**Descriptions of attached files**

(Edit on 22 Nov 2020, contact [yongxiao@uvic.ca](mailto:yongxiao@uvic.ca))

* Name of attached datasets: observational constraint of 21st century global warming using weighting method.
* CSV files naming rules: for future projections, cdf\_xxx (SSP scenarios).csv; for historical period cdf\_his\_xxx (historical constraint related to corresponding projected scenarios).csv.
* The original datasets introduced in this study are 20 years running mean of CMIP6 models simulations described in Table1. Here provide the changes of global mean near surface air temperature for projected period (base period :1995-2014).
* Each csv file provides every year projection on cumulative frequency (‘cdf\_p’ in csv files) with corresponding projections for weighted (‘cdf’) and unweighted (‘cdf\_e’) approach. The csv files also provide each year best estimates of weighted (‘mean\_w’) and unweighted (‘mean\_e’) approach.
* The weighting approach applied in these datasets are described in eq (1) of Liang et al. (2020). The CDF for weighted and unweighted produced here are the samples mean CDF of 5000 times of random selection on one ensemble per model [for more details, please refer to Fig 3 a-d of Liang et al. (2020)].
* A demo to read attached csv files for specific SSP scenario to get 5-95% uncertainty range and means is named ‘demo\_plot.py’ in attached files.
* SSP1-1.9 are not produced constraining results here because 1. only 13 models provide simulations 2. the overall performances of limited SSP1-1.9 model numbers by our cross-validated evaluation processes are not decent.

**Table 1**. CMIP6 model runs for each Shared Socioeconomic Pathway (SSP) used in this study. The number in table represents the ensemble runs of each model for corresponding SSP scenario. Same models and model ensembles are used for different scenarios for weighed and unweighted projections.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | **Number of model runs for each scenario** | | | | |
|  | **Model name** | **Historical** | **SSP1-2.6** | **SSP2-4.5** | **SSP3-7.0** | **SSP5-8.5** |
| 1 | ACCESS-CM2 | 3 | 3 | 3 | 3 | 3 |
| 2 | ACCESS-ESM1-5 | 10 | 10 | 10 | 10 | 10 |
| 3 | AWI-CM-1-1-MR | 1 | 1 | 1 | 1 | 1 |
| 4 | BCC-CSM2-MR | 3 | 1 | 1 | 1 | 1 |
| 5 | CAMS-CSM1 | 2 | 2 | 2 | 2 | 2 |
| 6 | CanESM5 | 50 | 50 | 50 | 50 | 50 |
| 7 | CESM2 | 3 | 3 | 3 | 3 | 3 |
| 8 | CESM2-WACCM | 1 | 1 | 1 | 1 | 1 |
| 9 | CMCC-CM2-SR5 | 1 | 1 | 1 | 1 | 1 |
| 10 | CNRM-CM6-1 | 6 | 6 | 6 | 6 | 6 |
| 11 | CNRM-ESM2-1 | 5 | 5 | 5 | 5 | 5 |
| 12 | CNRM-CM6-1-HR | 1 | 1 | 1 | 1 | 1 |
| 13 | EC-Earth3 | 7 | 7 | 7 | 7 | 7 |
| 14 | EC-Earth3-Veg | 3 | 3 | 3 | 3 | 3 |
| 15 | FGOALS-f3-L | 1 | 1 | 1 | 1 | 1 |
| 16 | FGOALS-g3 | 1 | 1 | 1 | 1 | 1 |
| 17 | FIO-ESM-2-0 | 3 | 3 | 3 | 3 | 3 |
| 18 | GFDL-ESM4 | 1 | 1 | 1 | 1 | 1 |
| 19 | GISS-E2-1-G | 7 | 7 | 7 | 7 | 7 |
| 20 | HadGEM3-GC31-LL | 1 | 1 | 1 | 1 | 1 |
| 21 | IITM-ESM | 1 | 1 | 1 | 1 | 1 |
| 22 | INM-CM5-0 | 1 | 1 | 1 | 1 | 1 |
| 23 | INM-CM4-8 | 1 | 1 | 1 | 1 | 1 |
| 24 | IPSL-CM6A-LR | 6 | 6 | 6 | 6 | 6 |
| 25 | KACE-1-0-G | 3 | 3 | 3 | 3 | 3 |
| 26 | MCM-UA-1-0 | 1 | 1 | 1 | 1 | 1 |
| 27 | MIROC6 | 3 | 3 | 3 | 3 | 3 |
| 28 | MIROC-ES2L | 1 | 1 | 1 | 1 | 1 |
| 29 | MPI-ESM1-2-HR | 2 | 2 | 2 | 2 | 2 |
| 30 | MPI-ESM1-2-LR | 8 | 8 | 8 | 8 | 8 |
| 31 | MRI-ESM2-0 | 1 | 1 | 1 | 1 | 1 |
| 32 | NorESM2-LM | 1 | 1 | 1 | 1 | 1 |
| 33 | NorESM2-MM | 1 | 1 | 1 | 1 | 1 |
| 34 | UKESM1-0-LL | 5 | 5 | 5 | 5 | 5 |

**Reference:** Liang, Y., Gillett, N. P., and Monahan, A. H.: Climate Model Projections of 21st Century Global Warming Constrained Using the Observed Warming Trend, Geophys. Res. Lett., 47, 1–10, https://doi.org/10.1029/2019GL086757, 2020.