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Evaluation of global teleconnections in CMIP6 climate projections using complex networks

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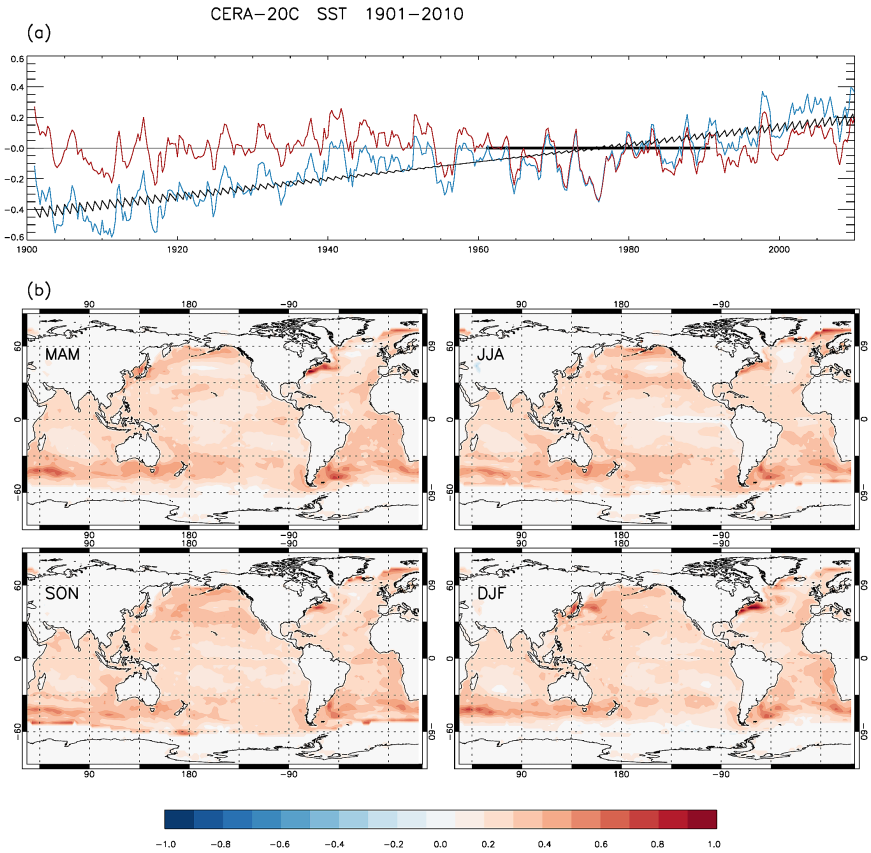

Figure S1: Linearly detrended CERA-20C SST fields over the time period 1901–2010. (a) Global mean SST anomaly (GMSSTa) wrt. base period 1961–1990 (blue), forced component of GMSSTa (black), and residual (red). (b) Seasonal linear-trend patterns (arbitrary units normalized to [-1,1] over all seasons).

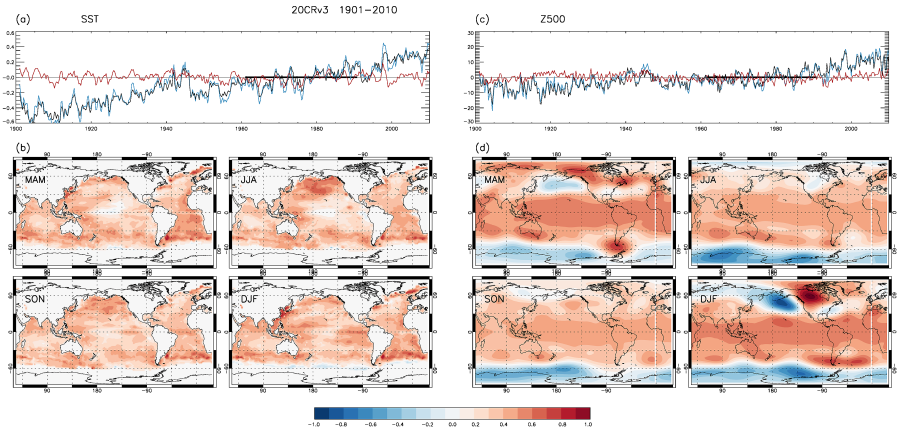

Figure S2: Season-reliant trend-EOF of the 20CRv3 SST and Z500 fields over the time period 1901–2010. Global mean SST (a) and global mean Z500 (c) anomaly wrt. base period 1961–1990 (blue), forced component thereof (black), residual (red). (b) and (d) respective seasonal trend-loading patterns in physical space (arbitrary units normalized to [-1,1] over all seasons).

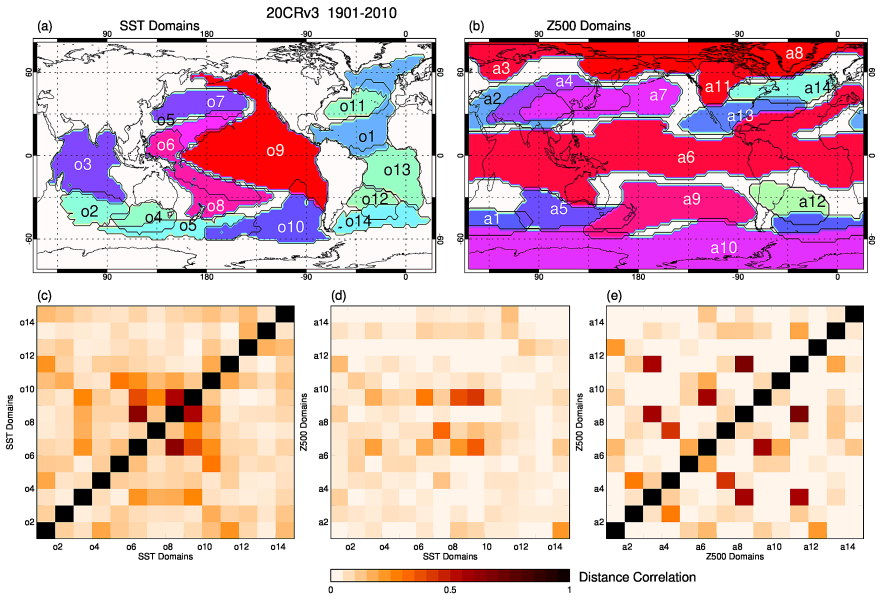

Figure S3: Domains of the 20CRv3 (a) SST and (b) Z500 fields over the time period 1901–2010 (arbitrary colors). Maximum lagged distance correlation links between (c) SST and (e) Z500 domains and (d) cross-links.

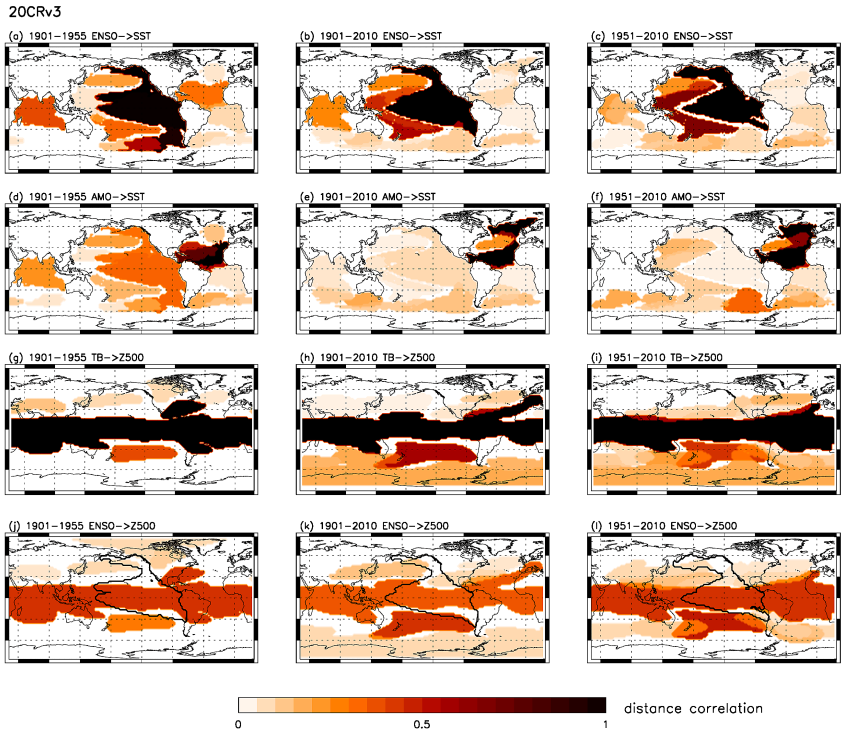

Figure S4: Spatially distributed maximum lagged distance correlation links and cross-links between SST and/or Z500 domains in 20CRv3. (a)–(c) ENSO (black) to SST domains; (d)–(f) tropical North Atlantic (AMO, black) to SST domains; (g)–(i) tropical belt (TB, black) to Z500 domains; (j)–(l) ENSO (contoured) to Z500 domains. (a),(d),(g),(j) time period 1901–1955, (b),(e),(h),(k) time period 1901–2010, (c),(f),(i),(l) time period 1951–2010.

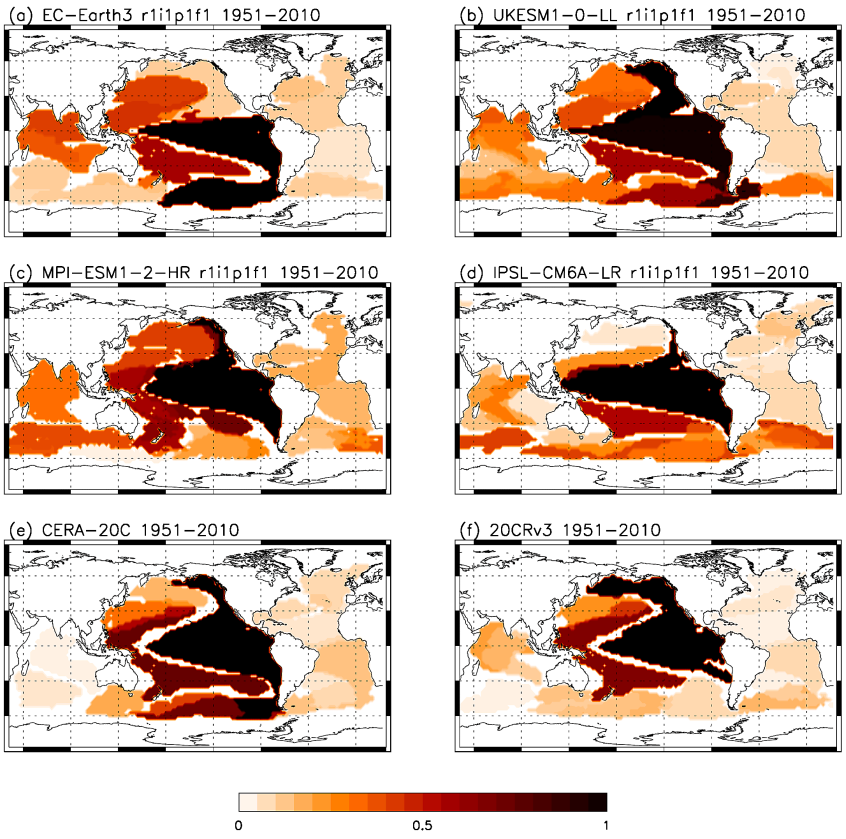

Figure S5: Spatially distributed maximum lagged distance correlation links between the ENSO SST domain (black) and all other SST domains over the time period 1951–2010. (a) EC-Earth3, (b) UKESM1-0-LL, (c) MPI-ESM1-2-HR, (d) IPSL-CM6A-LR,(e) CERA-20C, (f) 20CRv3

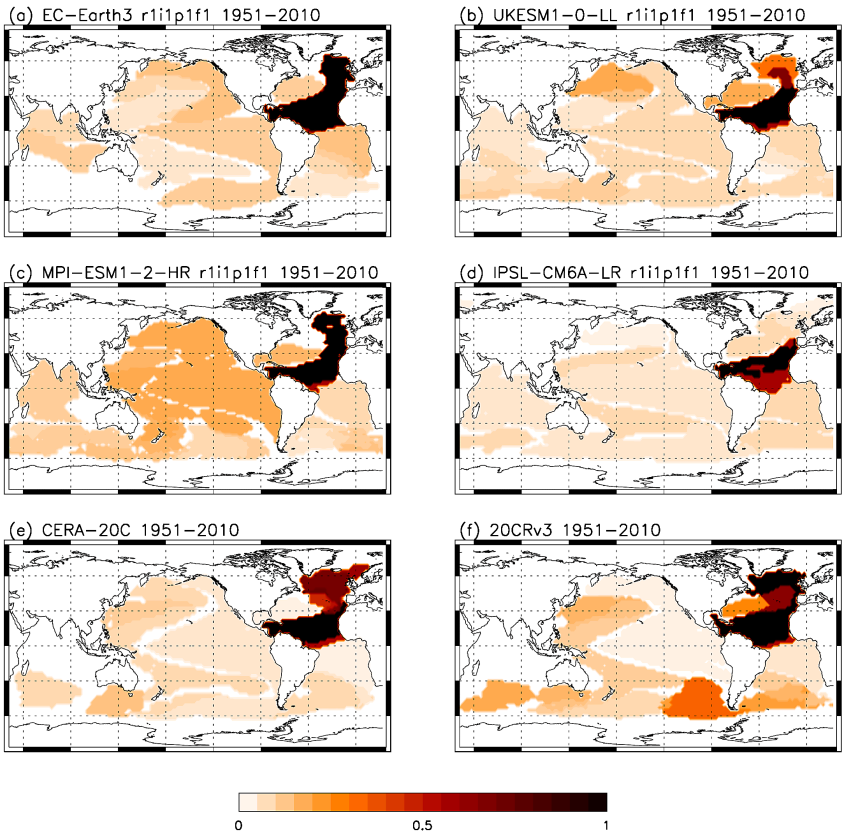

Figure S6: Spatially distributed maximum lagged distance correlation links between the AMO SST domain (black) and all other SST domains over the time period 1951–2010. (a) EC-Earth3, (b) UKESM1-0-LL, (c) MPI-ESM1-2-HR, (d) IPSL-CM6A-LR,(e) CERA-20C, (f) 20CRv3

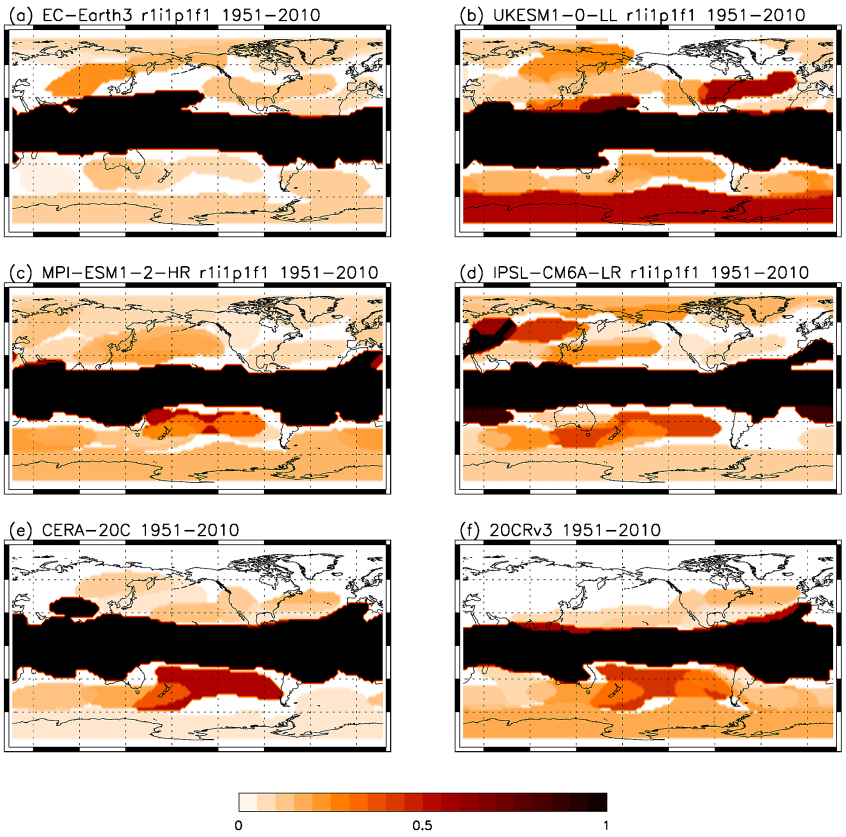

Figure S7: Spatially distributed maximum lagged distance correlation links between the TB Z500 domain (black) and all other Z500 domains over the time period 1951–2010. (a) EC-Earth3, (b) UKESM1-0-LL, (c) MPI-ESM1-2-HR, (d) IPSL-CM6A-LR,(e) CERA-20C, (f) 20CRv3

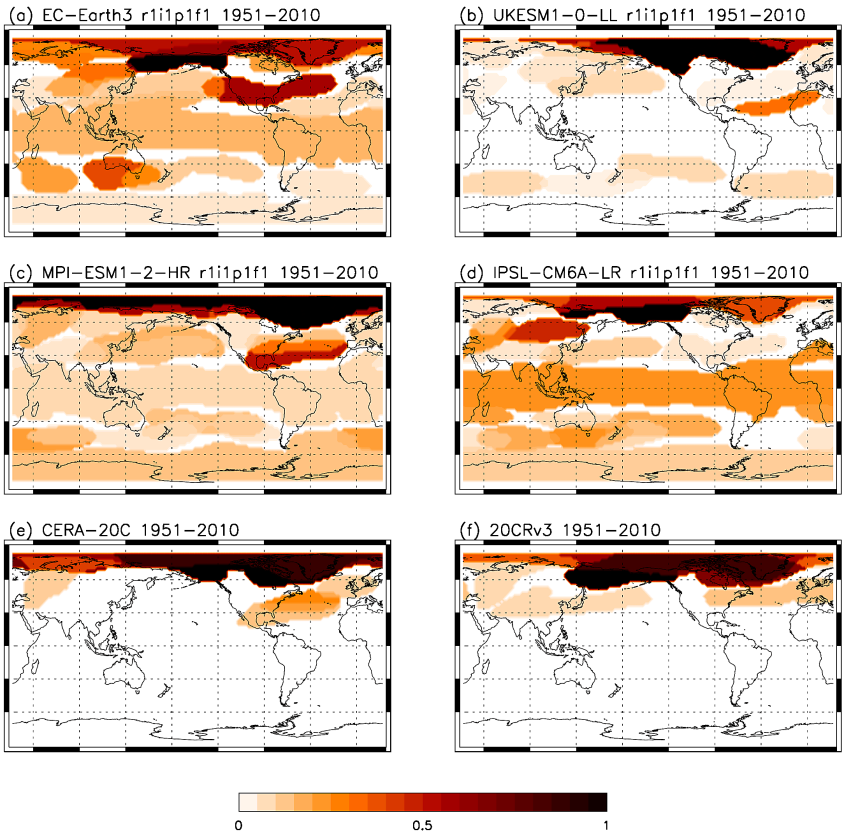

Figure S8: Spatially distributed maximum lagged distance correlation links between a North Polar Z500 domain (black) and all other Z500 domains over the time period 1951–2010. (a) EC-Earth3, (b) UKESM1-0-LL, (c) MPI-ESM1-2-HR, (d) IPSL-CM6A-LR,(e) CERA-20C, (f) 20CRv3

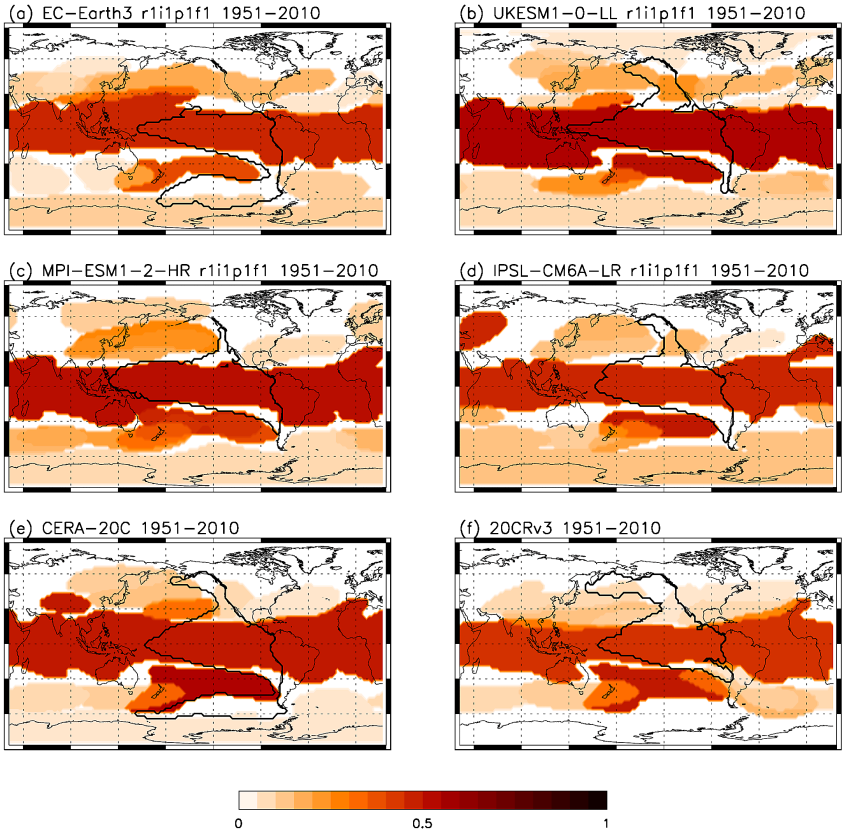

Figure S9: Spatially distributed maximum lagged distance correlation links between the ENSO SST domain (black) and all Z500 domains the time period 1951–2010. (a) EC-Earth3, (b) UKESM1-0-LL, (c) MPI-ESM1-2-HR, (d) IPSL-CM6A-LR,(e) CERA-20C, (f) 20CRv3

Table S1: Similarity (in terms of domain-wise NQS) of individual SST and Z500 domains between CERA-20C and 20CRv3 over 1901–2010

SST domain in CERA-20C	most similar SST domain in 20CRv3	NQS	SST domain in 20CRv3	most similar SST domain in CERA-20C	NQS
o1	o13	0.74	o1	o15	0.73
o2	o2	0.60	o2	o2	0.60
o3	o3	0.73	o3	o3	0.73
o4	o2	0.43	o4	o6	0.62
o5	o7	0.45	o5	o9	0.44
o6	o4	0.62	o6	o7	0.65
o7	o8	0.69	o7	o8	0.65
o8	o7	0.65	o8	o7	0.69
o9	o10	0.59	o9	o11	0.72
o10	o8	0.67	o10	o9	0.59
o11	o9	0.72	o11	o13	0.68
o12	o14	0.62	o12	o12	0.50
o13	o11	0.68	o13	o1	0.74
o14	o1	0.61	o14	o12	0.62
o15	o1	0.73			
o16	o1	0.58			
Z500 domain in CERA-20C	most similar Z500 domain in 20CRv3	NQS	Z500 domain in 20CRv3	most similar Z500 domain in CERA-20C	NQS
a1	a3	0.65	a1	a4	0.55
a2	a3	0.46	a2	a5	0.59
a3	a10	0.66	a3	a1	0.65
a4	a1	0.55	a4	a6	0.57
a5	a2	0.59	a5	a7	0.51
a6	a4	0.57	a6	a15	0.64
a7	a9	0.56	a7	a9	0.51
a8	a8	0.47	a8	a13	0.62
a9	a7	0.51	a9	a12	0.67
a10	a7	0.50	a10	a3	0.66
a11	a11	0.52	a11	a13	0.62
a12	a9	0.67	a12	a3	0.39
a13	a3	0.63	a13	a14	0.54
a14	a13	0.54	a14	a16	0.49
a15	a6	0.64			
a16	a14	0.49			
a17	a14	0.38			