Working Group Meeting

TRENDY CLM5

Feng Tao

Department of Earth System Science, Tsinghua University

taof18@mails.tsinghua.edu.cn

Tuesday, 29th June 2021

Carbon Pools in CLM5

- **S0**: Control. No forcing change (time-invariant “pre-industrial” CO2, climate and land use mask). S0 is needed to diagnose any “cold start” issues or model drift
- **S1**: CO2 only (time-invariant “pre-industrial” climate and land use mask)
- **S2**: CO2 and climate only (time-invariant “pre-industrial” land use mask)
- **S3**: CO2, climate and land use (all forcing time-varying)

Models with N cycle should have time-varying N inputs for S1, S2 and S3

Global Carbon Budget 2020 Simulations

- **S0**: Control. No forcing change (time-invariant “pre-industrial” CO2, climate and land use mask). S0 is needed to diagnose any “cold start” issues or model drift
- **S1**: CO2 only (time-invariant “pre-industrial” climate and land use mask)
- **S2**: CO2 and climate only (time-invariant “pre-industrial” land use mask)
- **S3**: CO2, climate and land use (all forcing time-varying)

Models with N cycle should have time-varying N inputs for S1, S2 and S3

Experiment Protocol

- Model spin up:
    - 1700 CO_2 concentration (276.59ppm).
    - recycling climate mean and variability from the early decades of the 20th century (i.e. 1901-1920).
    - constant 1700 LUC (crops and pasture distribution).
- 1701-1900 transient simulation:
    - varying CO_2 (S1, S2, S3). 1700 CO_2 (S0)
    - continue recycling spin up climate (all simulations)
    - varying LUC (S3). 1700 LUC, as in spin-up (S0, S1, S2)
- 1901-2018 transient simulation:
    - varying CO_2 (S1, S2, S3). 1700 CO_2 (S0).
    - varying climate (S2, S3). Continue recycling spin up climate (1901-1920: S0, S1)
    - varying LUC (S3). 1700 LUC, as in spin-up (S0, S1, S2)

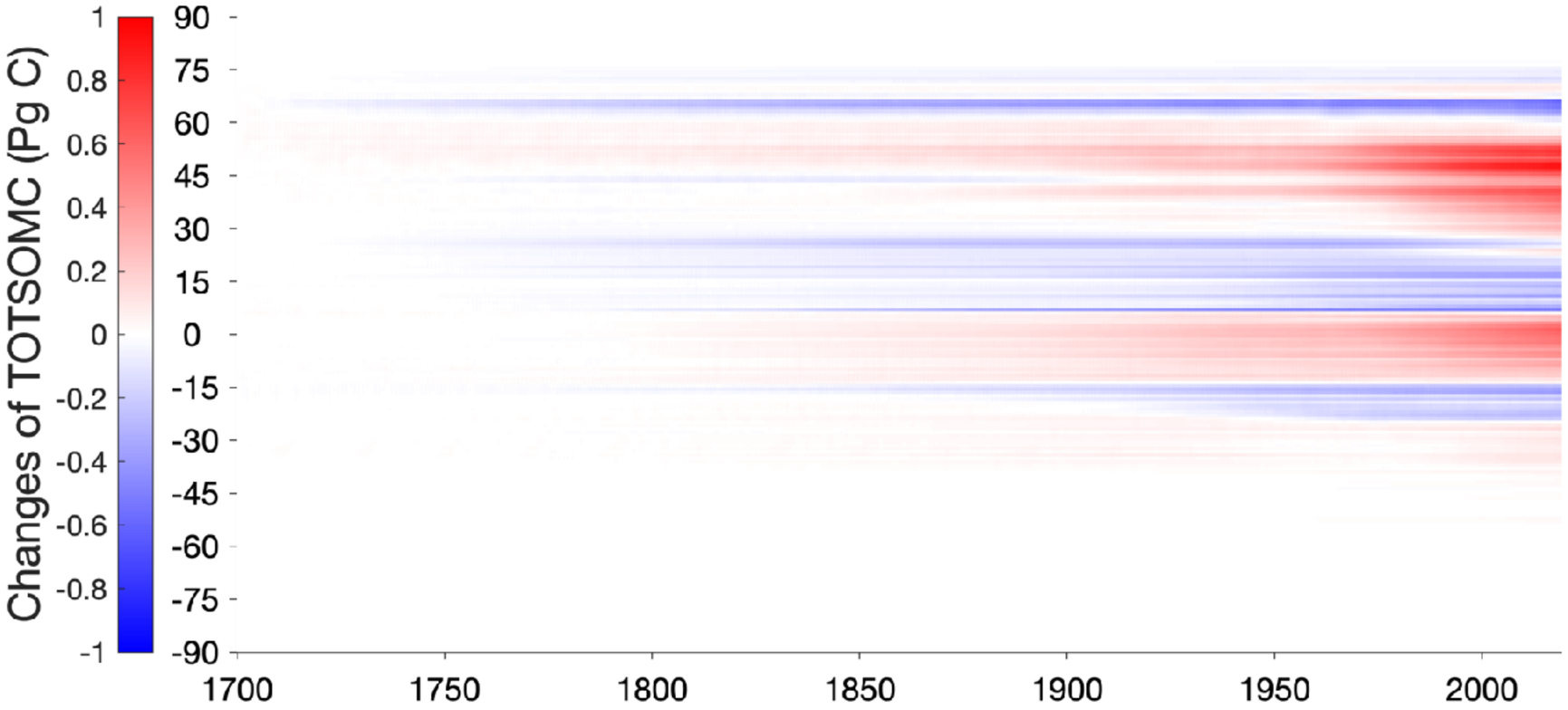
Models having a nitrogen cycle should use time varying Nitrogen inputs (see annex 3)

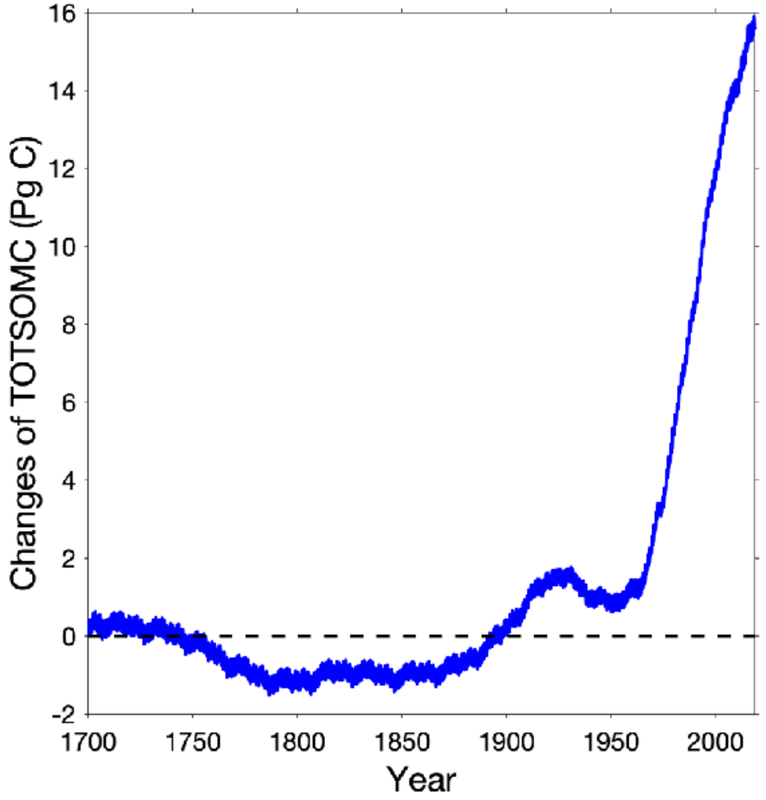
CLM5 Outputs

- **Default CLM5 (non-matrix version): S0, S1, S2, S3 all are ready**
- **Matrix CLM5: only S3 is ready**

Default CLM5	Matrix CLM5 (additionally providing)
CWDC, CWDC_vr	CWDC_Cap_vr
LITR1C, LITR1C_vr	LITR1C_Cap_vr
LITR2C, LITR2C_vr	LITR2C_Cap_vr
LITR3C, LITR3C_vr	LITR3C_Cap_vr
TOTLITC	
SOIL1C, SOIL1C_vr	SOIL1C_Cap_vr
SOIL2C, SOIL2C_vr	SOIL2C_Cap_vr
SOIL3C, SOIL3C_vr	SOIL3C_Cap_vr
SOILC_vr, TOTSOMC	
O_SCALAR, T_SCALAR, W_SCALAR, FPI	
GPP, NPP, NEP	
HR, HR_vr	

CLM5 Outputs





Work Plan

- Single grid as example to infer the matrix equation (matrix S3 versus default S3 simulation)?
- Retrieve key properties in S0 - S3 (soil carbon capacity, potential, etc.)
- Carbon source/sink attribution
- Uncertainty analysis among models

THANKS!

QUESTIONS TIME