

Brief communication: CMIP6 does not suggest any circulation change over Greenland in summer by 2100

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Occurrences of summer with GB2		2000-2019				2040-2060				2080-2100			
		> 1	> 2	< -1	< -2	> 1	> 2	< -1	< -2	> 1	> 2	< -1	< -2
CMIP5	Average	2.17	0.31	4.26	0.77	2.06	0.31	5.94	1.94	1.23	0.17	9.20	3.97
	Mediane	2	0	4	1	2	0	6	2	1	0	9	3
	Max	6	1	9	3	6	2	10	6	4	3	17	13
	Min	0	0	0	0	0	0	0	0	0	0	0	0
CMIP6	Average	3.94	0.75	2.88	0.25	2.38	0.50	5.31	1.56	1.25	0.13	7.88	2.94
	Mediane	3	0	3	0	2	0	5	1.50	0.50	0	8	3
	Max	9	3	6	1	8	2	10	5	5	1	13	6
	Min	0	0	0	0	0	0	0	0	0	0	0	0
NCEP		11	9	2	2								

Table S1. Occruences of summer with GB2 > (<) 1 (-1) and 2 (-2) over 2000 – 2019, 2040 – 2060 and 2080 – 2100. The average, mediane, minimum and maximum values are listed for the CMIP5 and CMIP6. The reference NCEP-NCAR v1 is given for the comparison.

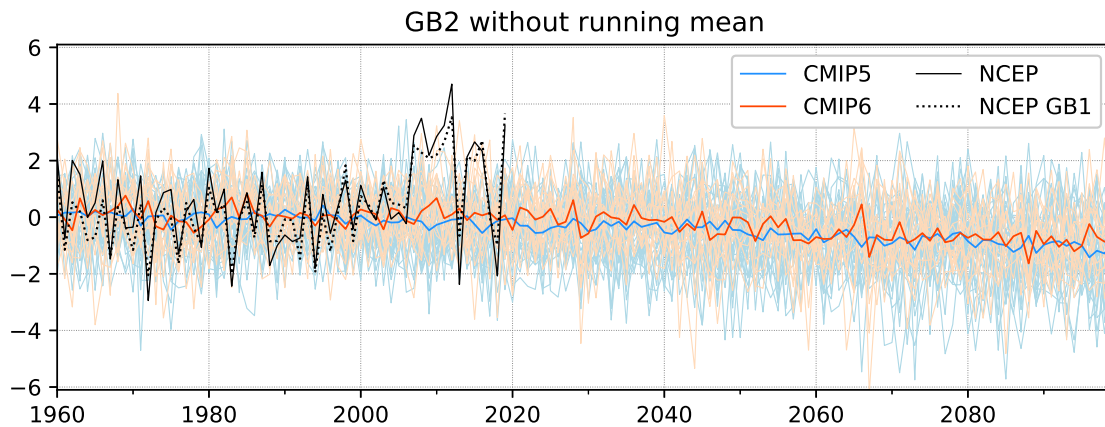


Figure S1. JJA GB1 (dashed) and GB2 (solid) indices over 1950 – 2100 as represented by NCEP/NCARv1 Reanalysis as well as JJA GB2 by all the CMIP5 models (RCP8.5 scenario, blue lines) and the CMIP6 models (ssp585, red lines). For the CMIP5-based time series, the historical scenario is used over 1950 – 2005 and until 2014 for CMIP6, while RCP8.5 and ssp585 respectively afterwards. The values have been normalized using 1986 – 2005 as the reference period.

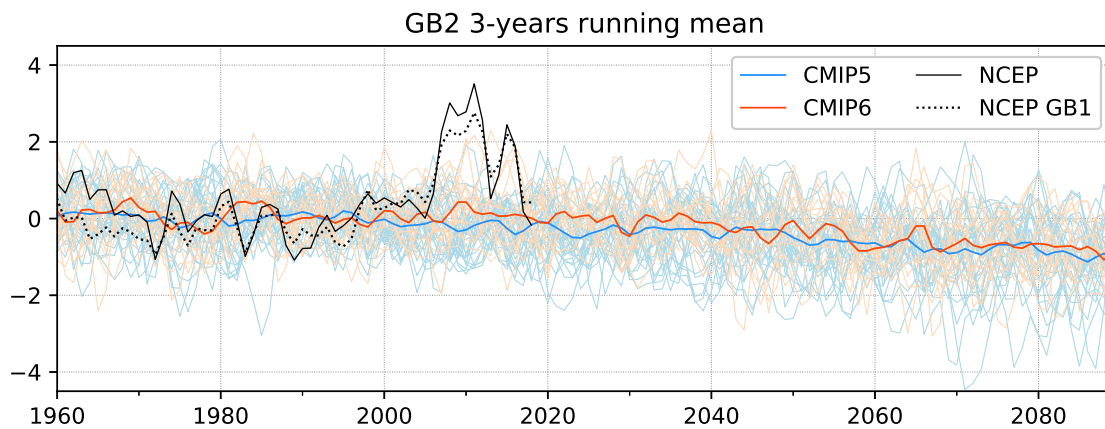


Figure S2. Same as S1 with a 3-year running mean to smooth the time series.

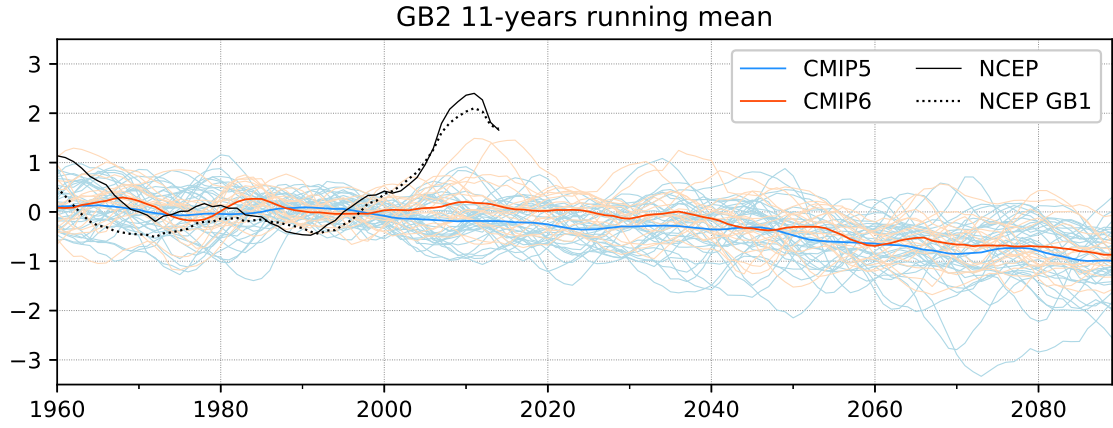


Figure S3. Same as S1 with an 11-year running mean to smooth the time series.

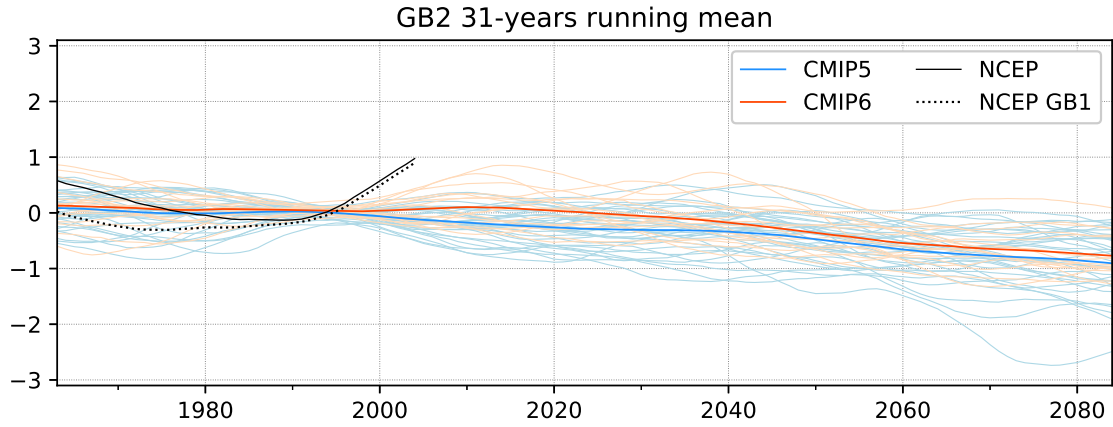


Figure S4. Same as S1 with a 31-year running mean to smooth the time series.

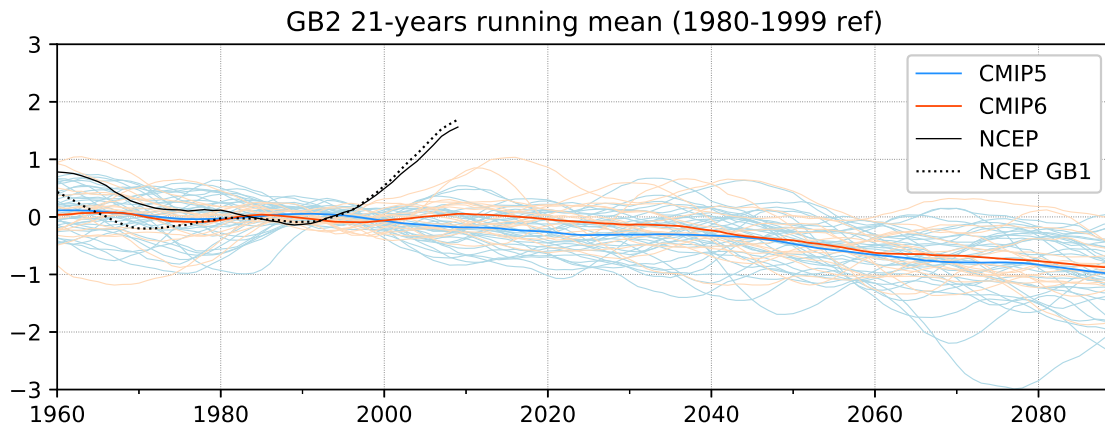


Figure S5. Same as S1 with a 21-year running mean and the reference period between 1980 and 1999.

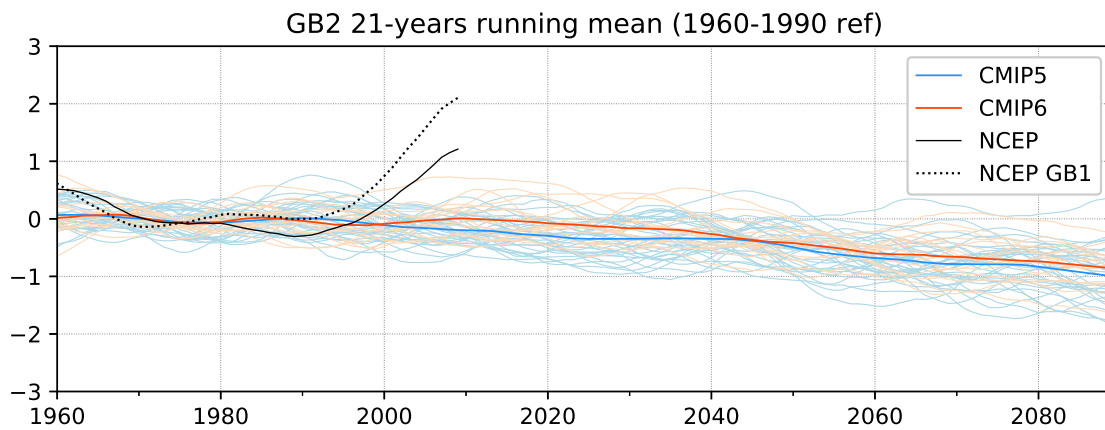


Figure S6. Same as S1 with a 21-year running mean and the reference period between 1960 and 1990.

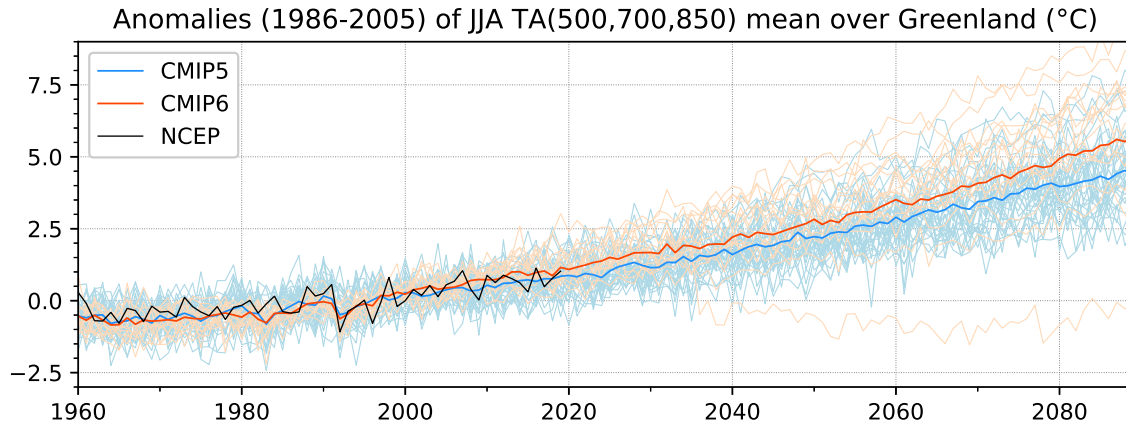


Figure S7. Free-atmosphere temperature anomalies over Greenland, defined as the mean temperature of 500, 700 and 850 hPa levels, for CMIP5 (blue) and CMIP6 (red) models, and NCEP/NCARv1 (black). Lighter lines represent the anomalies for each model while the mean of CMIP5 and CMIP6 models are represented by the thicker lines. The reference period is 1986 – 2005.

CMIP5 model name		CMIP6 model name
ACCESS1-0	GISS-E2-H	BCC-CSM2-MR
ACCESS1-3	GISS-E2-R-CC	CanESM5
bcc-csm1-1	GISS-E2-R	CAMS-CSM1-0
bcc-csm1-1-m	HadGEM2-AO	CESM2
CanESM2	HadGEM2-CC	CESM2-WACCM
CCSM4	HadGEM2-ES	CNRM-CM6-1
CESM1-BGC	inmcm4	CNRM-ESM2-1
CESM1-CAM5	IPSL-CM5A-LR	EC-Earth3-Veg
CMCC-CM	IPSL-CM5A-MR	EC-Earth3
CMCC-CMS	IPSL-CM5B-LR	IPSL-CM6A-LR
CNRM-CM5	MIROC5	MIROC6
EC-EARTH	MIROC-ESM-CHEM	MRI-ESM2-0
FGOALS-g2	MIROC-ESM	UKESM1-0-LL
FIO-ESM	MPI-ESM-LR	FGOALS-g3
GFDL-CM3	MPI-ESM-MR	GFDL-ESM4
GFDL-ESM2G	NorESM1-ME	NESM3
GFDL-ESM2M	NorESM1-M	
GISS-E2-H-CC		

Table S2. CMIP5 and CMIP6 models that have been used in this study. The only selection criterion was the availability of the RCP8.5 scenario for CMIP5 models and SSP585 for CMIP6 ones.

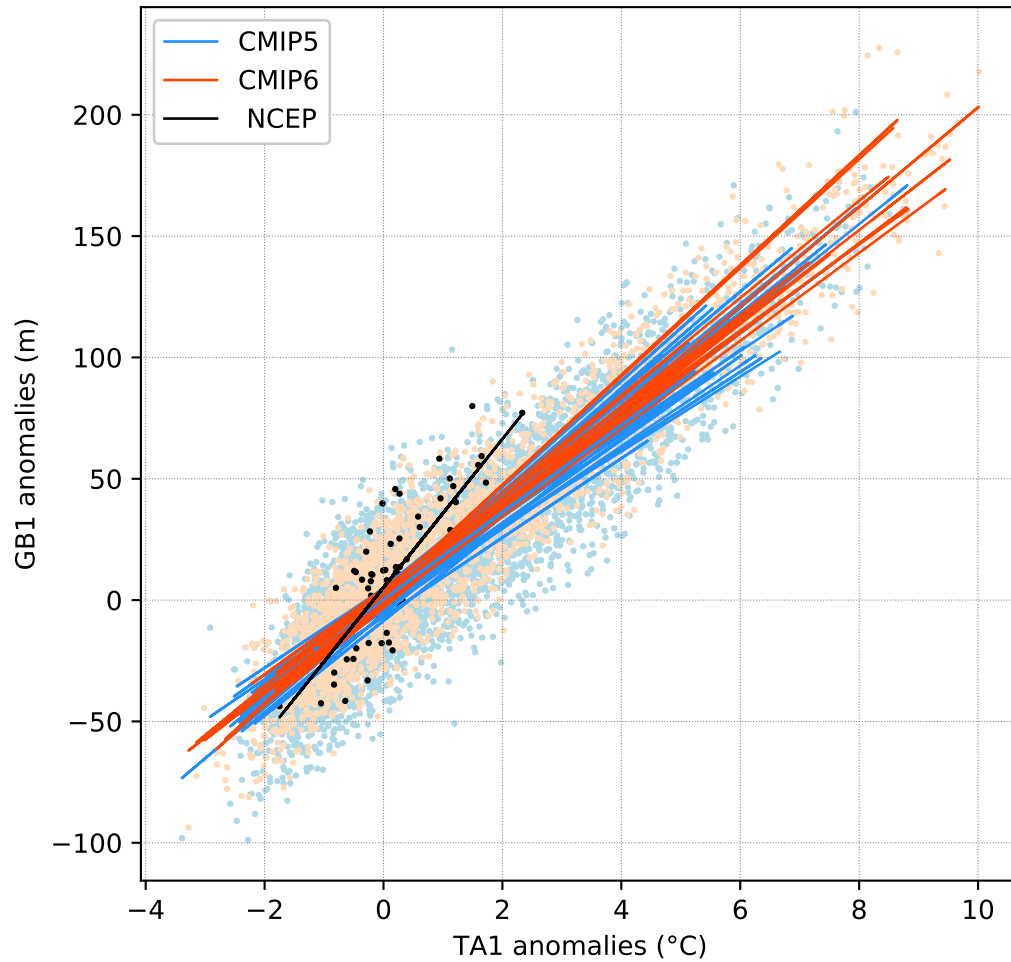


Figure S8. Greenland Blocking Index (GB1) anomalies regarding mean 850, 700 and 500 hPa temperature anomalies over 60–80 ° N, 20–80 ° W area. The reference period is 1986 – 2005. The regression lines are computed for each CMIP5 (blue) and CMIP6 (red) models. The figure shows that even considered one by one, no ESM represents the strong increase in GB1 not directly related to warming.