

Supplementary Information for

Global South shows higher urban flood exposures than the Global North under current and future scenarios

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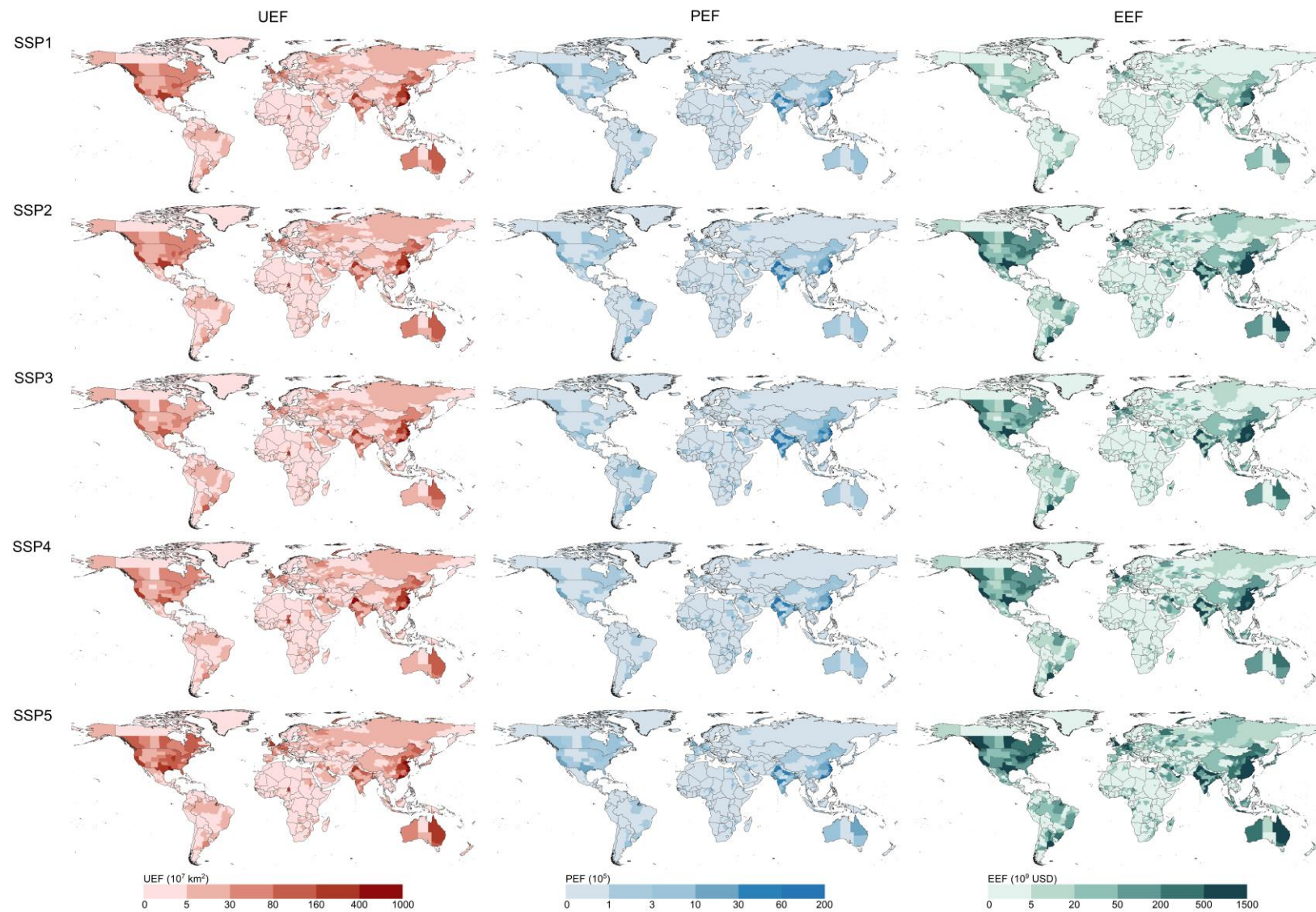
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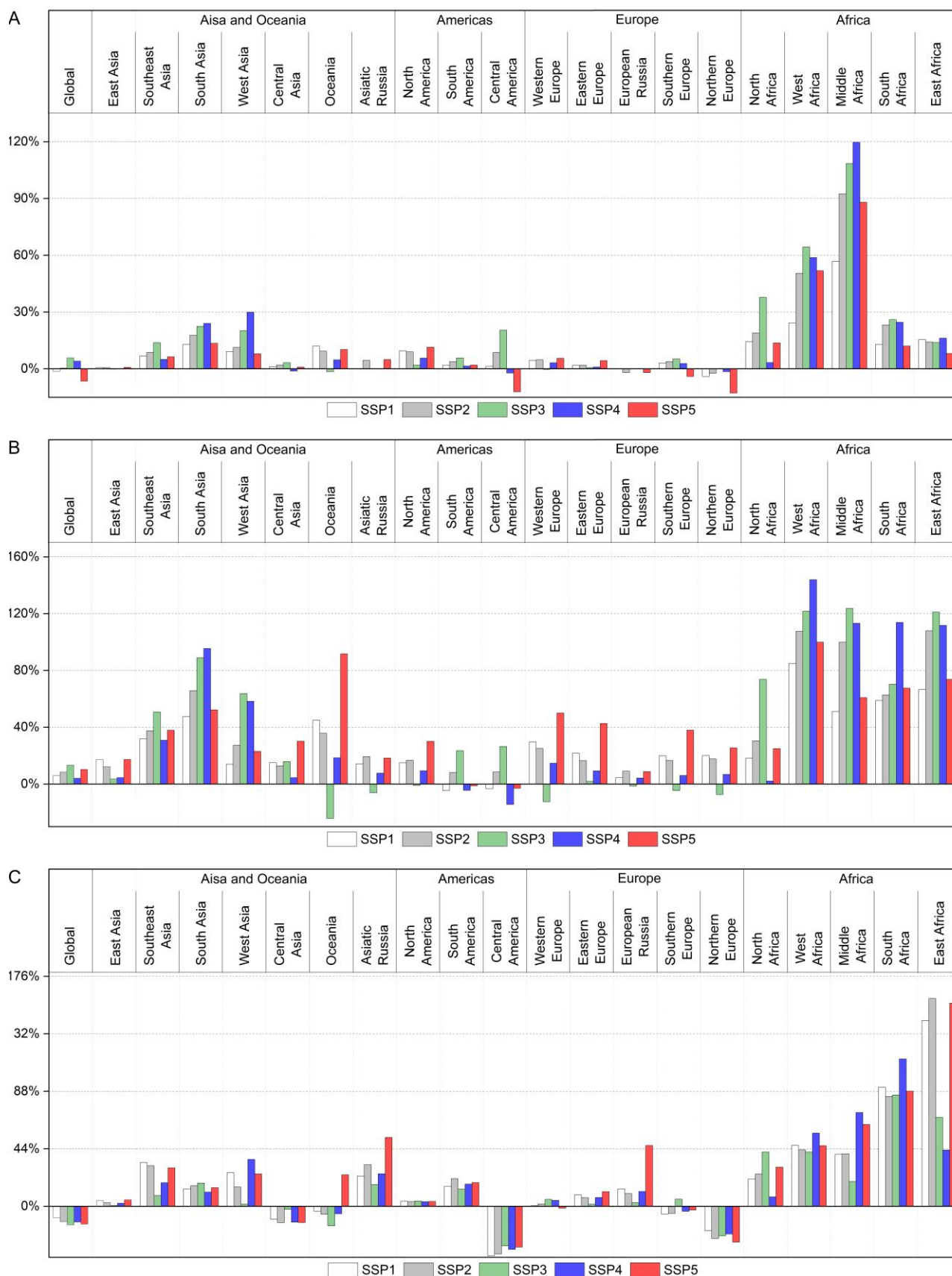
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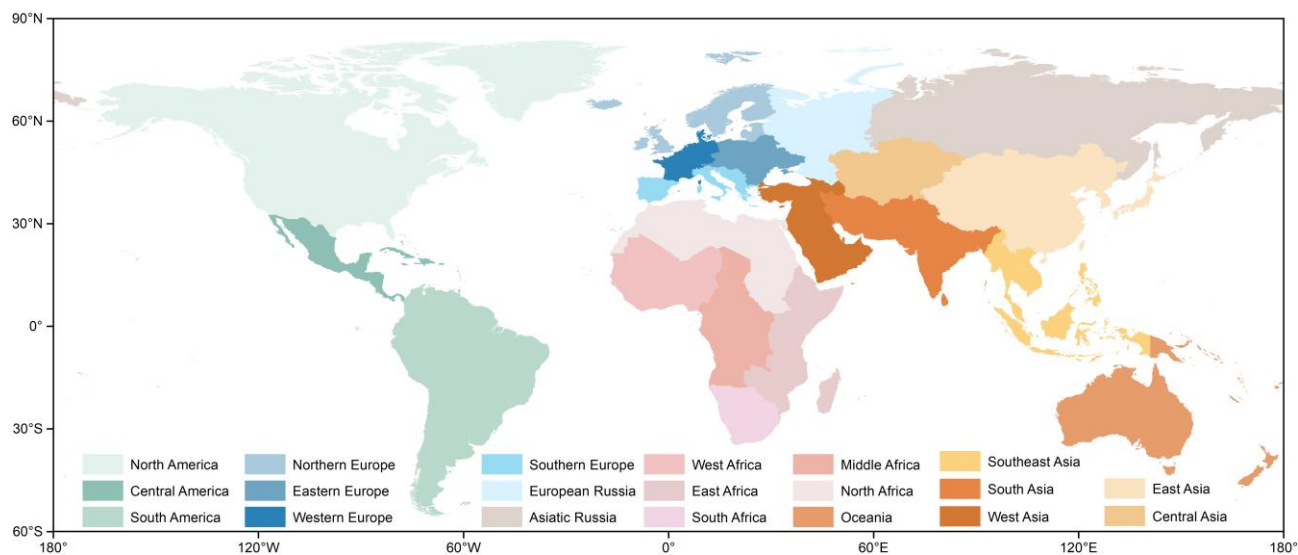
Supplementary Figures



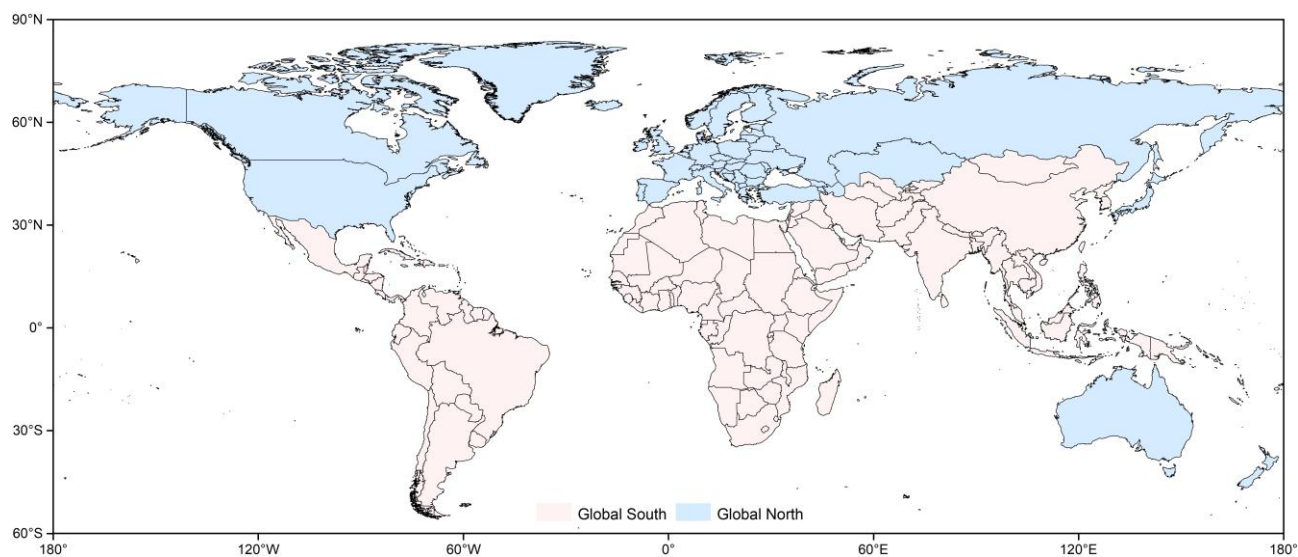
Supplementary Figure 1. Future urban flood exposure risk at subnational scale.



Supplementary Figure 2. Future changes in PUEF, PPEF, and PEEF under different SSPs. (A) PUEF. (B) PPEF. (C) PEEF.



Supplementary Figure 3. Division of subcontinental regions.



Supplementary Figure 4. Division of Global South and Global North.

Supplementary Tables

Supplementary Table 1. Average growth rate per annum of UEF, PEF and EEF at global and sub-continental scales from 2000 to 2020.

	UEF					PEF					EEF				
	2000-2005	2005-2010	2010-2015	2015-2020	2000-2020	2000-2005	2005-2010	2010-2015	2015-2020	2000-2020	2000-2005	2005-2010	2010-2015	2015-2020	2000-2020
Global	4.50%	5.10%	3.34%	13.50%	6.53%	4.08%	3.70%	2.02%	7.76%	4.37%	5.73%	4.14%	6.31%	5.14%	5.33%
East Asia	8.11%	8.80%	5.86%	12.09%	8.69%	5.30%	4.67%	2.64%	5.71%	4.57%	7.44%	7.99%	7.37%	6.50%	7.32%
Southeast Asia	5.89%	6.44%	2.45%	29.35%	10.55%	5.53%	5.35%	2.06%	14.71%	6.81%	5.48%	2.84%	7.11%	7.55%	5.73%
South Asia	3.85%	3.63%	1.94%	15.15%	6.02%	3.71%	3.23%	1.59%	9.91%	4.57%	10.19%	3.74%	6.88%	6.70%	6.85%
West Asia	2.69%	2.22%	0.61%	18.09%	5.68%	3.10%	2.56%	2.26%	11.27%	4.73%	-3.86%	3.91%	3.83%	8.81%	3.07%
Central Asia	2.78%	3.66%	0.47%	50.52%	12.67%	2.28%	3.66%	1.12%	26.84%	7.99%	17.69%	14.63%	11.87%	15.14%	14.81%
Oceania	2.75%	2.31%	0.05%	14.91%	4.85%	3.56%	2.68%	0.48%	8.59%	3.79%	7.45%	-0.47%	10.61%	-0.08%	4.27%
Asiatic Russia	3.71%	5.92%	0.25%	36.43%	10.71%	1.36%	1.96%	-0.02%	15.60%	4.54%	5.12%	2.98%	5.90%	-1.16%	3.17%
North America	1.79%	1.49%	0.37%	8.21%	2.92%	1.60%	1.18%	0.85%	3.72%	1.83%	4.98%	-1.82%	5.51%	-0.51%	1.99%
South America	2.12%	2.23%	0.57%	18.22%	5.55%	2.43%	1.88%	1.02%	9.19%	3.58%	4.84%	1.81%	3.80%	2.78%	3.30%
Central America	3.95%	2.15%	0.38%	9.99%	4.05%	2.94%	1.90%	0.75%	4.57%	2.53%	1.59%	-1.04%	0.42%	0.53%	0.37%
Western Europe	1.99%	1.74%	0.47%	10.00%	3.49%	1.10%	0.83%	-0.19%	5.26%	1.73%	1.12%	-1.15%	5.15%	1.47%	1.62%
Eastern Europe	2.12%	2.94%	1.05%	22.03%	6.70%	0.95%	0.94%	0.20%	6.84%	2.20%	3.36%	2.10%	4.90%	3.88%	3.55%
European Russia	2.14%	2.24%	0.62%	25.49%	7.16%	0.60%	0.53%	0.19%	8.97%	2.51%	23.27%	0.38%	-4.72%	5.91%	5.71%
Southern Europe	3.22%	2.44%	0.97%	16.38%	5.58%	2.15%	1.92%	-0.52%	6.71%	2.53%	4.05%	-0.95%	4.10%	-1.48%	1.39%
Northern Europe	1.04%	0.78%	0.71%	13.98%	3.98%	1.16%	1.40%	0.52%	5.89%	2.22%	9.19%	-4.40%	9.02%	-2.31%	2.68%
North Africa	1.81%	1.09%	0.66%	13.07%	4.03%	3.26%	2.83%	1.66%	9.58%	4.29%	3.10%	8.29%	-0.01%	9.45%	5.14%
West Africa	4.31%	3.08%	0.56%	18.16%	6.32%	6.34%	3.65%	3.20%	15.73%	7.12%	4.72%	13.98%	0.96%	9.16%	7.10%
Middle Africa	0.47%	1.25%	-0.89%	25.93%	6.15%	2.83%	4.97%	1.48%	20.32%	7.15%	11.67%	-2.44%	7.37%	3.26%	4.84%
South Africa	1.72%	0.00%	0.60%	17.79%	4.78%	2.31%	1.33%	2.06%	15.39%	5.12%	16.27%	-2.27%	5.26%	7.46%	6.48%
East Africa	1.76%	-1.28%	4.10%	63.63%	14.37%	4.56%	9.02%	4.28%	38.29%	13.23%	-0.22%	11.81%	9.30%	28.42%	11.86%

Supplementary Table 2. Regions with declines in EEF and PEEF from 2015 to 2020 and related urban and population exposure to urban flooding.

Subcontinental region	Subnational region	The change of UEF (10 ⁷ km ²)	The change of PUEF	The change of PEF	The change of PPEF	The change of EEF (billion USD)	The change of PEEF
North America	New York	2.66	0.18%	91212	0.16%	-9.13	-1.11%
	New Jersey	1.37	-0.02%	33185	-0.16%	-7.50	-2.43%
	Wisconsin	-1.71	0.74%	16838	-0.13%	-6.01	-3.60%
	Illinois	-0.34	0.69%	31300	-0.01%	-5.51	-0.24%
	Massachusetts	1.29	-0.05%	28690	0.42%	-4.25	-1.74%
	Oregon	2.74	-1.63%	54478	0.11%	-3.92	-4.82%
Central America	Ciudad de México	0.43	-1.29%	-94388	-0.86%	-3.08	-0.70%
	Estado de México	-0.17	-0.38%	147338	-0.11%	-1.91	-1.37%
	Panamá	0.17	-2.46%	13212	0.05%	-0.92	-2.76%
	Querétaro	0.00	0.40%	3855	0.21%	-0.12	-0.42%
	San José	0.09	-0.04%	289	0.01%	-0.01	-0.03%
Southern Europe	Lazio	0.94	-7.14%	71557	-3.47%	-17.43	-6.93%
	Emilia-Romagna	0.69	0.57%	74665	0.95%	-0.58	-1.04%
	Grad Zagreb	0.26	2.95%	7673	-0.21%	-0.40	-2.39%
	Lisboa	0.17	-1.37%	1687	-0.15%	-0.11	-0.12%
Northern Europe	England	1.97	-0.10%	300808	-0.04%	-18.65	-1.34%
	Viken	-0.09	-19.45%	1562	-15.07%	-4.17	-22.89%
	Telemark	0.17	-14.46%	7060	-6.85%	-1.47	-14.81%
	Dublin	0.17	0.70%	4510	0.36%	-0.35	-0.43%

Supplementary Table 3. Gini coefficient of urban flood exposure on global scale.

	Historical					Future								
	2000	2005	2010	2015	2020	2030	2040	2050	2060	2070	2080	2090	2100	
UEF	0.95	0.95	0.96	0.96	0.94	SSP1	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
						SSP2	0.92	0.92	0.92	0.92	0.91	0.91	0.91	0.91
						SSP3	0.92	0.92	0.91	0.91	0.91	0.91	0.91	0.91
						SSP4	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.91
						SSP5	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
PUEF	0.88	0.88	0.87	0.88	0.81	SSP1	0.81	0.80	0.80	0.80	0.80	0.80	0.80	0.80
						SSP2	0.80	0.80	0.80	0.80	0.80	0.80	0.79	0.79
						SSP3	0.81	0.80	0.80	0.80	0.80	0.80	0.80	0.80
						SSP4	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
						SSP5	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.79
PEF	0.96	0.96	0.96	0.96	0.95	SSP1	0.96	0.96	0.95	0.95	0.95	0.95	0.95	0.95
						SSP2	0.96	0.96	0.95	0.95	0.95	0.95	0.95	0.95
						SSP3	0.96	0.96	0.95	0.95	0.95	0.95	0.95	0.95
						SSP4	0.96	0.95	0.95	0.95	0.95	0.95	0.95	0.95
						SSP5	0.96	0.95	0.95	0.95	0.95	0.95	0.95	0.94
PPEF	0.92	1.00	0.92	0.92	0.84	SSP1	0.86	0.86	0.86	0.86	0.86	0.85	0.85	0.85
						SSP2	0.86	0.86	0.86	0.85	0.85	0.85	0.85	0.85
						SSP3	0.87	0.86	0.86	0.86	0.85	0.85	0.85	0.85
						SSP4	0.86	0.86	0.86	0.85	0.85	0.85	0.85	0.85
						SSP5	0.86	0.86	0.86	0.86	0.85	0.85	0.85	0.85
EEF	0.97	0.97	0.97	0.97	0.97	SSP1	0.97	0.97	0.96	0.96	0.96	0.96	0.95	0.95
						SSP2	0.97	0.97	0.96	0.96	0.96	0.95	0.95	0.95
						SSP3	0.97	0.97	0.96	0.96	0.96	0.96	0.95	0.95
						SSP4	0.97	0.97	0.96	0.96	0.96	0.96	0.96	0.95
						SSP5	0.97	0.97	0.96	0.96	0.96	0.95	0.95	0.95
PEEF	0.91	0.90	0.90	0.90	0.85	SSP1	0.97	0.96	0.96	0.96	0.94	0.94	0.93	0.93
						SSP2	0.97	0.97	0.96	0.96	0.95	0.95	0.95	0.94
						SSP3	0.96	0.96	0.95	0.95	0.95	0.95	0.95	0.95
						SSP4	0.97	0.95	0.95	0.95	0.95	0.94	0.93	0.93
						SSP5	0.97	0.96	0.95	0.89	0.90	0.90	0.90	0.90

Supplementary Table 4. The ratio of the Gini coefficient in the Global South to the Global North.

	Historical					Future								
	2000	2005	2010	2015	2020	2030	2040	2050	2060	2070	2080	2090	2100	
UEF	1.06	1.06	1.07	1.08	1.10	SSP1	1.09	1.09	1.08	1.08	1.07	1.07	1.07	1.07
						SSP2	1.09	1.09	1.08	1.08	1.07	1.07	1.07	1.07
						SSP3	1.09	1.10	1.09	1.10	1.10	1.10	1.10	1.10
						SSP4	1.09	1.09	1.09	1.08	1.08	1.08	1.08	1.08
						SSP5	1.09	1.08	1.08	1.07	1.06	1.06	1.05	1.05
PUEF	1.07	1.07	1.06	1.07	1.05	SSP1	1.07	1.06	1.06	1.06	1.06	1.06	1.06	1.06
						SSP2	1.07	1.07	1.07	1.06	1.07	1.06	1.06	1.06
						SSP3	1.06	1.07	1.07	1.07	1.07	1.06	1.06	1.06
						SSP4	1.06	1.06	1.06	1.04	1.02	1.02	1.02	1.02
						SSP5	1.07	1.07	1.07	1.06	1.06	1.06	1.06	1.06
PEF	1.08	1.09	1.10	1.10	1.14	SSP1	1.11	1.11	1.11	1.10	1.10	1.09	1.09	1.08
						SSP2	1.11	1.11	1.11	1.11	1.11	1.10	1.10	1.09
						SSP3	1.11	1.12	1.13	1.14	1.15	1.15	1.16	1.17
						SSP4	1.11	1.11	1.11	1.11	1.11	1.10	1.10	1.10
						SSP5	1.11	1.10	1.10	1.09	1.08	1.08	1.07	1.06
PPEF	1.09	1.17	1.10	1.11	1.05	SSP1	1.13	1.13	1.12	1.12	1.12	1.13	1.13	1.13
						SSP2	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13
						SSP3	1.13	1.13	1.13	1.12	1.12	1.12	1.12	1.11
						SSP4	1.13	1.13	1.13	1.13	1.12	1.13	1.13	1.13
						SSP5	1.13	1.13	1.12	1.12	1.13	1.13	1.13	1.13
EEF	1.04	1.04	1.04	1.05	1.05	SSP1	1.07	1.08	1.08	1.08	1.09	1.08	1.08	1.08
						SSP2	1.07	1.07	1.07	1.08	1.08	1.07	1.07	1.07
						SSP3	1.06	1.07	1.07	1.07	1.07	1.07	1.07	1.07
						SSP4	1.06	1.07	1.07	1.08	1.07	1.07	1.07	1.07
						SSP5	1.07	1.08	1.08	1.08	1.08	1.08	1.07	1.07
PEEF	1.06	1.06	1.06	1.06	1.05	SSP1	1.12	1.09	1.08	1.05	1.02	1.01	1.00	1.00
						SSP2	1.12	1.10	1.08	1.07	1.06	1.07	1.07	1.08
						SSP3	1.10	1.09	1.07	1.07	1.07	1.07	1.08	1.08
						SSP4	1.11	1.08	1.07	1.06	1.06	1.13	1.12	1.11
						SSP5	1.12	1.11	1.07	1.03	1.03	1.02	1.02	1.01