East Asian summer monsoon enhanced by COVID-19

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Supplementary Information

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Table S1 Detailed information for the available models participating in COVID-MIP. The five models with their names in bold are selected for analysis.

Model ID	No. of available realizations	IDs for the available realizations
ACCESS-ESM1-5	10	r1i1p1f1, r2i1p1f1, ..., r10i1p1f1
CanESM5	10	r1i1p1f1, r2i1p1f1, ..., r10i1p1f1
E3SM-1-1	10	r1i1p1f1, r2i1p1f1, ..., r10i1p1f1
EC-Earth3	13	r1i1p1f2, r2i1p1f2, r8i1p1f2, r12i1p1f2, r15i1p1f2, r17i1p1f2, r19i1p1f2, r21i1p1f2, r23i1p1f2, r25i1p1f2, r27i1p1f2, r29i1p1f2, r30 i1p1f2
GISS-E2-1-G	10	r1i1p5f2, r2i1p5f2, ... , r10i1p5f2
MIROC-ES2L	30	r1i1p1f2, r2i1p1f2, ... , r30i1p1f2 for SSP2-4.5 r1i1p1f242, r2i1p1f242, ... , r30i1p1f242 for SSP2-4.5-COVID experiment
MPI-ESM1-2-LR	10	r1i1p1f99, r2i1p1f99, ... , r10i1p1f99
MRI-ESM2-0	10	r1i1p1f1, r1i3p1f1, r2i1p1f1, r2i3p1f1, r3i1p1f1, r3i3p1f1, r4i1p1f1, r4i3p1f1, r5i1p1f1, r5i3p1f1
UKESM1-0-LL	16	r1i1p1f2, r2i1p1f2, ..., r12i1p1f2, r16i1p1f2, r17i1p1f2, r18i1p1f2, r19i1p1f2

Table S2 The 16 AGCMs in which the piClim-control and piClim-aer experiments are analyzed in this study. The first realization ("r1i1p1f1") of each model is adopted.

Model ID			
ACCESS-CM2	ACCESS-ESM1-5	BCC-ESM1	CanESM5
CESM2	EC-Earth3	GISS-E2-1-G	HadGEM3-GC31-LL
IPSL-CM6A-LR	IPSL-CM6A-LR-INCA	MIROC6	MPI-ESM-1-2-HAM
MRI-ESM2-0	NorESM2-LM	NorESM2-MM	UKESM1-0-LL

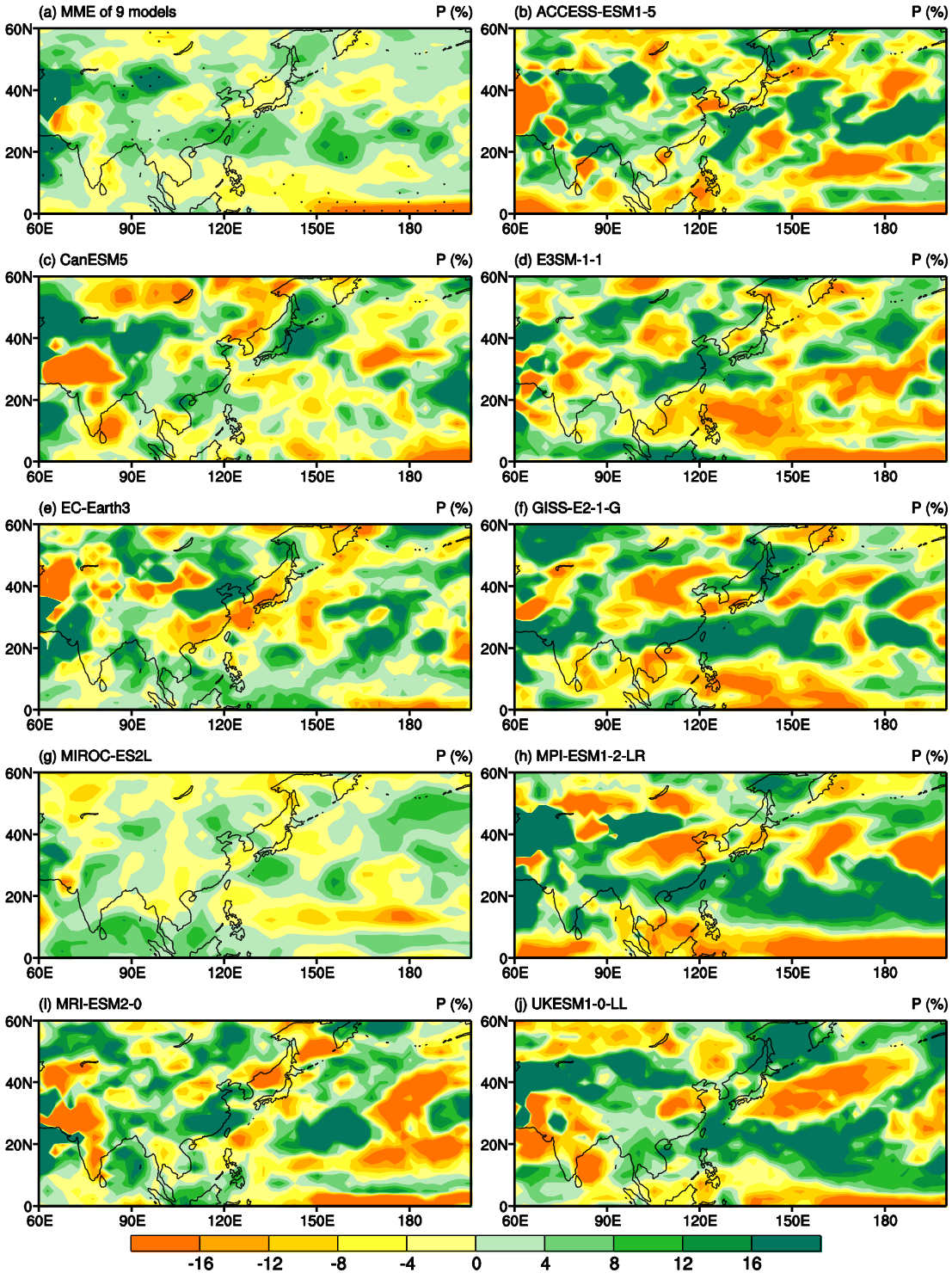


Fig. S1 Simulated change in precipitation (unit: %) in response to COVID-19 based on the MME (a) of all the nine available models participating in COVID-MIP and the individual models (b-j).

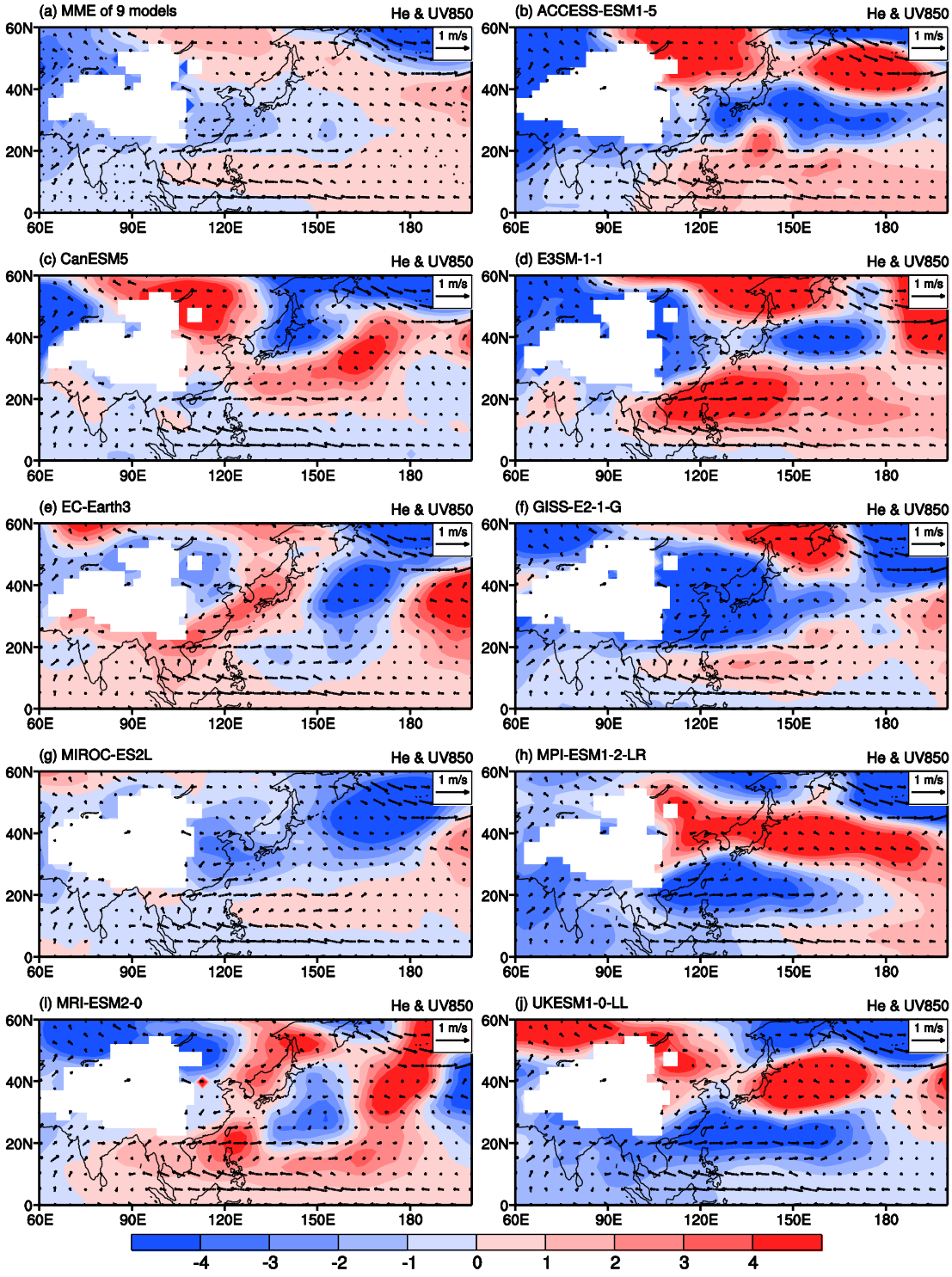
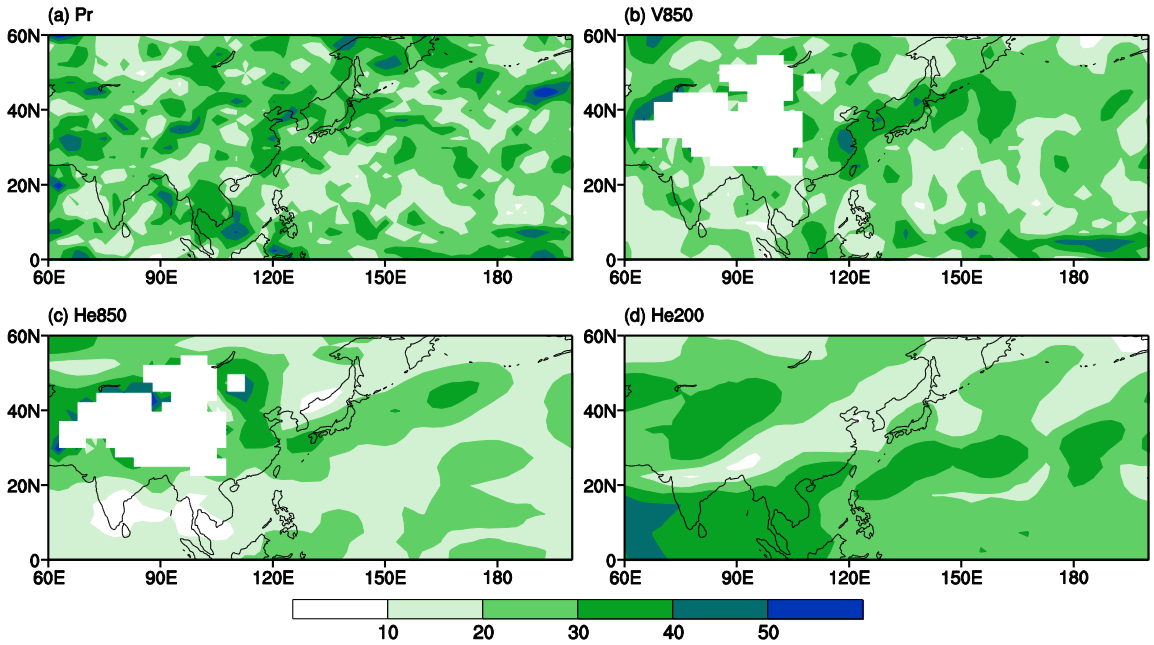


Fig. S2 Same as in Fig. S1, but for the wind (unit: m/s) and eddy gepotential height (unit: m) at 850 hPa.



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39 **Fig. S3** The ratio (%) for the simulated response to COVID-19 w.r.t. the standard
40 deviation of the interannual variability based on the MME of the five selected models
41 participating in COVID-MIP, for precipitation (a), meridional wind at 850 hPa (b), eddy
42 geopotential height at 850 hPa (c), and eddy geopotential height at 200 hPa (d).

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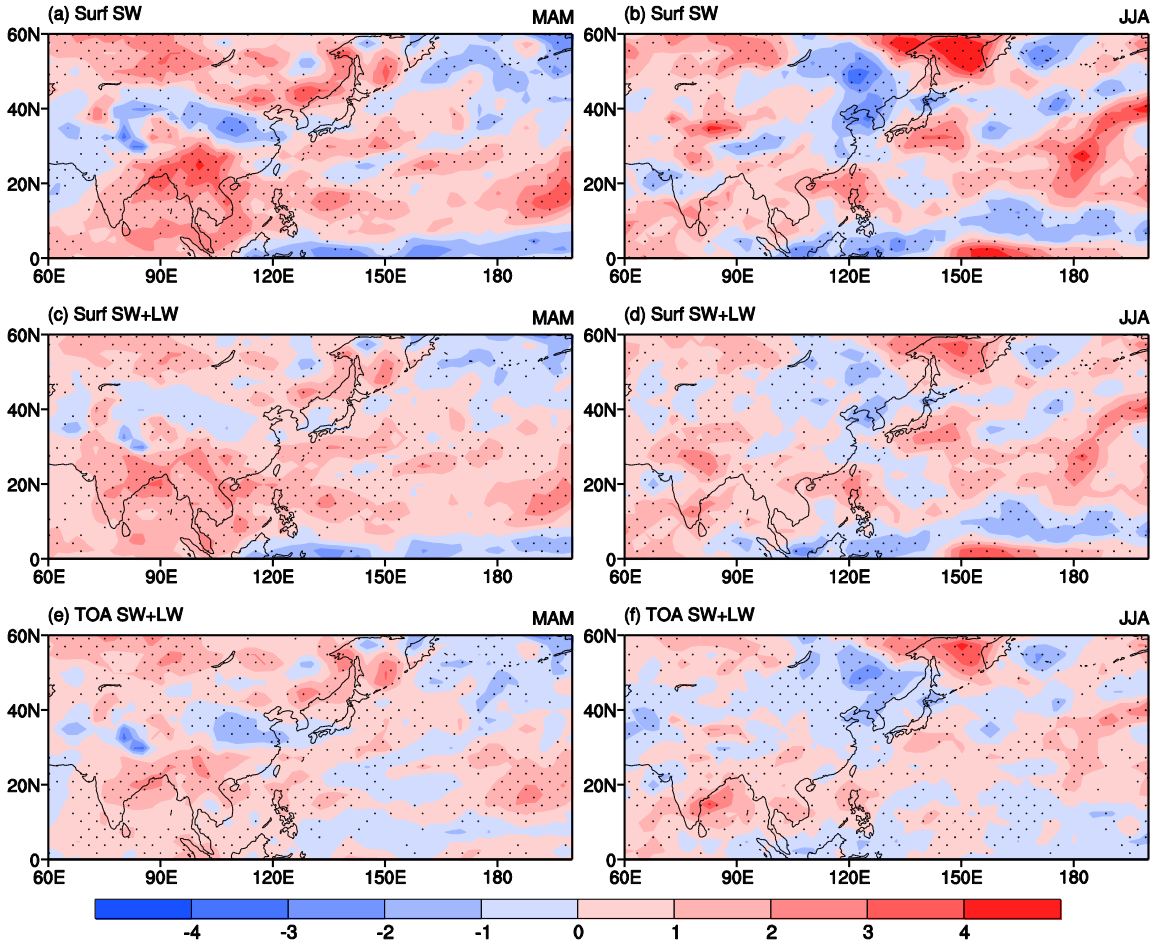
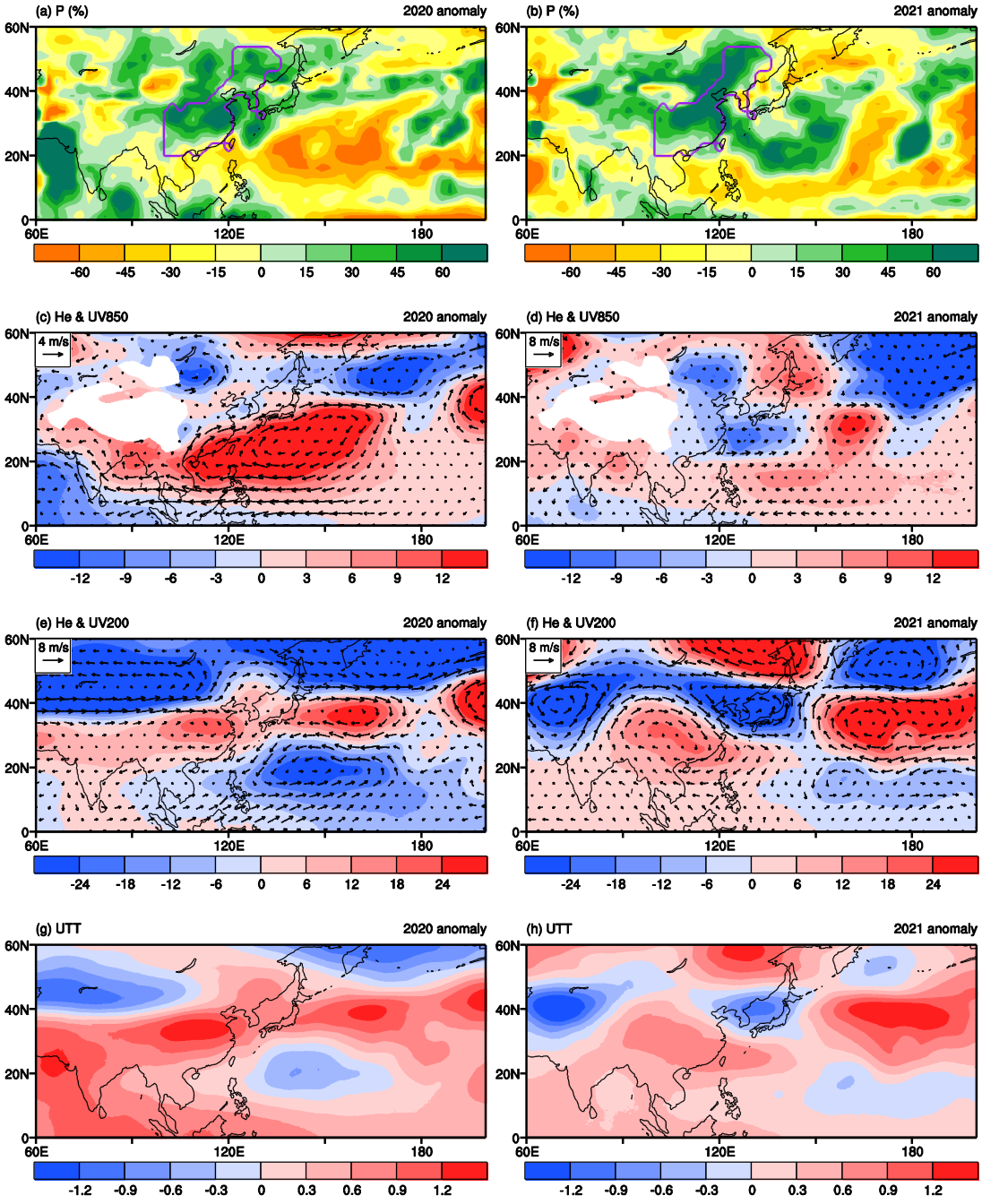


Fig. S4 Response of the net surface shortwave radiation (a,b), net surface shortwave plus longwave radiation (c,d) and TOA shortwave plus longwave radiation (e,f) to COVID-19 forcing (unit: W/m^2, positive downward), based on four of the five selected models participating in COVID-MIP (CanESM5 excluded because of no available output). Left and Right panels are for MAM and JJA, respectively.



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52 **Fig. S5** Same as Fig. 7 in the main text but for the observed anomalies in 2020 (left

53 column) and 2021 (right column), respectively.

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