GLOBAL AGENDA OF ACTION
IN SUPPORT OF SUSTAINABLE LIVESTOCK SECTOR DEVELOPMENT

New findings on soil C sequestration potential of the world's grasslands

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OUTLINE

- Background
- Motivation / objectives
- Scope / general approach
- Updates on previous work
- Approach (detailed)
- Preliminary findings
- Next steps

Background

- This grassland work is a key component of larger FAO project – to estimate:
  - potential to mitigate global livestock GHG emissions, and
  - economic implications of achieving this potential
- Scope of overall project:
  - <u>GHG emissions</u>
    - CH_4 (enteric fermentation & manure); N_2O (manure & feed);
    - CO_2 removals (↑soil C storage in grasslands)
  - <u>Livestock species</u>
    - Ruminants: cattle, buffalo, small ruminants
    - Monogastrics: pigs, poultry _

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Motivation / objective

- Global estimates of soil C sequestration potential too big to ignore!
  - IPCC (2007) estimate > 80% (1.5 GtCO2eq) of sector's total mitigation potential is through soil C sequestration on grasslands
  - Lal (2004) estimates 0.4 - 1.1 GtCO2eq per yr

- Objective of grassland component of study:
  - Estimate global potential to enhance storage of soil C stocks, using Century model (studies to-date have mainly used very generalized meta-analyses)
  - Estimate spatial/temporal distribution of this potential and the

Scope & general approach

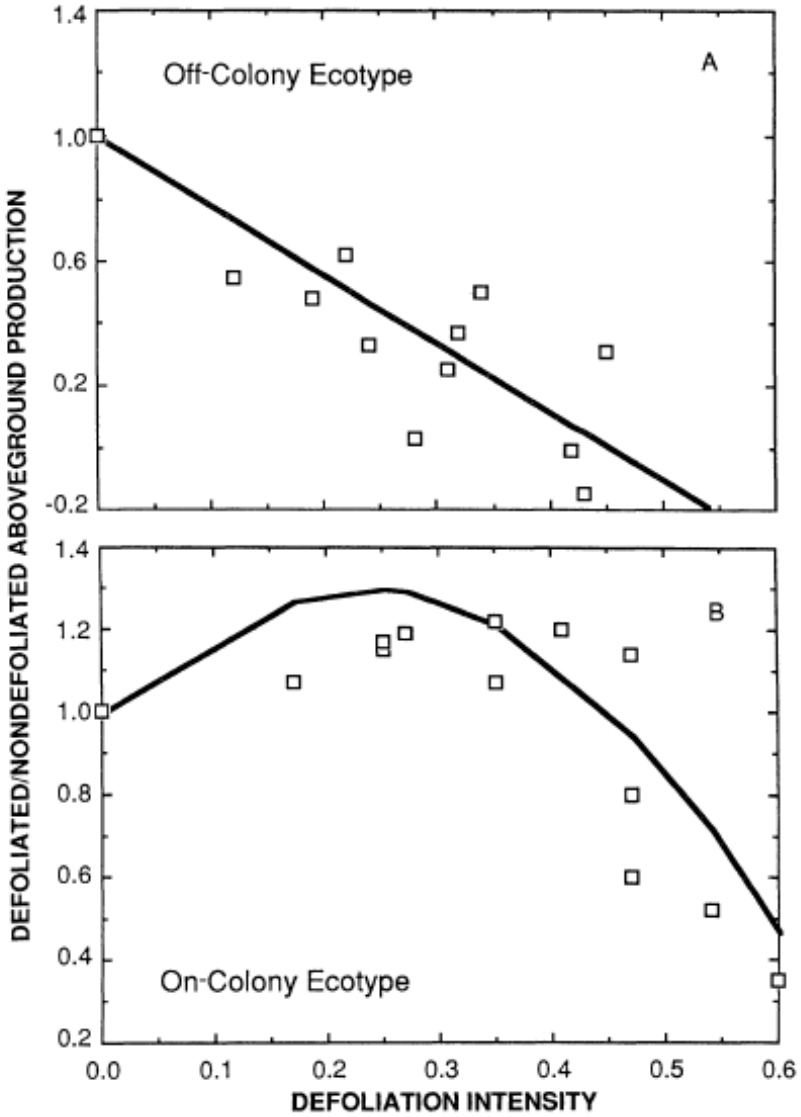
- Study being presented covers the **rangeland** portion of grasslands:
  - According to FAOSTAT, grasslands cover 3.4 billion ha
  - Rangeland component, based on Potsdam biome database, are estimated to comprise approx. 71% of total grassland area.
  - Results for higher productivity pasturelands, still to be processed

- General approach – ruminant forage offtake rates adjusted, to maximize NPP:
  - rates increased in under-utilized grasslands, and
  - rates reduced in over-utilized grasslands.

Update on previous work

- Preliminary results previously presented at Brasilia FA2 consultation (May 2012), have been updated in a number of ways:
  - More precise matching of animals, animal forage needs, and forage availability more realistic specification of forage offtake rate adjustments
    - spatial distribution of ruminant numbers and feed levels taken from GLEAM (FAO LCA model)
  - In addition to estimating max. sequestration potential, a response surface was built, using 10% incremental adjustments in offtake rate, from baseline to optimum.
    - allows comparison across areas at same level of adjustment in offtake rate
    - can capture non-linearities wr to the response of C stock

Background – production responses to grazing

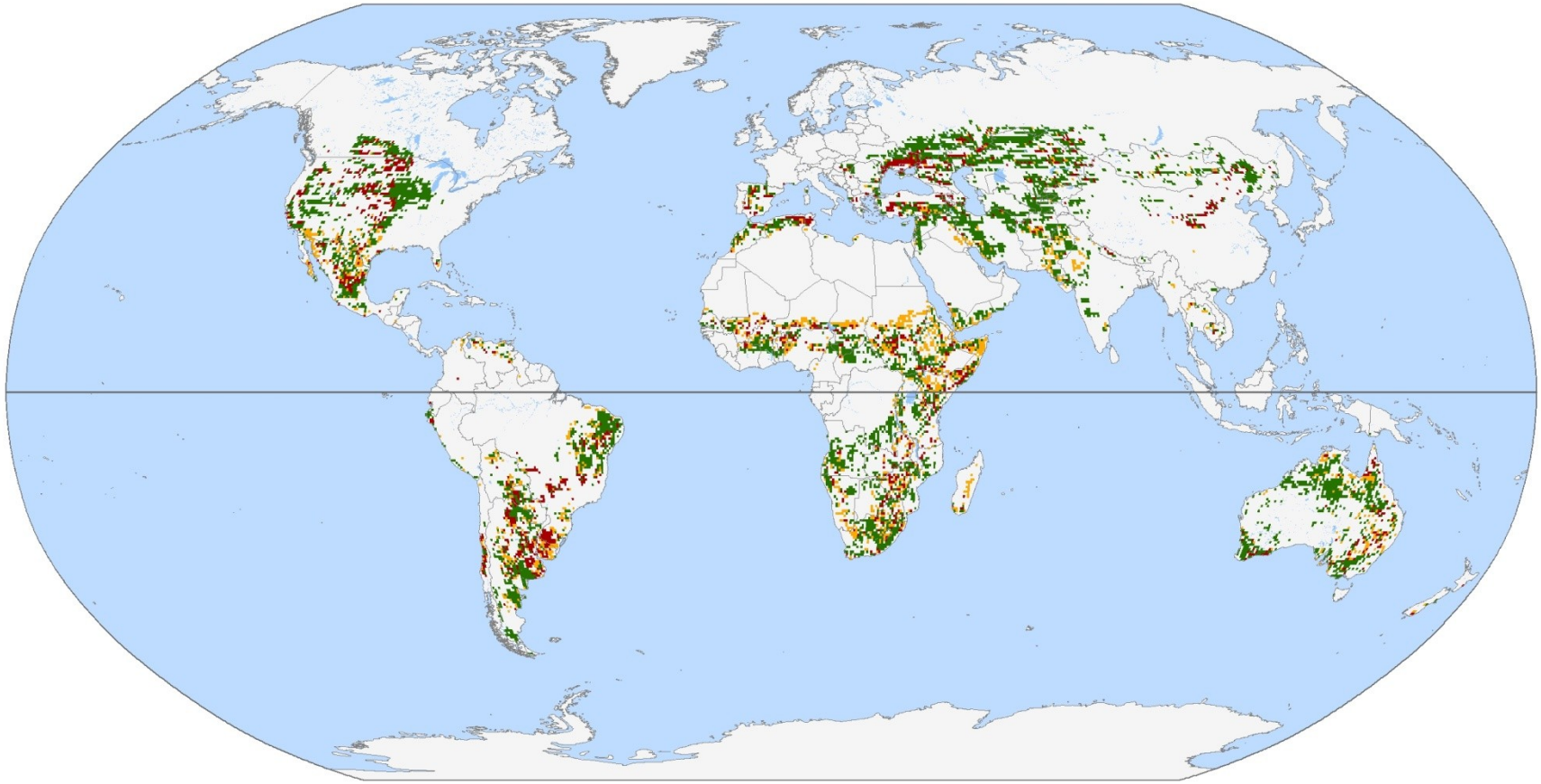


Results

- Maximum technical soil C sequestration potential for rangelands is estimated to be approx. 0.4 GtCO2eq

- Results suggest that of total rangeland area:
  - 37% under-utilized (baseline offtake % < optimal offtake %)
  - 47% over-utilized (baseline offtake % > optimal offtake %)
  - 16% optimally utilized (baseline offtake % = optimal offtake %)
- Optimal management increases absolute levels of forage offtake in most areas:

Changes in grass consumption (optimum -



optimum consumption = observed consumption
optimum consumption > observed consumption
optimum consumption < observed consumption

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Next steps – how findings will be used

- Immediate next steps:
  - Process results for higher productivity pasturelands – including pasture intensification
  - Use results from incremental analysis, combined with economic data on grazing management, to assess the economic potential of grassland C sequestration as large scale mitigation option
    - With grass consumption increasing in most areas, we expect this management option to be economically feasible in most areas
- How findings will be used:
  - To identify broad grassland regions with particularly high technical/economic potential for C sequ.

Next steps Agenda partners may want to invest in

- We turn to Agenda partners for more detailed complementary regional analyses (including case studies & pilot projects):
  - improve understanding of C sequ. potential at higher—more policy relevant—level of resolution
  - Identify technical/policy options to address barriers to adoption. Potential barriers:
    - labor & other input constraints
    - land tenure (issues with leasehold & communal)
    - Measurement/monitoring costs
    - risk/uncertainty (non-permanence)
  - Test complementary model frameworks, including measurement of additional environmental co-benefits (e.g. biodiversity, water) and socio-economic impacts

THANK YOU

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