Land-Use Harmonization Datasets for Annual Global Carbon Budgets
Chini, Hurtt, Sahajpal, Frolking, Klein Goldewijk, Sitch, Ganzenmüller, Ma, Ott, Pongratz, Poulter (2021), ESSD (https://doi.org/10.5194/essd-2020-388)

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Science Questions
- What is the annual global carbon flux from land use activities?
- How can we incorporate the latest land-use data updates (including retrospective changes) while also maintaining consistency with climate simulations and across annual assessments?

Methods
- Land-Use Harmonization 2 (LUH2) developed as a required input to CMIP6 and IPCC (Hurtt et al. 2020) and extended for use in GCB simulations
- New cropland, grazing land, and wood harvest inputs from FAO and HYDE (Klein Goldewijk et al., 2017) harmonized with previous inputs
- NASA remote sensing data products constrain spatial patterns of wood harvesting and shifting cultivation, as well as for diagnostics.

Results
- LUH2-GCB2019 forcing updated from 1950 onwards
- Corrected anomalous data in Brazil between 1990 and 2010
- Max cropland correction of 77,000 km^2 in year 2009 within Brazil
- Max grazing land correction of 100,000 km^2 in year 2000 within Brazil
- New LU projections to 2019 using recent FAO/HYDE data

Significance
- LUH2 data updated annually for use in Global Carbon Budget (a large international synthesis study of the global carbon cycle).
- NASA remote sensing data has important role in constraining LU patterns
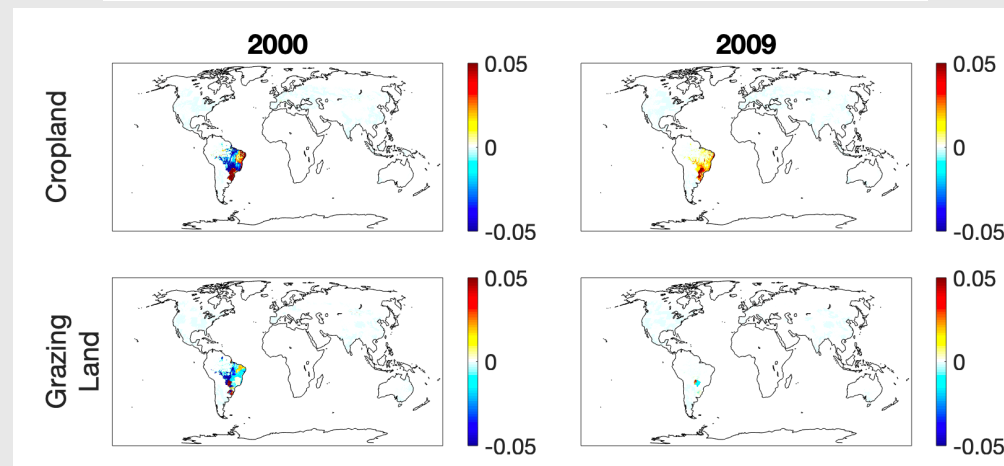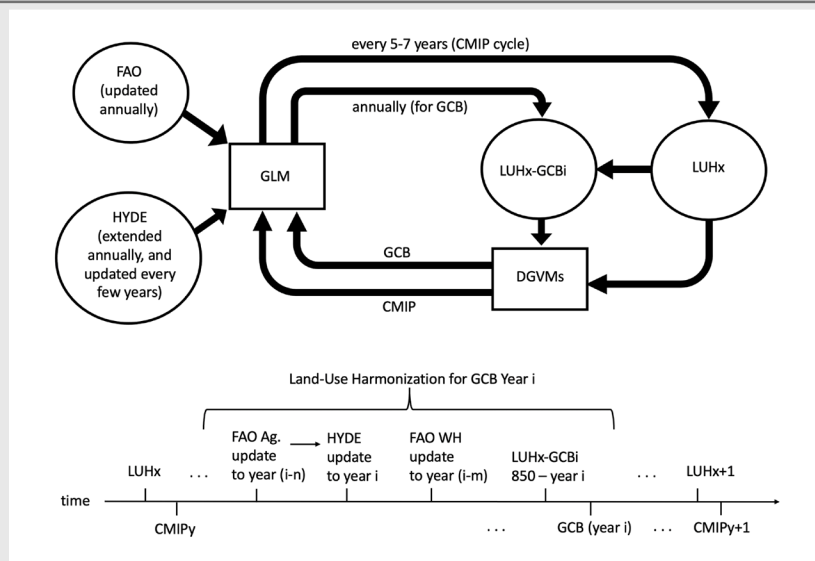
Top: schematic diagram of annual LUH-GCB workflow
Bottom: changes in spatial patterns of global land-use between LUH2-GCB2019 and LUH2 v2h