ESA - MOST Dragon 2 Programme

2011 DRAGON 2 SYMPOSIUM

中国科技部-欧洲空间局合作 "龙计划"二期

"龙计划"二期2011年学术研讨会

Project Summary

ID 5319 **The role of croplands and grasslands in the carbon budget of China**

Wednesday 22 June 2011

Main Results

The role of croplands and grasslands in the terrestrial Carbon budget of China Is studied using models , in situ and EO data

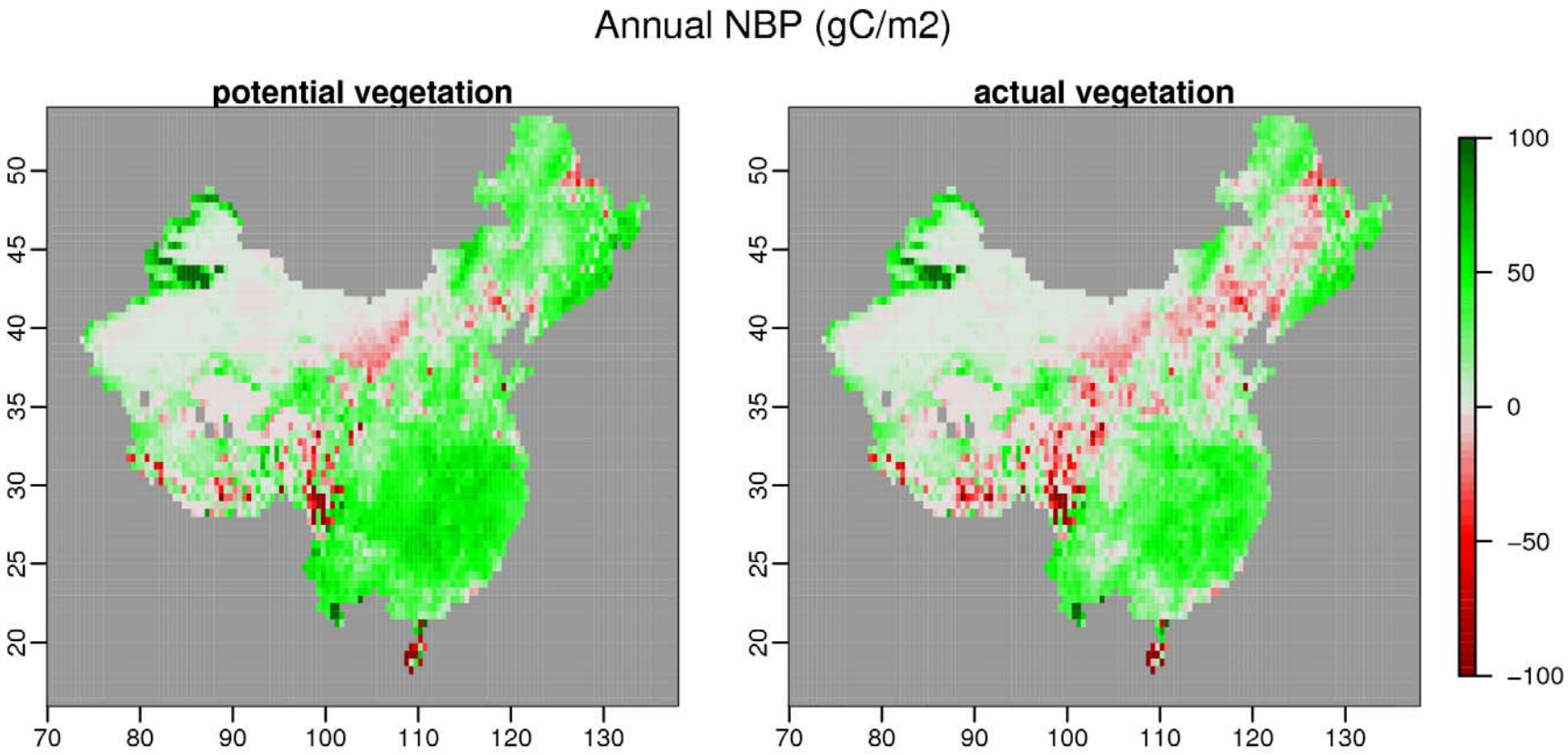
- **Dynamic Vegetation model LPJ-mL (from PIK): Carbon sink**
  - **100 MtC/yr (forest+crop land)**
  - **180 MtC/yr (potential vegetation)**
  - **190-260 MtC/yr (forest), in Piao et al., 2009**
- **Soil carbon in crop/grassland: 700 MtC from 1980 to 2009 (24 MtC/yr)**

- **Increase of C uptake by Crop management (soil C sequestration, fertilization, multiple cropping)**

- **No significant change in the C budget of grasslands at 2 regions observed in the study**

LPJmL Carbon Fluxes

C balance for China:

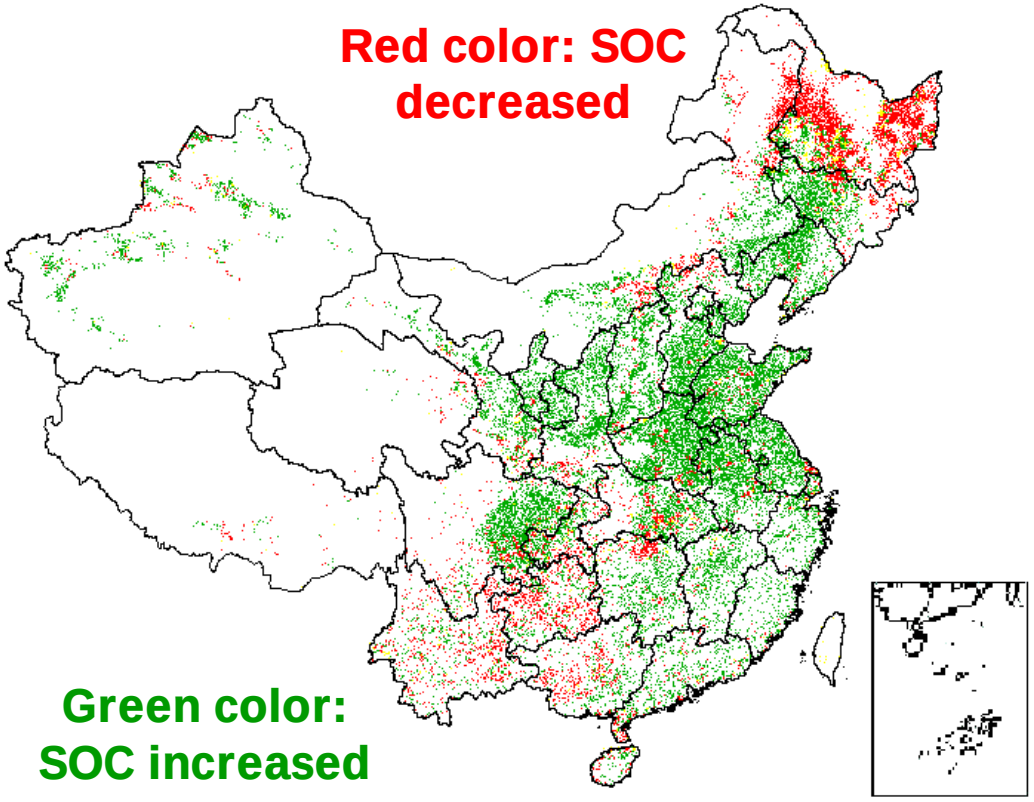


0.18 PgC/yr

0.10 PgC/yr

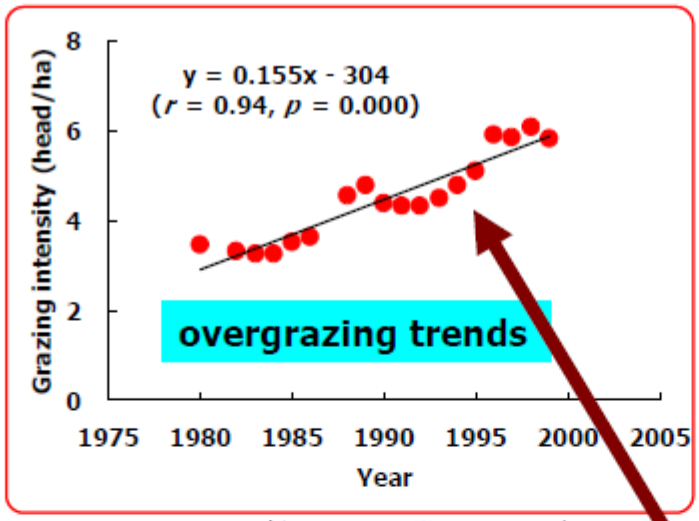
(Piao et al., 2009: Ecosystem models (no crop): 0.17 PgC/yr)

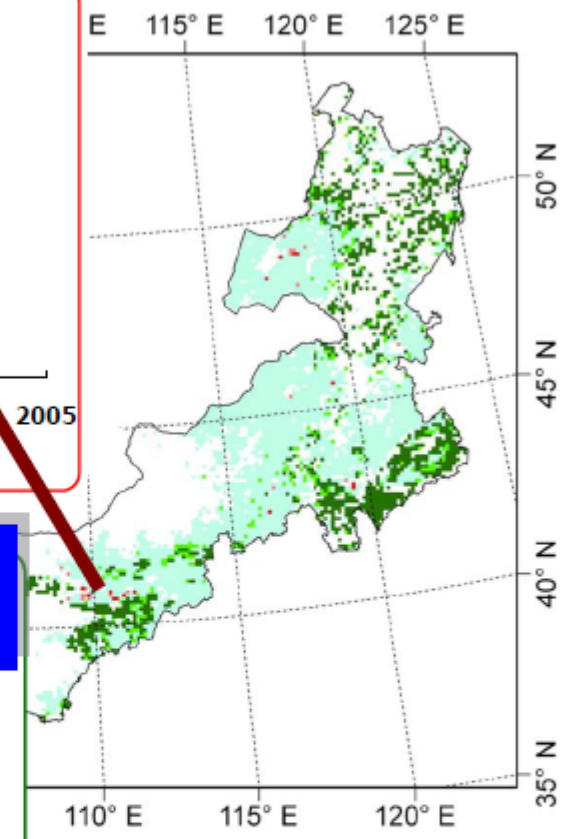
Model AGRO-C: change in SOC

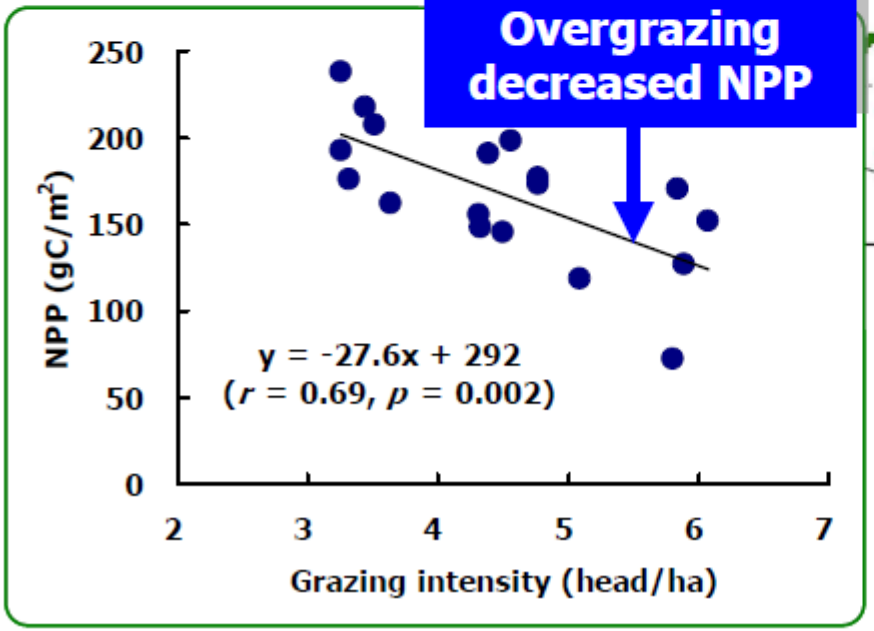


Simulated changes in soil organic carbon between 1980 and 2000 by using Agro-C

- SOC increased in 71%–76%, decreased in 22%–25% and stabilized in 3%–5% of the national croplands.
- An overall increase was estimated to be 23±4 TgC/yr.

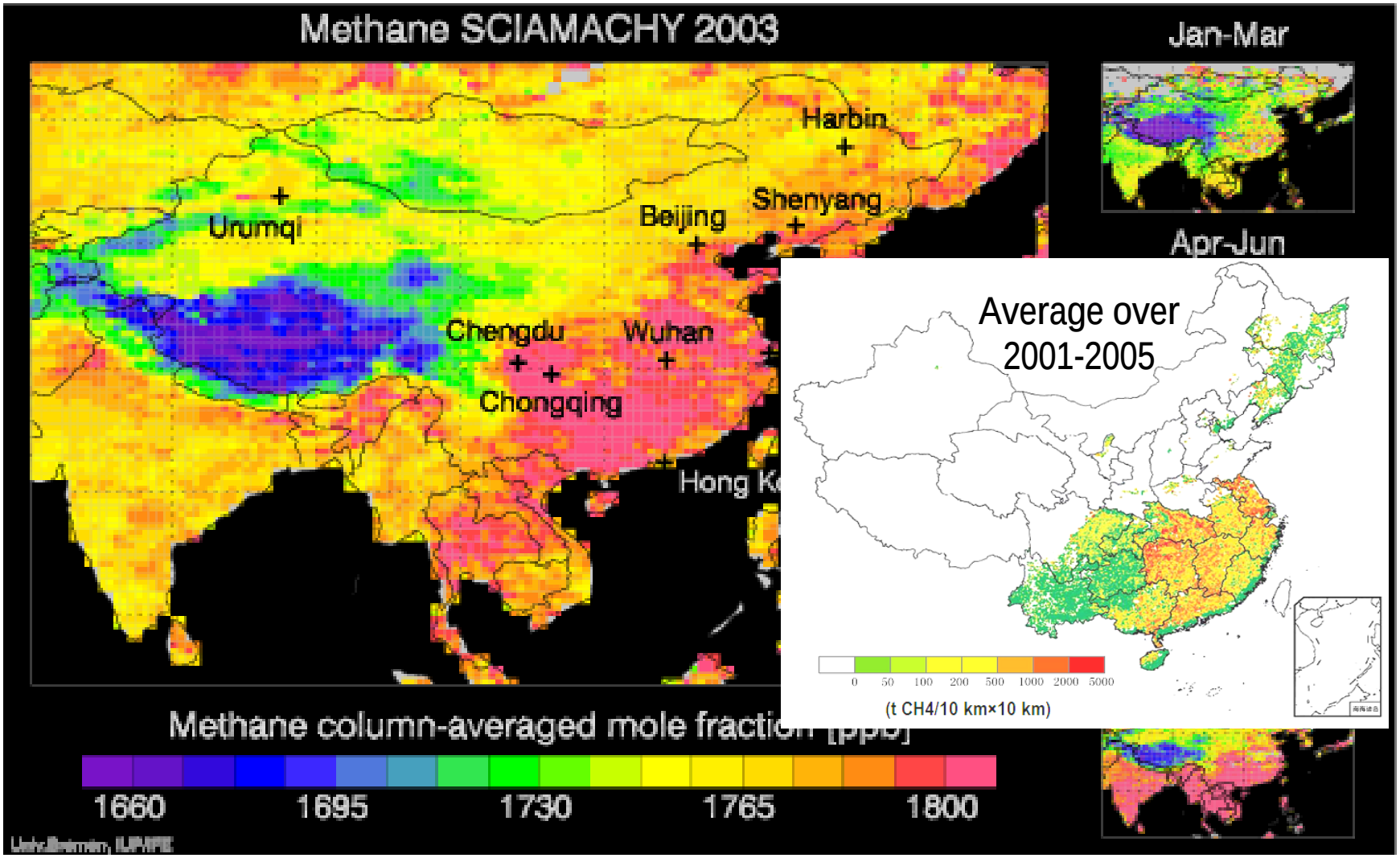






Overgrazing in the Tumote County decreased NPP

SCIAMACHY CH_4 and modelled rice paddy CH_4



Summary (2)

- Remote Sensing data have been used
  - As land cover maps
  - As long time series in models for decade comparison (GIMMS since 1980)
  - In detailed study using more advanced data (SPOT VGT since 1998)
  - As demonstrators for advanced inputs in models (rice using ASAR)

- There is a big need for comprehensive/temporal datasets from remote sensing (e.g.rice and crop parameters from Sentinel 1, soil moisture from SMOS, ASAR GM, validated land cover maps)

Issues and Recommendations

- Remote Sensing data have been used
  - As land cover maps (from Landsat, Modis, Spot VGT)
  - As long time series in models for decade comparison (GIMMS since 1980)
  - In detailed study using more advanced data (SPOT VGT since 1998)
  - As demonstrators for advanced inputs in models (rice using ASAR)

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Project Planning – 2011 and 2012

- ❑ Better integration of remote sensing data

- ❑ Synthesis of the different results on cropland and grassland

→ Joint publications foreseen

- ❑ Starting to introduce the forest ecosystem in the carbon balance

Collaboration required with
Forest ecosystems and Fire projects