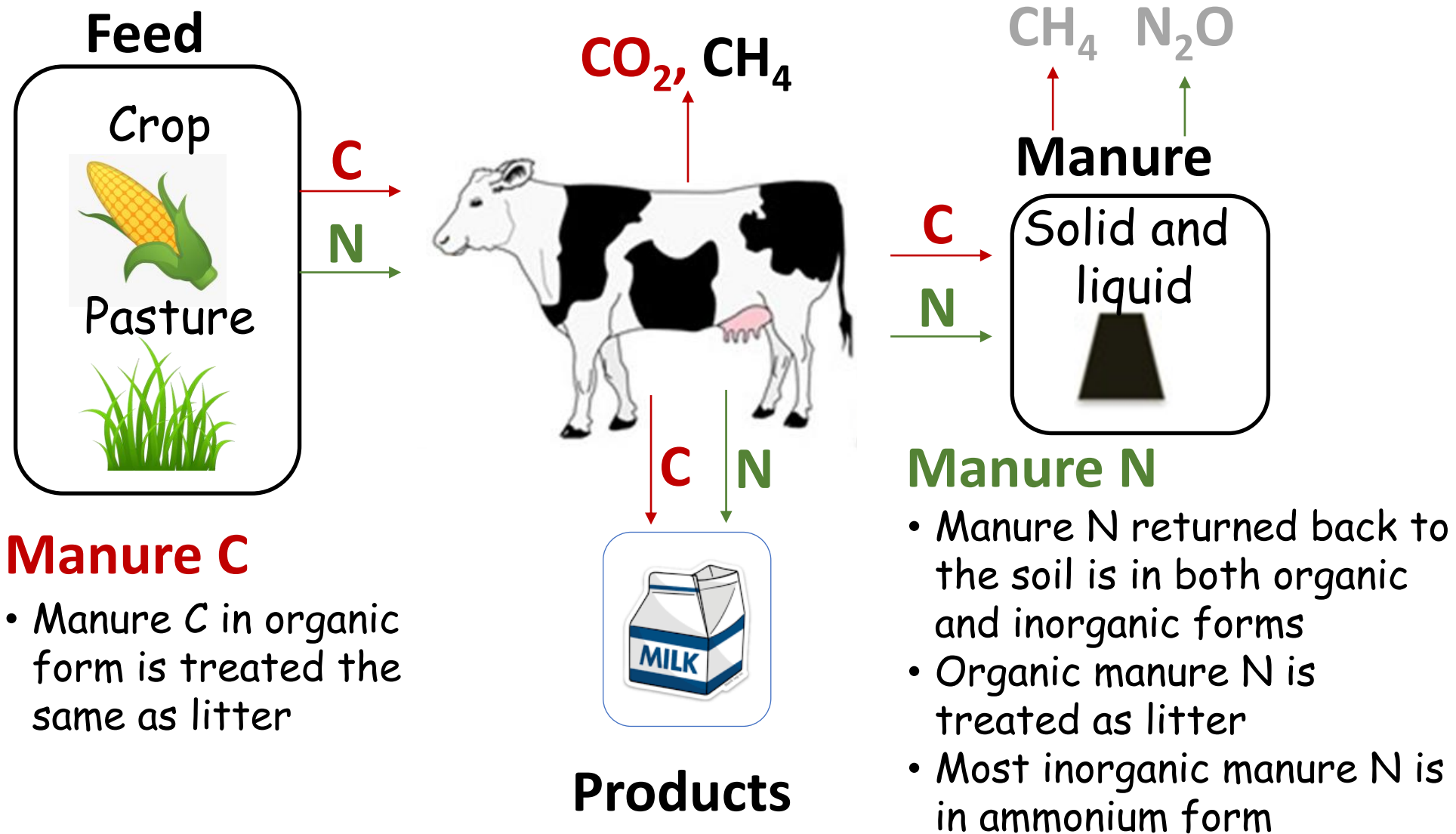


# Implementation of land management practices into ISAM model: grazing land



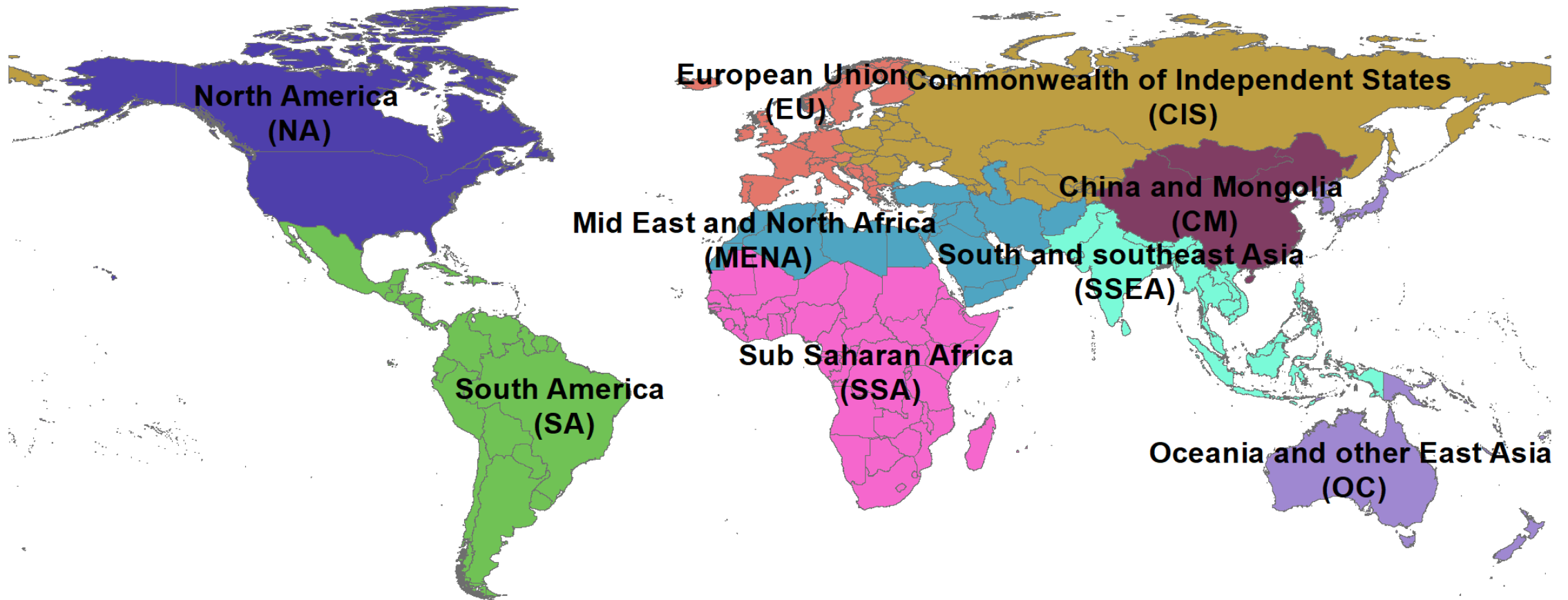
Pasture feed demand:  
1,076 Tg C/yr

# Feed and Manure C and N



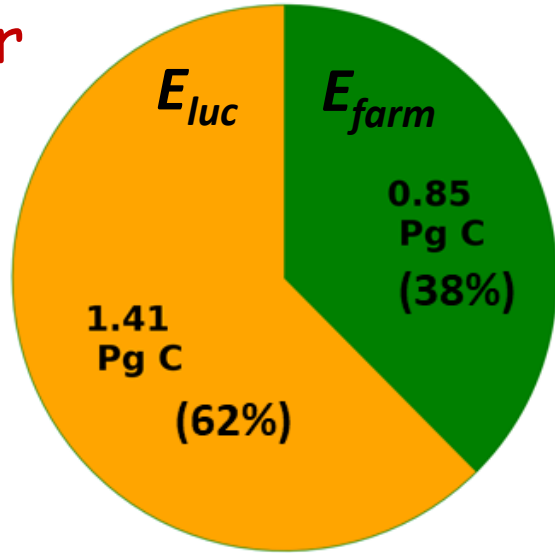


Results are presented for 9 macro-geographical regions

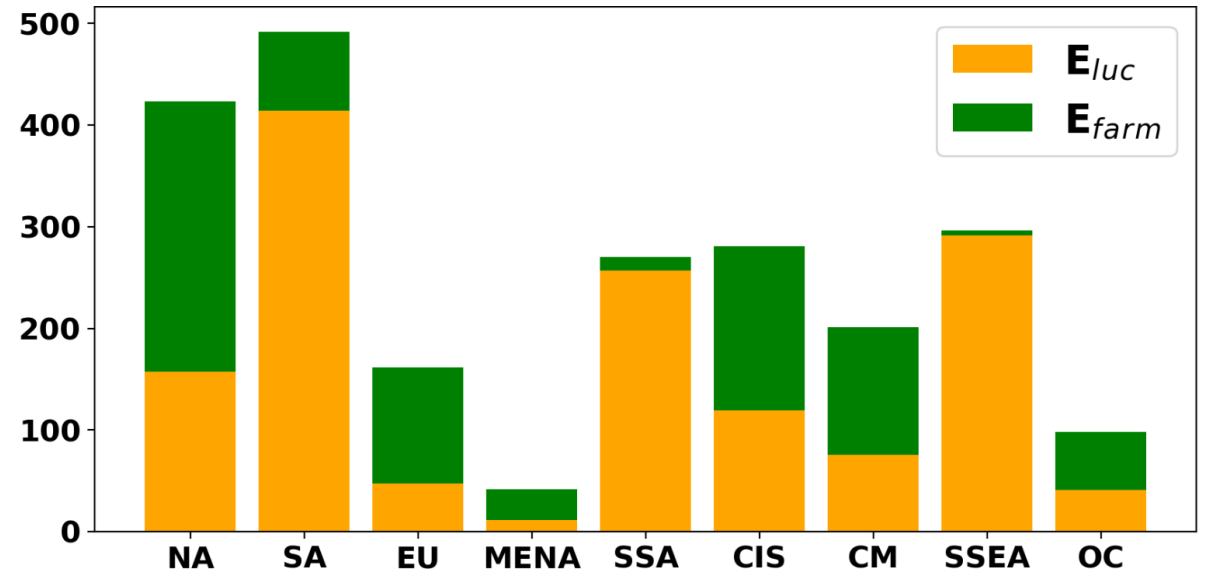
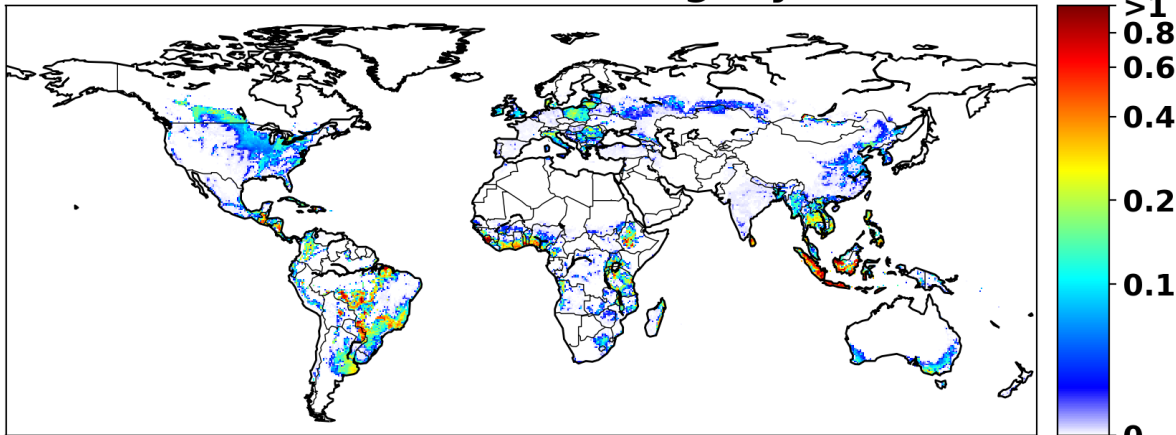


# $E_{luc}$ and $E_{farm}$ fluxes in 2010

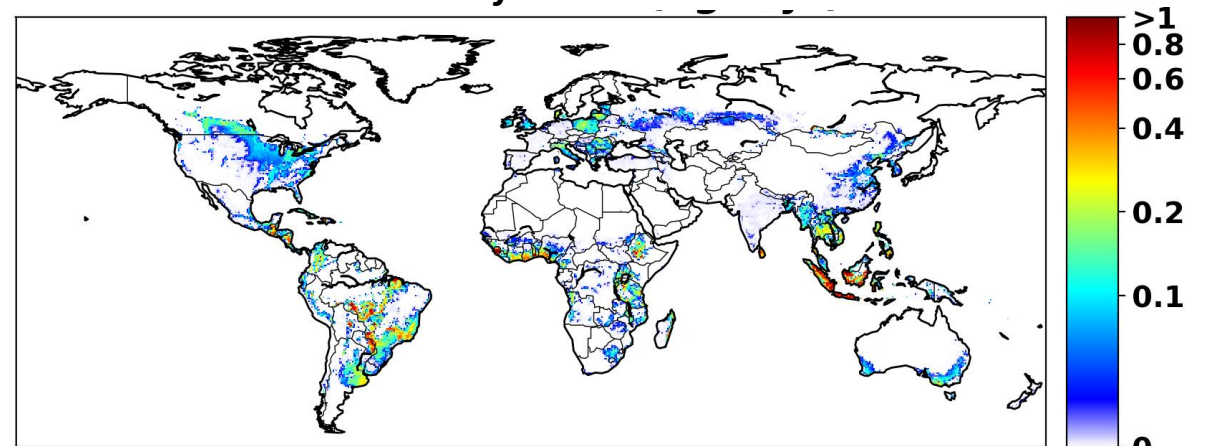
Total Agriculture net carbon flux:  
2.26 Pg C/yr



$E_{luc}$  (Tg C/yr)



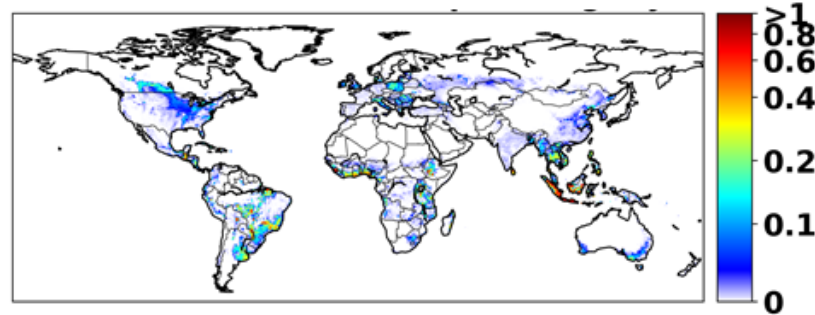
$E_{farm}$  (Tg C/yr)



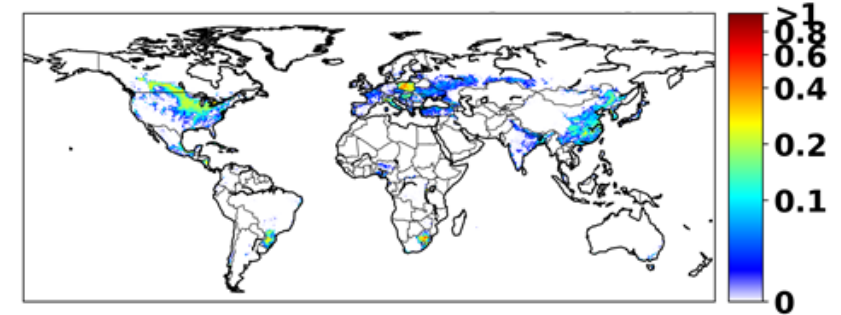
# $E_{luc}$ and $E_{lu}$ on cropland and grazing land

Cropland

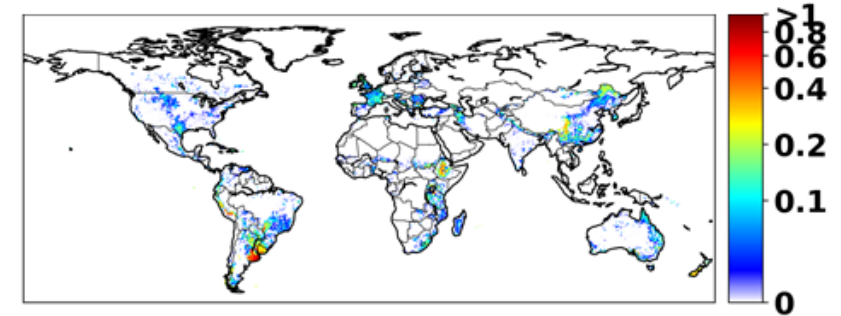
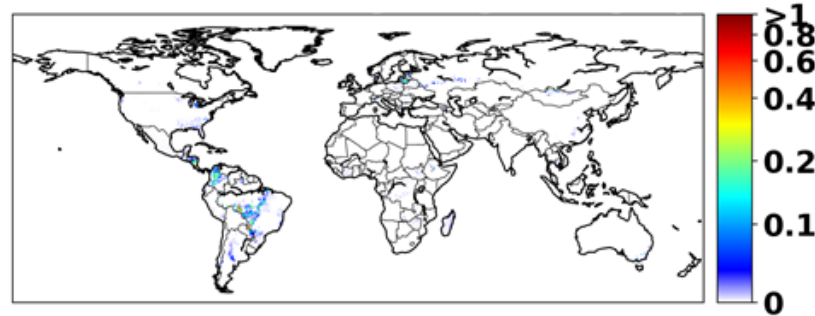
$E_{luc}$  (Tg C/yr)



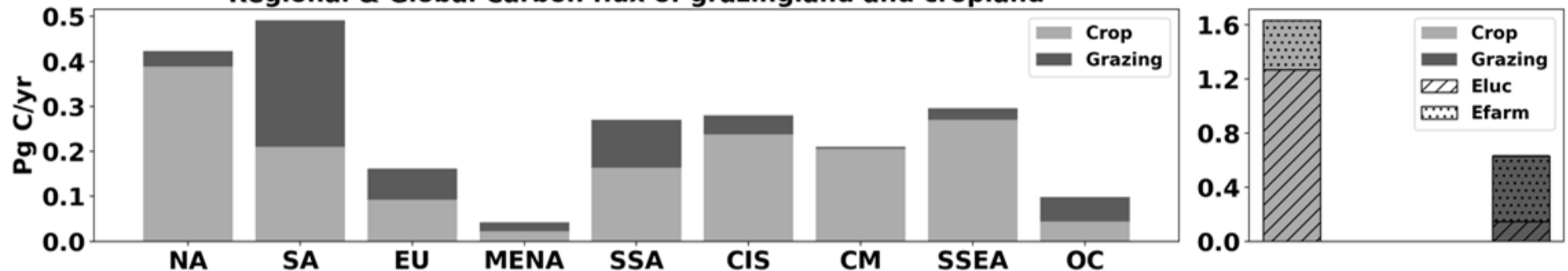
$E_{farm}$  (Tg C/yr)

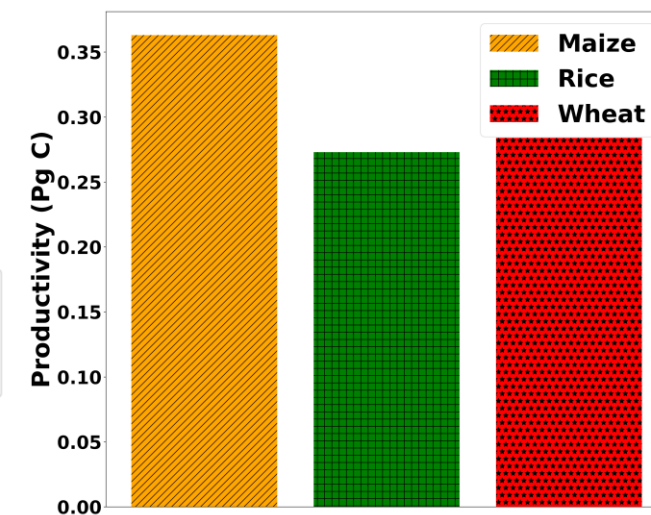
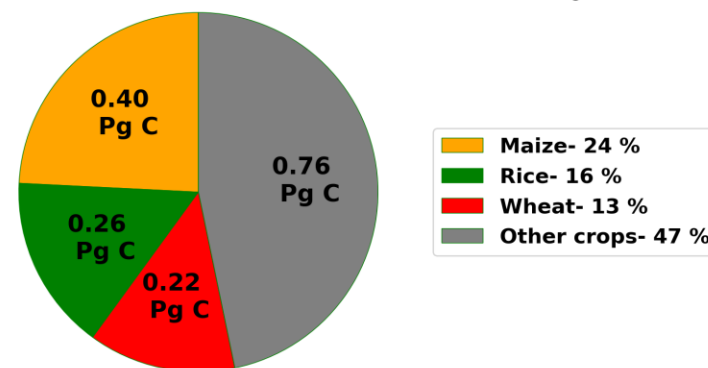
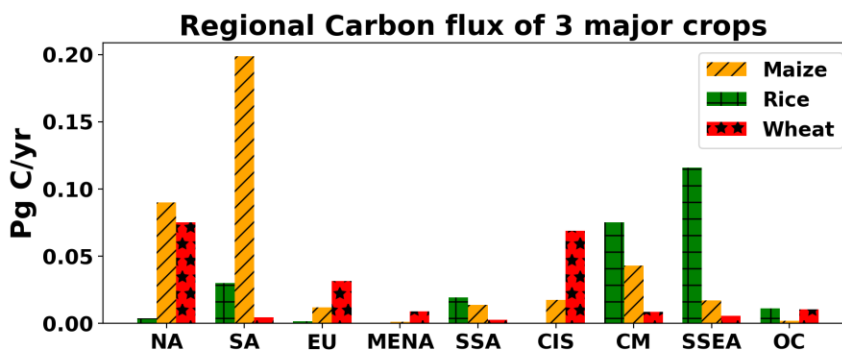
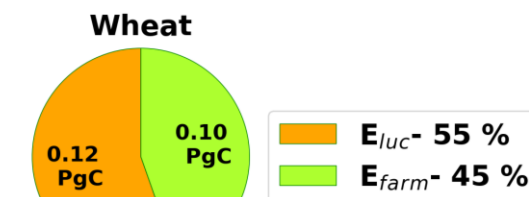
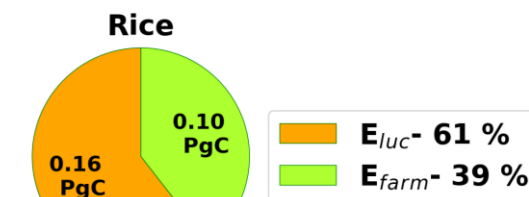
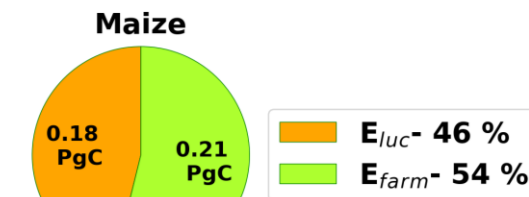
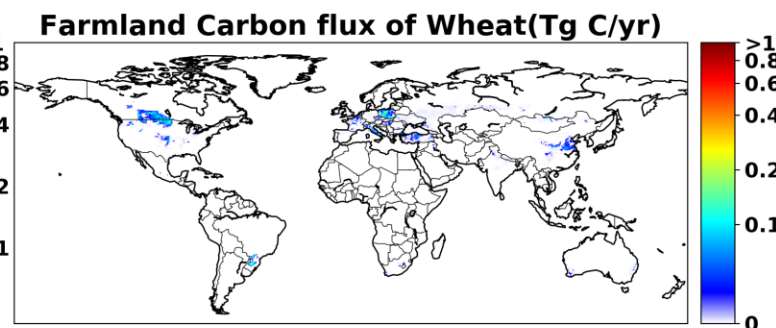
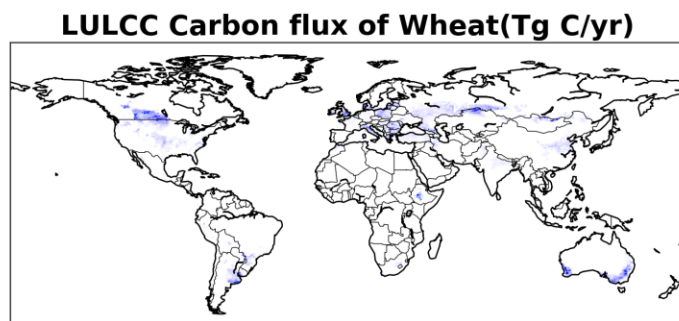
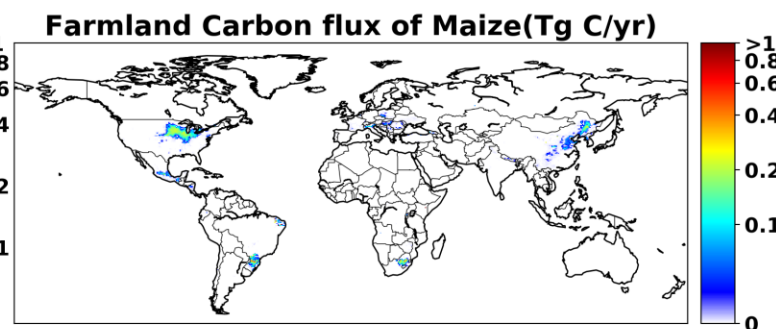
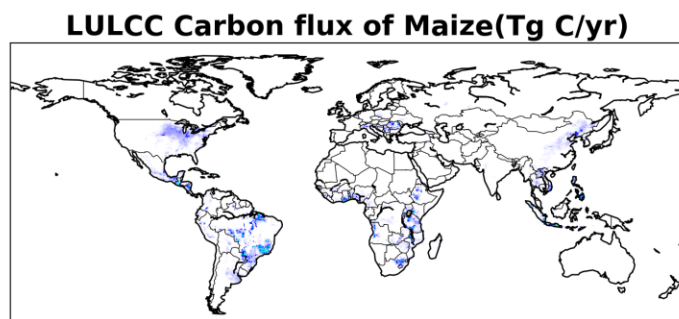
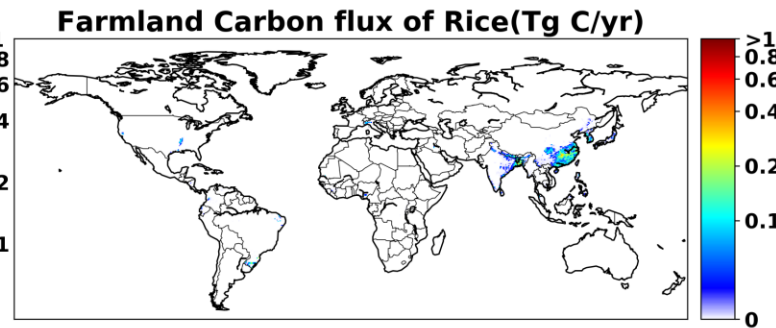
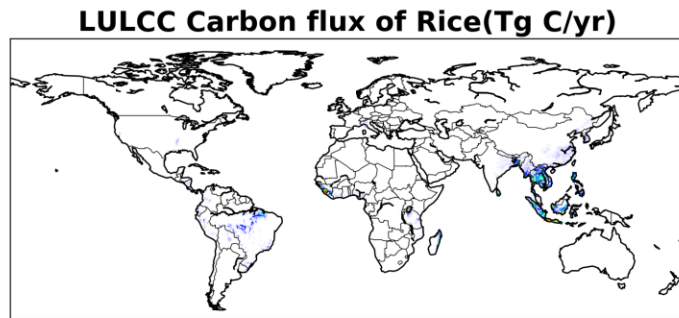


Grazing land

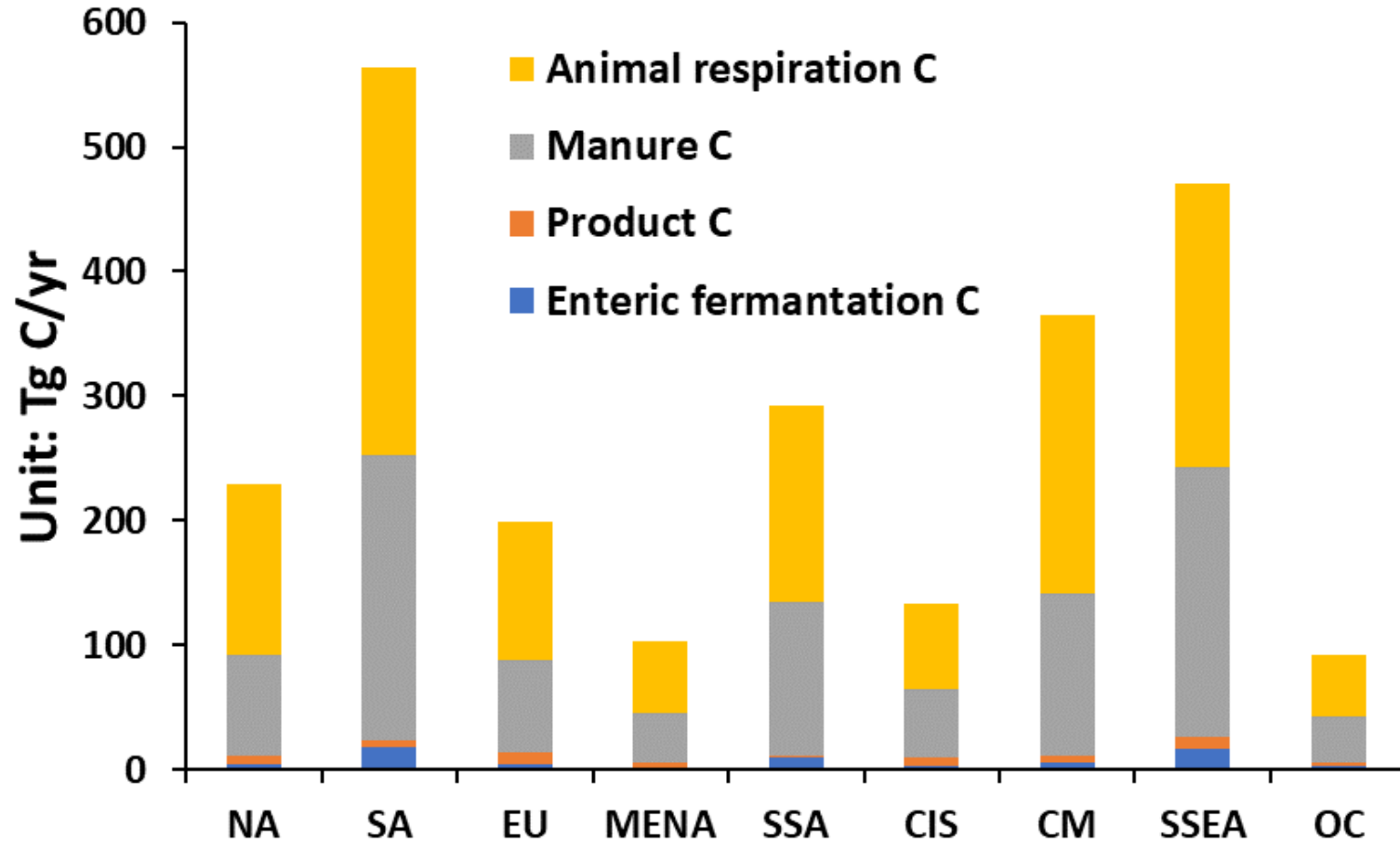


Regional & Global Carbon flux of grazingland and cropland





# Carbon flux in feed-manure cycle





# Summary

- Agricultural land is a net carbon source with the flux 2.26 Pg C/yr in 2010
- Emissions from farmland management activities contribute to 38% and land use change contribute 62% to total emissions
- South America and North America are the largest emitting regions
- Cropland and grazing land contribute 72% and 28% to total emission
- Maize, Rice and Wheat are the major contributing crops

# Acknowledgements

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