Machine learning-based evidence and attribution mapping of 100,000 climate impact studies - Supplementary material

Max Callaghan[1,2], Carl-Friedrich Schleussner[3,5], Shruti Nath[3,4], Quentin Lejeune[3], Thomas R. Knutson[6], Markus Reichstein[7,8], Gerrit Hansen[1], Emily Theokritoff[3,5], Marina Andrijevic[3,5], Robert Brecha[3,9], Michael Hegarty[3], Chelsea Jones[3], Kaylin Lee[3], Agathe Lucas[3], Nicole van Maanen[3,5], Inga Menke[3], Peter Pfleiderer[3,5], Burcu Yesil[3], and Jan Minx[1,2]

[1]Mercator Research Institute on Global Commons and Climate Change, Torgauer Straße, 10829 Berlin, Germany
[2]Priestley International Centre for Climate, University of Leeds, Leeds LS2 9JT, United Kingdom
[3]Climate Analytics, Berlin, Germany
[4]Institute of Atmospheric and Climate Sciences, ETH Zürich, Switzerland
[5]Integrative Research Institute on Transformations of Human-Environment Systems, Humboldt University, Berlin, Germany
[6]NOAA/Geophysical Fluid Dynamics Laboratory. Princeton, NJ, 08540, USA
[7]Max Planck Institute for Biogeochemistry, Department Biogeochemical Integration, D-07701 Jena, Germany
[8]Michael Stifel Center Jena for Data-driven and Simulation Science, Jena, Germany
[9]Hanley Sustainability Institute, Renewable and Clean Energy Program and Physics Dept., University of Dayton, Dayton, Ohio, USA

		Coastal and marine Ecosystems (WS>1)	Human and managed systems (WS>1)	Mountains, snow and ice (WS>1)	Rivers, lakes, and soil moisture (WS>1)	Terrestrial ecosystems (WS>1)	Other systems (WS>1)	Total (WS>5)
South America	D&A	365 (194-662)	460 (275-925)	296 (184-491)	384 (207-794)	1366 (699-2681)	830 (331-1744)	3674 (2400-5760)
	Other	209 (74-520)	130 (61-322)	57 (35-116)	234 (141-469)	235 (94-592)	205 (56-689)	1061 (605-1995)
North America	D&A	2429 (1304-4241)	1708 (936-3300)	1734 (972-3203)	2621 (1415-4899)	7835 (4308-13552)	5614 (2485-11662)	21745 (14364-31884)
	Other	1620 (579-3859)	446 (180-1240)	608 (295-1259)	1715 (876-3595)	2259 (1029-4821)	2307 (799-6068)	8868 (5002-15196)
Africa	D&A	448 (219-881)	1102 (625-2039)	268 (143-514)	747 (393-1422)	1556 (706-2951)	1246 (470-2725)	5323 (3391-8104)
	Other	345 (105-865)	364 (164-956)	79 (44-199)	531 (259-1077)	447 (182-1036)	496 (99-1488)	2251 (1220-4105)
Europe	D&A	1300 (628-2426)	1637 (934-3162)	985 (547-1937)	1307 (743-2638)	6006 (3389-10396)	2850 (1150-6705)	13991 (9105-21466)
	Other	678 (222-1900)	162 (70-620)	344 (198-723)	834 (439-1850)	816 (361-2020)	956 (287-2893)	3762 (2089-7232)
Asia	D&A	1164 (604-2097)	3516 (2124-6329)	1105 (700-2011)	2968 (1790-5292)	5822 (3270-10040)	6480 (3089-12295)	20885 (14705-29783)
	Other	712 (256-1856)	917 (410-2383)	275 (144-531)	1987 (1138-3699)	991 (402-2269)	1938 (664-4896)	6764 (3999-11548)
Oceania	D&A	890 (499-1484)	494 (271-979)	349 (191-622)	521 (296-993)	1539 (777-2866)	1720 (875-3228)	5482 (3579-8202)
	Other	594 (235-1239)	117 (50-367)	79 (44-192)	272 (125-568)	355 (155-873)	519 (215-1336)	1922 (1047-3441)
Global	D&A	5529 (2957-9755)	7729 (4487-14423)	3783 (2201-7050)	6623 (3777-12384)	19622 (10796-34361)	14498 (6382-30282)	57366 (38371-85227)
	Other	3465 (1277-8215)	1870 (823-5013)	1423 (750-2912)	4416 (2391-8910)	4249 (1885-9546)	5149 (1658-13868)	20419 (11697-35705)
Without location	D&A	0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)
	Other	3613 (1561-7413)	2587 (1213-6704)	1101 (575-2266)	1766 (887-3867)	11117 (5839-21759)	3956 (1517-11551)	23954 (13897-42921)

Table 1: The number of studies in each impact category and each continent

| | | Coastal and marine Ecosystems (WS>1) | | Human and managed systems (WS>1) | | Mountains, snow and ice (WS>1) | | Rivers, lakes, and soil moisture (WS>1) | | Terrestrial ecosystems (WS>1) | | Other systems (WS>1) | | Total (WS>5) | |
		area	population	area	population	area	population	area	population	area	population	area	population	area	population
South America	D&A	8% (5%-31%)	26% (18%-51%)	26% (13%-62%)	55% (38%-79%)	11% (8%-15%)	19% (14%-32%)	16% (6%-45%)	33% (14%-68%)	63% (38%-64%)	77% (67%-81%)	45% (11%-64%)	63% (27%-81%)	52% (18%-63%)	75% (46%-81%)
	Other	3% (1%-27%)	6% (2%-15%)	24% (5%-34%)	14% (9%-17%)	13% (6%-14%)	6% (3%-10%)	19% (3%-34%)	15% (5%-19%)	36% (29%-36%)	19% (17%-19%)	28% (8%-36%)	17% (7%-19%)	33% (12%-36%)	19% (13%-19%)
North America	D&A	33% (19%-50%)	58% (43%-70%)	40% (25%-57%)	64% (48%-72%)	34% (18%-54%)	43% (27%-56%)	52% (24%-64%)	60% (41%-69%)	70% (61%-70%)	70% (64%-72%)	58% (32%-71%)	72% (58%-72%)	62% (55%-70%)	70% (69%-72%)
	Other	11% (5%-12%)	27% (9%-27%)	9% (7%-15%)	28% (26%-28%)	8% (5%-19%)	19% (8%-24%)	15% (9%-18%)	28% (28%-28%)	21% (16%-21%)	28% (28%-28%)	16% (11%-21%)	28% (27%-28%)	17% (16%-21%)	28% (28%-28%)
Africa	D&A	12% (4%-23%)	22% (12%-37%)	32% (25%-46%)	68% (58%-79%)	3% (1%-9%)	7% (6%-14%)	17% (5%-35%)	44% (18%-68%)	40% (22%-51%)	71% (46%-79%)	35% (15%-52%)	64% (26%-79%)	32% (24%-41%)	66% (51%-75%)
	Other	2% (0%-4%)	1% (0%-4%)	7% (3%-14%)	3% (3%-5%)	0% (0%-1%)	0% (0%-1%)	9% (1%-13%)	4% (2%-7%)	7% (3%-20%)	4% (2%-9%)	9% (2%-23%)	6% (2%-8%)	6% (2%-12%)	4% (2%-6%)
Europe	D&A	16% (11%-21%)	59% (41%-71%)	25% (20%-33%)	80% (73%-88%)	21% (8%-30%)	58% (25%-79%)	24% (18%-31%)	77% (64%-86%)	35% (28%-56%)	88% (83%-95%)	29% (21%-45%)	85% (73%-93%)	28% (25%-34%)	83% (78%-90%)
	Other	0% (0%-0%)	0% (0%-0%)	1% (0%-1%)	0% (0%-0%)	0% (0%-1%)	0% (0%-0%)	0% (0%-0%)	0% (0%-0%)	1% (1%-3%)	0% (0%-0%)	0% (0%-1%)	0% (0%-0%)	0% (0%-1%)	0% (0%-0%)
Asia	D&A	19% (6%-29%)	47% (18%-58%)	61% (44%-78%)	80% (75%-82%)	27% (14%-43%)	39% (12%-56%)	61% (34%-72%)	75% (50%-81%)	71% (60%-81%)	80% (72%-83%)	73% (51%-83%)	80% (73%-84%)	70% (60%-76%)	80% (78%-82%)
	Other	3% (1%-4%)	9% (4%-13%)	5% (5%-7%)	15% (15%-15%)	4% (2%-4%)	14% (6%-14%)	5% (5%-5%)	15% (15%-15%)	6% (4%-7%)	15% (14%-15%)	6% (5%-7%)	15% (15%-15%)	5% (5%-6%)	15% (15%-15%)
Oceania	D&A	76% (72%-76%)	91% (59%-91%)	74% (53%-84%)	70% (54%-86%)	3% (2%-8%)	37% (15%-53%)	19% (4%-83%)	53% (43%-82%)	84% (79%-86%)	77% (74%-92%)	86% (73%-86%)	89% (61%-91%)	84% (74%-86%)	84% (75%-92%)
	Other	14% (14%-14%)	5% (5%-5%)	14% (14%-14%)	5% (5%-5%)	1% (1%-3%)	4% (4%-4%)	14% (1%-14%)	5% (4%-5%)	14% (14%-14%)	5% (5%-5%)	14% (14%-14%)	5% (5%-5%)	14% (14%-14%)	5% (5%-5%)
Global	D&A	22% (13%-33%)	44% (23%-57%)	38% (27%-53%)	73% (64%-79%)	17% (9%-27%)	32% (13%-46%)	32% (16%-49%)	62% (40%-75%)	53% (41%-62%)	75% (63%-81%)	49% (29%-63%)	75% (59%-82%)	48% (37%-56%)	74% (67%-80%)
	Other	5% (2%-8%)	8% (3%-11%)	8% (4%-12%)	11% (11%-12%)	4% (2%-7%)	9% (4%-10%)	9% (3%-12%)	11% (10%-12%)	12% (9%-15%)	12% (11%-13%)	11% (5%-16%)	12% (11%-13%)	10% (6%-13%)	12% (11%-12%)

Table 2: The percentage of land area and population with robust evidence by impact category and continent

| | | Coastal and marine Ecosystems (WS>1) | | Human and managed systems (WS>1) | | Mountains, snow and ice (WS>1) | | Rivers, lakes, and soil moisture (WS>1) | | Terrestrial ecosystems (WS>1) | | Other systems (WS>1) | | Total (WS>5) | |
		area	population	area	population	area	population	area	population	area	population	area	population	area	population
Low income	D&A	8% (2%-20%)	17% (5%-27%)	35% (29%-45%	53% (46%-61%	6% (3%-11%)	6% (3%-17%)	22% (7%-37%)	36% (11%-54%	37% (25%-48%	51% (41%-61%	38% (17%-54%	51% (27%-64%	34% (27%-43%	50% (43%-59%)
	Other	3% (0%-5%)	12% (11%-17%	5% (4%-11%)	20% (20%-21%	1% (1%-2%)	16% (5%-17%)	4% (2%-8%)	20% (18%-23%	7% (3%-19%)	21% (18%-26%	8% (4%-20%)	22% (19%-24%	5% (3%-7%)	20% (19%-22%)
Lower middle income	D&A	26% (9%-37%)	59% (19%-65%	50% (42%-74%	77% (71%-80%	22% (6%-29%)	49% (12%-58%	38% (19%-59%	67% (37%-77%	64% (41%-71%	78% (58%-80%	58% (31%-72%	76% (62%-80%	58% (40%-65%	77% (70%-79%)
	Other	5% (1%-8%)	10% (2%-16%)	14% (9%-19%)	18% (18%-18%	12% (3%-12%)	17% (7%-17%)	13% (8%-20%)	18% (17%-19%	19% (14%-21%	19% (17%-19%	15% (7%-22%)	18% (17%-19%	16% (9%-21%)	18% (18%-19%)
Upper middle income	D&A	11% (5%-23%)	29% (17%-49%	34% (21%-51%	80% (69%-88%	13% (9%-24%)	19% (11%-42%	31% (16%-47%	73% (52%-85%	53% (39%-64%	87% (81%-91%	45% (25%-59%	83% (67%-90%	45% (33%-53%	85% (77%-89%)
	Other	2% (1%-9%)	4% (1%-6%)	9% (3%-11%)	6% (4%-6%)	2% (2%-3%)	2% (0%-4%)	9% (2%-12%)	6% (4%-6%)	10% (8%-13%)	6% (5%-6%)	10% (4%-13%)	6% (5%-6%)	10% (5%-12%)	6% (5%-6%)
High Income	D&A	45% (34%-56%	77% (60%-85%	50% (37%-66%	85% (80%-90%	32% (16%-48%	68% (37%-82%	46% (24%-68%	81% (71%-86%	73% (66%-76%	87% (86%-89%	67% (47%-78%	89% (81%-91%	67% (60%-74%	88% (85%-89%)
	Other	9% (6%-10%)	9% (6%-9%)	8% (6%-13%)	9% (8%-9%)	5% (3%-13%)	7% (6%-8%)	12% (5%-14%)	9% (8%-9%)	15% (12%-17%	9% (9%-9%)	13% (9%-17%)	9% (9%-9%)	13% (12%-16%	9% (9%-9%)
Global	D&A	22% (13%-33%	44% (23%-57%	38% (27%-53%	73% (64%-79%	17% (9%-27%)	32% (13%-46%	32% (16%-49%	62% (40%-75%	53% (41%-62%	75% (63%-81%	49% (29%-63%	75% (59%-82%	48% (37%-56%	74% (67%-80%)
	Other	5% (2%-8%)	8% (3%-11%)	8% (4%-12%)	11% (11%-12%	4% (2%-7%)	9% (4%-10%)	9% (3%-12%)	11% (10%-12%	12% (9%-15%)	12% (11%-13%	11% (5%-16%)	12% (11%-13%	10% (6%-13%)	12% (11%-12%)

Table 3: The percentage of land area and population with robust evidence by impact category and income category