Supplementary Tables

Table S1 | Metadata for climate metrics

Ocean climate variable	ESGF metadata	Earth System Models (ESMs)		Climate metric	Calculation	IPCC emissions scenarios	
Sea surface temperature (SST) (Temperature of upper boundary of the liquid ocean, including temperatures below sea-ice and floating ice shelves °C)	Frequency: SST – Daily; O_2, pH – Monthly Variants: r1i1p1f1, r1i1p1f2 Grid: gn, gr Years: Recent past (1995–2014) Projections (2021–2100)	ACCESS-ESM1-5 ACCESS-CM2 CanESM5 CMCC-ESM2 CNRM-ESM2-1 IPSL-CM6A-LR	MIROC6 MPI-EMS1-2-HR MRI-ESM2-0 NorESM2-LM NorESM2-MM	Rate of change (decade^{-1})	20-year slope of the regression, representing the rate of change of anomalous values relative to the mean baseline climatology (1995–2014). Analysis not-depth resolved, only surface layers used.	SSP1–2.6	Net-zero CO_2 emissions in the second half of the century. Surface warming estimates of below 2.0°C (relative to 1850–1900).
				Cumulative MHW intensity (degree days decade^{-1})	As in Hobday et al. (2016), calculated as the mean intensity multiplied by the duration of each event in each year, and ensembled across ESMs for each IPCC emissions scenario. Calculated using the *heatwaveR* package (Schlegel & Smit, 2018).	SSP2–4.5	Scenario in line with the upper end of Nationally Determined Contributions emissions levels by 2030. CO_2 emissions remain at current levels until mid-century. Surface warming estimates of 2.7°C by 2100 (relative to 1850–1900).
				Climate velocity (km decade^{-1})	Calculated as gradient-based magnitude climate velocity — the ratio between the long-term temporal trend in climate conditions multiplied by the spatial gradient in climate conditions. Calculated using the *VoCC* R package (rewritten for *terra*, owing to the deprecation of *raster* and *sp* following the removal of support in October 2023).	SSP3–7.0	Intermediate-high scenario resulting from no additional climate policy. CO_2 emissions double from current levels by 2100. Surface warming estimates of 2.8–4.6°C by 2100 (relative to 1850–1900).
Oxygen content (Dissolved Oxygen Concentration µg L^{-1})		ACCESS-ESM1-5 CanESM5 CMCC-ESM2 CNRM-ESM2-1 GFDL-ESM4	IPSL-CM6A-LR MIROC-ES2L MPI-EMS1-2-HR NorESM2-LM NorESM2-MM	Rate of change (decade^{-1})	20-year slope of the regression, representing the rate of change of anomalous values relative to the mean recent past (1995–2014). Analysis not-depth resolved, only surface layers used.	SSP5–8.5	High reference scenario, no additional climate policy is implemented. CO_2 emissions double from current levels by 2100. Surface warming estimates of 3.3–5.7°C by 2100 (relative to 1850–1900). For more information, see Cross-Chapter Box 1.4, Table 1 in Chen et al. (2021)
pH (Negative log of hydrogen ion concentration with the concentration expressed as mol H kg^{-1})		CESM2-WACCM CMCC-ESM2 CNRM-ESM2-1 GFDL-ESM4 IPSL-CM6A-LR	MIROC-ES2L MPI-EMS1-2-HR NorESM2-LM NorESM2-MM				

Table S2 | Summary statistics of climate metrics within the EEZ

				SSP1–2.6				SSP2–4.5				SSP3–7.0				SSP5–8.5			
			Recent	Near	Mid	Int	Long	Near	Mid	Int	Long	Near	Mid	Int	Long	Near	Mid	Int	Long
Rate of change	SST (^{o}C $decade^{-1}$)	Median	0.066	0.066	0.02	-0.089	-0.062	0.114	0.07	0.06	0.018	0.086	0.222	0.2	0.259	0.148	0.27	0.304	0.344
		Q1	0.305	0.032	-0.011	-0.132	-0.093	0.076	0.03	0.031	-0.031	0.034	0.162	0.146	0.216	0.089	0.241	0.216	0.302
		Q3	0.101	0.108	0.046	-0.041	-0.038	0.153	0.114	0.094	0.068	0.142	0.262	0.239	0.293	0.204	0.3	0.356	0.384
		Min	-0.097	-0.007	-0.154	-0.321	-0.180	-0.022	-0.084	-0.075	-0.221	-0.0975	0.030	0.031	0.109	0.037	0.045	0.065	0.08
		Max	0.275	0.303	0.153	0.112	0.048	0.315	0.437	0.256	0.191	0.363	0.371	0.533	0.618	0.443	0.578	0.554	0.658
	pH ($decade^{-1}$)	Median	-1.71x10-2	$-1.9x10^{-2}$	$-7.0x10^{-3}$	$1.8x10^{-3}$	$8.7x10^{-3}$	$-2.5x10^{-2}$	$-2.3x10^{-2}$	$-1.7x10^{-2}$	$-5.7x10^{-3}$	$-3.1x10^{-2}$	$-3.5x10^{-2}$	$-3.6x10^{-2}$	$-3.7x10^{-2}$	$-3.4x10^{-2}$	$-4.7x10^{-2}$	$-5.8x10^{-2}$	$-5.4x10^{-2}$
		Q1	-1.87x10-2	$-2.0x10^{-2}$	$-7.7x10^{-3}$	$1.2x10^{-3}$	$8.2x10^{-3}$	$-2.7x10^{-2}$	$-2.4x10^{-2}$	$-1.8x10^{-2}$	$-6.3x10^{-3}$	$-3.3x10^{-2}$	$-3.6x10^{-2}$	$-3.7x10^{-2}$	$-3.8x10^{-2}$	$-3.5x10^{-2}$	$-4.9x10^{-2}$	$-6.0x10^{-2}$	$-5.5x10^{-2}$
		Q3	-1.64x10-2	$-1.8x10^{-2}$	$-6.3x10^{-3}$	$2.4x10^{-3}$	$9.2x10^{-3}$	$-2.4x10^{-2}$	$-2.2x10^{-2}$	$-1.6x10^{-2}$	$-5.1x10^{-3}$	$-3.0x10^{-2}$	$-3.4x10^{-2}$	$-3.5x10^{-2}$	$-3.7x10^{-2}$	$-3.2x10^{-2}$	$-4.6x10^{-2}$	$-5.7x10^{-2}$	$-5.3x10^{-2}$
		Min	-2.17x10-2	$-2.2x10^{-2}$	$-1.3x10^{-2}$	$-1.6x10^{-3}$	$4.9x10^{-3}$	$-2.9x10^{-2}$	$-2.6x10^{-2}$	$-2.0x10^{-2}$	$-9.5x10^{-3}$	$-3.6x10^{-2}$	$-3.8x10^{-2}$	$-3.9x10^{-2}$	$-4.0x10^{-2}$	$-3.6x10^{-2}$	$-5.2x10^{-2}$	$-6.2x10^{-2}$	$-5.9x10^{-2}$
		Max	-1.38x10-2	$-1.6x10^{-2}$	$-4.2x10^{-3}$	$4.4x10^{-3}$	$1.1x10^{-2}$	$-2.1x10^{-2}$	$-1.8x10^{-2}$	$-1.4x10^{-2}$	$-2.2x10^{-3}$	$-2.7x10^{-2}$	$-3.1x10^{-2}$	$-3.2x10^{-2}$	$-3.5x10^{-2}$	$-2.5x10^{-2}$	$-4.1x10^{-2}$	$-5.3x10^{-2}$	$-4.6x10^{-2}$
	O_2 (μg L^{-1} $decade^{-1}$)	Median	-2.3x10-4	$-2.8x10^{-4}$	$2.4x10^{-5}$	$3.7x10^{-4}$	$3.0x10^{-4}$	$-4.3x10^{-4}$	$-2.8x10^{-4}$	$-9.5x10^{-5}$	$-7.1x10^{-5}$	$-5.0x10^{-4}$	$-8.5x10^{-4}$	$-7.5x10^{-4}$	$-8.4x10^{-4}$	$-6.2x10^{-4}$	$-9.8x10^{-4}$	$-1.1x10^{-3}$	$-1.1x10^{-3}$
		Q1	-3.9x10-4	$-4.8x10^{-4}$	$-8.6x10^{-5}$	$-1.4x10^{-4}$	$1.2x10^{-4}$	$-6.7x10^{-4}$	$-4.9x10^{-4}$	$-2.6x10^{-4}$	$-2.3x10^{-4}$	$-7.0x10^{-4}$	$-9.8x10^{-4}$	$-9.1x10^{-4}$	$-1.1x10^{-3}$	$-8.5x10^{-4}$	$-1.1x10^{-3}$	$-1.2x10^{-3}$	$-1.3x10^{-3}$
		Q3	-6.0x10-4	$-8.7x10^{-5}$	$-2.0x10^{-4}$	$-5.6x10^{-4}$	$5.0x10^{-4}$	$-2.8x10^{-4}$	$-9.4x10^{-5}$	$4.7x10^{-5}$	$-1.3x10^{-4}$	$-2.9x10^{-4}$	$-7.4x10^{-4}$	$-6.4x10^{-4}$	$-7.3x10^{-4}$	$-3.4x10^{-4}$	$-8.8x10^{-4}$	$-9.6x10^{-4}$	$-9.9x10^{-4}$
		Min	-1.8x10-3	$-1.6x10^{-3}$	$-9.9x10^{-4}$	$-9.8x10^{-4}$	$-7.9x10^{-4}$	$-1.5x10^{-3}$	$-2.4x10^{-3}$	$-9.9x10^{-4}$	$-1.2x10^{-3}$	$-2.4x10^{-3}$	$-2.5x10^{-3}$	$-2.6x10^{-3}$	$-3.7x10^{-3}$	$-2.6x10^{-3}$	$-3.2x10^{-3}$	$-3.0x10^{-3}$	$-3.1x10^{-3}$
		Max	6.5x10-4	$6.4x10^{-4}$	$-1.6x10^{-3}$	$1.5x10^{-3}$	$1.3x10^{-3}$	$5.5x10^{-4}$	$6.6x10^{-4}$	$8.9x10^{-4}$	$1.3x10^{-3}$	$2.9x10^{-4}$	$-1.6x10^{-4}$	$-3.3x10^{-5}$	$-2.2x10^{-4}$	$-7.1x10^{-4}$	$-3.2x10^{-4}$	$-2.5x10^{-4}$	$-5.8x10^{-4}$
	Cumulative MHW intensity (degree days $decade^{-1}$)	Median	0.08	13.3	21.8	6.6	1.0	18.7	54.7	55.6	42.8	18.3	103	109	131	29.2	131	150	163
		Q1	0.02	8.5	14.3	-0.7	-8.2	13.2	41.3	44.9	29.3	12.0	75.9	97.2	118	17.8	112	117	150
		Q3	0.2	21.9	30.4	13.1	11	28	68.1	64.3	58.0	28.2	115	119	146	44.5	144	167	176
		Min	-0.03	0.3	-13.5	-30.6	-35.2	-0.1	19.6	16.2	-0.9	0.8	39.8	52.0	81.8	2.6	59.5	79.0	82.9
		Max	5.6	56.3	62.7	58.5	58.5	63.9	174	131	98.0	74.5	163	226	239	102	236	229	273
Climate velocity	Climate velocity (km $decade^{-1}$)	Median	34.8	31.8	21.8	3.78	-0.63	48.2	40.2	33.2	24.4	40.3	74.3	65.2	82.9	54.3	86.3	93.8	93.5
		Q1	24.0	17.8	12.9	-3.29	-9.23	28.0	22.9	19.2	13.0	26.9	45.6	43.4	52.8	30.4	57.9	47.2	69.7
		Q3	64.9	67.2	38.5	11.1	9.06	83.4	66.3	66.4	38.5	87.9	135	120	148	108	152	164	175
		Min	0.979	-16.7	-14.4	-70.3	-502	9.11	-7.40	-1.09	-21.0	7.01	16.0	11.5	19.3	9.31	22.4	8.14	33.5
		Max	1532	1673	1002	446	94.4	2145	1897	1439	585	3042	3310	3159	3292	3732	3819	4157	4710

Values represent anomalies relative to the recent past (1995–2014) from an ensemble-median of 9-11 ESMs (see Methods).