



Grand Challenge Carbon Feedbacks in the Climate System

41st Session of the WCRP Joint
Scientific Committee

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Online



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Progress and achievements

- **For 2019-2020, GC-Carbon co-organised:**
 - Side meeting “carbon cycle predictability”, Barcelona, March 2019
 - Session on carbon cycle feedbacks at the AGU 2019
 - Session at the Ocean Sciences Meeting and Town hall meeting on carbon cycle predictability, February 2020, San Diego
- **Funding**

EU H2020 Project 4C (coordinator P. Friedlingstein, 2019-2023), focus on improving understanding of current carbon cycle, develop policy-relevant decadal predictions of carbon cycle and long-term projections of mitigation effort.
- **Contribution to CMIP6**

GC-carbon strong contributor to C4MIP and ZECMIP: coordination, design, simulations, analysis and publications.
- **Contribution to GCP**

Strong interaction between GC-Carbon and global carbon project. P. Friedlingstein leading the 2019 Global Carbon Budget (Friedlingstein et al., Global Carbon Budget, ESSD, 2019, <https://doi.org/10.5194/essd-11-1783-2019>)
- **GC-Carbon related Publications**
 - Arora et al., Carbon-concentration and carbon-climate feedbacks in CMIP6 models, and their comparison to CMIP5 models, BGD, 2019, <https://doi.org/10.5194/bg-2019-473>
 - Friedlingstein et al., Global Carbon Budget, ESSD, 2019, <https://doi.org/10.5194/essd-11-1783-2019>
 - Jones et al., The Zero Emissions Commitment Model Intercomparison Project (ZECMIP) contribution to C4MIP: quantifying committed climate changes following zero carbon emissions, GMD, 2019, <https://doi.org/10.5194/gmd-12-4375-2019>
 - MacDougall., et al., Is there warming in the pipeline? A multi-model analysis of the zero emission commitment from CO₂, BG, 2020, <https://doi.org/10.5194/bg-2019-492>



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Future plans

- GC-Carbon Assessment on TCRE (following the format of the WCRP ECS assessment), led by Chris Jones (UK MetOffice), Tatiana Ilyina (MPI, Hamburg) and Pierre Friedlingstein (U. Exeter). Time lines : next 18-24 months
- GC-Carbon sponsored workshop on TCRE assessment, place and time to be discussed.
- GC-Carbon contribution to Global Carbon Budget 2020. Focus of impact of COVID-19 on CO2 emissions, atmospheric CO2 and carbon cycle response
- Development of framework for GC-Carbon annual to decadal prediction of the global carbon cycle
- GC-Carbon led analysis of carbon cycle in CMIP6 ESMs



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Links to the WCRP Strategic and Implementation Plans

- **Strong links with the Four WCRP strategic objectives:**
 - *Fundamental understanding of the climate system*
 - *Prediction of the near-term evolution of the climate system*
 - *Future evolution of the climate system*
 - *Bridging climate science and society*
- **Directly relevant to the following lighthouse activities:**
 - *Explaining and Prediction Earth System Changes (What on Earth is going on?)*
 - *Safe Landing Climates*



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Emerging issues

- Future of the Grand Challenges in the new WCRP strategic and implementation plan ?



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Additional Slides



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