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Supplement of

Pan-European assessment of coastal flood hazards

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Table S1 State-of-the-Art on existing large-scale coastal flooding studies centered on the estimation of flooding resulting from extreme events.

Study	Flooding resolution	Dynamic flood modeling	Wave contribution	Variable foreshore slope	Methodology validation
Present study	25 m	x	Semi-empirical	x	x
Wing et al. (2024)	30 m	x	Empirical		
Le Gal et al. (2023)	100 m	x	Empirical		x
Kirezci et al. (2020)	1 km		Semi-empirical		
Paprotny et al. (2018)	100 m				x
Vousdoukas et al. (2016)	90 m	x	Empirical		x
Muis et al. (2016)	1 km				
Groenemeijer et al. (2016)	100 m				x

Table S2 Description and correspondence of land use classes from ODSE-LULC (Witjes et al., 2022) and Global Land Cover dataset (Copernicus, 2019), accompanied by the respective Manning roughness coefficients, following van der Sande et al. (2003).

Group	Description	ODSE-LULC	Global Land Cover	Manning roughness coefficient
1	Urban areas	1	50	0.150
2	Other urban areas	2 – 8	–	0.200
3	Rural areas	9 – 15	20 / 40	0.127
4	Natural vegetation	16 – 21	111 – 126	0.100
5	Bare areas (beaches, sand), dunes)	22 – 26	30 / 60 / 70 / 100	0.120
6	Waterbodies	27 – 33	80 / 90 / 200	0.050

Table S3 Relative maximum flooded area (%) resulting from a 100-yr TWL under different flood modeling approaches (static vs dynamic), hydrograph shapes (triangular vs smooth-shaped) with a composite scenario and different types of storms, per country. Values are shown relative to each floodplain to facilitate the comparison of results.

Country	Static flood modeling	Dynamic flood modeling					
		Triangular hydrograph	Smooth-shaped hydrographs				
			Composite scenario	ST A	ST B	ST C	ST D
Albania	37.43	28.42	27.32	13.79	0.00	26.31	27.30
Belgium	33.51	6.61	7.83	0.00	7.77	8.31	0.00
Bosnia and Herzegovina	5.5	0	0.00	0.00	0.00	0.00	0.00
Croatia	20.04	14.98	12.65	0.00	0.00	11.90	12.91
Cyprus	7.19	6.18	5.63	0.01	0.01	5.62	5.62
Denmark	24.95	22.8	22.29	4.26	0.12	18.13	22.17
Estonia	4.83	3.36	3.34	3.32	0.00	0.01	3.34
Finland	19.07	17.78	17.71	17.70	0.00	0.00	17.68
France	38.74	12.35	14.33	0.22	11.60	2.33	2.73
Germany	47.99	35.23	35.58	0.29	24.62	35.67	6.63
Greece	14.09	12.17	11.89	4.28	1.11	7.77	10.89
Ireland	24.47	14.49	15.23	0.00	15.19	14.54	0.06
Isle of Man	10.48	8.12	8.59	0.00	8.59	0.01	0.01
Italy	28.39	22.34	21.01	1.57	0.00	20.28	21.56
Latvia	13.5	6.26	5.90	5.90	0.00	0.00	5.91
Lithuania	29.63	25.68	24.63	24.76	0.00	0.01	24.66
Malta	22.19	19.92	19.91	19.92	0.00	19.91	19.92
Montenegro	44.83	3.12	3.08	0.00	0.00	3.04	3.08
Netherlands	69.93	45.46	46.23	0.00	29.83	46.55	0.00
Norway	32.13	27.76	27.85	0.84	17.18	25.83	6.72
Poland	45.58	36.54	34.97	26.40	0.00	8.78	35.04
Portugal	23.17	12.13	13.03	0.03	13.03	1.95	0.03
Russia	27.28	18.73	17.31	15.80	0.00	0.53	17.20
Slovenia	32.23	25.56	25.59	0.00	0.00	25.58	0.00
Spain	26.62	10.15	10.07	5.88	3.85	3.88	6.20
Sweden	11.44	8.91	8.59	7.68	0.00	1.49	8.59
Turkey	0.89	0.76	0.76	0.02	0.03	0.77	0.76
United Kingdom	43.66	12.33	14.10	0.00	13.74	5.56	0.23

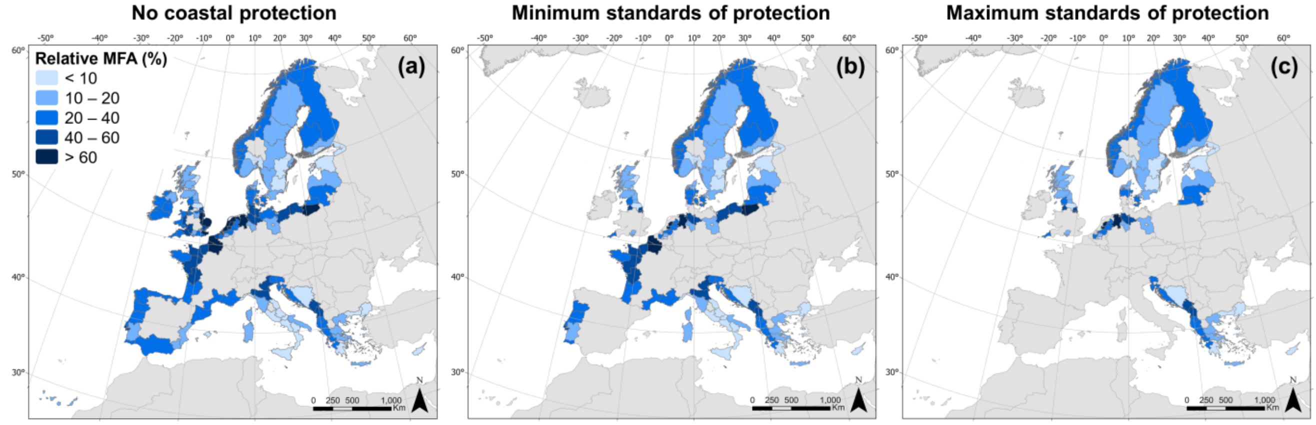

Figure S1: European spatial distribution of 100-yr TWL flood hazards without coastal protection (a) and with minimum (b) and maximum (c) standards of coastal protection using a static flood model. Results are shown as relative MFA in regards to the floodplain area of each NUTS2. Standards of coastal protections were obtained from the COASTPRO-EU database (van Maanen et al., 2025).

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