Computers and Geotechnics

Evaluation and analysis of liquefaction potential of gravelly soils using explainable probabilistic machine learning model

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Appendix A Description of Case History Database

The compiled dataset used in this study is reproduced from Hu et al. (2021), Rollins et al. (2021), and Rollins et al. (2022) after dropping and determining a few missing values. The processed dataset which was considered in the paper for the gravelly soil liquefaction potential assessment model development are shown in Table A1. All the notations are as per the Table 2 of the main paper. The testing dataset along with the predicted results from Model B and Rollins et al. (2021) model are shown in Table A2. The codes associated with the LightGBM model development and the SHAP method are available in the GitHub repository (Link: https://github.com/Kaushikjas10/Liquefaction-gravel-eml-2023.git).

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Table A.1

Final processed dataset for LightGBM model development.

CIN	Earthquake	Site	IP1	IP2	IP3	IP4	IP5	OP	Imported from
1	1906 San Francisco	Coyote Creek 1	7.9	**5.242507**	153	0.878	0.319	1	Rollins et al. (2022)
2	1906 San Francisco	Coyote Creek 2	7.9	**7.332711**	177	0.878	0.309	1	Rollins et al. (2022)
3	1906 San Francisco	Coyote Creek 3	7.9	**8.124356**	185	0.878	0.309	1	Rollins et al. (2022)
4	1906 San Francisco	Coyote Creek 4	7.9	**8.750434**	191	0.878	0.319	1	Rollins et al. (2022)
5	1964 Alaska	Seward 1	9.2	10.6	215	0.577	0.762	1	Rollins et al. (2022)
6	1964 Alaska	Seward 2	9.2	19.2	251	0.577	0.676	1	Rollins et al. (2022)
7	1964 Alaska	Seward 3	9.2	7.6	200	0.577	0.641	1	Rollins et al. (2022)
8	1964 Alaska	Seward 4	9.2	5.4	170	0.577	0.797	1	Rollins et al. (2022)
9	1964 Alaska	Old Valdez 1	9.2	9.23	189	0.577	0.771	1	Rollins et al. (2022)

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CIN	Earthquake	Site	IP1	IP2	IP3	IP4	IP5	OP	Imported from
10	1964 Alaska	Olda Valdez 2	9.2	16.14	185	0.577	0.785	1	Rollins et al. (2022)
11	1964 Alaska	Olda Valdez 3	9.2	7.8	144	0.577	0.787	1	Rollins et al. (2022)
12	1964 Alaska	Olda Valdez 4	9.2	9.08	136	0.577	0.786	1	Rollins et al. (2022)
13	1964 Alaska	Olda Valdez 6	9.2	12.3	242	0.577	0.812	1	Rollins et al. (2022)
14	1964 Alaska	Matanuska river, MP 147.4, B.H.17	9.2	15.53635	247.0385908	0.592734	0.5308797	1	Hu et al. (2021)
15	1964 Alaska	Matanuska river, MP 147.5, B.H.18	9.2	6.822775	181.2555172	0.592734	0.5317634	1	Hu et al. (2021)
16	1964 Alaska	Twenty-Mile river, MP 64.7, B.H.20	9.2	28.7129	278.0995091	0.592734	0.752519	1	Hu et al. (2021)
17	1964 Alaska	Twenty-Mile river, MP 64.7, B.H.24	9.2	9.339066	183.9318586	0.592734	0.39854	1	Hu et al. (2021)

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CIN	Earthquake	Site	IP1	IP2	IP3	IP4	IP5	OP	Imported from
18	1964 Alaska	Portage Creek, MP 63.0, B.H.25	9.2	7.406406	192.7077103	0.592734	0.6502315	0	Hu et al. (2021)
19	1964 Alaska	Portage Creek, MP 63.5, B.H.28	9.2	8.203285	171.7146738	0.592734	0.4303282	1	Hu et al. (2021)
20	1976 Friuli	Avasinis 1	6.4	12.33	220	1.426	0.4	1	Rollins et al. (2022)
21	1976 Friuli	Avasinis 2	6.4	7.74	208	1.426	0.4	1	Rollins et al. (2022)
22	1976 Friuli	Avasinis 3	6.4	15.01	257	1.426	0.4	1	Rollins et al. (2022)
23	1976 Friuli	Avasinis 5	6.4	5.48	226	1.426	0.332	1	Rollins et al. (2022)
24	1976 Friuli	Avasinis 1	6	12.33	220	1.622	0.159	1	Rollins et al. (2022)
25	1977 Friuli	Avasinis 1	5.3	12.33	208	2.034	0.127	1	Rollins et al. (2022)
26	1976 Friuli	Bordano 1	6.4	13.84	253	1.426	0.29	1	Rollins et al. (2022)

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CIN	Earthquake	Site	IP1	IP2	IP3	IP4	IP5	OP	Imported from
27	1976 Friuli	Bordano 2	6.4	15.66	286	1.426	0.343	1	Rollins et al. (2022)
28	1976 Guatemala	Lake Amatitlan B-1	7.5	5.98811	168.063087	1	0.1706696	1	Hu et al. (2021)
29	1976 Guatemala	Lake Amatitlan B-2	7.5	10.01114	205.713158 1	1	0.150601	1	Hu et al. (2021)
30	1976 Guatemala	Lake Amatitlan B-4	7.5	8.7823	198.427019 5	1	0.1409056	0	Hu et al. (2021)
31	1976 Tangshan	Baihe dam, Miyun reservoir	7.8	3.84392	130.799626 7	0.912882	0.1478398	1	Hu et al. (2021)
32	1983 Borah Peak, Idaho	Andersen Bar, SA-1	6.9	6.735129	159.857361 1	1.213828	0.2149957	1	Hu et al. (2021)
33	1983 Borah Peak, Idaho	Andersen Bar, X1-X2	6.9	6.661133	159.717369 1	1.213828	0.216532	1	Hu et al. (2021)

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CIN	Earthquake	Site	IP1	IP2	IP3	IP4	IP5	OP	Imported from
34	1983 Borah Peak, Idaho	Goddard Ranch, SA-2	6.9	7.782228	168.8155155	1.213828	0.20992	1	Hu et al. (2021)
35	1983 Borah Peak, Idaho	Goddard Ranch, SA-4	6.9	5.325557	145.1656715	1.213828	0.20978	1	Hu et al. (2021)
36	1983 Borah Peak, Idaho	Mackay Dam, downstream toe,	6.9	45.91412	318.5425813	1.213828	0.1314036	0	Hu et al. (2021)
37	1983 Borah Peak, Idaho	North Gravel Bar, Bar Site	6.9	29.63969	303.6669394	1.213828	0.3422241	0	Hu et al. (2021)
38	1983 Borah Peak, Idaho	North Gravel Bar, Tarrace	6.9	37.54913	316.1218443	1.213828	0.2580048	0	Hu et al. (2021)
39	1983 Borah Peak, Idaho	Pence Ranch, SA1	6.9	7.404698	132.9494306	1.213828	0.2332386	1	Hu et al. (2021)

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CIN	Earthquake	Site	IP1	IP2	IP3	IP4	IP5	OP	Imported from
40	1983 Borah Peak, Idaho	Pence Ranch, SA2	6.9	7.527912	122.6410352	1.213828	0.2526416	1	Hu et al. (2021)
41	1983 Borah Peak, Idaho	Pence Ranch, SA3	6.9	8.296681	141.7612486	1.213828	0.2352909	1	Hu et al. (2021)
42	1983 Borah Peak, Idaho	Pence Ranch, SA4	6.9	7.160854	130.4439417	1.213828	0.2354289	1	Hu et al. (2021)
43	1983 Borah Peak, Idaho	Pence Ranch, SA5	6.9	7.453253	159.4407897	1.213828	0.2488224	1	Hu et al. (2021)
44	1983 Borah Peak, Idaho	Pence Ranch, SA-A	6.9	8.876036	172.8418377	1.213828	0.2335471	1	Hu et al. (2021)
45	1983 Borah Peak, Idaho	Pence Ranch, SA-B	6.9	10.52959	184.4927064	1.213828	0.22381	1	Hu et al. (2021)

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CIN	Earthquake	Site	IP1	IP2	IP3	IP4	IP5	OP	Imported from
46	1983 Borah Peak, Idaho	Pence Ranch, SA-C	6.9	10.61053	154.9938794	1.213828	0.2249209	1	Hu et al. (2021)
47	1983 Borah Peak, Idaho	Pence Ranch, SA-D	6.9	10.38846	187.1678567	1.213828	0.2212194	1	Hu et al. (2021)
48	1983 Borah Peak, Idaho	Pence Ranch, SA-E	6.9	9.759109	167.3701973	1.213828	0.2140106	1	Hu et al. (2021)
49	1983 Borah Peak, Idaho	Pence Ranch, XDXE	6.9	9.600205	187.6639497	1.213828	0.2578123	1	Hu et al. (2021)
50	1983 Borah Peak, Idaho	Pence Ranch, HY1-C	6.9	8.100926	136.1965494	1.213828	0.2271884	1	Hu et al. (2021)
51	1983 Borah Peak, Idaho	Pence Ranch, HY2-C	6.9	8.774661	135.4868313	1.213828	0.2393587	1	Hu et al. (2021)

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CIN	Earthquake	Site	IP1	IP2	IP3	IP4	IP5	OP	Imported from
52	1983 Borah Peak, Idaho	Pence Ranch, HY3-C	6.9	9.511506	154.9286407	1.213828	0.2224778	1	Hu et al. (2021)
53	1983 Borah Peak, Idaho	Pence Ranch, PH1-C	6.9	10.3603	146.8254444	1.213828	0.2355455	1	Hu et al. (2021)
54	1983 Borah Peak, Idaho	Pence Ranch, HY1-D	6.9	24.47549	277.7946138	1.213828	0.2689893	0	Hu et al. (2021)
55	1983 Borah Peak, Idaho	Pence Ranch, HY2-D	6.9	25.13944	260.0869213	1.213828	0.2877387	0	Hu et al. (2021)
56	1983 Borah Peak, Idaho	Pence Ranch, HY3-D	6.9	25.88844	300.4684498	1.213828	0.2849961	0	Hu et al. (2021)
57	1983 Borah Peak, Idaho	Pence Ranch, BR1-D	6.9	21.50478	250.9350025	1.213828	0.2818743	0	Hu et al. (2021)

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CIN	Earthquake	Site	IP1	IP2	IP3	IP4	IP5	OP	Imported from
58	1983 Borah Peak, Idaho	Pence Ranch, PH1-D	6.9	27.27899	322.2587283	1.213828	0.2995205	0	Hu et al. (2021)
59	1983 Borah Peak, Idaho	Whiskey Springs, B.H.1	6.9	27.39536	275.0950149	1.213828	0.3406143	1	Hu et al. (2021)
60	1983 Borah Peak, Idaho	Whiskey Springs, B.H.2	6.9	13.10715	202.5156238	1.213828	0.2701708	1	Hu et al. (2021)
61	1983 Borah Peak, Idaho	Whiskey Springs, B.H.3	6.9	4.991618	147.8392542	1.213828	0.3116106	1	Hu et al. (2021)
62	1983 Borah Peak, Idaho	Whiskey Springs, B.H.4	6.9	4.928896	151.5404265	1.213828	0.2963561	1	Hu et al. (2021)
63	1983 Borah Peak, Idaho	Whiskey Springs, WS1B-C1	6.9	19.5715	250.2379671	1.213828	0.406594	1	Hu et al. (2021)
64	1983 Borah Peak, Idaho	Whiskey Springs, WS1B-D	6.9	15.76415	240.342594	1.213828	0.4295353	0	Hu et al. (2021)

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CIN	Earthquake	Site	IP1	IP2	IP3	IP4	IP5	OP	Imported from
65	1983 Borah Peak, Idaho	Whiskey Springs, WS2B-C1	6.9	11.83796	190.5973841	1.213828	0.3022336	1	Hu et al. (2021)
66	1983 Borah Peak, Idaho	Whiskey Springs, WS3B-C1	6.9	5.546049	148.1053013	1.213828	0.2522475	1	Hu et al. (2021)
67	1983 Borah Peak, Idaho	Whiskey Springs Site 1 Unit C1	6.9	16.8996	215.8305875	1.213828	0.3970222	1	Hu et al. (2021)
68	1983 Borah Peak, Idaho	Whiskey Springs Site 2 Unit C1	6.9	13.36705	200.642677	1.213828	0.3049341	1	Hu et al. (2021)
69	1983 Borah Peak, Idaho	Whiskey Springs Site 3 Unit C1	6.9	6.424706	158.2641523	1.213828	0.2521558	1	Hu et al. (2021)
70	1983 Borah Peak, Idaho	Larter Ranch, X3X4	6.9	19.34226	240.0349988	1.213828	0.4008876	1	Hu et al. (2021)

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CIN	Earthquake	Site	IP1	IP2	IP3	IP4	IP5	OP	Imported from
71	1983 Borah Peak, Idaho	Larter Ranch, SA1, 85	6.9	14.61959	209.7208851	1.213828	0.3765642	1	Hu et al. (2021)
72	1983 Borah Peak, Idaho	Larter Ranch, SA1, 90	6.9	20.56242	246.5392703	1.213828	0.3860399	1	Hu et al. (2021)
73	1983 Borah Peak, Idaho	Whiskey Springs	6.9	25.45762	275.5475178	1.213828	0.3167867	1	Hu et al. (2021)
74	1983 Borah Peak, Idaho	Larter Ranch	6.9	10.82992	197.4342973	1.213828	0.408457	1	Hu et al. (2021)
75	1983 Borah Peak, Idaho	Pence Ranch	6.9	13.85671	212.6483479	1.213828	0.2617442	1	Hu et al. (2021)
76	1983 Cephalonia	Argostoli 11	7	2.2	170	1.175	0.117	0	Rollins et al. (2022)
77	1983 Cephalonia	Argostoli 12	7	5.4	205	1.175	0.128	0	Rollins et al. (2022)

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CIN	Earthquake	Site	IP1	IP2	IP3	IP4	IP5	OP	Imported from
78	1983 Cephalonia	Argostoli 13	7	2.7	174	1.175	0.102	0	Rollins et al. (2022)
79	1983 Nihonkai-Chubu	Noshiro-N2, B.H.78	7.7	28.43859	266.2189924	0.940671	0.1734326	0	Hu et al. (2021)
80	1983 Nihonkai-Chubu	Noshiro-N2, B.H.84	7.7	23.55498	255.5390924	0.940671	0.1985367	0	Hu et al. (2021)
81	1985 Borah Peak	Pence ranch	6.9	7.88	151	1.213	0.228	1	Rollins et al. (2022)
82	1985 Borah Peak	Larter Ranch	6.9	9.25	216	1.213	0.39	1	Rollins et al. (2022)
83	1985 Borah Peak	Whiskey Springs	6.9	12.95	251	1.213	0.392	1	Rollins et al. (2022)
84	1985 Borah Peak	Goddard Ranch	6.9	**4.821349**	147.5	1.213	0.194	1	Rollins et al. (2022)
85	1985 Borah Peak	Anderson Bar	6.9	**4.673369**	145.5	1.213	0.21	1	Rollins et al. (2022)
86	1988 Armenia	Pambak Valley	6.8	7.40185	153.2394657	1.255717	0.1875822	1	Hu et al. (2021)

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CIN	Earthquake	Site	IP1	IP2	IP3	IP4	IP5	OP	Imported from
87	1989 Loma Prieta	Coyote Creek 1	6.9	**5.242507**	153	1.213	0.133	0	Rollins et al. (2022)
88	1989 Loma Prieta	Coyote Creek 2	6.9	**7.332711**	177	1.213	0.122	0	Rollins et al. (2022)
89	1989 Loma Prieta	Coyote Creek 3	6.9	**8.124356**	185	1.213	0.122	0	Rollins et al. (2022)
90	1989 Loma Prieta	Coyote Creek 4	6.9	**8.750434**	191	1.213	0.133	0	Rollins et al. (2022)
91	1993 Hokkaido	Pension House	7.7	**1.962862**	99	0.937	0.199	1	Rollins et al. (2022)
92	1993 Hokkaido-Nansei-Oki	Pension House, BH1	8.3	2.617691	109.4348644	0.790142	0.207353	1	Hu et al. (2021)
93	1993 Hokkaido-Nansei-Oki	Pension House, BH2	8.3	6.106188	162.3915878	0.790142	0.2684424	1	Hu et al. (2021)
94	1995 Hyogoken-Nambu	Hanshin Expressway 5.3	6.9	8.676614	180.3263636	1.213828	0.384686	1	Hu et al. (2021)

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CIN	Earthquake	Site	IP1	IP2	IP3	IP4	IP5	OP	Imported from
95	1995 Hyogoken-Nambu	Hanshin Expressway 5.10	6.9	3.506954	125.3398141	1.213828	0.4534477	1	Hu et al. (2021)
96	1995 Hyogoken-Nambu	Hanshin Expressway 5.14	6.9	8.40173	178.2191944	1.213828	0.3808302	1	Hu et al. (2021)
97	1995 Hyogoken-Nambu	Hanshin Expressway 5.25	6.9	7.096561	174.0207281	1.213828	0.4792787	1	Hu et al. (2021)
98	1995 Hyogoken-Nambu	Hanshin Expressway 5.29	6.9	7.911688	178.4024133	1.213828	0.4995303	1	Hu et al. (2021)
99	1995 Hyogoken-Nambu	KNK Kainan Port Sub-station (KPS) 1	6.9	5.061161	146.9825156	1.213828	0.0908284	0	Hu et al. (2021)
100	1995 Hyogoken-Nambu	KNK Kainan Port Sub-station (KPS) 2	6.9	6.176161	168.4	1.213828	0.0990121	0	Hu et al. (2021)

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CIN	Earthquake	Site	IP1	IP2	IP3	IP4	IP5	OP	Imported from
101	1995 Hyogoken-Nambu	Nishinomiya Expressway 3	6.9	8.191728	178.4088904	1.213828	0.4129399	0	Hu et al. (2021)
102	1995 Hyogoken-Nambu	Nishinomiya Expressway 17	6.9	20.9595	239.8336565	1.213828	0.3417139	0	Hu et al. (2021)
103	1995 Hyogoken-Nambu	Nishinomiya Expressway 23	6.9	5.959601	148.1953896	1.213828	0.3854522	0	Hu et al. (2021)
104	1995 Hyogoken-Nambu	Nishinomiya Expressway 28	6.9	7.791472	173.0777361	1.213828	0.482931	0	Hu et al. (2021)
105	1995 Hyogoken-Nambu	LPG Tank Yard, Kobe	6.9	4.101561	128.3877765	1.213828	0.3728428	1	Hu et al. (2021)
106	1995 Hyogoken-Nambu	Port Island 1C, Instrumented array	6.9	6.336851	164.2415919	1.213828	0.3480242	1	Hu et al. (2021)

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CIN	Earthquake	Site	IP1	IP2	IP3	IP4	IP5	OP	Imported from
107	1995 Hyogoken-Nambu	Port Island Common Factory, 1	6.9	10.67283	202.4912018	1.213828	0.3395979	0	Hu et al. (2021)
108	1995 Hyogoken-Nambu	Port Island Common Factory, 2	6.9	8.069209	181.5878685	1.213828	0.3401376	0	Hu et al. (2021)
109	1995 Hyogoken-Nambu	Port Island Dhole Array 91	6.9	10.01541	194.1163054	1.213828	0.3668879	1	Hu et al. (2021)
110	1995 Hyogoken-Nambu	Port Island Dhole Array 95	6.9	6.912306	169.7739252	1.213828	0.4056859	1	Hu et al. (2021)
111	1995 Hyogoken-Nambu	SGK Technical Research Center (TRC) 1	6.9	7.76277	176.2308322	1.213828	0.2358379	0	Hu et al. (2021)
112	1995 Hyogoken-Nambu	SGK Technical Research Center (TRC) 2	6.9	5.454385	155.848841	1.213828	0.2192443	0	Hu et al. (2021)

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CIN	Earthquake	Site	IP1	IP2	IP3	IP4	IP5	OP	Imported from
113	1999 Chi-Chi	NanTou, B-1	7.6	10.61268	190.803972 7	0.969687	0.4088069	0	Hu et al. (2021)
114	1999 Chi-Chi	NanTou, B-2	7.6	13.98571	223.256227 2	0.969687	0.4416732	0	Hu et al. (2021)
115	1999 Chi-Chi	NanTou, BH-2	7.6	14.15354	222.147478 9	0.969687	0.4182675	0	Hu et al. (2021)
116	1999 Chi-Chi	NanTou, BH-3	7.6	18.54029	269.757622 4	0.969687	0.3677562	0	Hu et al. (2021)
117	1999 Chi-Chi	NanTou, BH-4	7.6	8.466391	178.474722 9	0.969687	0.3139408	0	Hu et al. (2021)
118	1999 Chi-Chi	NanTou, BH-5	7.6	18.75811	273.283333 9	0.969687	0.3916594	0	Hu et al. (2021)

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CIN	Earthquake	Site	IP1	IP2	IP3	IP4	IP5	OP	Imported from
119	1999 Chi-Chi	NanTou, BH-6	7.6	7.105908	164.1855607	0.969687	0.4121732	1	Hu et al. (2021)
120	1999 Chi-Chi	NanTou, BH-7	7.6	17.51466	263.8170383	0.969687	0.4311932	0	Hu et al. (2021)
121	1999 Chi-Chi	NanTou, BH-8	7.6	11.67431	200.2394346	0.969687	0.3345767	0	Hu et al. (2021)
122	1999 Chi-Chi	NanTou, BH-9	7.6	15.85958	248.1366947	0.969687	0.2888142	0	Hu et al. (2021)
123	1999 Chi-Chi	NanTou, BH-10	7.6	12.10804	203.6818305	0.969687	0.381248	0	Hu et al. (2021)
124	1999 Chi-Chi	NanTou, BH-14	7.6	6.464011	165.92512	0.969687	0.4135822	0	Hu et al. (2021)
125	1999 Chi-Chi	WuFeng, BH-2	7.6	17.35261	236.9123231	0.969687	0.5091478	0	Hu et al. (2021)

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CIN	Earthquake	Site	IP1	IP2	IP3	IP4	IP5	OP	Imported from
126	1999 Chi-Chi	WuFeng, BH-3	7.6	16.05893	247.733915	0.969687	0.8212624	0	Hu et al. (2021)
127	1999 Chi-Chi	WuFeng, BH-14	7.6	10.7787	198.9843579	0.969687	0.681317	1	Hu et al. (2021)
128	1999 Chi-Chi	WuFeng -Fu Tin Bridge	7.6	10.03048	189.7101392	0.969687	0.5651973	1	Hu et al. (2021)
129	1999 Chi-Chi	YuanLin, BH-02	7.6	13.62386	234.9151428	0.969687	0.1416457	0	Hu et al. (2021)
130	1999 Chi-Chi	YuanLin, BH-14	7.6	16.46606	251.9868778	0.969687	0.1964303	0	Hu et al. (2021)
131	1999 Chi-Chi	YuanLin, BH-40	7.6	14.5554	225.1814945	0.969687	0.1893241	0	Hu et al. (2021)
132	1999 Izmit-Kocaeli	Hotel Sapanca, SH-4	7.4	22.33758	266.3806112	1.031687	0.3049109	1	Hu et al. (2021)

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CIN	Earthquake	Site	IP1	IP2	IP3	IP4	IP5	OP	Imported from
133	1999 Izmit-Kocaeli	Hotel Sapanca, SH-7	7.4	21.30093	245.6882808	1.031687	0.2567491	1	Hu et al. (2021)
134	1999 Izmit-Kocaeli	Sapanca Lake, B.H. JS4	7.4	20.30575	237.6546964	1.031687	0.4240419	1	Hu et al. (2021)
135	1999 Izmit-Kocaeli	Sapanca Lake, B.H. JS5	7.4	29.6437	270.1863844	1.031687	0.405714	1	Hu et al. (2021)
136	1999 Izmit-Kocaeli	Sapanca Lake, B.H. JS7	7.4	19.70444	246.7182354	1.031687	0.5167252	1	Hu et al. (2021)
137	1999 Izmit-Kocaeli	Sapanca Lake, B.H. JS9	7.4	9.626298	196.2242575	1.031687	0.4761407	1	Hu et al. (2021)
138	1999 Izmit-Kocaeli	Sapanca Lake, B.H. JS12	7.4	41.0679	315.2265102	1.031687	0.4482268	0	Hu et al. (2021)

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CIN	Earthquake	Site	IP1	IP2	IP3	IP4	IP5	OP	Imported from
139	1999 Izmit-Kocaeli	Sapanca Lake, B.H. JS13	7.4	18.76116	251.0695869	1.031687	0.5670185	1	Hu et al. (2021)
140	1999 Izmit-Kocaeli	Sapanca Lake, B.H. S1/8	7.4	30.57381	256.7733282	1.031687	0.4847134	1	Hu et al. (2021)
141	1999 Izmit-Kocaeli	Sapanca Lake, B.H. S2/3	7.4	11.68358	216.493598	1.031687	0.4929905	1	Hu et al. (2021)
142	1999 Izmit-Kocaeli	Sapanca Lake, B.H. S4/3	7.4	17.89363	228.1079506	1.031687	0.3771895	1	Hu et al. (2021)
143	2008 Wenchuan	Jiangyou thermal power plant ZK3	7.9	**22.29017**	283.6	0.878	0.29	0	Rollins et al. (2022)
144	2008 Wenchuan	Jiangyou thermal power plant Site 1	7.9	**23.57811**	290.3	0.878	0.345	0	Rollins et al. (2022)
145	2008 Wenchuan	Jiangyou thermal power plant Site 3	7.9	**26.18536**	303.2	0.878	0.293	0	Rollins et al. (2022)

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CIN	Earthquake	Site	IP1	IP2	IP3	IP4	IP5	OP	Imported from
146	2008 Wenchuan	Wenjiang construction site ZKl40	7.9	**28.01864**	311.8	0.878	0.226	0	Rollins et al. (2022)
147	2008 Wenchuan	Wenjiang construction site ZKl42	7.9	**47.11692**	385.7	0.878	0.225	0	Rollins et al. (2022)
148	2008 Wenchuan	Mianyang Fengtai ZK2	7.9	**13.14465**	227.2	0.878	0.183	0	Rollins et al. (2022)
149	2008 Wenchuan	Chengdu Zhiminlu	7.9	**15.09789**	240.9	0.878	0.099	0	Rollins et al. (2022)
150	2008 Wenchuan	Dujiangyan Zipingpu School	7.9	**22.04543**	282.3	0.878	0.662	0	Rollins et al. (2022)
151	2008 Wenchuan	Xudu Element School	7.9	**15.82173**	245.7	0.878	0.314	0	Rollins et al. (2022)
152	2008 Wenchuan	Yanjiang Element School	7.9	**42.28268**	369.1	0.878	0.332	0	Rollins et al. (2022)
153	2008 Wenchuan	Congzhou Jiezi Hospital	7.9	**40.53316**	362.8	0.878	0.481	0	Rollins et al. (2022)
154	2008 Wenchuan	Chongzhou Dahua Hospital	7.9	**22.34688**	283.9	0.878	0.266	0	Rollins et al. (2022)

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CIN	Earthquake	Site	IP1	IP2	IP3	IP4	IP5	OP	Imported from
155	2008 Wenchuan	Chongzhou Liaojia Hospital	7.9	**21.15621**	277.5	0.878	0.281	0	Rollins et al. (2022)
156	2008 Wenchuan	Chongzhou Jixian Hospital	7.9	**21.06488**	277	0.878	0.275	0	Rollins et al. (2022)
157	2008 Wenchuan	Jiangyou Longxigu	7.9	**17.80535**	258.2	0.878	0.329	0	Rollins et al. (2022)
158	2008 Wenchuan	Wenchuan Mianshi Cherry	7.9	**27.39182**	308.9	0.878	0.59	0	Rollins et al. (2022)
159	2008 Wenchuan	Shifang Lingjie Hospital	7.9	**23.69563**	290.9	0.878	0.339	0	Rollins et al. (2022)
160	2008 Wenchuan	Pixian Huayutianfu ZK26	7.9	**38.40432**	354.9	0.878	0.221	0	Rollins et al. (2022)
161	2008 Wenchuan	Pixian Huayutianfu ZK53	7.9	**14.62681**	237.7	0.878	0.243	0	Rollins et al. (2022)
162	2008 Wenchuan	Mianyang Fanhua Plaza	7.9	**16.55072**	250.4	0.878	0.238	0	Rollins et al. (2022)
163	2008 Wenchuan	Chengdu Erxianqiao	7.9	**11.86029**	217.5	0.878	0.165	0	Rollins et al. (2022)
164	2008 Wenchuan	Wenjiang Campus,Chengdu	7.9	**27.65013**	310.1	0.878	0.219	0	Rollins et al. (2022)

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CIN	Earthquake	Site	IP1	IP2	IP3	IP4	IP5	OP	Imported from
165	2008 Wenchuan	Wenjiang Campus,Chengdu	7.9	**34.80625**	340.9	0.878	0.238	0	Rollins et al. (2022)
166	2008 Wenchuan	Jiangyou shuangma	7.9	**29.20939**	317.2	0.878	0.31	0	Rollins et al. (2022)
167	2008 Wenchuan	Deyang Fukang	7.9	**14.36584**	235.9	0.878	0.156	0	Rollins et al. (2022)
168	2008 Wenchuan	Pengzhou Qingbaijiang	7.9	**16.8035**	252	0.878	0.36	0	Rollins et al. (2022)
169	2008 Wenchuan	Pengzhou Jiuchimao	7.9	**17.33231**	255.3	0.878	0.185	0	Rollins et al. (2022)
170	2008 Wenchuan	Pixian south	7.9	**33.5257**	335.7	0.878	0.274	0	Rollins et al. (2022)
171	2008 Wenchuan	Chengdu Xinfanzheng	7.9	**10.80019**	209	0.878	0.235	0	Rollins et al. (2022)
172	2008 Wenchuan	Chengdu Tiantian	7.9	**19.63657**	269	0.878	0.157	0	Rollins et al. (2022)
173	2008 Wenchuan	Chengdu Nanbu center	7.9	**18.65635**	263.3	0.878	0.086	0	Rollins et al. (2022)
174	2008 Wenchuan	Chengdu Taiye plaza	7.9	**22.63179**	285.4	0.878	0.174	0	Rollins et al. (2022)
175	2008 Wenchuan	Chengdu Jintanghexie	7.9	**18.92838**	264.9	0.878	0.167	0	Rollins et al. (2022)

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CIN	Earthquake	Site	IP1	IP2	IP3	IP4	IP5	OP	Imported from
176	2008 Wenchuan	Mianyang Fuleyaju	7.9	**19.49713**	268.2	0.878	0.268	0	Rollins et al. (2022)
177	2008 Wenchuan	Mianyang Fulin	7.9	**15.92902**	246.4	0.878	0.218	0	Rollins et al. (2022)
178	2008 Wenchuan	Wenchuan Miansi	7.9	**57.7943**	418.9	0.878	0.528	0	Rollins et al. (2022)
179	2008 Wenchuan	Deyang Changjiangxilu	7.9	**12.90022**	225.4	0.878	0.157	0	Rollins et al. (2022)
180	2008 Wenchuan	Beichuan Xinfeng cement ZK48	7.9	**32.13253**	329.9	0.878	0.61	0	Rollins et al. (2022)
181	2008 Wenchuan	Jiangyou Lanwan ZK5	7.9	**28.06219**	312	0.878	0.398	0	Rollins et al. (2022)
182	2008 Wenchuan	Jiangyou Lanwan ZKI 7	7.9	**65.93876**	441.7	0.878	0.345	0	Rollins et al. (2022)
183	2008 Wenchuan	Mianyang Jinqiaoyinzuo ZKl4	7.9	**17.75605**	257.9	0.878	0.297	0	Rollins et al. (2022)
184	2008 Wenchuan	Mianyang Jinqiaoyinzuo ZK21	7.9	**21.91435**	281.6	0.878	0.258	0	Rollins et al. (2022)

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CIN	Earthquake	Site	IP1	IP2	IP3	IP4	IP5	OP	Imported from
185	2008 Wenchuan	Santai Guixidijing ZKl7	7.9	**14.72908**	238.4	0.878	0.093	0	Rollins et al. (2022)
186	2008 Wenchuan	Santai Guixidijing ZK40	7.9	**17.01062**	253.3	0.878	0.091	0	Rollins et al. (2022)
187	2008 Wenchuan	Santai Zizhou ZK2	7.9	**12.27511**	220.7	0.878	0.084	0	Rollins et al. (2022)
188	2008 Wenchuan	Santai Zizhou ZK20	7.9	**12.71204**	224	0.878	0.08	0	Rollins et al. (2022)
189	2008 Wenchuan	Wulan	7.9	12.1	251	0.878	0.176	0	Rollins et al. (2022)
190	2008 Wenchuan	Chuanmu	7.9	17.9	241	0.878	0.298	0	Rollins et al. (2022)
191	2008 Wenchuan	Nangui	7.9	11.4	273	0.878	0.231	0	Rollins et al. (2022)
192	2008 Wenchuan	Mianzhu	7.9	15.5	296	0.878	0.32	0	Rollins et al. (2022)
193	2008 Wenchuan	Heping	7.9	23.3	283	0.878	0.176	0	Rollins et al. (2022)
194	2008 Wenchuan	Quezhu	7.9	19.8	257	0.878	0.22	0	Rollins et al. (2022)
195	2008 Wenchuan	Bayi	7.9	14.4	236	0.878	0.298	0	Rollins et al. (2022)

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CIN	Earthquake	Site	IP1	IP2	IP3	IP4	IP5	OP	Imported from
196	2008 Wenchuan	Yongling	7.9	36.5	332	0.878	0.496	0	Rollins et al. (2022)
197	2008 Wenchuan	Shenghua	7.9	14.7	232	0.878	0.176	0	Rollins et al. (2022)
198	2008 Wenchuan	Dacheng	7.9	22.4	253	0.878	0.265	0	Rollins et al. (2022)
199	2008 Wenchuan	Min'an	7.9	16.8	252	0.878	0.231	0	Rollins et al. (2022)
200	2008 Wenchuan	Changlin	7.9	**33.59876**	336	0.878	0.331	0	Rollins et al. (2022)
201	2008 Wenchuan	Wufan	7.9	23.4	21 l	0.878	0.265	0	Rollins et al. (2022)
202	2008 Wenchuan	Yangjia	7.9	19.9	205	0.878	0.143	0	Rollins et al. (2022)
203	2008 Wenchuan	Linfa	7.9	19.5	365	0.878	0.386	0	Rollins et al. (2022)
204	2008 Wenchuan	Minjiang flood plain ZK3	7.9	**29.88428**	320.2	0.878	1.214	1	Rollins et al. (2022)
205	2008 Wenchuan	Minjiang flood plain ZK5	7.9	**27.22046**	308.1	0.878	1.384	1	Rollins et al. (2022)
206	2008 Wenchuan	Banqiao School XK5	7.9	**9.983551**	202.1	0.878	0.502	1	Rollins et al. (2022)

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CIN	Earthquake	Site	IP1	IP2	IP3	IP4	IP5	OP	Imported from
207	2008 Wenchuan	Banqiao School XK 15	7.9	**11.92453**	218	0.878	0.456	1	Rollins et al. (2022)
208	2008 Wenchuan	Banqiao School XK26	7.9	**17.75605**	257.9	0.878	0.519	1	Rollins et al. (2022)
209	2008 Wenchuan	Mianzhu Mianyuan school	7.9	**13.11735**	227	0.878	0.376	1	Rollins et al. (2022)
210	2008 Wenchuan	Wenchuan Weizhouzhen	7.9	**21.19281**	277.7	0.878	0.617	1	Rollins et al. (2022)
211	2008 Wenchuan	Yongfen	7.9	13.5	250	0.878	0.331	1	Rollins et al. (2022)
212	2008 Wenchuan	Xinshi	7.9	10.4	171	0.878	0.364	1	Rollins et al. (2022)
213	2008 Wenchuan	Pilu	7.9	9.6	182	0.878	0.242	1	Rollins et al. (2022)
214	2008 Wenchuan	Banqiao	7.9	12.1	173	0.878	0.32	1	Rollins et al. (2022)
215	2008 Wenchuan	Songhai	7.9	10.7	221	0.878	0.298	1	Rollins et al. (2022)
216	2008 Wenchuan	Guoyuan	7.9	15.9	219	0.878	0.165	1	Rollins et al. (2022)
217	2008 Wenchuan	Jingqiao	7.9	7.6	181	0.878	0.176	1	Rollins et al. (2022)

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CIN	Earthquake	Site	IP1	IP2	IP3	IP4	IP5	OP	Imported from
218	2008 Wenchuan	An'ren	7.9	16	278	0.878	0.342	1	Rollins et al. (2022)
219	2008 Wenchuan	Xiangliu	7.9	19.8	249	0.878	0.342	1	Rollins et al. (2022)
220	2008 Wenchuan	Zinglong	7.9	9.4	203	0.878	0.441	1	Rollins et al. (2022)
221	2008 Wenchuan	Shihu	7.9	13.8	177	0.878	0.276	1	Rollins et al. (2022)
222	2008 Wenchuan	Bijiang	7.9	14.4	162	0.878	0.209	1	Rollins et al. (2022)
223	2008 Wenchuan	Qifu	7.9	12.2	189	0.878	0.253	1	Rollins et al. (2022)
224	2008 Wenchuan	Anping	7.9	8.2	177	0.878	0.165	1	Rollins et al. (2022)
225	2008 Wenchuan	Guiua	7.9	15.9	215	0.878	0.441	1	Rollins et al. (2022)
226	2008 Wenchuan	Zhenjiang	7.9	15.7	251	0.878	0.309	1	Rollins et al. (2022)
227	2008 Wenchuan	Sangyuan	7.9	15.2	227	0.878	0.231	1	Rollins et al. (2022)
228	2008 Wenchuan	Wudu	7.9	6.7	162	0.878	0.54	1	Rollins et al. (2022)

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CIN	Earthquake	Site	IP1	IP2	IP3	IP4	IP5	OP	Imported from
229	2008 Wenchuan	Shengli	7.9	12	220	0.878	0.198	1	Rollins et al. (2022)
230	2008 Wenchuan	Changzheng	7.9	13.8	220	0.878	0.187	1	Rollins et al. (2022)
231	2008 Wenchuan	Bailutou	7.9	22.5	237	0.878	0.419	1	Rollins et al. (2022)
232	2008 Wenchuan	Baiyang	7.9	**7.526056**	179	0.878	0.353	1	Rollins et al. (2022)
233	2008 Wenchuan	Linyan	7.9	7.5	237	0.878	0.342	1	Rollins et al. (2022)
234	2008 Wenchuan	Qingliang	7.9	**15.86766**	246	0.878	0.276	1	Rollins et al. (2022)
235	2008 Wenchuan	Siyuan	7.9	15.4	206	0.878	0.386	1	Rollins et al. (2022)
236	2008 Wenchuan	Shuanquan	7.9	15.3	233	0.878	0.397	1	Rollins et al. (2022)
237	2008 Wenchuan	Yongpquan	7.9	**7.821764**	182	0.878	0.265	1	Rollins et al. (2022)
238	2008 Wenchuan	Wuli	7.9	**5.809157**	160	0.878	0.11	1	Rollins et al. (2022)
239	2008 Wenchuan	Jiangyou	7.9	**14.67059**	238	0.878	0.452	1	Rollins et al. (2022)

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CIN	Earthquake	Site	IP1	IP2	IP3	IP4	IP5	OP	Imported from
240	2009 L'Aquila	L'Aquila 1	6.1	25.6	516	1.571	0.211	0	Rollins et al. (2022)
241	2009 L'Aquila	L'Aquila 2	6.1	17.9	323	1.571	0.227	0	Rollins et al. (2022)
242	2009 L'Aquila	L'Aquila 3	6.1	16.04	230	1.571	0.21	0	Rollins et al. (2022)
243	2009 L'Aquila	L'Aquila4	6.1	19.9	384	1.571	0.204	0	Rollins et al. (2022)
244	2009 L'Aquila	L'Aquila 5	6.1	21.96	472	1.571	0.195	0	Rollins et al. (2022)
245	2011 Tohoku	Chiba-ken, CH350	9	16.36647	264.1037675	0.627041	0.2944883	0	Hu et al. (2021)
246	2011 Tohoku	Chiba-ken, CH344	9	17.19018	256.7582211	0.627041	0.3656098	0	Hu et al. (2021)
247	2011 Tohoku	Gunma-ken, GU001	9	9.51359	178.4301486	0.627041	0.1969906	0	Hu et al. (2021)

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CIN	Earthquake	Site	IP1	IP2	IP3	IP4	IP5	OP	Imported from
248	2011 Tohoku	Gunma-ken, GU002	9	11.59256	207.7108652	0.627041	0.1930195	0	Hu et al. (2021)
249	2011 Tohoku	Gunma-ken, GU003	9	14.97425	245.549184	0.627041	0.2741856	0	Hu et al. (2021)
250	2011 Tohoku	Ibaraki-ken, IB014	9	15.60824	246.4866996	0.627041	0.3904416	0	Hu et al. (2021)
251	2011 Tohoku	Ibaraki-ken, IB021	9	8.538159	181.7330596	0.627041	0.4730833	1	Hu et al. (2021)
252	2011 Tohoku	Ibaraki-ken, IB022	9	12.749	223.8857058	0.627041	0.6178458	1	Hu et al. (2021)
253	2011 Tohoku	Ibaraki-ken, IB023	9	15.78916	246.4991723	0.627041	0.6947112	0	Hu et al. (2021)
254	2011 Tohoku	Ibaraki-ken, IB025	9	9.055188	187.6252206	0.627041	0.9766427	1	Hu et al. (2021)

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CIN	Earthquake	Site	IP1	IP2	IP3	IP4	IP5	OP	Imported from
255	2011 Tohoku	Ibaraki-ken, IB027	9	12.61317	220.803474 5	0.627041	1.2215795	0	Hu et al. (2021)
256	2011 Tohoku	Ibaraki-ken, IB028	9	8.677993	180.292491	0.627041	0.9470585	1	Hu et al. (2021)
257	2011 Tohoku	Kanagawa-ken, KA001	9	12.319	219.458598 5	0.627041	0.1818971	0	Hu et al. (2021)
258	2011 Tohoku	Kanagawa-ken, KA002	9	11.53296	198.816278 2	0.627041	0.17144	0	Hu et al. (2021)
259	2011 Tohoku	Kanagawa-ken, KA003	9	16.64206	254.157155 9	0.627041	0.1490614	0	Hu et al. (2021)
260	2011 Tohoku	Kanagawa-ken, KA005	9	8.244115	158.962120 1	0.627041	0.2140679	0	Hu et al. (2021)
261	2011 Tohoku	Kanagawa-ken, KA008	9	18.87855	282.182378 2	0.627041	0.2627128	0	Hu et al. (2021)

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CIN	Earthquake	Site	IP1	IP2	IP3	IP4	IP5	OP	Imported from
262	2011 Tohoku	Kanagawa-ken, KA010	9	17.07118	258.163157 3	0.627041	0.272413	0	Hu et al. (2021)
263	2011 Tohoku	Kanagawa-ken, KA011	9	12.08755	200.657343 1	0.627041	0.1732891	0	Hu et al. (2021)
264	2011 Tohoku	Saitama-ken, SA001	9	10.55563	199.606054 4	0.627041	0.3862163	0	Hu et al. (2021)
265	2011 Tohoku	Saitama-ken, SA003	9	13.50167	232.907778 3	0.627041	0.221406	0	Hu et al. (2021)
266	2011 Tohoku	Tochiki-ken, TC002	9	10.40943	194.283359 4	0.627041	0.4376938	0	Hu et al. (2021)
267	2011 Tohoku	Tokyo, TO001	9	18.94559	285.735602 7	0.627041	0.2239234	0	Hu et al. (2021)
268	2011 Tohoku	Tokyo, TO025	9	20.41159	296.610089	0.627041	0.3072483	0	Hu et al. (2021)

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CIN	Earthquake	Site	IP1	IP2	IP3	IP4	IP5	OP	Imported from
269	2013 Cook Strait	Wellington 1	6.6	4.93	152	1.337	0.094	0	Rollins et al. (2022)
270	2013 Cook Strait	Wellington 2	6.6	5.19	205	1.337	0.08	0	Rollins et al. (2022)
271	2013 Lake Grassmere	Wellington 3	6.6	6.53	160	1.337	0.09	0	Rollins et al. (2022)
272	2013 Lake Grassmere	Wellington4	6.6	6.09	222	1.337	0.075	0	Rollins et al. (2022)
273	2014 Cephalonia	Lixouri	6.1	2.5	156	1.571	0.304	1	Rollins et al. (2022)
274	2014 Cephalonia	Lixouri	6.1	5.4	217	1.571	0.374	1	Rollins et al. (2022)
275	2014 Cepbalonia	Lixouri	6.1	3	208	1.571	0.304	1	Rollins et al. (2022)
276	2014 Cephalonia	Lixouri	6.1	3.5	195	1.571	0.375	1	Rollins et al. (2022)
277	2014 Cephalonia	Lixouri	6.1	5	208	1.571	0.301	1	Rollins et al. (2022)
278	2014 Cephalonia	Lixouri	6	2.5	156	1.622	0.372	1	Rollins et al. (2022)
279	2014 Cephalonia	Lixouri	6	5.4	217	1.622	0.292	1	Rollins et al. (2022)

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CIN	Earthquake	Site	IP1	IP2	IP3	IP4	IP5	OP	Imported from
280	2014 Cephalonia	Lixouri	6	3	208	1.622	0.376	1	Rollins et al. (2022)
281	2014 Cephalonia	Lixouri	6	3.5	195	1.622	0.288	1	Rollins et al. (2022)
282	2014 Cephalonia	Lixouri	6	5	208	1.622	0.366	1	Rollins et al. (2022)
283	2014 Cephalonia	Argostoli	6.1	2.2	170	1.571	0.199	1	Rollins et al. (2022)
284	2014 Cephalonia	Argostoli	6.1	5.4	205	1.571	0.239	1	Rollins et al. (2022)
285	2014 Cephalonia	Argostoli	6.1	2.7	174	1.571	0.225	1	Rollins et al. (2022)
286	2014 Cephalonia	Argostoli	6	2.2	170	1.622	0.193	1	Rollins et al. (2022)
287	2014 Cephalonia	ArgostoIi	6	5.4	205	1.622	0.232	1	Rollins et al. (2022)
288	2014 Cephalonia	Argostoli	6	2.7	174	1.622	0.218	1	Rollins et al. (2022)
289	2016 Muisine	Manta 1	7.8	7.4	150	0.907	0.353	1	Rollins et al. (2022)
290	2016 Muisine	Manta 2	7.8	8.66	190	0.907	0.386	1	Rollins et al. (2022)

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CIN	Earthquake	Site	IP1	IP2	IP3	IP4	IP5	OP	Imported from
291	2016 Muisine	Manta3	7.8	11.7	195	0.907	0.375	1	Rollins et al. (2022)
292	2016 Muisine	Manta4	7.8	9.56	195	0.907	0.386	1	Rollins et al. (2022)
293	2016 Kaikoura	Wellington 1	7.8	4.93	152	0.907	0.22	1	Rollins et al. (2022)
294	2016 Kaikoura	Wellington 2	7.8	5.19	205	0.907	0.214	1	Rollins et al. (2022)
295	2016 Kaikoura	Wellington 3	7.8	6.53	160	0.907	0.187	1	Rollins et al. (2022)
296	2016 Kaikoura	Wellington 4	7.8	6.09	222	0.907	0.165	1	Rollins et al. (2022)

Note: Bold numbers denote the missing values of IP2 that have been determined in this study.

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Table A.2

True class labels and predicted class labels with associated probabilities for testing dataset.

CIN	Actual liquefaction label	Predicted liquefaction label by Model B	Predicted liquefaction label by Rollins et al. (2021) model	Predicted liquefaction probability by Model B	Predicted liquefaction probability by Rollins et al. (2021) model	Misclassification by Model B	Misclassification by Rollins et al. (2021) model
78	0	0	0	0.237	2.13094E-08	No	No
266	0	0	0	0.035	0.022559038	No	No
120	0	0	1	0.205	0.948124599	No	Yes
202	0	0	0	0.215	0.244340729	No	No
198	0	0	0	0.38	0.160170239	No	No
114	0	0	1	0.164	0.955689746	No	Yes
251	1	0	1	0.274	0.994990037	Yes	No

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CIN	Actual liquefaction label	Predicted liquefaction label by Model B	Predicted liquefaction label by Rollins et al. (2021) model	Predicted liquefaction probability by Model B	Predicted liquefaction probability by Rollins et al. (2021) model	Misclassification by Model B	Misclassification by Rollins et al. (2021) model
101	0	0	0	0.5	0.055512708	No	No
27	1	0	1	0.459	0.630530195	Yes	No
249	0	0	1	0.309	0.820613379	No	Yes
73	1	1	1	0.87	0.988382582	No	No
48	1	1	1	0.782	0.913654362	No	No
187	0	0	0	0.183	0.006409639	No	No
278	1	1	1	0.955	0.98017908	No	No
238	1	1	1	0.58	0.956816224	No	No

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CIN	Actual liquefaction label	Predicted liquefaction label by Model B	Predicted liquefaction label by Rollins et al. (2021) model	Predicted liquefaction probability by Model B	Predicted liquefaction probability by Rollins et al. (2021) model	Misclassification by Model B	Misclassification by Rollins et al. (2021) model
208	1	1	1	0.643	0.945696149	No	No
28	1	0	0	0.488	0.321495363	Yes	Yes
126	1	0	1	0.346	0.998967492	Yes	No
30	1	1	0	0.889	0.459124466	No	Yes
0	1	1	1	0.819	0.975714983	No	No
197	0	0	0	0.405	0.002106051	No	No
263	0	0	1	0.468	0.972481089	No	Yes
288	1	1	1	0.953	0.982821392	No	No

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CIN	Actual liquefaction label	Predicted liquefaction label by Model B	Predicted liquefaction label by Rollins et al. (2021) model	Predicted liquefaction probability by Model B	Predicted liquefaction probability by Rollins et al. (2021) model	Misclassification by Model B	Misclassification by Rollins et al. (2021) model
271	0	0	0	0.357	0.031004257	No	No
40	1	1	1	0.896	0.89423228	No	No
194	0	0	1	0.456	0.741617289	No	Yes
169	0	0	0	0.071	1.67207E-12	No	No
4	1	1	1	0.959	0.999015202	No	No
247	0	0	0	0.379	0.414062913	No	No
61	1	1	1	0.801	0.975770325	No	No
154	0	0	0	0.258	0.011904365	No	No

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CIN	Actual liquefaction label	Predicted liquefaction label by Model B	Predicted liquefaction label by Rollins et al. (2021) model	Predicted liquefaction probability by Model B	Predicted liquefaction probability by Rollins et al. (2021) model	Misclassification by Model B	Misclassification by Rollins et al. (2021) model
135	1	1	1	0.794	0.593031357	No	No
203	1	0	0	0.145	2.51495E-05	Yes	Yes
35	0	0	0	0.037	1.51707E-34	No	No
99	0	1	0	0.518	0.109302238	Yes	No
90	1	1	1	0.952	0.808359754	No	No
98	0	1	0	0.636	0.078584527	Yes	No
210	1	1	1	0.626	0.883165411	No	No
215	1	1	0	0.562	0.055774134	No	Yes

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CIN	Actual liquefaction label	Predicted liquefaction label by Model B	Predicted liquefaction label by Rollins et al. (2021) model	Predicted liquefaction probability by Model B	Predicted liquefaction probability by Rollins et al. (2021) model	Misclassification by Model B	Misclassification by Rollins et al. (2021) model
131	1	1	0	0.654	0.005694211	No	Yes
182	0	0	0	0.2	0.262060038	No	No
231	1	1	1	0.693	0.981957515	No	No
250	1	0	1	0.428	0.993712428	Yes	No
72	1	0	0	0.371	0.000116098	Yes	Yes
166	0	0	0	0.325	0.092771731	No	No
261	0	0	0	0.049	0.215969956	No	No
81	1	1	1	0.864	0.98986733	No	No

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CIN	Actual liquefaction label	Predicted liquefaction label by Model B	Predicted liquefaction label by Rollins et al. (2021) model	Predicted liquefaction probability by Model B	Predicted liquefaction probability by Rollins et al. (2021) model	Misclassification by Model B	Misclassification by Rollins et al. (2021) model
29	0	0	0	0.419	0.303189692	No	No
14	1	1	1	0.939	0.997230116	No	No
256	0	0	0	0.197	0.288003304	No	No
201	0	0	0	0.272	0.001294752	No	No
49	1	1	1	0.854	0.879115229	No	No
31	1	1	1	0.819	0.867395141	No	No
147	0	0	0	0.325	0.291946532	No	No
282	1	1	1	0.812	0.881154719	No	No

CIN	Actual liquefaction label	Predicted liquefaction label by Model B	Predicted liquefaction label by Rollins et al. (2021) model	Predicted liquefaction probability by Model B	Predicted liquefaction probability by Rollins et al. (2021) model	Misclassification by Model B	Misclassification by Rollins et al. (2021) model
46	1	1	1	0.776	0.798030219	No	No
273	1	1	1	0.891	0.994267362	No	No
158	0	0	0	0.121	0.00148449	No	No
111	0	1	1	0.824	0.890365335	Yes	Yes
12	1	1	1	0.866	0.998792643	No	No

Appendix B. Performance Evaluation Metrics for ML Models

In this appendix, a brief detail about the performance evaluation metrics employed in the current study is given. Fig. 5(c) illustrates the "confusion matrix", which shows the total number of correctly and incorrectly classified classes of liquefaction and non-liquefaction. In this figure, negative instance stands for liquefaction class and positive instance stands for non-liquefaction class.

The performance evaluation metrics used to compare LightGBM models are

$$\text{Overall accuracy} = \frac{\text{Number of correct predictions}}{\text{Total number of predictions made}} = \frac{(\text{TP} + \text{TN})}{(\text{TP} + \text{FN} + \text{TN} + \text{FP})} \tag{B.1}$$

$$\text{Precision} = \frac{\text{TP}}{(\text{TP} + \text{FP})} \text{ or } \frac{\text{TN}}{(\text{TN} + \text{FN})} \tag{B.2}$$

$$\text{Recall} = \frac{\text{TP}}{(\text{TP} + \text{FN})} \text{ or } \frac{\text{TN}}{(\text{TN} + \text{FP})} \tag{B.3}$$

$$\text{F}_1 \text{ score} = \frac{(2 \times \text{Precision} \times \text{Recall})}{(\text{Precision} + \text{Recall})} \tag{B.4}$$

The "average precision score (APS)" recaps the "PR curve" as follows:

$$\text{APS} = \sum_n (R_n - R_{n-1}) \times P_n \tag{B.5}$$

where R_n and R_{n-1} are the recall at n^{th} and $(n-1)^{th}$ threshold, respectively, and P_n is the precision at the n^{th} threshold.

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