



Environment and
Climate Change Canada

Environnement et
Changement climatique Canada

The Canadian Centre for Climate Modelling and Analysis (CCCma) CanESM5.0

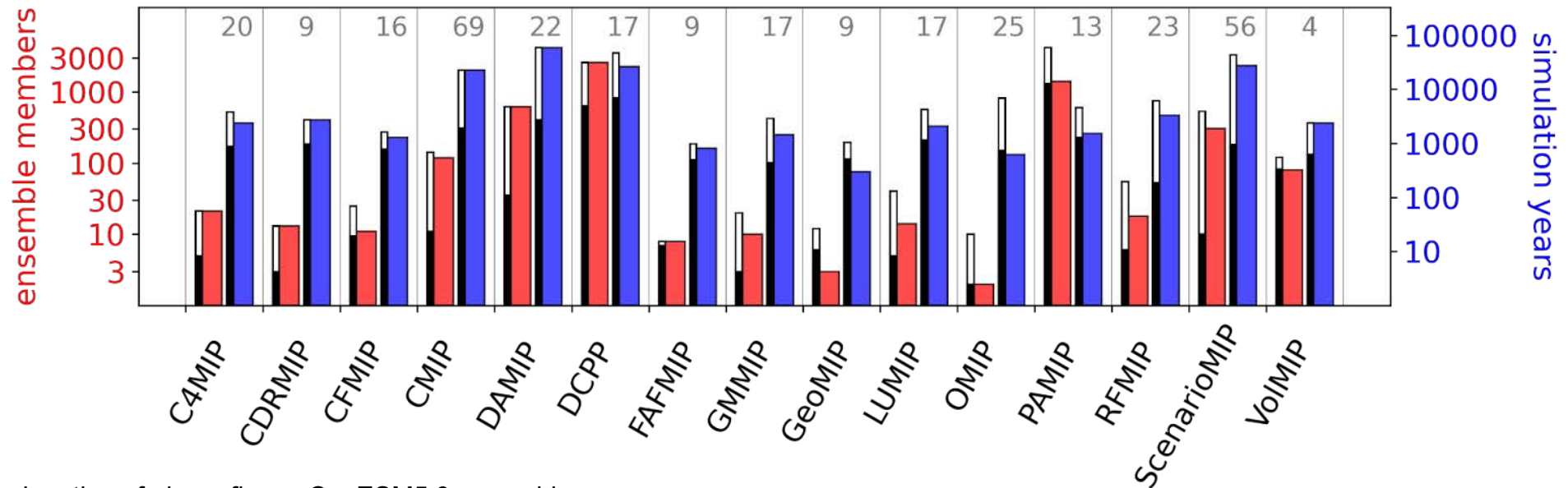
Greg Flato

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Climate Change Canada

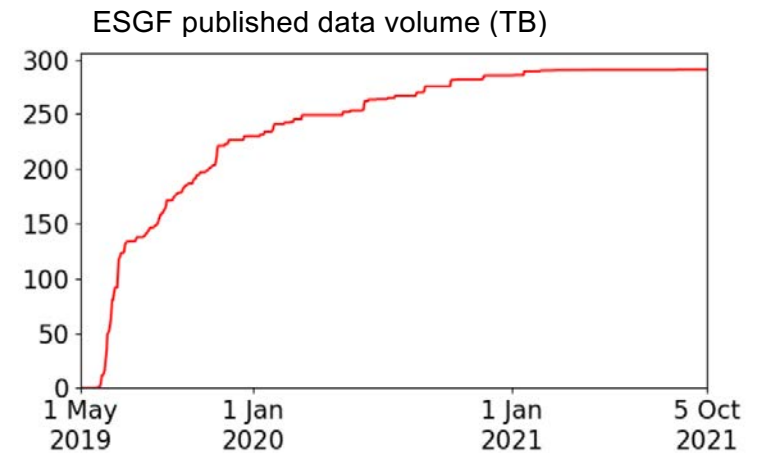
11 05 2022



Runs completed for CMIP6



Explanation of above figure: CanESM5.0 ensemble members (red) and simulation years (blue) contributed to experiments defined by CMIP6-endorsed MIPs. For each MIP, thinner inset bars show the median (black) and maximum (white) number of contributions by all models participating in the MIP, with the number of contributing models indicated at top. Determined by a search of the ESGF archive on 22 Oct 2022 for monthly-mean atmospheric near-surface temperature (tas), precipitation (pr), ocean surface temperature (tos) and surface salinity (sos).



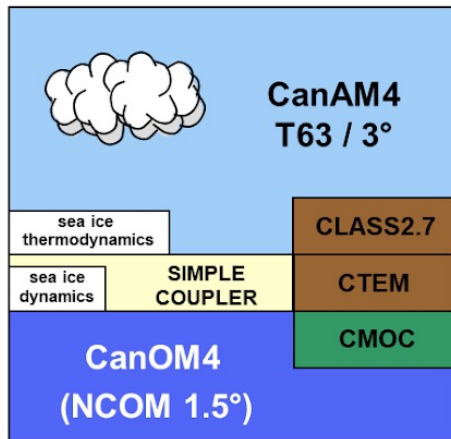
Model Development Plans

2011

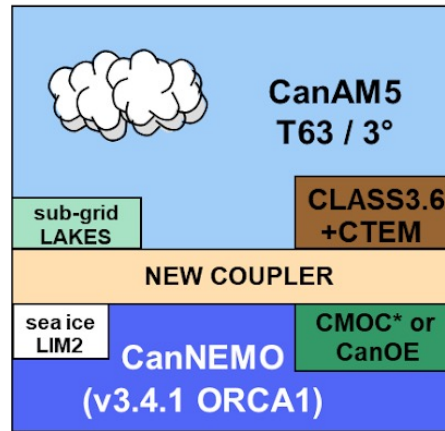
2018

2025

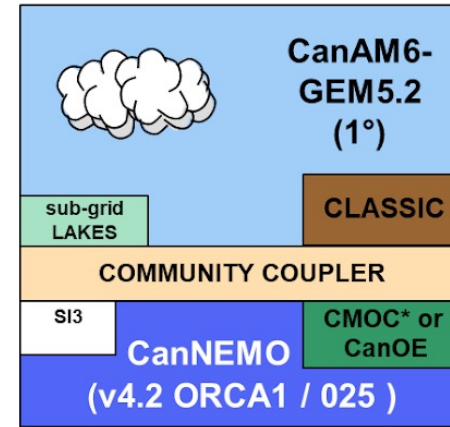
CanESM2.0 (CMIP5)



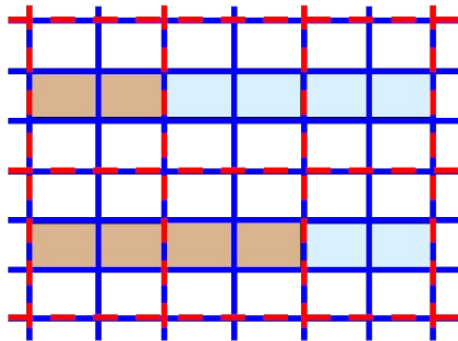
CanESM5.0 (CMIP6)



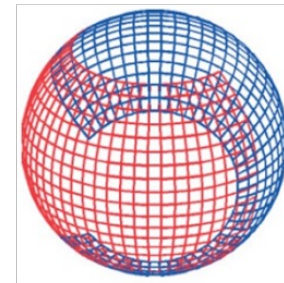
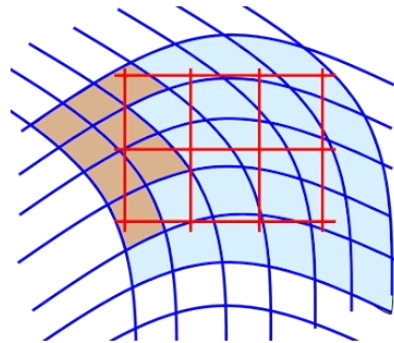
CanESM6.0 (CMIP7)



Co-incident grids

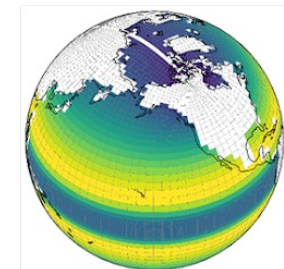


Gaussian to tripolar



Yin-Yang

tripolar



to

Current Status

- CanESM5.0 had the highest climate sensitivity of CMIP6 models, with an ECS of 5.6°C (Zelinka et al., 2020). We have been actively working on understanding this.
- With various changes, we have a new version, CanESM5.1, in which we can reduce climate sensitivity by 1°C and improve ENSO. We have done DECK and other simulations and so are interested in the CMIP6+ status. (would be very valuable to have a way to make these sort of documenting runs available to the community).
- We are in the process of migrating and modestly expanding our ESGF server from 1 to 2 PB.

Thoughts/Concerns

- We have a very ambitious model development program planned which will be a challenge to accomplish on the CMIP7 timeline we anticipate. We will face a major HPC migration during the CMIP7 delivery period.
- Outward-facing data storage (ESGF server) and bandwidth are increasingly an issue (not part of our HPC package). Future is a bit uncertain. Server-side processing? Cloud?
- Considerable pain in accommodating CMIP6 data request, so hoping for minimal change for CMIP7.
- Unlikely we can sustain growth in number of MIPs. Our mandate requires focus on future projections and downscaling to support climate services and Adaptation/Mitigation users and decision-makers.