ARCTIC
VOL. 71, NO. 3 (SEPTEMBER 2018) P. S1–S12
https://doi.org/10.14430/arctic4732

Arctic Sea Routes: Potential New Pathways for Nonindigenous Species Spread

Duy Nong,[1,2] Amanda M. Countryman,[1] Travis Warziniack[3] and Erin K. Grey[4]

TABLE S1. The number of stations in the former region matching climates in 2030 with the stations in the latter region at each grade/score level.

	Terrestrial climate matching					Marine climate matching				
Climate matching score	6	7	8	9	Percentage of stations ≥ 8	6	7	8	9	Percentage of stations ≥ 8
USA-China	293	2,091	1,363	425	43%	1	2	9	289	99%
USA-Japan	0	550	3091	532	87%	3	29	118	151	89%
USA-KOR	2175	714	434	0	10%	6	84	125	85	70%
China-USA	1291	1034	2448	792	58%	0	0	1	215	100%
China-Finland	1715	232	0	0	0%	103	9	7	1	4%
China-Sweden	2218	307	0	0	0%	73	49	21	0	10%
China-Norway	3581	383	0	0	0%	97	28	23	1	11%
China-UK	1126	8	0	0	0%	88	100	15	0	7%
China-Germany	2551	1512	27	0	1%	54	93	26	1	13%
China-NLD	573	14	0	0	0%	56	75	27	1	13%
China-Denmark	577	10	0	0	0%	91	33	17	1	8%
China-France	2686	287	3	0	0%	2	49	163	2	76%
China-Belgium	455	6	0	0	0%	47	86	22	0	10%
China-Spain	2724	209	4	0	0%	1	20	170	25	90%
China-Portugal	1885	55	0	0	0%	6	120	89	1	42%
China-Poland	3355	988	17	0	0%	73	48	9	0	4%
Japan-USA	130	313	688	146	61%	0	0	6	335	100%
Japan-Finland	249	374	144	13	12%	39	0	0	0	0%
Japan-Sweden	337	349	298	22	24%	243	32	32	5	11%
Japan-Norway	259	654	338	33	27%	211	70	30	10	12%
Japan-UK	386	631	139	0	10%	127	160	31	13	13%
Japan-Germany	200	315	459	238	51%	202	76	31	8	11%
Japan-NLD	293	394	98	0	7%	136	150	32	13	13%
Japan-Denmark	295	385	109	0	8%	171	20	29	2	9%
Japan-France	266	420	414	22	32%	6	31	218	86	89%
Japan-Belgium	366	347	203	0	15%	202	85	30	10	12%
Japan-Spain	306	521	351	0	26%	20	48	169	99	79%
Japan-Portugal	454	420	306	0	25%	44	158	95	27	36%
Japan-Poland	268	383	406	122	39%	14	0	0	0	0%
KOR-USA	148	164	21	0	6%	0	0	0	37	100%
KOR-Finland	59	0	0	0	0%	4	0	0	0	0%
KOR-Sweden	78	5	0	0	0%	21	6	0	0	0%
KOR-Norway	169	43	0	0	0%	28	6	0	0	0%
KOR-UK	82	2	0	0	0%	26	10	1	0	3%
KOR-Germany	191	73	5	0	1%	21	14	1	0	3%
KOR-NLD	55	4	0	0	0%	22	11	4	0	11%
KOR-Denmark	79	2	0	0	0%	13	3	0	0	0%
KOR-France	94	14	0	0	0%	0	1	26	10	97%
KOR-Belgium	52	0	0	0	0%	1	26	10	0	27%
KOR-Spain	116	16	0	0	0%	6	18	6	7	35%
KOR-Portugal	135	14	0	0	0%	25	4	6	2	22%
KOR-Poland	145	60	0	0	0%	5	3	0	0	0%
Finland-China	82	618	0	0	0%	0	2	66	12	98%
Finland-Japan	0	0	375	325	100%	79	0	0	0	0%
Finland-KOR	696	0	0	0	0%	71	0	0	0	0%
Sweden-China	230	470	0	0	0%	0	10	177	0	95%
Sweden-Japan	0	1	477	222	100%	106	39	33	9	22%
Sweden-KOR	661	38	0	0	0%	50	42	0	0	0%
Norway-China	423	191	0	0	0%	2	191	140	15	45%
Norway-Japan	0	90	559	51	87%	82	68	108	88	56%
Norway-KOR	430	229	0	0	0%	99	59	0	0	0%
UK-China	264	429	0	0	0%	2	248	183	0	42%
UK-Japan	0	49	651	0	93%	65	100	224	39	60%
UK-KOR	695	1	0	0	0%	195	93	2	0	0%

[1] Department of Agricultural and Resource Economics, Colorado State University, Fort Collins, Colorado 80523-1172, USA
[2] Corresponding author: duy.nong@colostate.edu
[3] Rocky Mountain Research Station, 240 West Prospect, Fort Collins, Colorado 80526, USA
[4] Division of Science, Mathematics and Technology, Governors State University, University Park, Illinois 60484-0975, USA

TABLE S1. The number of stations in the former region matching climates in 2030 with the stations in the latter region at each grade/score level – *continued*:

Climate matching score	Terrestrial climate matching					Marine climate matching				
	6	7	8	9	Percentage of stations ≥ 8	6	7	8	9	Percentage of stations ≥ 8
Germany-China	16	597	87	0	12%	0	14	173	4	93%
Germany-Japan	0	0	447	253	100%	37	84	35	35	37%
Germany-KOR	533	148	19	0	3%	99	87	3	0	2%
NLD-China	3	171	0	0	0%	0	21	172	16	90%
NLD-Japan	0	0	174	0	100%	72	65	24	48	34%
NLD-KOR	157	17	0	0	0%	132	69	8	0	4%
Denmark-China	34	204	0	0	0%	0	43	90	1	68%
Denmark-Japan	0	0	238	0	100%	18	84	22	7	22%
Denmark-KOR	202	36	0	0	0%	84	8	0	0	0%
France-China	16	631	42	0	6%	0	35	129	1	79%
France-Japan	0	67	606	27	90%	26	41	55	43	59%
France-KOR	532	158	0	0	0%	5	92	37	31	41%
Belgium-China	48	92	0	0	0%	0	1	71	0	99%
Belgium-Japan	0	0	140	0	100%	51	16	0	5	7%
Belgium-KOR	140	0	0	0	0%	0	63	3	0	5%
Spain-China	26	644	30	0	4%	0	21	53	37	81%
Spain-Japan	11	438	251	0	36%	1	27	30	53	75%
Spain-KOR	603	93	0	0	0%	16	21	38	36	67%
Portugal-China	176	170	0	0	0%	0	5	29	1	86%
Portugal-Japan	11	236	100	0	29%	0	6	16	13	83%
Portugal-KOR	337	10	0	0	0%	4	6	17	8	71%
Poland-China	1	670	29	0	4%	0	4	15	0	79%
Poland-Japan	0	0	209	491	100%	9	0	0	0	0%
Poland-KOR	435	265	0	0	0%	7	12	0	0	0%

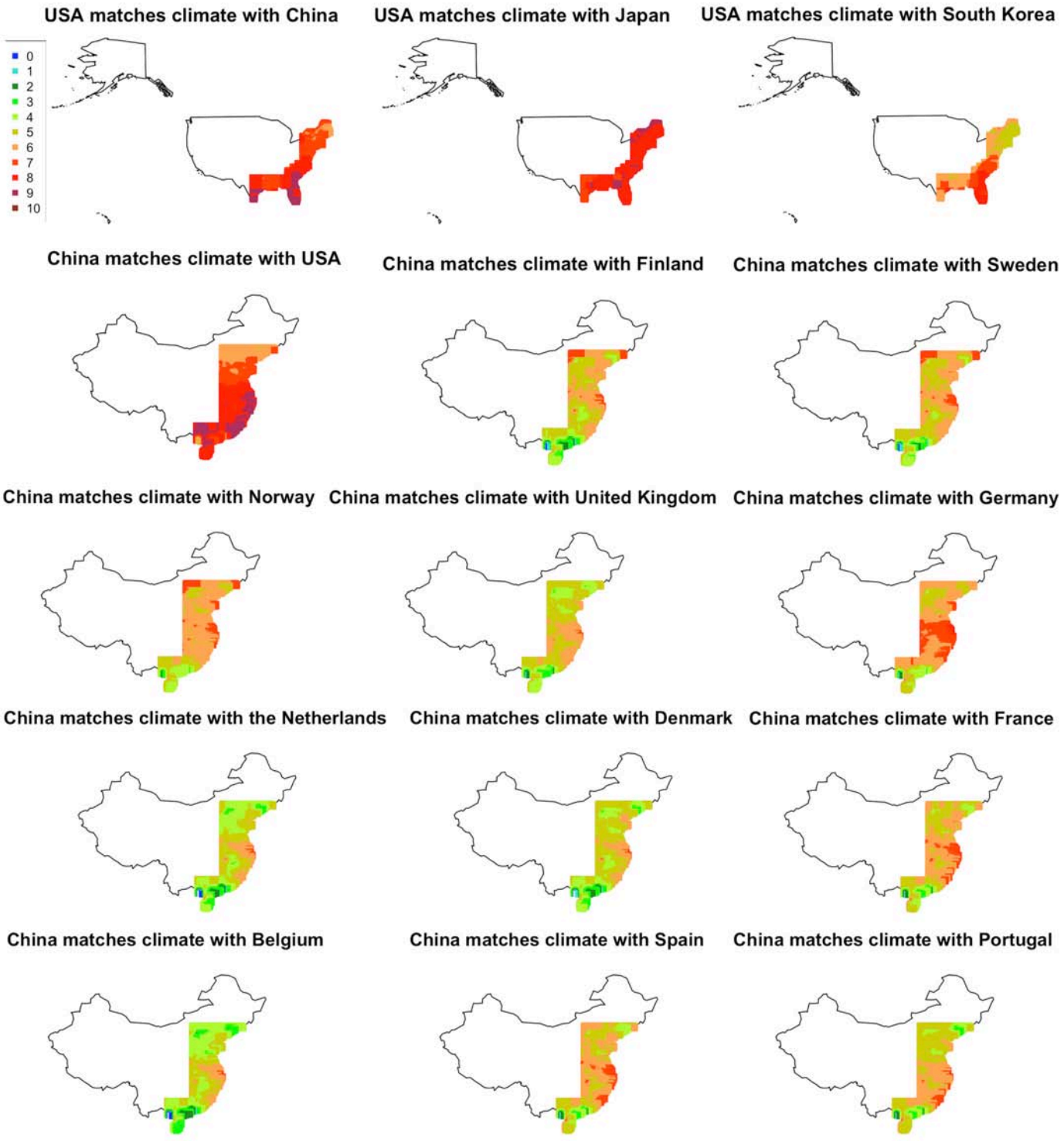

FIG. S1. Terrestrial climate matching between regions in 2030. Colored observations on each map are meteorological stations. Euclidean distance is calculated for each station to determine a score for climate similarity with stations in the partner countries indicated. Stations with a score of 0 (blue) have no climate similarity. Scores of 10 (dark red) have the highest degree of climate similarity with stations in the partner country.

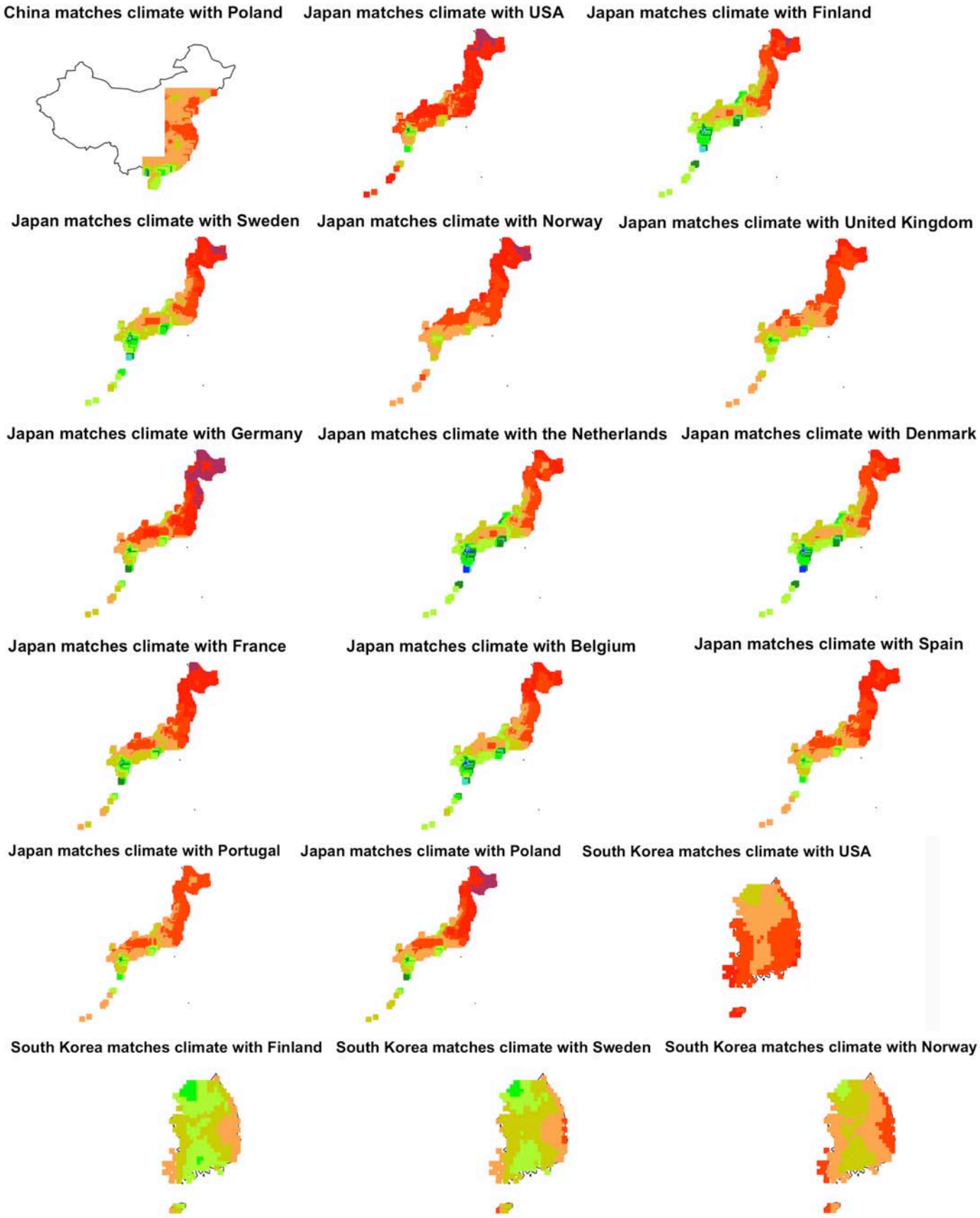

FIG. S1. Terrestrial climate matching between regions in 2030. Colored observations on each map are meteorological stations. Euclidean distance is calculated for each station to determine a score for climate similarity with stations in the partner countries indicated. Stations with a score of 0 (blue) have no climate similarity. Scores of 10 (dark red) have the highest degree of climate similarity with stations in the partner country. – *continued*.

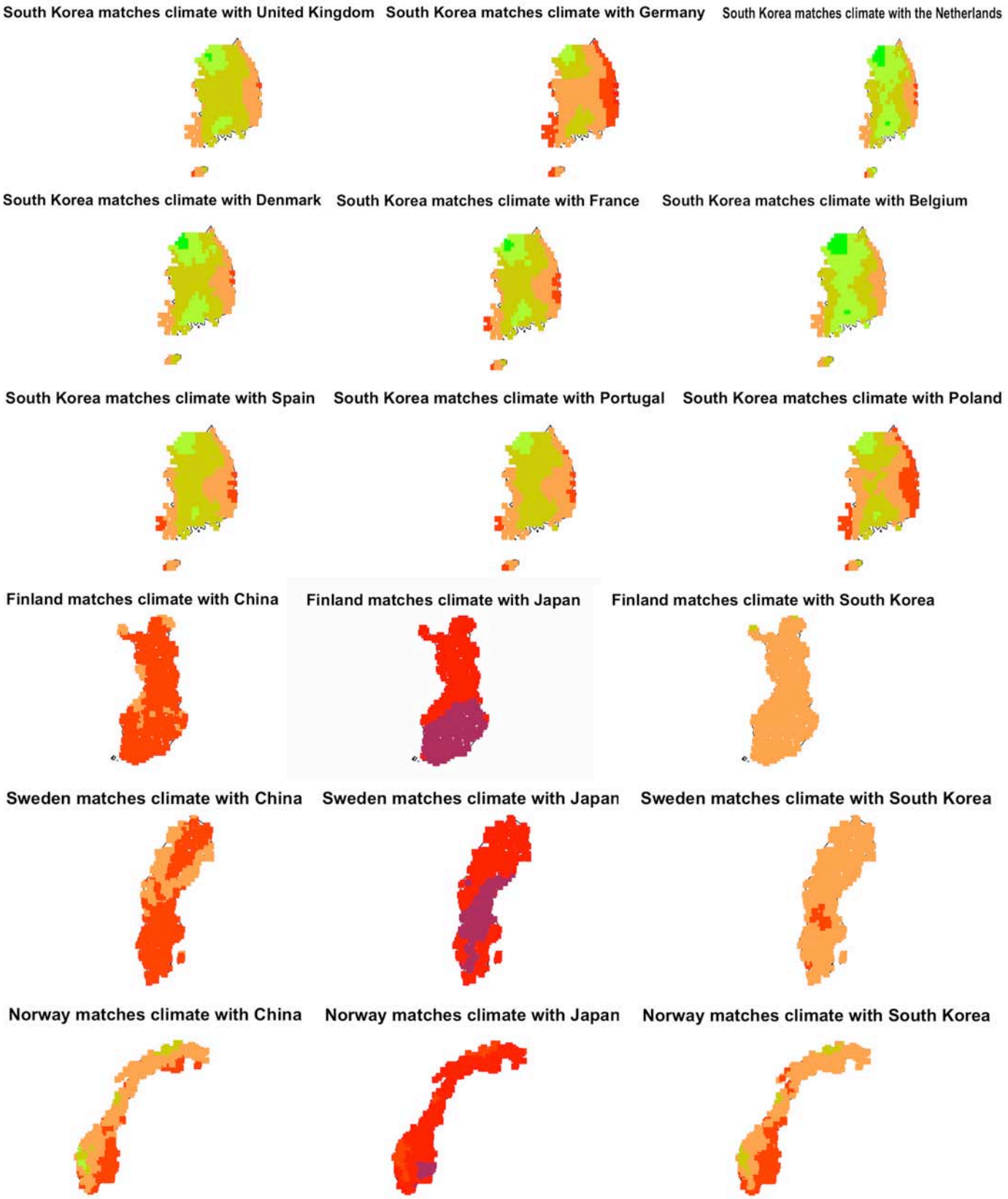

FIG. S1. Terrestrial climate matching between regions in 2030. Colored observations on each map are meteorological stations. Euclidean distance is calculated for each station to determine a score for climate similarity with stations in the partner countries indicated. Stations with a score of 0 (blue) have no climate similarity. Scores of 10 (dark red) have the highest degree of climate similarity with stations in the partner country. – *continued*.

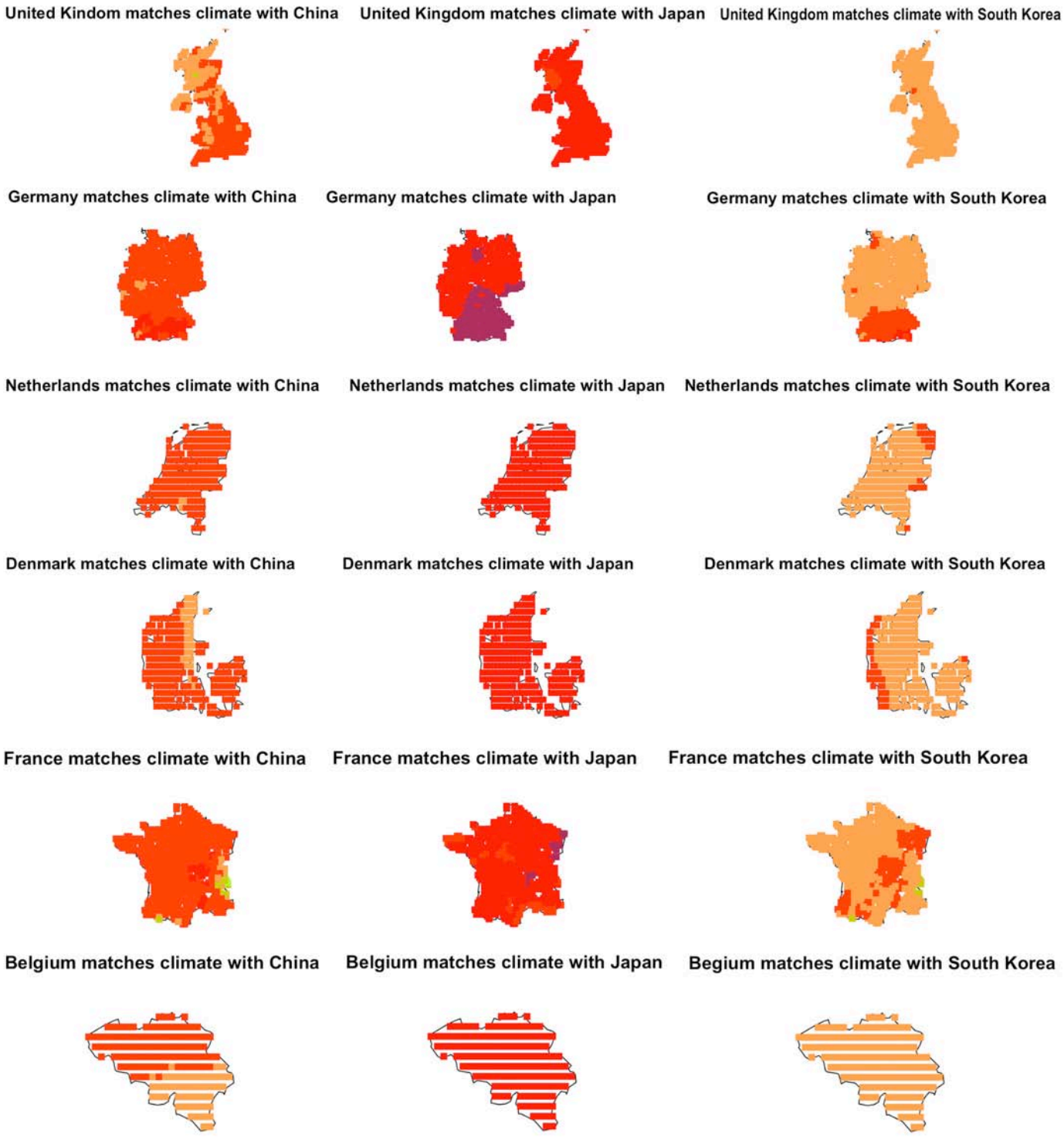

FIG. S1. Terrestrial climate matching between regions in 2030. Colored observations on each map are meteorological stations. Euclidean distance is calculated for each station to determine a score for climate similarity with stations in the partner countries indicated. Stations with a score of 0 (blue) have no climate similarity. Scores of 10 (dark red) have the highest degree of climate similarity with stations in the partner country. – *continued*.

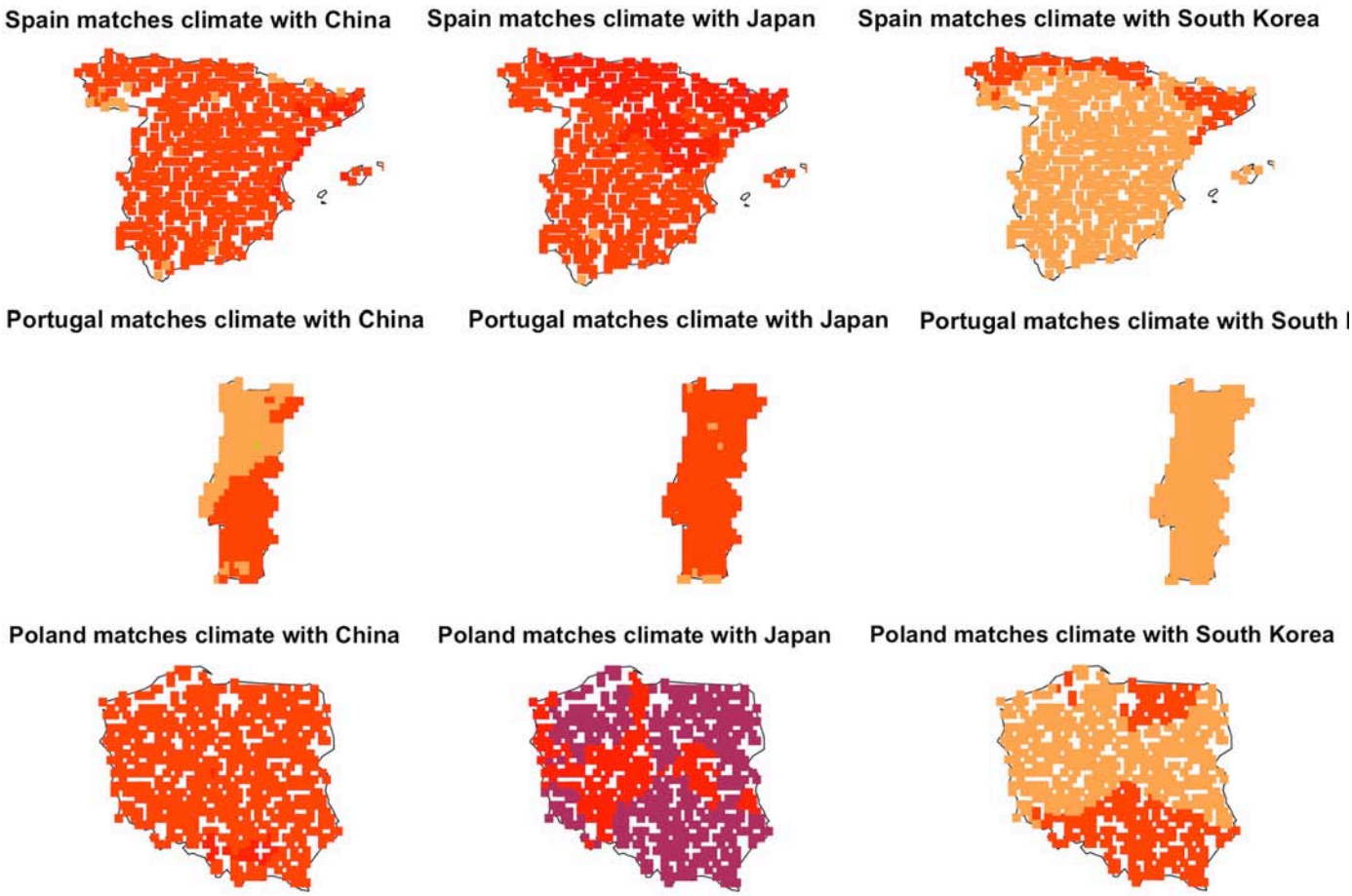

FIG. S1. Terrestrial climate matching between regions in 2030. Colored observations on each map are meteorological stations. Euclidean distance is calculated for each station to determine a score for climate similarity with stations in the partner countries indicated. Stations with a score of 0 (blue) have no climate similarity. Scores of 10 (dark red) have the highest degree of climate similarity with stations in the partner country. – *continued*.

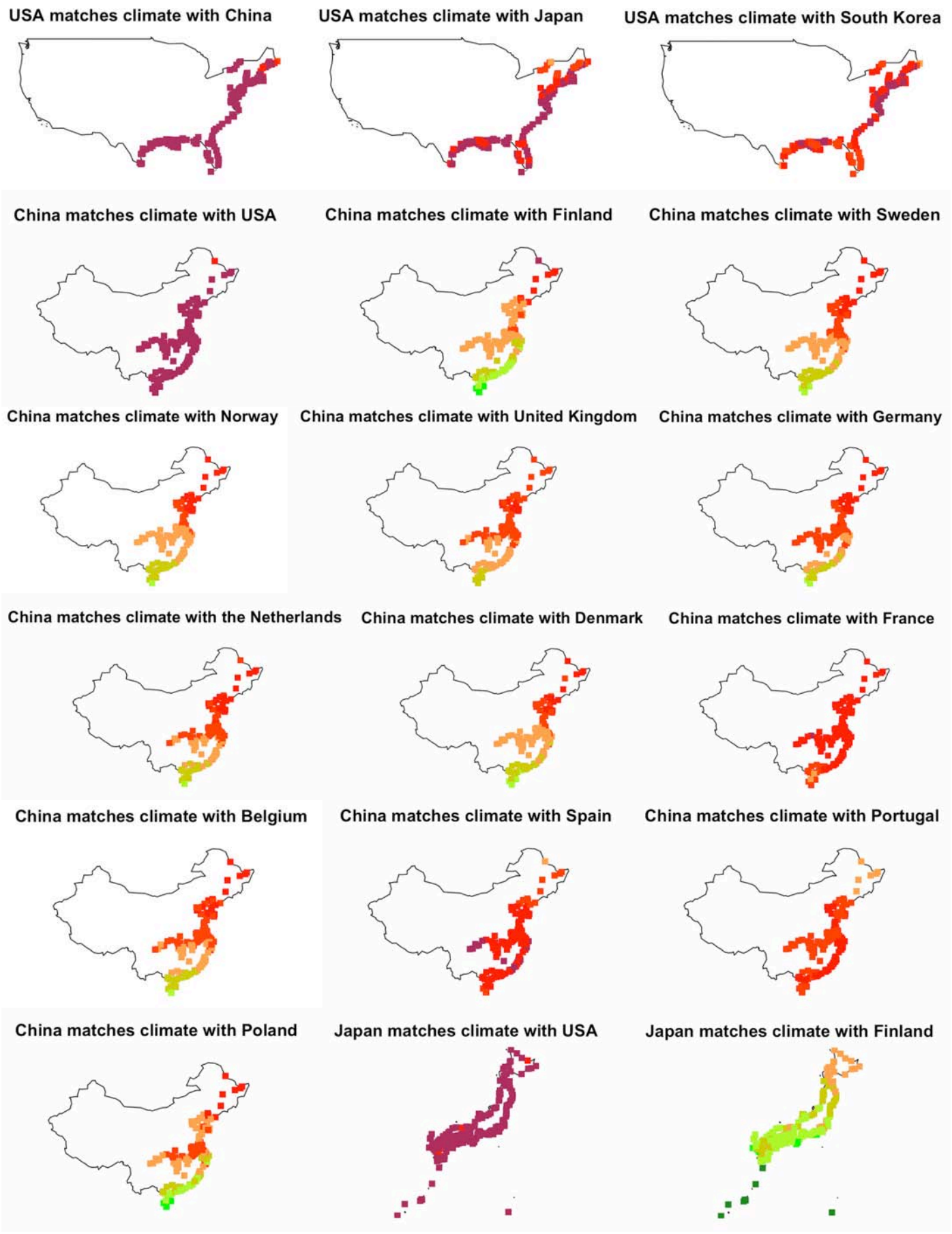

FIG. S2. Marine climate matching between regions in 2030. Details as in Figure A.

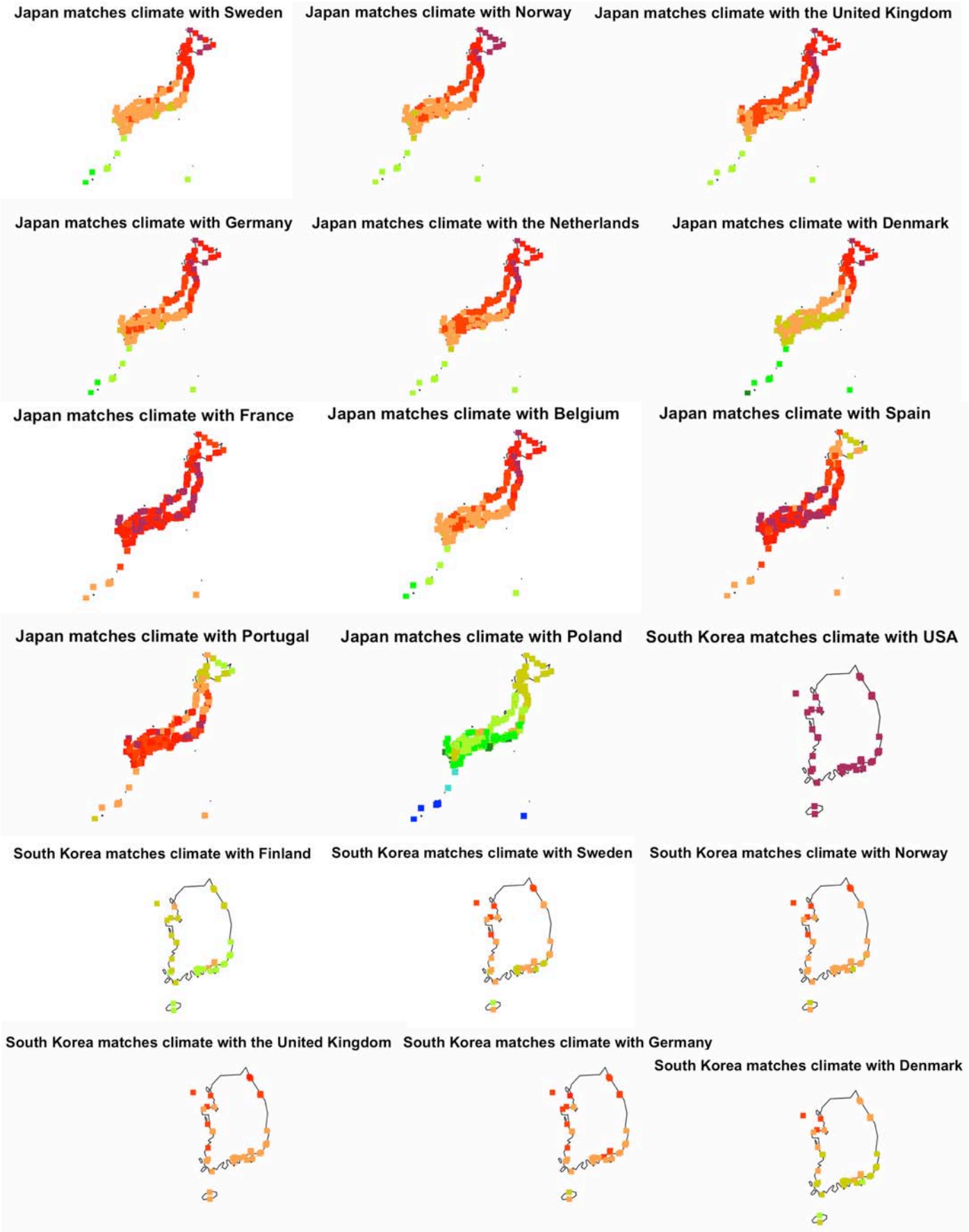

FIG. S2. Marine climate matching between regions in 2030. Details as in Figure A – *continued*.

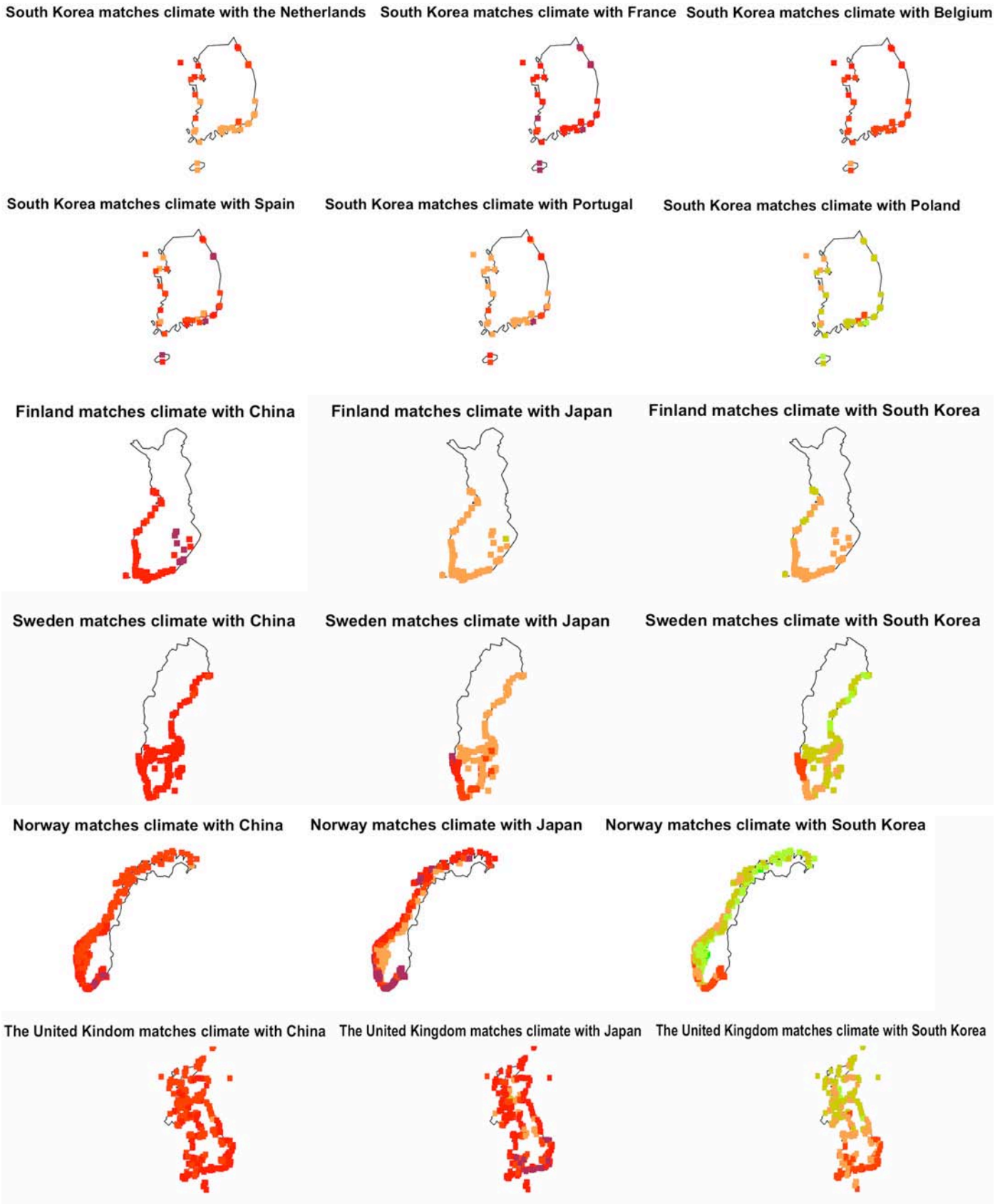

FIG. S2. Marine climate matching between regions in 2030. Details as in Figure A – *continued*.

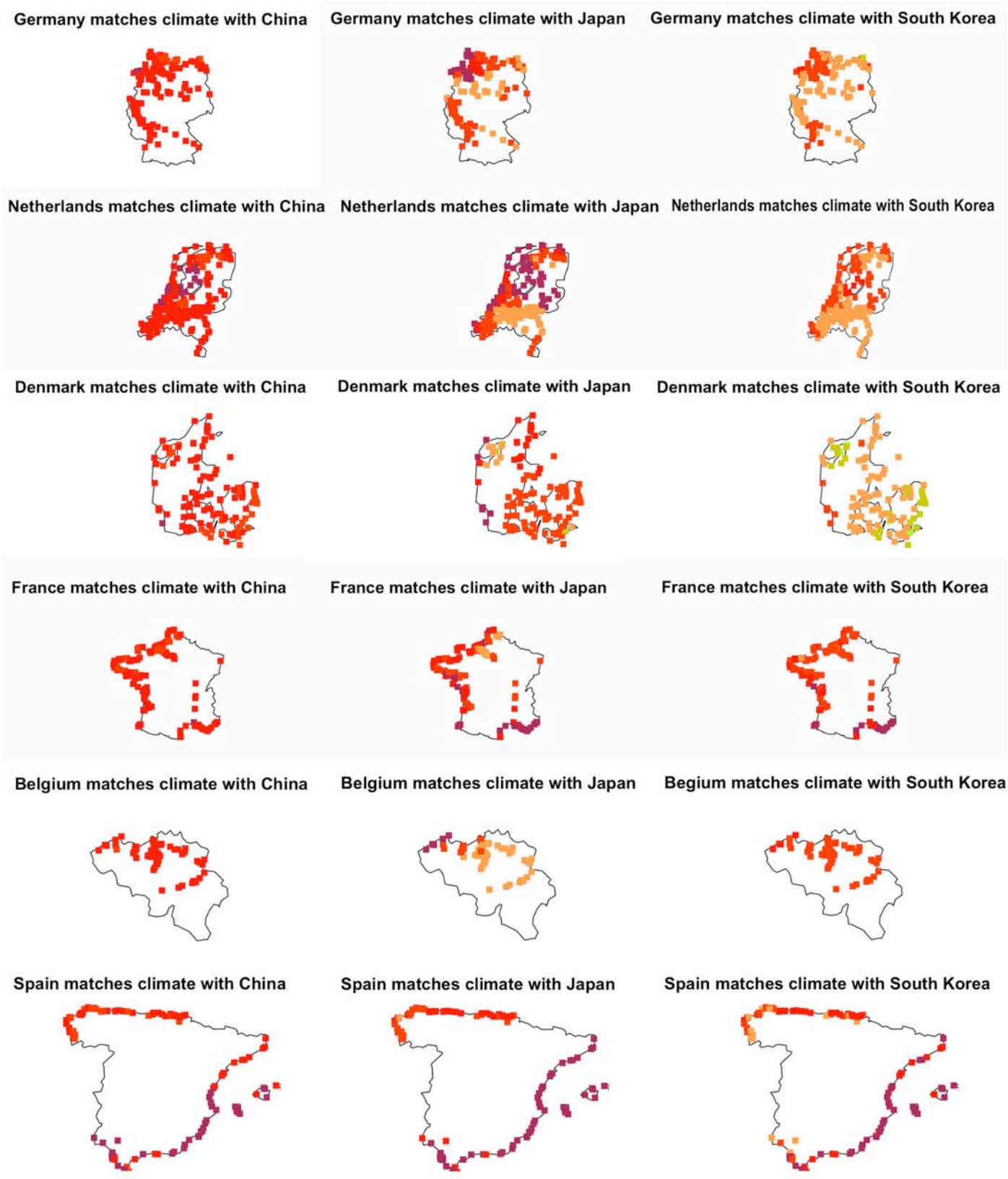

FIG. S2. Marine climate matching between regions in 2030. Details as in Figure A – *continued*.

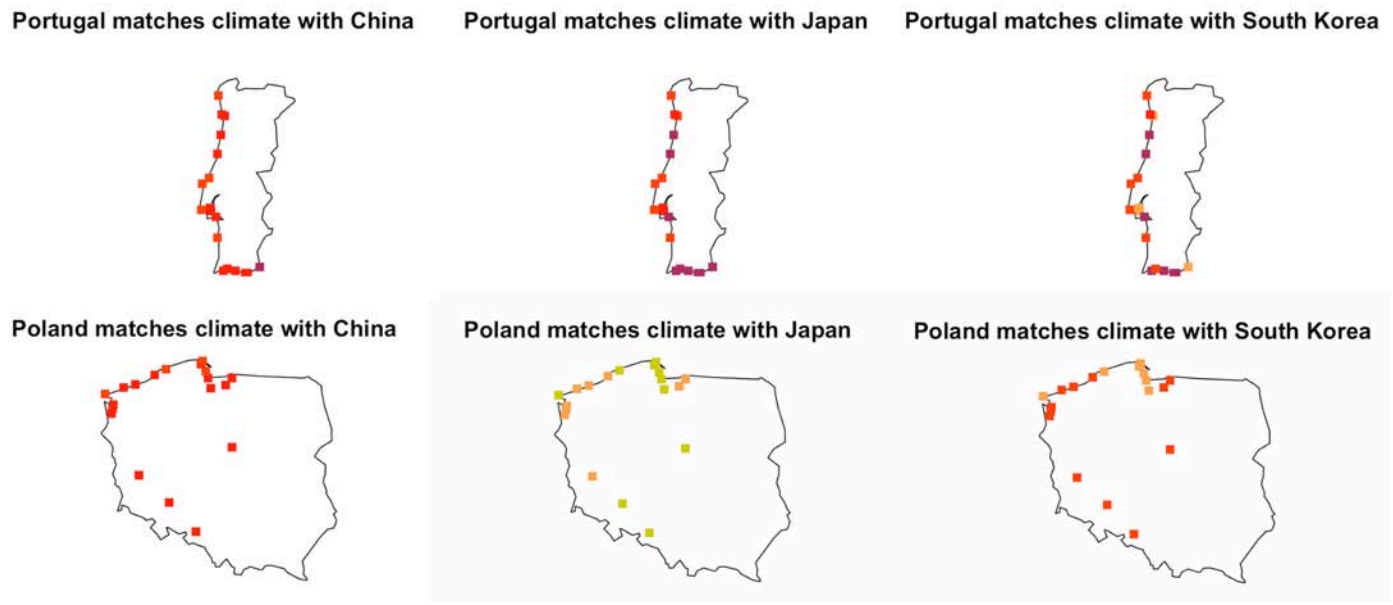

FIG. S2. Marine climate matching between regions in 2030. Details as in Figure A – *continued*.