

Motivation

The aim is to estimate the dynamic trend in a specific target variable from a standard climate change simulation (comparable to observations). The result of the dynamic trend estimation is going to be evaluated with a counterfactual piControl-nudged simulation that is supposed to only contain the dynamic trend of the cliamte change simulation (see below).

Data

Standard climate change simulations (climChange)

We have three standard simulation runs with historic emissions until 2014 and SSP370 emissions from there on:

run	1850-2014	2015 - 2100
1300	b.e212.BHISTcmip6.f09_g17.1300	b.e212.BSSP370cmip6.f09_g17.1300
1400	b.e212.BHISTcmip6.f09_g17.1400	b.e212.BSSP370cmip6.f09_g17.1400
1500	b.e212.BHISTcmip6.f09_g17.1500	b.e212.BSSP370cmip6.f09_g17.1500

In these runs greenhouse gas concentrations are rising over time leading to thermodynamic and dynamic changes.

Nudged counterfactual simulations (piControl-nudged)

For each of the standard simulations from above one simulation in the piControl setting (no greenhouse gas emissions). The simulations is nudged towards the wind fields throughout the whole atmosphere of the respective simulations from above.

run	1850-2100
1300	b.e212.B1850cmip6.f09_g17.001.nudge-1850-2100-SSP370.1300.linear-weak
1400	b.e212.B1850cmip6.f09_g17.001.nudge-1850-2100-SSP370.1400.linear-weak
1500	b.e212.B1850cmip6.f09_g17.001.nudge-1850-2100-SSP370.1500.linear-weak

Locations

We test methods for land grid-cells (?) around the northern hemispheric mid-latitudes. Grid-cells are located at around 50°N and spaced in 10° longitude steps.



Latitudes, longitudes as well as the respective indices in the CESM2 output grid are listed in [locations.csv](#)

	lat	lon	iy	ix
0	50.4188	10	149	8
1	50.4188	20	149	16
2	50.4188	30	149	24
3	50.4188	40	149	32
...

Target variables

1. **TREFHT** - surface air temperature
2. *optional* **TOTPREC** - total precipitation

Seasons

1. **DJF** (December, January, February)
2. **JJA** (June, July, August)

Statistics

1. seasonal mean
2. *optional* seasonal daily maximum
3. *optional* seasonal daily minimum

Desired output (trends):

One csv table for each combination of target variable, season and statistic.

Seasonal trends over the period 1979-2023

- **reproduced total trend** (*should be similar to climChange run on which was trained*)
- **dynamic trend** (*should be similar to corresponding piControl-nudged run*)
- *optional* **thermodynamic trend**
- *optional* other decomposed trends you got from your method

lat	lon	run	reproduced trend	dynamic trend	thermodynamic trend	other columns ...
50.4188	10	1300	?	?	optional	optional
50.4188	10	1400	?	?	optional	optional
50.4188	10	1500	?	?	optional	optional
50.4188	20	1300	?	?	optional	optional
50.4188	20	1400	?	?	optional	optional
...

Daily output (optional):

If applicable/possible it would be even better if you could save the daily output of you estimates.