

Supplementary Information

Patterns and Frequency of Projected Future Tropical Cyclone Genesis are Governed by Dynamic Effects

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This file includes Supplementary Tables S1–S2 and Figures S1–S10.

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Supplementary Table

Table S1 List of CMIP5 models used in this study. The model-dependent criteria for TC detection are the relative vorticity at 850 hPa, temperature anomaly, and duration. The last column indicates the future scenarios used in this study.

Model name	Expanded model name	Horizontal resolution	TC detection criteria			Simulation Used	
		[lat x lon]	ζ_{850} (m/s)	t_a (K)	d (hours)	RCP4.5	RCP8.5
ACCESS1-0	Australian Community Climate and Earth System Simulator, version 1.0	1.2500×1.8750	3.500×10^{-5}	0.75	30	✓	
BCC_CSM1.1	Beijing Climate Center, Climate System Model, version 1.1	1.1250×1.1250	1.675×10^{-4}	1.00	36	✓	✓
BCC_CSM1.1.M	Beijing Climate Center, Climate System Model, version 1.1 with a modelate resolution	1.1250×1.1250	1.675×10^{-4}	1.00	36	✓	✓
CCSM4	Community Climate System Model, version 4	1.25000×0.93758	8.000×10^{-5}	1.00	36	✓	✓
CMCC-CM	Centro Euro-Mediterraneo per I Cambiamenti Climatici Climate Model	0.7500×0.7500	1.575×10^{-4}	1.00	36	✓	✓
CNRM-CM5	Centre National de Recherches Meteorologiques Coupled Global Climate Model, version 5	1.4062×1.4062	4.500×10^{-5}	0.90	36	✓	✓
CSIRO Mk3.6.0	Commonwealth Scientific and Industrial Research Organisation Mark, version 3.6.0	1.8750×1.8750	7.550×10^{-5}	1.00	36	✓	✓
GFDL-CM3	NOAA Geophysical Fluid Dynamics Laboratory, Climate Model version 3	2.0000×2.5000	1.100×10^{-5}	0.70	36	✓	
GFDL-ESM2G	NOAA Geophysical Fluid Dynamics Laboratory, Earth System Model Version 2G	2.0225×2.0000	5.380×10^{-5}	1.00	36	✓	
GFDL-ESM2M	NOAA Geophysical Fluid Dynamics Laboratory, Earth System Model Version 2M	2.0225×2.5000	5.400×10^{-5}	1.00	36	✓	
HadGEM2-ES	Hadley Centre Global Environment Model, version 2-Earth System	1.8750×1.2500	6.100×10^{-5}	1.00	36	✓	✓
IPSL-CM5A-MR	IPSL (Institut Pierre Simon Laplace, Paris), version 5a, low-resolution configuration	1.2676×2.5000	1.000×10^{-6}	0.50	36	✓	
MIROC5	Model for Interdisciplinary Research on Climate, version 5	1.4062×1.4062	8.000×10^{-5}	1.00	36	✓	✓
MIROC-ESM	Model for Interdisciplinary Research on Climate, Earth System Model	2.7906×2.8125	5.000×10^{-6}	0.80	18	✓	
MIROC-ESM-CHEM	Model for Interdisciplinary Research on Climate, Earth System Model, Chemistry Coupled	2.7906×2.8125	5.000×10^{-6}	0.80	18	✓	
MPI-ESM-LR	Max Planck Institute Earth System Model, low resolution	1.8750×1.8750	4.000×10^{-5}	0.90	36	✓	✓
MPI-ESM-MR	Max Planck Institute Earth System Model, medium resolution	1.8750×1.8750	4.000×10^{-5}	0.70	36	✓	✓
MRI-CGCM3	MRI Coupled Atmosphere–Ocean General Circulation Model, version 3	1.1250×1.1250	1.560×10^{-4}	1.00	36	✓	✓
NoRESM1-M	Norwegian Climate Center's Earth System Model	2.7905×2.8125	2.125×10^{-5}	0.70	24	✓	

Supplementary Figures

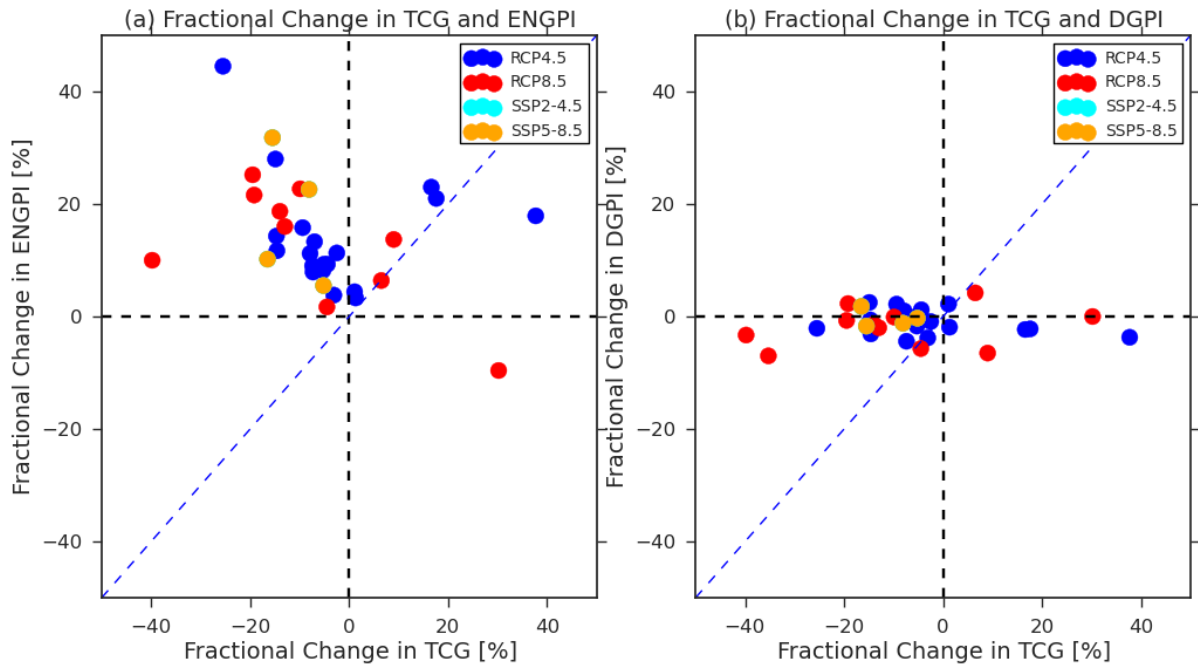


Fig. S1 Scatter plots between TCG changes and GPI changes. (a) ENGPI vs TCG, (b) DGPI vs TCG.

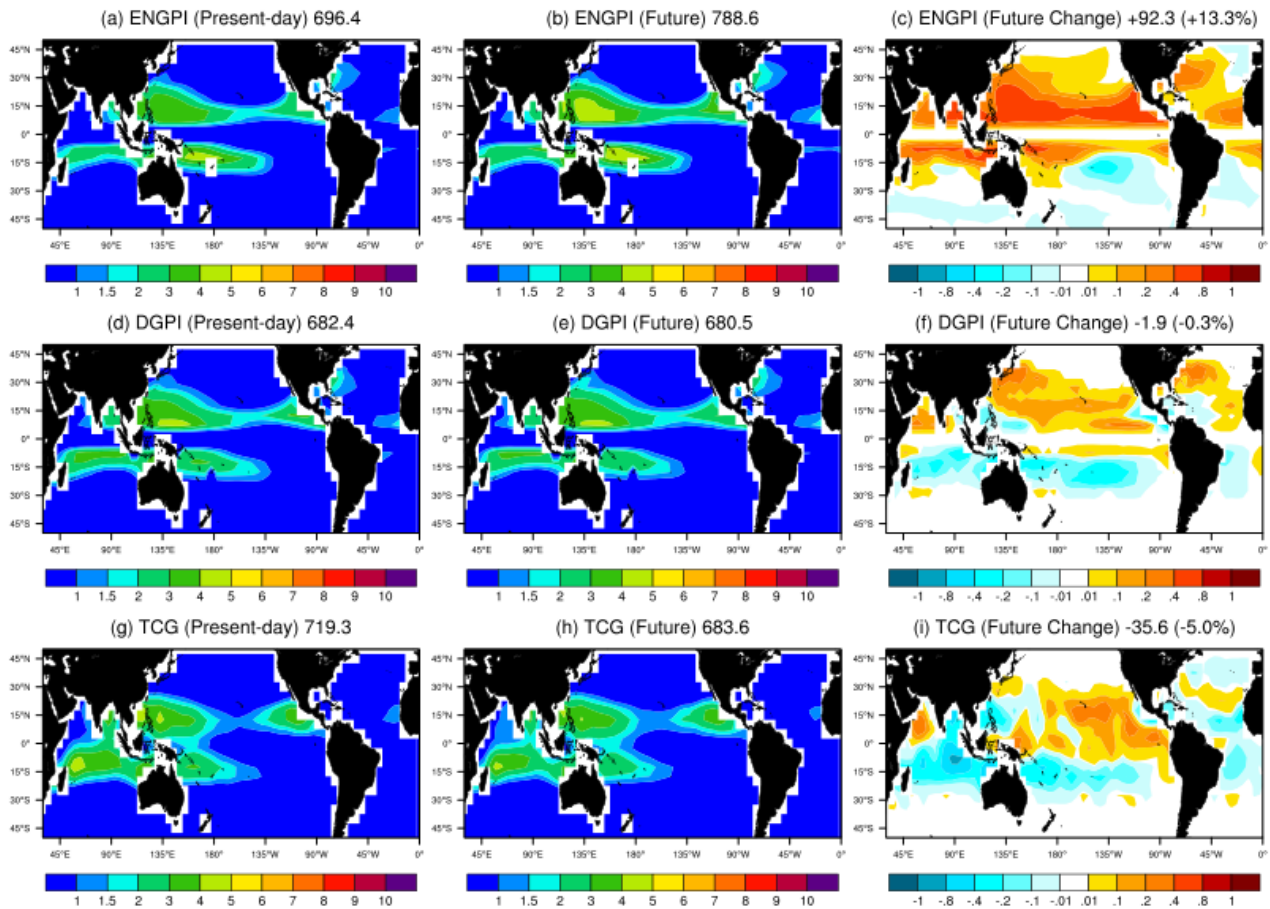


Fig. S2 As in Fig. 2, but for the ensemble mean of the 19 CMIP5 models under the RCP4.5 scenario.

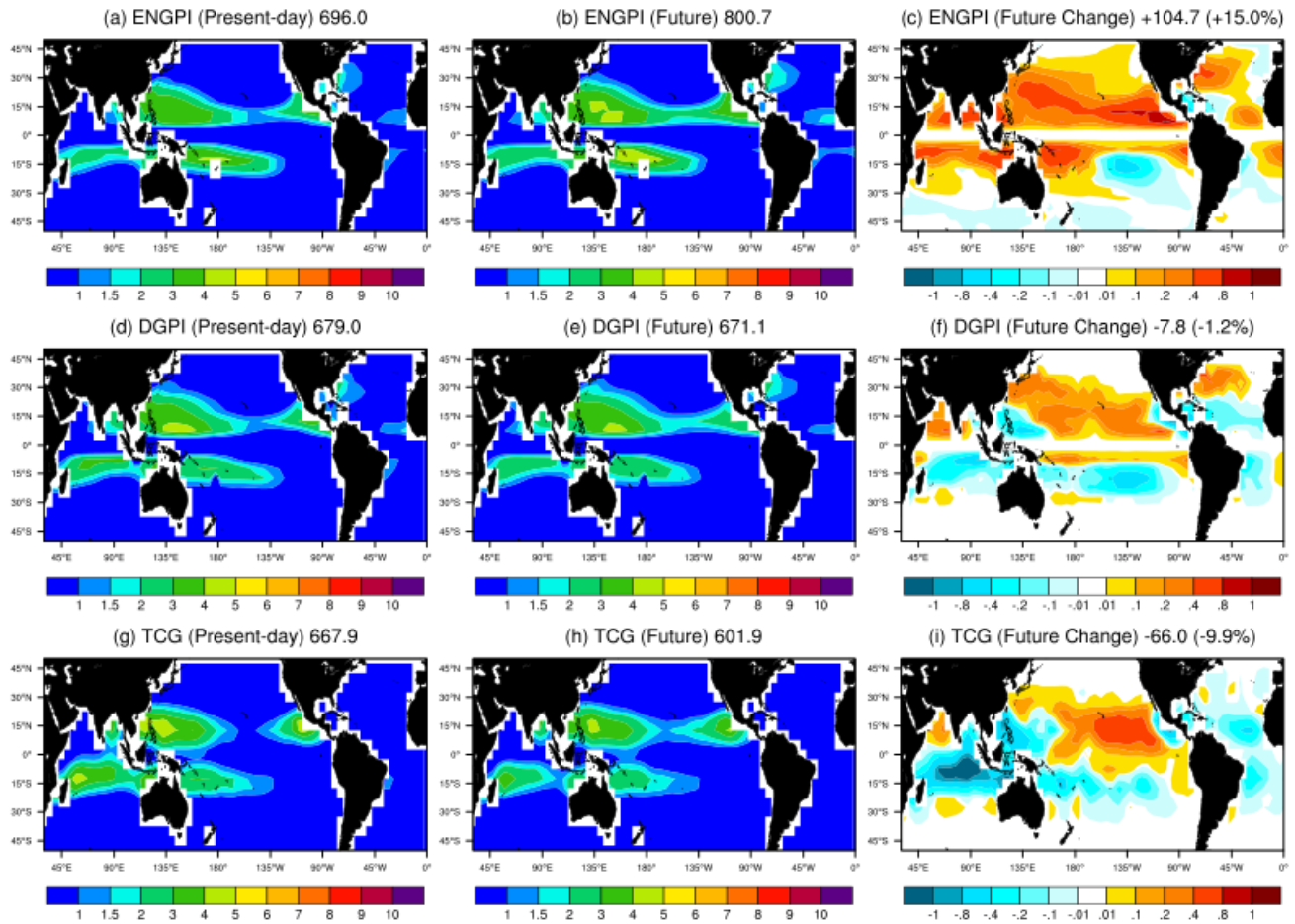


Fig. S3 As in Fig. 2, but for the ensemble mean of the 11 CMIP5 models under the RCP8.5 scenario.

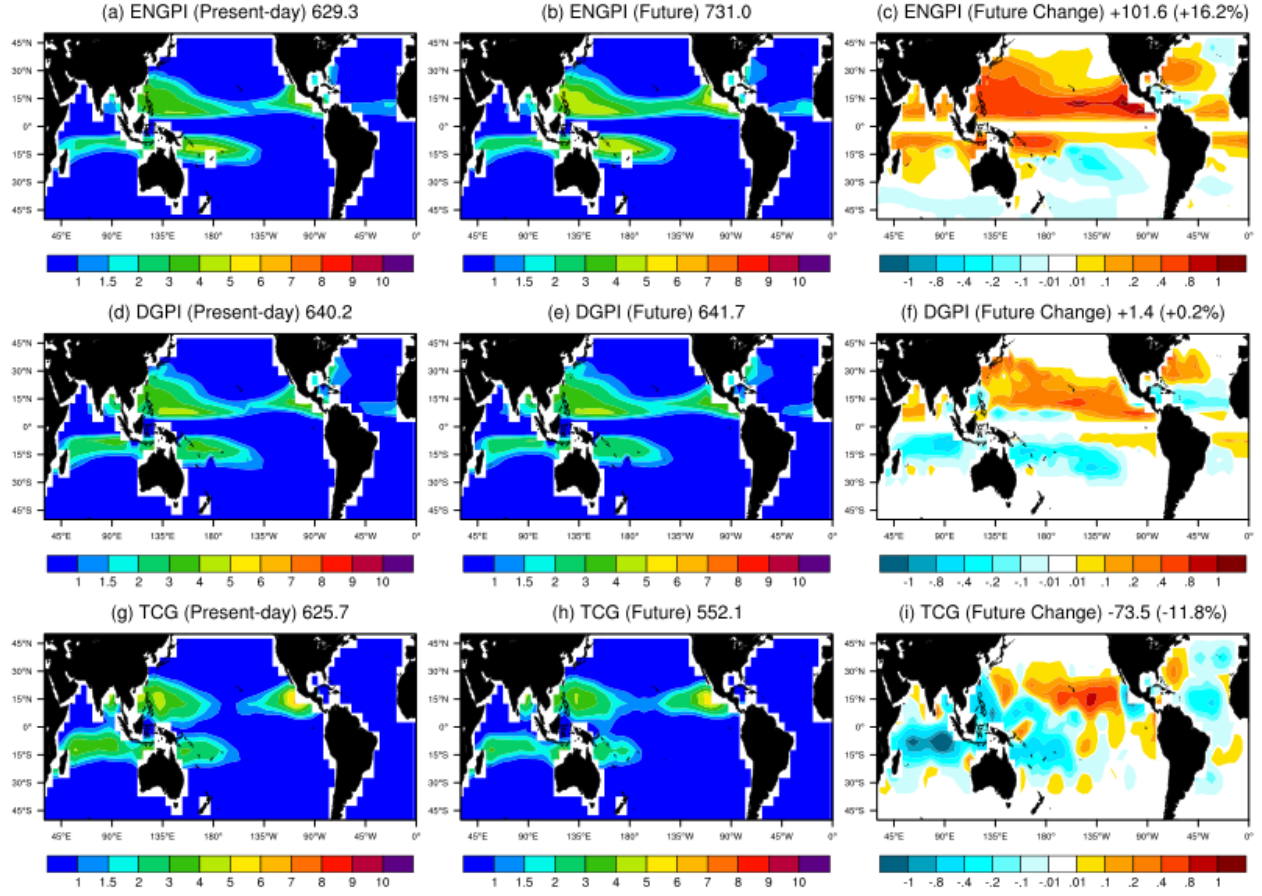


Fig. S4 As in Fig. 2, but for the ensemble mean of the 4 CMIP6 models under the SSP2-4.5 scenario.

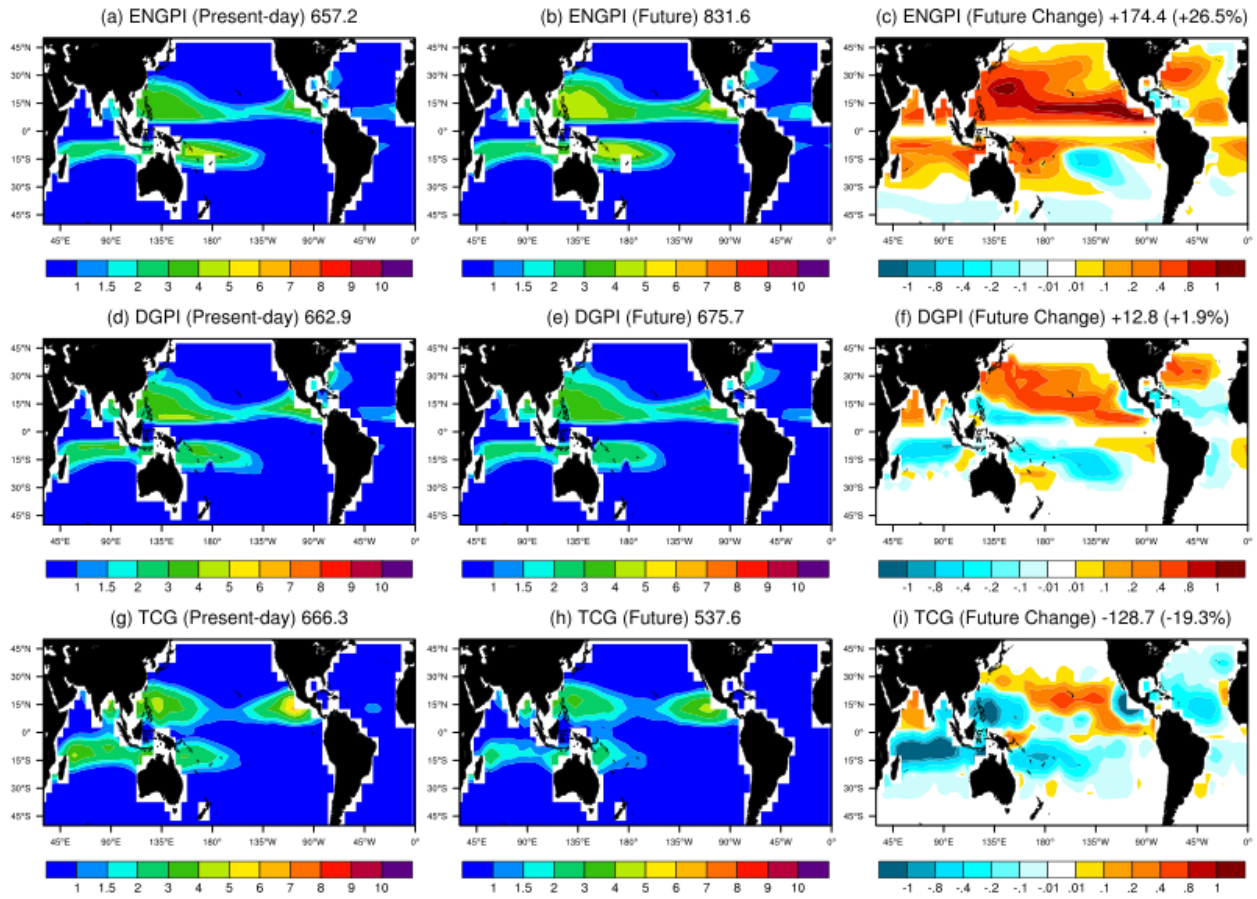


Fig. S5 As in Fig. 2, but for the ensemble mean of the 6 CMIP6 models under the SSP5-8.5 scenario.

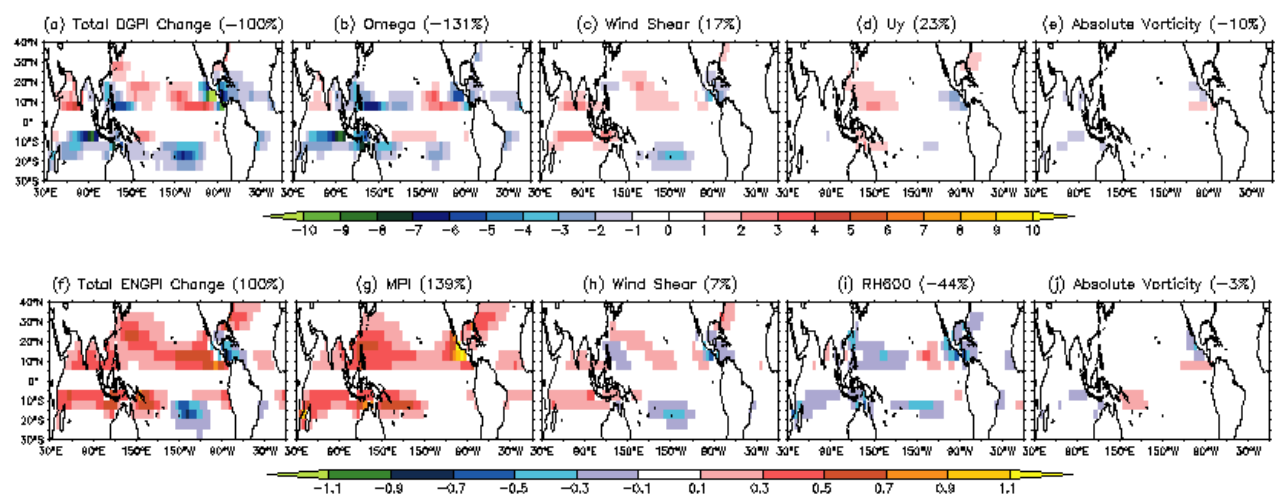


Fig. S6 As in Fig. 4, but for the ensemble mean of the 9 CMIP5 models under the RCP8.5 scenario.

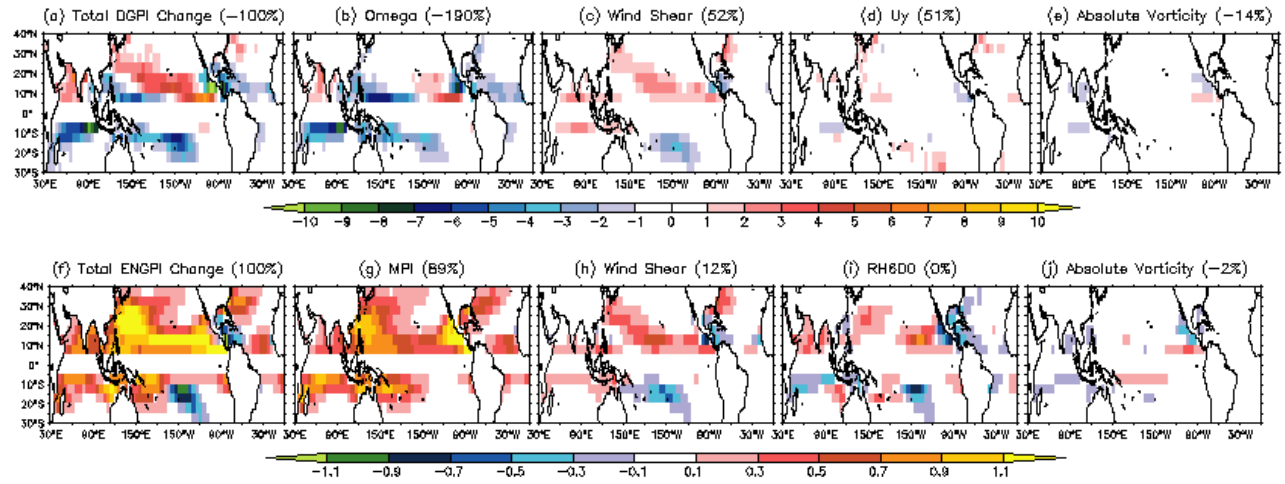


Fig. S7 As in Fig. 4, but for the CMIP6 models under the SSP5-8.5 scenario.

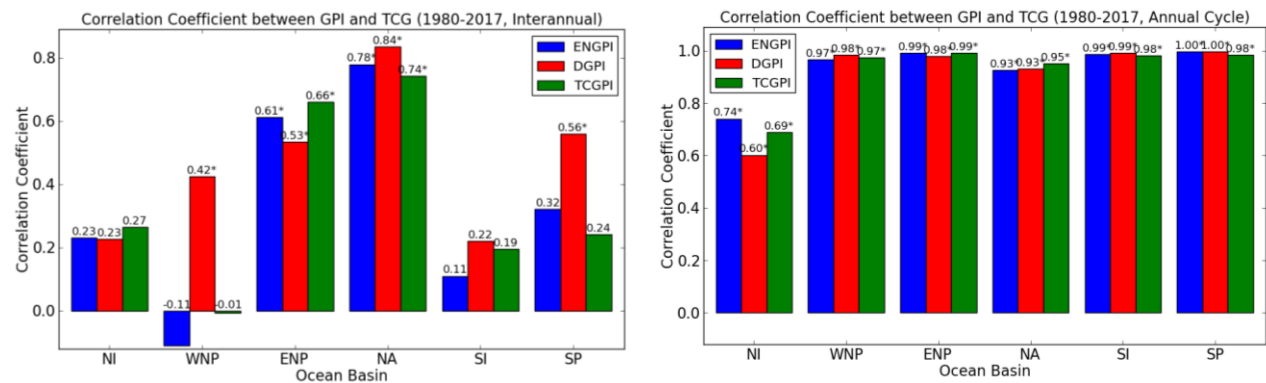


Fig. S8 (a, b) As in Figs. 1c, d, except for including Tippet et al. GPI³⁹ (green).

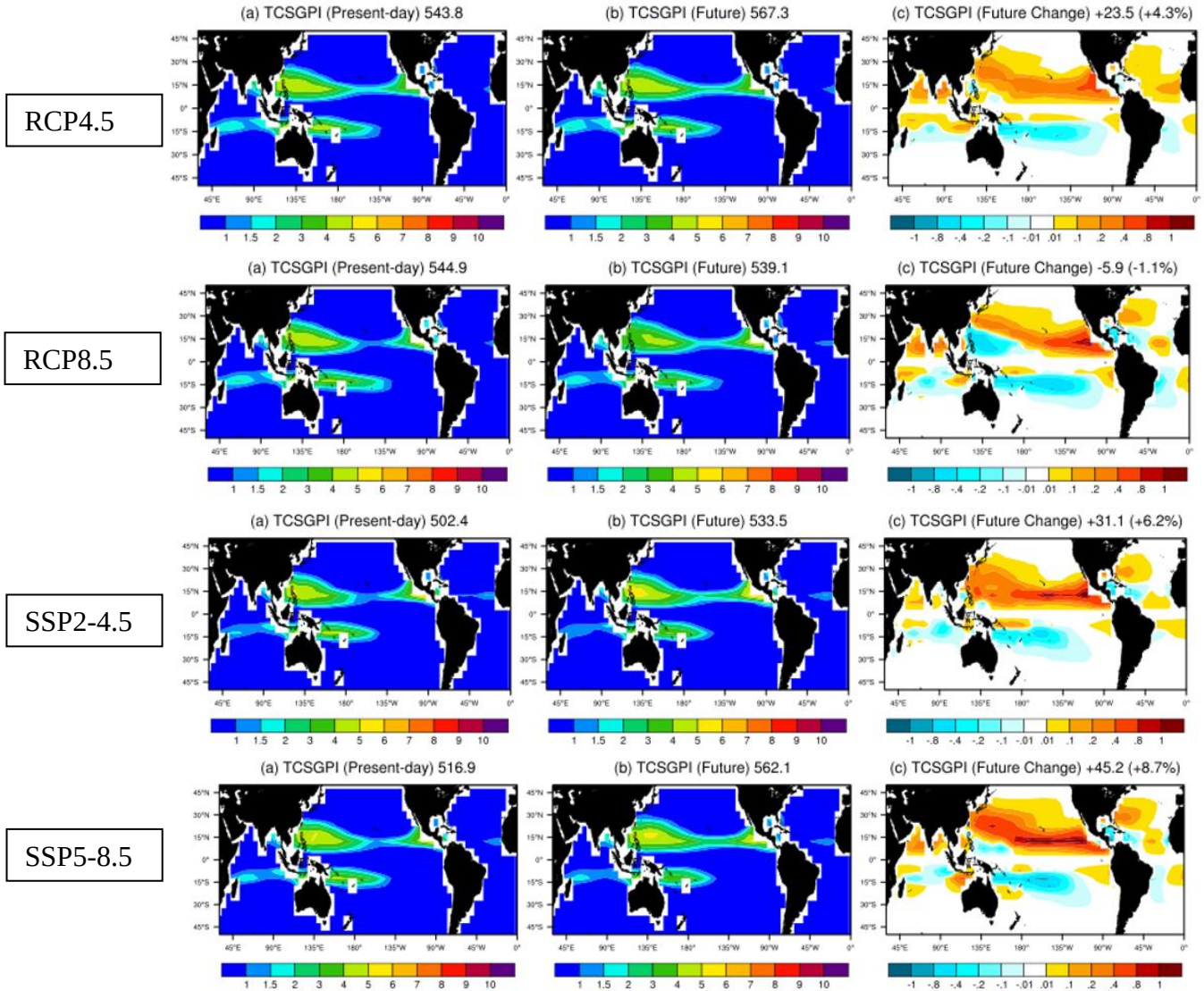


Fig. S9 Simulated Tippet et al.'s GPI³⁶ for the RCP4.5, RCP8.5, SSP2-4.5, and SSP5-8.5 scenarios from top. Left columns show the present-day mean (1979–2003). Middle columns represent the future mean (2075–2099). Right columns show the projected future change. The meaning of the numbers in the panel is the same as Fig. 2.

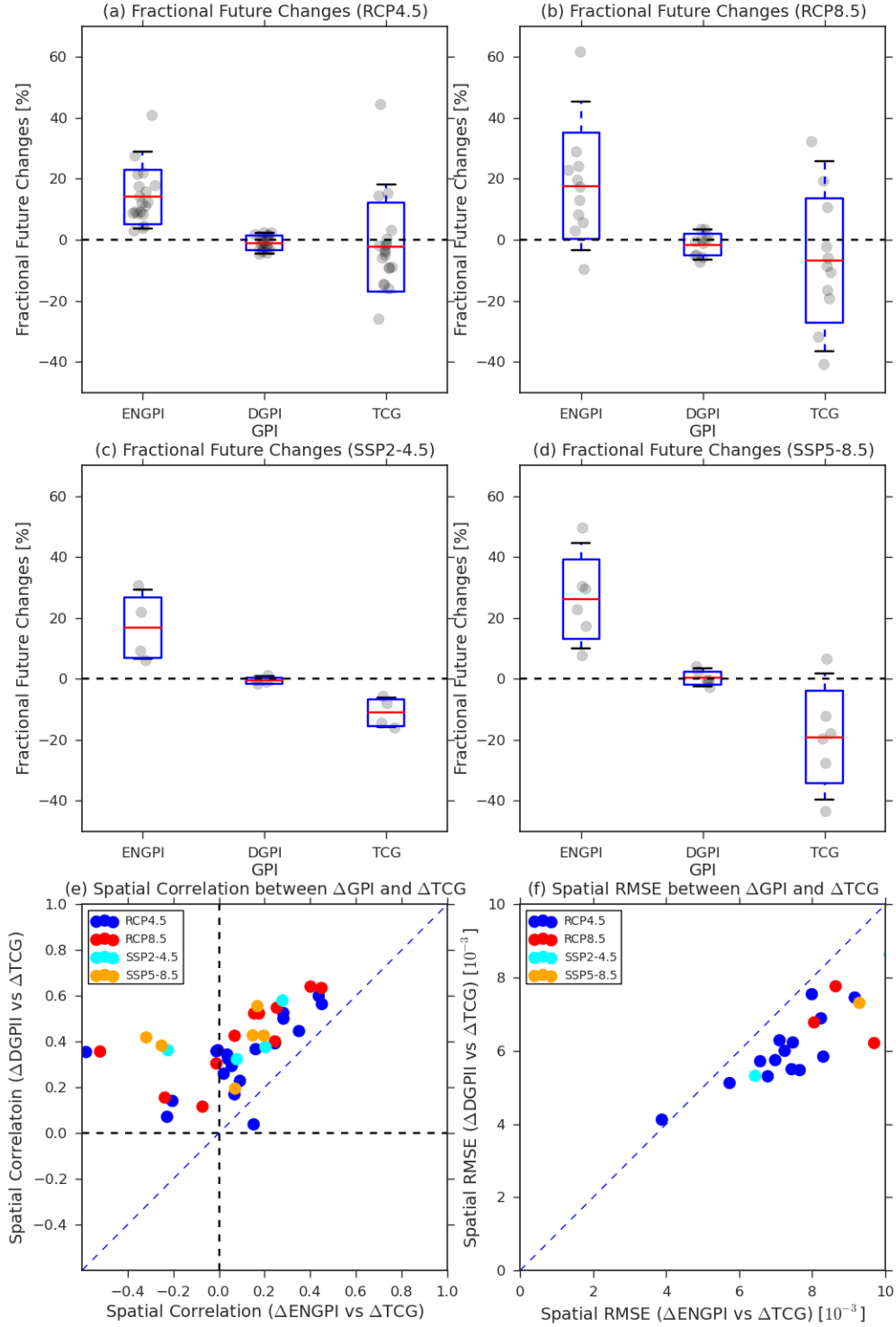


Fig. S10 As in Fig. 3, but for the peak storm season (May–October for the Northern Hemisphere and November–April for the Southern Hemisphere).