



WORLD CLIMATE RESEARCH PROGRAMME

42nd Session of the WCRP Joint Scientific Committee (JSC42)

WCRP Grand Challenges GC-Carbon

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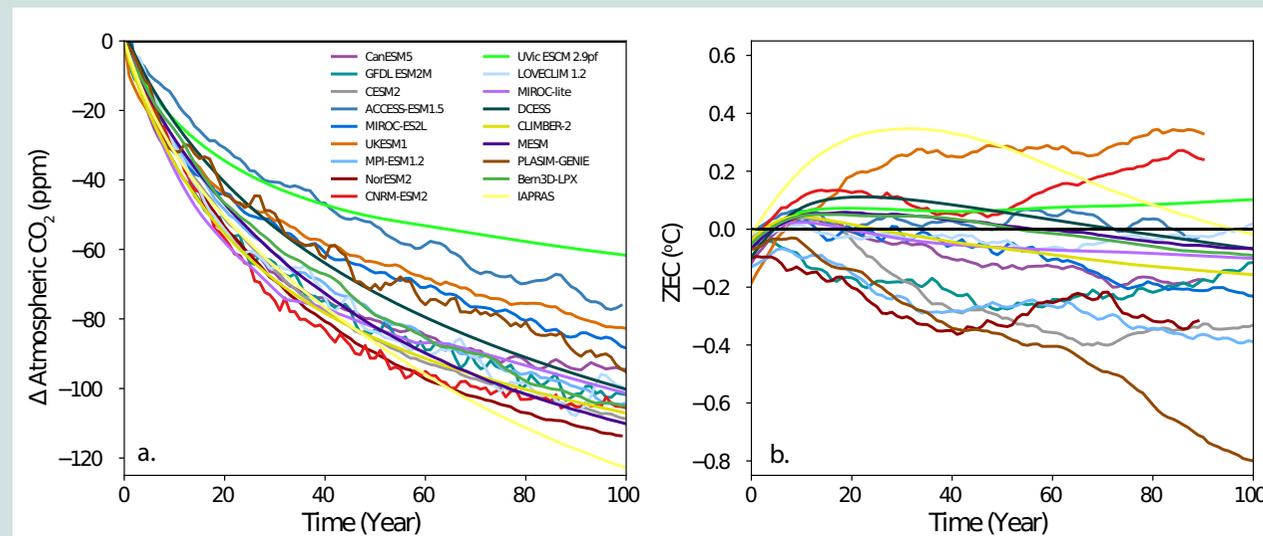


WCRP Grand Challenge: GC-Carbon

1. Highlights for JSC

• Contribution to CMIP6

- GC-Carbon has played a major role in contributing to C4MIP and ZECMIP, as well as to DCPD simulations including the carbon cycle
- GC-Carbon pushed CMIP6 beyond its “boundaries” with emission driven large ensemble simulations (historical and SSPs) as well as emission driven decadal predictability simulations



MacDougall et al., Biogeosciences, 2020

• Several relevant publications

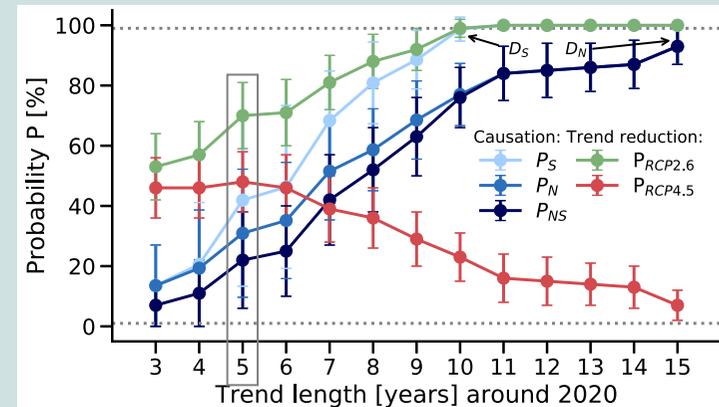
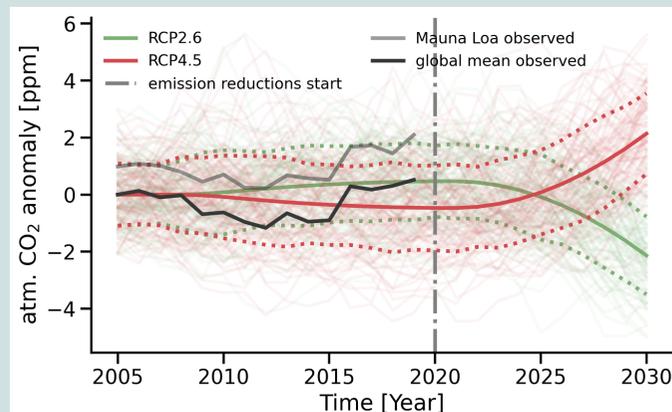
- 12 GC-Carbon related publications, see GC-Carbon report

WCRP Grand Challenge: GC-Carbon

1. Highlights for JSC

• Contribution to IPCC AR6

- Climate-carbon cycle feedbacks (α, β, γ)
- TCRE and compatible emissions
- Carbon cycle response in high and low warming worlds
- Predictability of carbon sinks and atmospheric CO₂
- Two carbon cycle figures in the SPM (current version)



Spring et al., ERL, 2020

• Several relevant publications

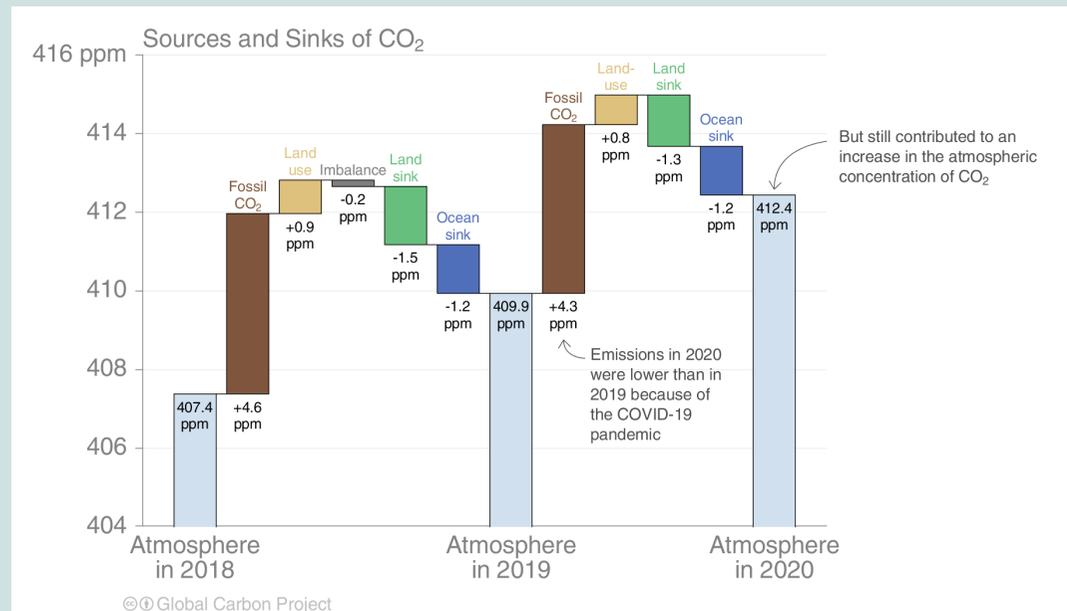
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WCRP Grand Challenge: GC-Carbon

1. Highlights for JSC

• Contribution to GCP

- Strong interaction between GC-Carbon and Global Carbon Project
- Global Carbon Budget 2020, Friedlingstein et al., ESSD 2020
- Shaping future directions of global carbon budget assessment (metrics for mitigation, carbon sinks efficiency)



Friedlingstein et al., ESSD, 2020

• Several relevant publications

- 12 GC-Carbon related publications, see GC-Carbon report

WCRP Grand Challenge: GC-Carbon

2. Future of the GC

- **Near term**
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 - TCRE assessment, including ongoing study on emergent constraints on TCRE and a broader community assessment
 - Development of robust carbon annual to decadal prediction of the global carbon cycle to support the annual Global Carbon Budgets
 - New work on mitigation metrics, carbon sinks efficiency to feed in GCB.
 - C4MIP workshop, Autumn 2021
- **Longer term**
 - Unclear...
 - Where is the home for Carbon in the new WCRP structure?
 - How to keep the GC-Carbon momentum in the new structure?



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