Supplementary Table 1 GPS horizontal and vertical velocity data (1996-2000) in the northeastern part of Japan.

Station	Longitude [°E]	Latitude [°N]	Velocity(E)[*1] [mm/yr]	Velocity(N)[*1] [mm/yr]	Velocity(U)[*1] [mm/yr]	Error(E)[*2] [mm/yr]	Error(N)[*2] [mm/yr]	Error(U)[*2] [mm/yr]
942001	141.84478	43.52882	-7.59	-1.52	1.36	2.36	4.12	17.11
940001	141.75043	45.40299	4.09	-1.99	0.60	2.13	3.34	12.12
940002	143.22418	44.43369	-2.31	0.74	1.24	2.01	3.01	12.15
940003	141.75631	44.39795	0.05	-1.17	-0.55	1.88	3.15	11.28
940004	144.67584	43.91569	-12.34	7.18	2.42	2.28	3.09	11.14
940005	144.44901	43.50786	-19.82	8.91	-2.03	2.19	2.79	10.47
940006	145.51146	43.28984	-28.49	10.58	-2.03	2.46	2.88	10.52
940007	142.48248	43.58966	-15.25	2.40	-1.58	2.25	2.94	11.30
940008	141.51037	43.85401	-3.14	-1.56	2.02	1.94	3.01	11.29
940009	145.12962	43.07008	-29.59	11.42	-1.15	2.26	2.84	10.74
940010	144.43193	42.96326	-23.93	9.05	-5.62	2.57	3.94	10.89
940011	143.45923	43.02863	-19.49	6.89	-4.17	2.46	3.73	11.30
940012	142.40197	42.98052	-18.09	2.09	-5.28	1.95	2.95	11.89
940013	141.03091	43.17786	-6.10	-2.77	2.86	1.97	2.97	10.46
940014	141.73067	42.98325	-12.50	-1.99	-2.12	2.51	3.00	10.16
940015	143.33099	42.32160	-26.30	9.09	0.08	3.34	3.10	11.04
940016	142.36460	42.35691	-16.32	1.81	-0.71	1.75	2.69	9.93
940017	139.85767	42.45074	-14.25	-1.53	4.09	2.61	2.83	10.72
940018	140.94240	42.37422	-8.14	-1.28	3.42	2.62	3.95	10.61
940019	143.15652	42.00586	-23.20	4.69	1.23	2.08	3.23	10.47
940020	139.51960	42.15355	-10.72	-0.47	-8.44	2.91	3.01	11.32
940021	140.10732	42.00808	-9.42	-1.14	2.18	2.07	2.81	10.32
940022	140.74782	41.82607	-7.20	-1.29	4.38	1.81	2.76	10.66
940023	140.04065	41.46638	-3.65	-1.15	2.25	2.00	2.76	11.71
940024	141.21327	41.30077	-8.64	-1.16	-0.44	2.16	2.68	11.32
940025	140.82959	40.84092	-5.32	-1.35	-0.16	1.91	2.64	10.39
940026	140.27298	40.77899	-3.95	-1.01	0.41	1.76	2.76	11.03
940027	141.78910	40.13345	-10.36	-1.88	2.68	2.04	2.48	10.23
940028	141.93996	39.57239	-14.12	0.15	0.31	2.07	2.51	10.81
940029	141.20392	39.11062	-18.75	6.34	-2.66	1.95	2.47	10.31
940030	139.77615	39.96790	-1.65	2.06	4.50	1.88	2.54	10.33
940031	140.04824	39.39870	-5.32	2.65	1.73	1.71	2.30	9.49
940032	139.80885	38.89460	-6.26	2.49	2.22	1.62	2.21	8.97
940033	140.31874	38.75860	-11.84	4.27	3.78	2.60	2.49	9.55
940034	139.55580	38.55554	-8.45	1.59	-2.10	1.63	2.15	9.89

940035	140.36609	38.33103	-17.27	2.40	0.97	1.75	2.17	9.70
940036	141.44116	38.44920	-29.31	5.65	-2.15	2.16	2.30	9.99
940037	140.95419	38.31749	-24.40	3.54	-5.20	1.91	2.19	10.32
940038	140.90808	37.80067	-25.22	3.23	-0.09	2.10	2.17	9.94
940039	140.32477	37.36190	-18.88	-0.64	-5.05	2.30	2.14	9.89
940040	139.79151	37.64370	-13.00	0.16	0.15	1.84	2.06	9.49
940041	140.90252	37.09071	-22.76	4.51	6.18	2.14	2.26	9.56
940049	139.50957	38.23069	-11.14	0.30	0.46	1.64	2.00	9.45
950101	142.16973	45.33583	1.62	-2.28	1.91	1.91	2.64	9.14
950102	141.03821	45.27597	5.25	-2.13	2.30	1.78	2.77	9.17
950103	142.53709	45.00240	0.14	-2.54	3.54	2.44	2.62	9.90
950104	141.74139	44.89246	2.98	-2.66	3.31	1.77	2.63	8.75
950105	142.26524	44.72850	0.48	-2.86	4.29	2.04	2.69	10.41
950106	141.33005	44.42705	1.46	-2.74	3.50	1.74	2.60	9.15
950107	142.62559	44.29457	-3.84	-0.63	2.75	1.83	2.56	9.11
950108	144.02977	44.06387	-10.71	1.45	1.07	2.26	3.27	9.24
950109	145.18609	44.01918	-11.27	6.28	4.94	2.94	2.78	10.42
950110	142.15169	44.00678	-5.14	-0.98	3.12	1.90	2.53	9.86
950111	143.33370	44.00562	-7.33	1.91	2.04	2.04	2.53	9.62
950112	143.92694	42.89452	-21.69	10.33	-4.32	1.87	2.61	8.38
950113	144.98696	43.54940	-20.52	8.06	-1.74	2.33	2.97	9.17
950114	143.78726	43.84890	-8.81	2.54	1.90	2.00	2.80	8.68
950115	145.13144	43.66182	-19.94	8.38	-2.46	2.10	2.78	9.27
950116	144.77433	43.40869	-24.20	10.16	-4.29	2.40	2.48	8.70
950117	141.43117	43.40468	-6.57	-3.64	3.38	1.70	2.43	8.54
950118	145.11496	43.38253	-26.53	9.81	-2.19	3.20	2.50	8.87
950119	145.80113	43.36685	-29.26	7.40	-3.11	2.30	2.55	8.92
950120	140.59707	43.29259	-4.81	-3.15	3.93	2.05	2.64	11.26
950121	143.56242	43.28947	-17.92	5.14	-1.49	1.93	2.56	8.15
950122	144.32503	43.23294	-22.95	9.92	-4.95	2.00	2.59	8.72
950123	143.29802	43.23200	-17.54	5.28	2.05	1.86	2.52	8.81
950124	144.12653	43.12061	-22.14	10.25	-3.32	1.96	2.54	8.52
950125	144.84302	43.05759	-28.12	10.55	-1.87	1.97	2.43	8.88
950126	140.49917	43.05683	-6.10	-3.25	6.73	1.79	2.57	8.21
950127	140.54394	42.98525	-7.29	-3.20	8.25	1.90	2.75	8.68
950128	141.29033	42.97138	-8.20	-3.50	2.28	1.81	2.52	9.49
950129	140.88334	42.85789	-8.38	-3.50	5.89	2.15	3.18	9.64
950130	140.60352	42.80272	-13.13	-4.55	7.38	2.54	3.26	8.48
950131	140.23320	42.78644	-12.73	-3.07	8.68	2.46	2.51	8.09
950132	141.86398	42.72944	-13.17	-2.09	-1.85	2.36	2.89	11.57
950133	142.29580	42.72724	-16.27	0.97	1.37	1.72	2.47	8.32

950134	143.10325	42.69927	-20.70	8.46	1.41	1.83	2.42	8.46
950135	141.07495	42.66788	-10.14	-4.99	2.88	2.42	3.25	10.56
950136	141.60226	42.65553	-11.69	-2.72	-2.60	1.77	2.50	8.69
950137	140.82568	42.64629	-10.63	-4.20	7.26	1.75	2.54	8.58
950138	143.46114	42.55165	-24.09	10.55	0.21	1.76	2.54	8.22
950139	141.36148	42.54980	-11.12	-2.10	-2.56	1.92	2.71	9.31
950140	140.35420	42.49436	-10.76	-2.92	9.53	2.30	2.43	8.20
950141	142.06022	42.48128	-5.69	-2.15	-2.33	1.77	2.43	8.69
950142	142.56745	42.24773	-15.63	0.34	3.10	1.79	2.42	8.19
950143	140.25048	42.24368	-11.70	-3.21	6.02	2.04	2.46	9.60
950144	142.93538	42.13094	-20.65	3.26	1.42	1.78	2.49	8.09
950145	140.00394	42.13085	-11.02	-1.47	5.45	2.04	2.56	9.29
950146	140.56850	42.09890	-8.17	-1.41	6.66	1.85	2.50	8.94
950147	140.80554	42.04297	-6.19	-1.92	5.29	2.03	2.72	9.38
950148	141.14077	41.83442	-12.85	3.44	-3.16	2.21	2.86	8.69
950149	140.31589	41.59903	-4.66	-2.46	3.56	1.99	2.47	9.73
950150	140.88050	41.45530	-7.05	-1.16	2.17	1.75	2.36	8.72
950151	140.63589	41.04322	-5.16	-1.46	1.54	1.86	2.36	9.81
950152	141.36796	40.96824	-9.81	-0.71	2.24	1.98	2.31	8.81
950153	141.19783	40.62507	-7.45	-1.05	0.54	1.92	2.27	9.18
950154	139.92812	40.57764	-6.70	0.04	1.93	1.73	2.31	9.16
950155	140.57815	40.52365	-5.05	0.01	2.95	1.67	2.36	8.81
950156	141.51128	40.51536	-10.46	-1.22	4.35	2.04	2.24	8.69
950157	141.07648	40.29108	-5.81	1.06	0.82	2.02	2.43	9.73
950158	141.71314	40.40520	-11.07	-1.70	5.01	2.24	2.23	9.06
950159	141.29369	40.29115	-7.91	-0.23	0.83	2.22	2.25	8.94
950160	141.46195	40.04860	-9.73	0.17	-1.79	2.13	2.32	8.68
950161	141.22507	39.98058	-10.10	1.56	-3.52	1.85	2.34	8.99
950162	141.95054	39.86937	-11.57	-2.69	3.17	2.02	2.12	9.23
950163	141.16486	39.85125	-11.42	2.85	-3.18	2.27	2.32	9.12
950164	141.80385	39.84918	-12.93	-1.85	0.60	2.26	2.25	9.10
950165	140.96450	39.70109	-9.59	3.85	0.04	2.17	2.51	9.81
950166	141.17211	39.59657	-12.87	4.35	-2.89	1.79	2.09	7.96
950167	141.95526	39.45816	-15.88	-0.43	-1.14	1.86	2.10	8.80
950168	141.05455	39.36262	-13.41	5.68	-2.50	1.83	2.04	7.77
950169	141.53416	39.33806	-17.10	3.86	-0.07	1.81	2.08	9.45
950170	141.79804	39.25352	-18.65	2.81	0.31	2.23	2.31	9.04
950171	141.73985	39.02378	-22.84	4.20	-0.02	1.80	2.04	8.68
950172	141.57259	38.90286	-24.60	4.58	1.03	1.68	2.01	7.81
950173	140.99058	38.81534	-19.43	6.09	-1.42	1.78	1.83	7.64
950174	140.80164	38.74894	-19.34	5.73	0.24	2.65	2.06	8.14

950175	141.44937	38.68270	-28.03	5.41	-0.65	1.89	1.89	7.98
950176	141.14754	38.53948	-25.29	5.72	-3.49	1.89	1.79	8.28
950177	140.85137	38.41176	-22.10	3.45	-0.96	1.76	1.78	8.72
950178	140.64285	38.20574	-21.10	0.99	-0.12	2.38	1.80	9.52
950179	140.84399	38.02966	-24.24	3.41	-2.91	1.91	1.65	8.51
950180	140.44257	37.98993	-18.28	1.15	2.66	1.96	1.74	9.09
950181	140.57735	40.32505	-5.50	4.42	6.52	1.83	2.40	8.78
950182	140.26366	40.27116	-5.45	1.76	4.90	1.61	2.16	8.82
950183	140.78733	40.21544	-5.21	2.31	1.15	1.76	2.21	9.15
950184	140.04547	40.23607	-5.52	1.61	6.18	1.59	2.27	8.27
950185	140.40199	40.00688	-5.53	2.53	3.62	1.67	2.12	9.49
950186	140.13238	39.93606	-3.98	1.68	4.74	1.62	2.15	8.15
950187	140.59704	39.74916	-6.17	1.85	2.48	2.08	2.57	8.91
950188	140.23421	39.65831	-3.08	3.01	2.77	1.82	2.14	8.87
950189	140.38662	39.54929	-7.19	3.34	0.98	1.71	2.20	8.32
950190	140.55978	39.32700	-5.35	3.22	-1.95	1.68	2.49	8.03
950191	139.90772	39.20606	-3.33	1.43	-0.12	1.68	1.87	8.41
950192	140.16198	39.16421	-7.92	3.03	2.99	2.24	2.36	10.47
950193	140.62958	39.05190	-11.94	7.77	2.55	1.81	3.51	9.02
950194	139.54766	39.18556	-0.06	0.53	3.20	1.45	2.13	8.87
950195	139.95737	38.75972	-9.77	1.11	2.46	1.56	1.97	8.62
950196	139.83177	38.59404	-8.85	1.26	5.05	1.97	1.95	9.44
950197	139.74225	38.14618	-12.46	1.06	3.96	1.80	1.77	9.99
950198	140.09353	37.96361	-15.44	1.62	2.88	1.61	1.62	8.58
950199	140.07757	38.19754	-15.73	4.47	0.39	2.22	1.92	9.79
950200	140.46649	37.68331	-20.83	0.34	-0.02	2.06	1.89	8.33
950201	140.75508	37.56055	-23.43	1.11	-1.08	1.91	1.72	9.77
950202	140.07268	37.56695	-15.90	-0.65	1.51	1.75	1.65	8.02
950203	141.00661	37.53369	-24.88	3.14	-1.18	1.82	1.57	8.23
950204	139.52863	37.47346	-10.13	-0.53	1.75	1.44	1.35	8.57
950205	140.66211	37.32547	-21.89	1.19	-0.71	2.01	1.63	7.84
950206	139.36435	37.30280	-8.56	-1.21	1.27	1.55	1.36	7.79
950207	139.50377	37.28149	-10.54	-0.54	1.19	1.48	1.39	8.40
950208	140.99424	37.28483	-23.81	1.99	-0.77	2.04	1.81	8.25
950209	139.87143	37.26107	-13.61	-1.81	2.25	1.66	1.50	8.28
950210	140.25993	37.12629	-17.97	-1.76	0.30	1.75	1.64	7.67
950211	140.56164	37.08930	-20.34	1.63	-1.02	1.81	1.79	7.89
950212	140.41327	36.86209	-19.53	0.64	1.06	1.63	1.72	7.69
950217	140.03926	36.85424	-17.57	-0.34	-0.38	1.62	1.76	7.83
950231	139.25335	38.46539	-3.19	-1.05	-1.13	1.67	1.88	8.42
950234	139.35146	37.92938	-9.47	0.57	0.25	1.51	1.50	8.48

950236	139.47789	37.68591	-9.66	0.09	2.33	1.49	1.43	8.64
950238	139.05912	37.66230	-6.32	-0.80	0.87	1.26	1.31	6.38
950239	138.99801	37.46772	-6.69	0.46	2.46	1.40	1.27	8.00
960501	141.16709	45.13771	5.63	-2.75	6.61	1.99	2.88	10.10
960502	142.96446	44.58204	-3.17	-2.01	4.22	2.02	2.64	9.32
960503	143.61567	44.21972	-5.27	0.96	2.86	1.80	2.45	8.93
960504	143.07682	44.19194	-4.32	0.73	4.57	2.13	2.91	14.28
960505	144.29330	43.98879	-11.81	0.27	2.15	1.93	3.13	8.59
960506	142.57771	43.90841	-5.08	0.06	3.84	1.81	2.76	12.61
960507	144.11525	43.82808	-9.80	4.66	5.97	1.96	2.98	11.07
960508	142.40961	43.73853	-8.54	0.16	4.38	1.84	2.42	9.22
960509	141.87384	43.74084	-5.42	-1.22	2.10	1.87	2.77	11.20
960510	142.90302	43.77142	-10.16	1.33	3.67	2.20	3.03	12.13
960511	143.57815	43.67050	-7.80	2.29	3.47	2.30	3.17	12.81
960512	145.25895	43.23210	-27.43	10.12	-2.71	2.68	3.33	10.67
960513	144.07962	43.43884	-15.70	6.37	2.60	2.53	4.72	11.81
960514	142.39534	43.33627	-13.26	1.07	2.44	2.21	2.80	11.80
960515	144.59766	43.30701	-24.07	10.85	-4.18	3.20	3.11	9.11
960516	141.89093	43.24841	-12.78	-1.74	2.86	1.71	2.35	8.74
960517	140.86061	43.20951	-5.44	-3.16	5.42	1.77	2.53	9.26
960518	142.80973	43.16553	-16.88	2.32	-0.50	2.37	2.63	9.63
960519	145.52050	43.19516	-30.80	10.81	-0.29	1.96	2.46	8.33
960520	141.54011	43.07759	-9.22	-3.06	-0.16	1.71	2.40	8.79
960521	143.17056	42.93887	-19.87	9.50	-0.52	1.75	2.50	8.42
960522	141.57741	42.88443	-9.64	-2.39	1.49	1.77	2.34	9.06
960523	141.40709	42.77319	-6.19	-2.57	4.20	1.98	2.86	11.16
960524	140.89907	42.55894	-6.78	-2.45	2.45	1.93	2.74	11.90
960525	140.76762	42.55138	-8.80	-2.43	9.59	1.94	2.84	11.14
960526	140.87637	42.47390	-6.97	-3.58	4.39	2.06	3.16	12.88
960527	139.44615	42.06051	-7.51	-5.21	-5.69	1.83	2.49	8.77
960528	140.66687	42.12314	-9.28	-0.22	5.50	1.78	2.49	8.86
960529	140.71543	41.97669	-6.71	-2.38	7.30	1.88	2.50	9.29
960530	140.07123	41.80303	-11.26	1.00	2.98	2.43	2.44	8.60
960531	144.71915	42.98257	-28.30	10.17	-1.83	1.88	2.45	8.54
960532	143.31568	42.12559	-26.81	7.01	1.93	2.50	2.46	8.96
960533	141.44759	41.40471	-11.09	0.07	3.02	1.99	2.41	8.92
960534	140.49077	41.18508	-4.63	0.40	-2.10	2.23	2.70	11.59
960535	140.82198	41.14555	-5.54	-1.41	6.09	2.04	2.69	12.44
960536	140.87164	40.91340	-6.87	-2.23	2.15	1.82	2.26	10.37
960537	141.13181	40.86236	-8.10	0.50	2.36	1.93	2.18	10.92
960538	140.58922	40.70628	-5.22	-1.02	1.71	1.74	2.32	9.23

960539	141.37621	40.67640	-10.09	-1.26	2.20	1.73	2.20	8.73
960540	140.47853	40.62435	-3.57	-2.12	-10.45	1.86	2.65	11.26
960541	140.80335	40.64357	-4.25	-0.54	1.25	1.89	2.66	12.52
960542	140.45156	40.91018	-4.52	-1.25	2.39	1.66	2.26	8.75
960543	141.06633	39.95308	-2.46	6.52	-2.59	2.80	3.32	11.29
960544	140.76918	39.35130	-12.07	5.44	-4.54	1.95	2.21	12.36
960545	141.27479	38.90026	-24.58	5.29	-6.42	2.72	2.43	10.61
960546	141.57549	39.14309	-19.71	3.96	-1.98	2.62	2.59	10.60
960547	141.67529	39.59613	-13.81	1.26	-1.14	2.75	2.70	11.68
960548	140.84787	38.54622	-20.50	3.87	-1.40	2.73	2.33	10.32
960549	141.21291	38.42506	-26.48	4.70	-1.66	2.58	2.19	10.06
960550	141.50069	38.30119	-30.02	5.19	-0.04	2.57	2.25	10.14
960551	139.84893	39.89113	-1.02	1.33	9.53	2.69	2.83	11.17
960552	140.04472	39.82581	-4.25	2.60	13.13	2.61	3.13	11.80
960553	140.73285	39.70268	-5.05	-0.14	-1.75	3.12	2.95	11.23
960554	140.50669	39.19910	-9.21	4.91	-3.90	2.58	2.55	10.52
960555	139.92749	39.01597	-6.30	1.74	0.56	2.45	2.31	10.50
960556	140.36515	38.49677	-21.65	-1.81	-11.42	2.68	2.44	10.47
960557	140.27114	38.14810	-15.21	2.75	2.15	2.03	2.07	10.33
960558	140.94630	37.81791	-24.29	2.66	0.24	2.02	2.04	9.83
960559	140.20565	37.61595	-17.07	-0.39	-1.81	2.92	2.49	9.83
960560	140.37290	37.62073	-19.68	-0.61	-1.61	4.27	2.35	11.78
960561	140.13588	37.42451	-17.04	-0.05	-2.71	2.48	2.15	10.15
960562	140.83425	37.32506	-22.35	2.25	-2.64	2.31	2.02	10.45
960563	139.58616	37.09725	-11.01	0.44	-3.71	2.12	2.40	10.17
960564	139.46168	38.05618	-10.15	0.83	1.50	2.16	2.01	9.94
960568	139.02025	37.31987	-7.73	-0.39	-0.39	1.53	1.70	10.60
960571	139.07391	37.75206	-6.01	-0.97	-2.57	1.25	1.39	6.83
960585	140.16476	36.95231	-16.99	-0.48	-1.52	1.72	1.93	9.26
960586	139.80575	36.97958	-13.90	-0.11	0.33	2.21	2.34	9.45
960757	141.20404	39.11047	-16.52	3.63	3.07	2.33	2.45	9.14
970778	141.59823	45.21977	2.98	-1.89	-0.75	1.83	2.57	9.48
970779	142.35184	45.12678	-1.14	-1.76	2.08	1.82	2.53	9.98
970780	142.71791	44.78017	-0.27	-1.22	3.57	2.15	2.54	10.47
970781	141.79391	44.63993	0.96	-2.65	4.60	1.67	2.50	8.81
970782	142.26453	44.36513	-2.16	-1.77	0.33	1.84	2.63	10.72
970783	141.66460	44.14875	-1.32	-1.56	1.95	1.68	2.42	8.88
970784	144.50641	43.72278	-14.31	3.85	-2.79	1.91	3.16	9.52
970785	141.37058	43.62433	-3.55	-2.87	4.02	1.72	2.38	9.13
970786	142.94727	43.33358	-15.33	3.34	-0.42	1.90	2.29	10.55
970787	142.64306	43.43164	-12.59	1.66	3.37	2.39	2.38	12.79

970788	143.90198	43.10169	-20.43	10.16	-8.68	1.95	2.46	8.70
970789	142.87005	43.01366	-16.75	5.40	-0.15	2.56	2.40	9.01
970790	142.08460	42.93377	-13.03	0.34	-0.78	1.76	2.26	9.22
970791	143.49497	42.80651	-20.96	8.45	-3.67	1.85	2.23	7.99
970792	141.08106	42.42055	-11.04	1.92	-1.45	3.16	3.18	9.19
970793	143.15196	42.48642	-23.35	5.86	-1.76	2.21	2.43	9.21
970794	140.37123	41.93485	-7.74	-1.81	4.88	1.90	2.23	9.73
970795	141.45259	39.84902	-12.87	0.73	0.69	1.72	1.93	9.33
970796	140.98846	39.12701	-10.60	4.08	-3.73	3.20	2.42	11.37
970797	140.64564	37.98441	-21.35	0.64	-2.64	2.48	1.91	10.70
970798	140.82291	40.04498	-5.36	6.26	1.85	2.33	2.53	9.92
970799	140.09463	38.43434	-12.19	1.00	2.06	2.65	2.05	10.57
970800	140.84165	37.01845	-23.23	0.82	0.82	2.10	2.10	9.87
970801	139.40223	37.03694	-10.01	-0.28	0.33	2.88	2.03	10.93
970803	140.19992	38.28898	-13.98	1.77	4.15	1.61	1.47	9.21
970805	139.22604	37.82816	-6.48	-0.14	-0.69	1.19	1.42	7.37

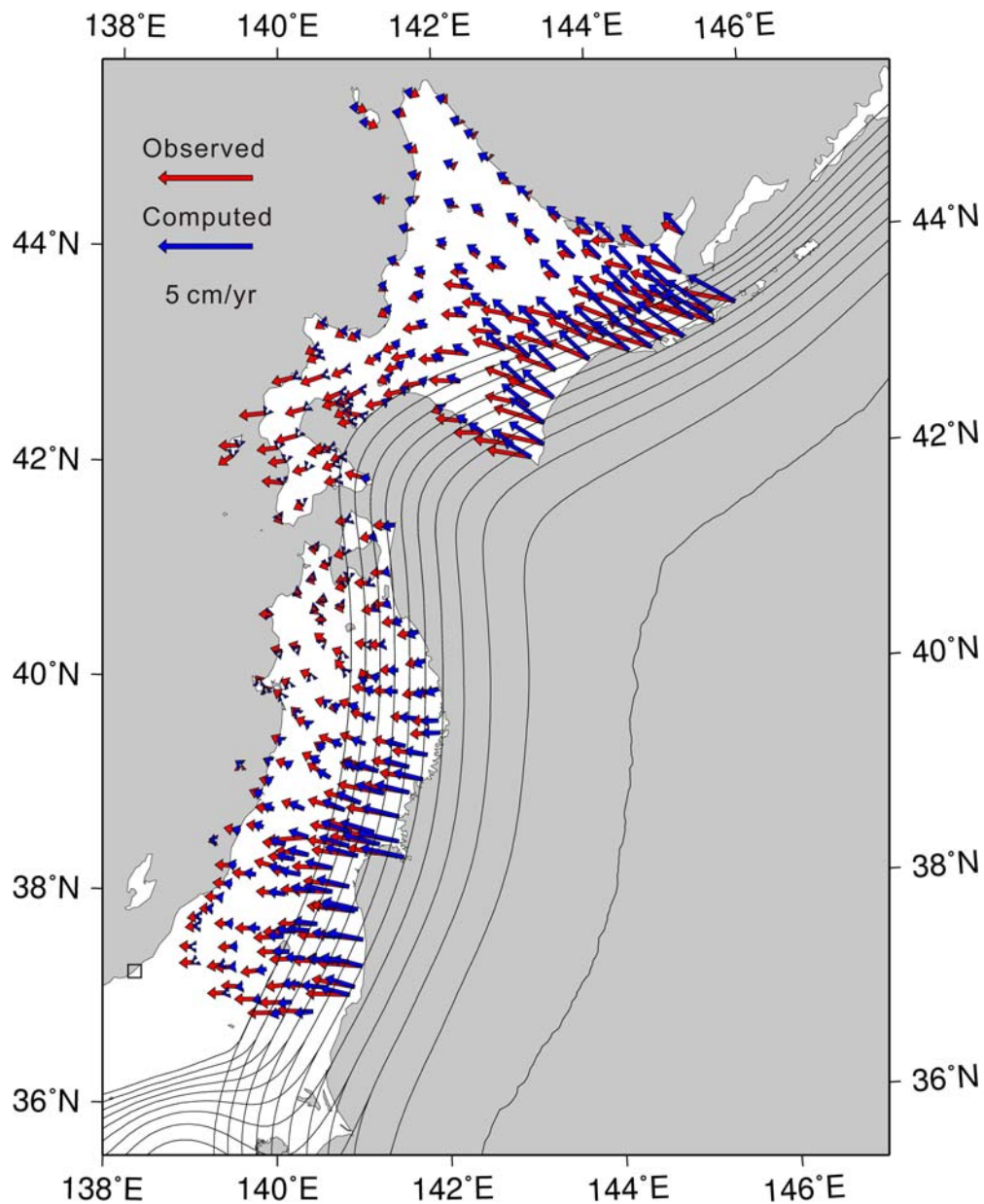The horizontal (E, N) and vertical (U) velocity data are obtained from GEONET daily coordinates for 1996/06/01-2000/05/31 with the methods given by Sagiya et al.[7]. [*1]Relative velocities to the station 950241 (138.33357°E, 37.23112°N). [*2]Standard deviation.
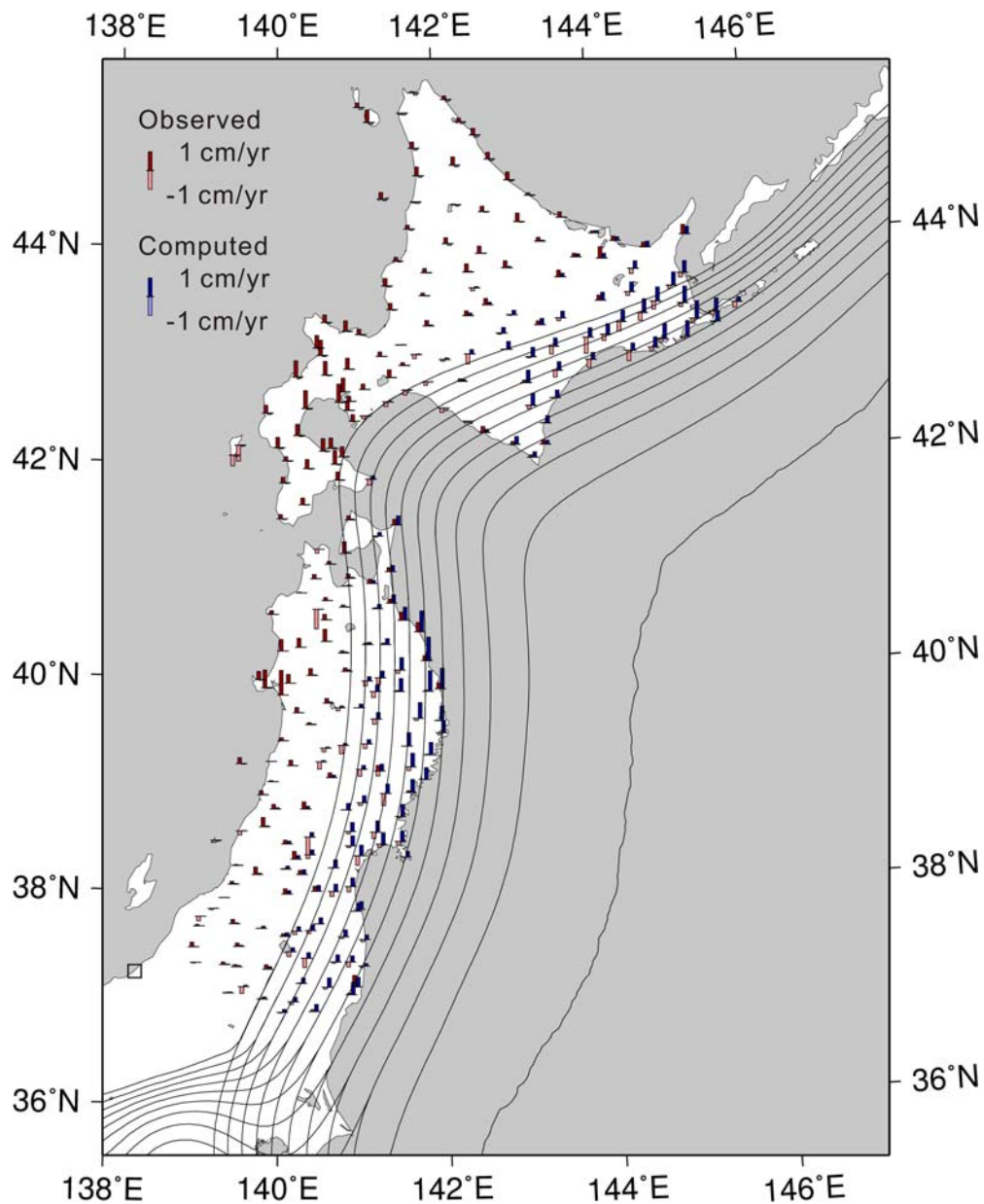
Supplementary Table 2 Large interplate earthquakes occurred in the last century along the Kuril-Japan trench.

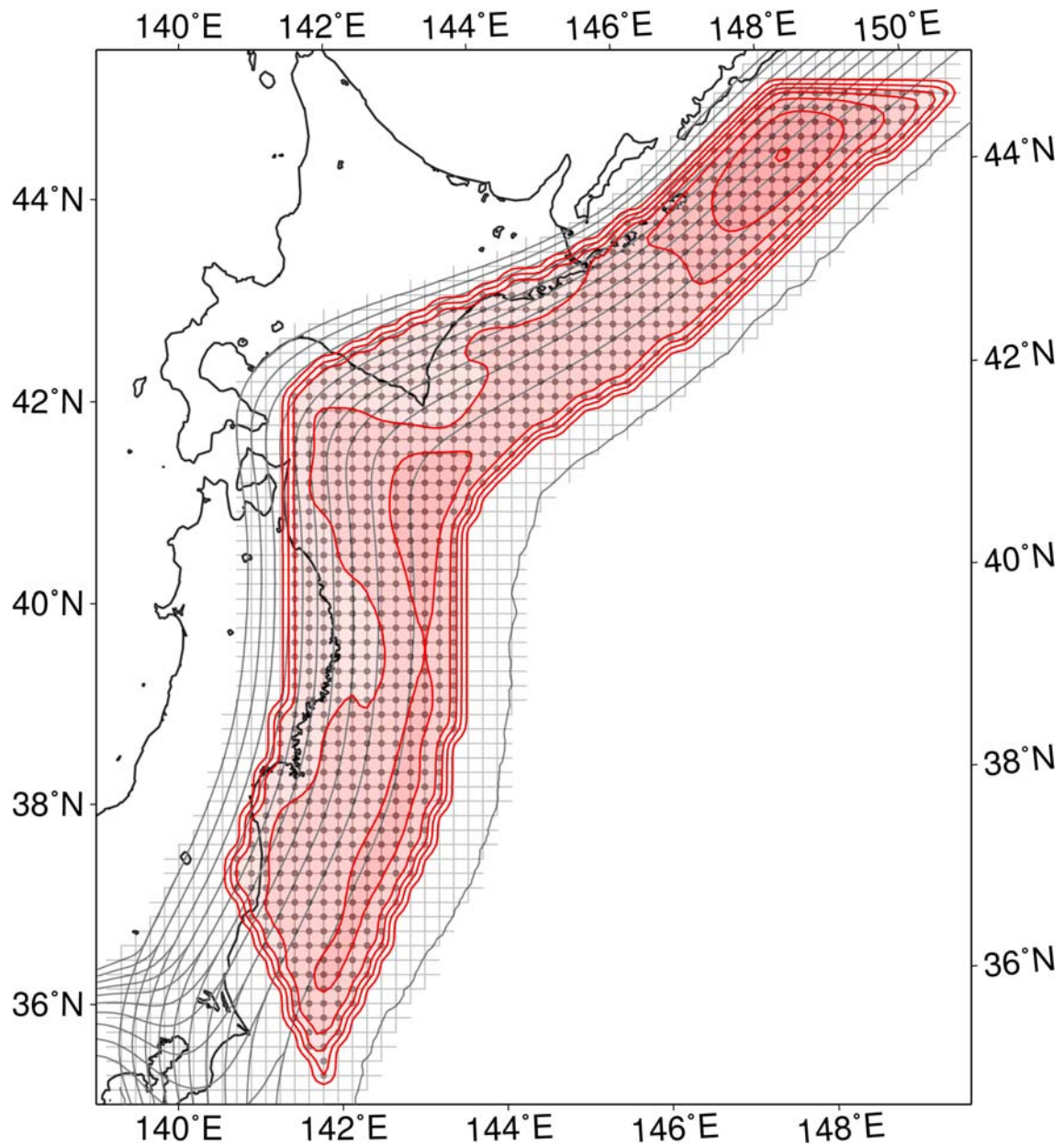| Earthquake	Epicentre [°E, °N]	M_w (M)
1931 Sanriku-oki	143.33, 40.15	- (7.6)
1936 Miyagi-oki	142.13, 38.15	- (7.5)
1938 Fukushima-oki	142.18, 37.33	7.8 (7.5)
1938 Fukushima-oki	141.65, 37.28	7.7 (7.3)
1952 Tokachi-oki	144.13, 41.80	8.1 (8.2)
1968 Tokachi-oki[*1]	143.58, 40.73	8.2 (7.9)
1973 Nemuro-oki	145.95, 42.97	7.8 (7.4)
1973 Nemuro-oki	146.43, 43.29	7.5 (7.1)
1978 Miyagi-oki	142.17, 38.15	7.6 (7.4)
1994 Sanriku-haruka-oki	143.75, 40.43	7.8 (7.5)
2003 Tokachi-oki	144.08, 41.78	8.1[*2] (8.0)

[*1]Occurred in the Sanriku-oki region. [*2]Detrmined by Yagi[24].

Supplementary Figure 1 Comparison of observed and computed horizontal velocities. The red arrows indicate the observed horizontal velocity vectors (Table 1). The blue arrows indicate the horizontal velocity vectors computed from the inverted slip-deficit rate distribution.

Supplementary Figure 2 Comparison of observed and computed vertical velocities. The dark and light red bars indicate the observed uplift and subsidence rates (Table 1), respectively. The dark and light blue bars indicate the uplift and subsidence rates computed from the inverted slip-deficit rate distribution, respectively.

Supplementary Figure 3 Estimation errors of slip-deficit rates. The red contours show the estimation errors of slip-deficit rates at the interval of 1 cm/yr. The gray dots indicate the central points of bi-cubic B-splines distributed on the North American-Pacific plate interface.