Supplementary material for "Newly detected earthquakes in Cascadia subduction zone linked to seamount subduction and deformed upper plate" by Morton, Bilek and Rowe

TABLE S1. CATALOG OF DETECTED EVENTS

Templates/ Catalogs*	Date	Time (UTC)	Latitude (°)	Longitude (°)	Depth (km)	M_D †	Num. of Picks	Azimuthal Gap (°)	Dist. to nearest station	tt RMS (s)	ERH § (km)	ERZ # (km)
Seamount Events												
C?	07/26/11	01:02:07.72	44.2888	-124.3340	2.49	2.86	4	332	163.8	0.06	13.1	3.2
	07/26/11	01:02:08.56	44.3017	-124.3180	3.86	2.98	5	316	131.1	0.50	35.4	22.2
T, Tr	08/24/11	08:21:52.55	44.2653	-124.6013	18.20	2.70	7	300	62.9	0.07	5.6	9.5
	11/21/11	04:49:12.20	44.4390	-124.5440	3.43	2.30	7	129	7.2	0.08	0.7	1.2
S	11/28/11	00:27:12.93	44.4158	-124.4907	22.03	2.74	11	102	12.2	0.27	0.8	0.7
	12/23/11	02:11:09.74	44.3528	-124.4260	10.18	2.17	7	116	20.5	0.09	0.6	6.6
	12/23/11	03:42:54.12	44.3628	-124.4362	5.84	2.39	7	113	19.2	0.05	0.4	1.2
	01/12/12	07:07:33.65	44.4173	-124.4353	25.42	2.13	6	110	49.5	0.17	1.2	18.9
	03/08/12	10:25:45.16	44.2492	-124.5425	6.89	1.47	4	257	25.6	0.92	38.6	50.2
T, Tr, S	03/12/12	11:37:21.30	44.3587	-124.4160	12.13	2.90	15	115	20.7	0.36	0.8	1.4
	03/12/12	11:51:51.30	44.3628	-124.4008	6.07	2.04	8	114	21.4	0.10	0.5	1.1
	03/13/12	22:19:17.46	44.3752	-124.1655	9.02	1.89	6	120	37.9	0.83	4.0	70.3
	03/17/12	22:17:44.06	44.3692	-124.4012	6.07	2.06	7	115	21.0	0.05	0.5	1.1
	03/19/12	13:34:37.21	44.3670	-124.4075	8.57	2.22	6	114	20.7	0.02	0.7	2.4
	03/20/12	08:30:30.30	44.3727	-124.4058	9.35	2.24	7	116	20.5	0.12	0.6	13.2
T, Tr, S	03/20/12	08:43:46.73	44.3778	-124.4445	19.39	2.93	17	110	17.6	0.48	1.3	1.6
T, Tr, S	03/20/12	09:28:37.00	44.3517	-124.4117	10.30	3.25	15	117	21.5	0.42	0.9	2.0

	03/20/12	09:35:22.50	44.3658	-124.4032	6.65	2.38	8	114	21.1	0.12	0.7	3.2
	03/20/12	09:47:17.66	44.3638	-124.4062	9.24	2.04	5	176	21.0	0.09	0.8	13.8
	03/20/12	10:14:15.55	44.3713	-124.4057	7.80	2.37	8	112	20.6	0.15	0.5	1.3
	03/20/12	10:36:08.30	44.3850	-124.4147	18.65	2.23	4	251	48.5	0.12	5.9	14.9
	03/22/12	00:58:30.04	44.4070	-124.4513	18.47	2.53	9	108	15.4	0.14	0.6	0.8
	03/22/12	06:34:27.36	44.3653	-124.4103	7.84	2.00	6	113	20.6	0.10	1.7	5.8
	03/22/12	09:26:57.52	44.3633	-124.4112	6.22	2.23	7	114	20.7	0.11	1.2	7.3
	03/23/12	12:53:02.26	44.3637	-124.4082	4.98	2.15	7	114	20.9	0.12	0.6	1.3
	03/23/12	14:15:32.92	44.3468	-124.4157	19.21	2.33	6	117	21.6	0.06	1.7	4.3
	03/24/12	17:11:51.13	44.3622	-124.4032	7.39	2.07	7	114	21.3	0.24	1.0	5.7
	03/25/12	04:50:23.12	44.3532	-124.4100	7.03	2.56	7	116	21.5	0.10	0.5	2.9
	03/26/12	00:01:21.45	44.3638	-124.4085	6.01	2.42	7	114	20.9	0.19	0.7	1.7
T, S	03/26/12	00:15:53.23	44.3700	-124.4125	9.44	2.72	11	113	20.2	0.19	0.5	1.3
	03/26/12	05:35:32.17	44.4060	-124.4428	6.24	2.29	8	127	16.1	0.76	4.8	30.0
	03/26/12	13:02:30.35	44.3537	-124.4013	9.44	2.20	6	181	47.3	0.08	0.7	13.9
	04/02/12	13:53:14.21	44.2998	-124.5188	5.53	2.15	8	181	36.2	0.99	3.5	4.1
	04/05/12	23:05:42.71	44.3637	-124.4043	6.38	2.27	8	114	21.1	0.10	0.5	3.1
	04/17/12	17:35:40.14	44.3405	-124.4878	15.12	2.11	6	174	18.2	0.30	6.4	18.3
	04/17/12	17:36:38.34	44.3123	-124.4490	7.57	2.13	7	125	22.5	0.16	0.9	3.1
S	04/22/12	09:18:16.26	44.3227	-124.4485	11.37	2.55	8	122	21.6	0.08	0.5	1.4
	04/24/12	18:08:19.66	44.3587	-124.4115	9.18	1.98	8	115	21.0	0.08	0.4	12.6
	04/24/12	23:27:46.08	44.3558	-124.4092	6.40	1.97	6	116	21.3	0.07	1.2	8.1
	04/25/12	00:59:03.25	44.3538	-124.4138	7.55	1.85	7	115	21.2	0.12	0.5	2.8
	04/28/12	06:29:51.93	44.3700	-124.3663	14.66	2.44	9	112	23.3	0.16	0.7	1.4
	05/06/12	23:43:35.32	44.3718	-124.4072	6.86	1.62	5	179	20.4	0.10	3.6	11.0

	05/12/12	14:18:55.49	44.3867	-124.4490	19.51	2.59	10	109	16.8	0.41	1.1	1.5
	05/12/12	14:21:34.36	44.3623	-124.3773	7.05	2.09	5	180	23.0	0.02	3.2	10.8
	05/15/12	21:16:52.48	44.3637	-124.4080	6.72	2.04	7	114	20.9	0.10	1.1	4.9
C, S	05/17/12	13:30:17.00	44.3148	-124.4518	7.64	2.75	11	124	22.2	0.21	0.5	1.7
C, S	05/17/12	19:51:15.41	44.3297	-124.4773	16.91	2.87	15	109	19.6	0.27	0.6	1.3
	05/17/12	19:52:26.72	44.3095	-124.4567	6.67	2.00	5	183	22.4	0.18	1.7	13.4
	05/17/12	19:57:11.10	44.3280	-124.4640	15.44	2.21	5	179	20.4	0.12	4.9	15.1
	05/17/12	19:58:10.32	44.3187	-124.4663	13.95	2.61	7	123	21.1	0.10	2.0	3.8
	05/17/12	22:05:42.05	44.3933	-124.4030	14.57	2.15	6	188	19.5	0.17	9.3	10.7
	05/17/12	22:36:01.10	44.3165	-124.4597	11.66	2.39	12	112	21.6	0.15	0.5	1.1
	05/26/12	10:40:57.59	44.3658	-124.4060	8.18	2.11	5	177	20.9	0.10	3.8	10.4
	06/03/12	17:39:59.32	44.2790	-124.4820	4.94	1.93	5	137	24.2	0.08	0.5	1.4
C, S	06/03/12	17:46:20.65	44.2952	-124.4867	16.38	2.88	10	128	22.5	0.19	0.6	1.1
	06/03/12	17:47:37.94	44.2787	-124.4748	5.30	2.28	6	138	24.5	0.12	0.6	1.4
	06/03/12	19:01:48.84	44.2927	-124.4828	15.45	2.08	7	129	22.9	0.14	1.0	6.8
S	06/04/12	11:43:00.24	44.2937	-124.4893	17.87	2.54	7	129	22.5	0.08	0.5	0.8
	06/21/12	15:57:04.62	44.4417	-124.6095	19.64	2.41	8	141	3.6	0.28	1.1	0.7
	08/13/12	07:06:38.75	44.3723	-124.3933	9.78	1.64	8	144	21.3	0.13	0.6	2.5
	08/14/12	01:57:59.21	44.4087	-124.3373	4.21	1.62	7	151	23.7	0.14	0.6	1.7
	10/18/12	05:31:41.98	44.3990	-124.1975	6.29	1.50	6	145	34.7	0.06	0.4	13.5
	11/07/12	17:15:26.45	44.3572	-124.4205	10.64	1.78	5	172	20.4	0.04	6.9	8.4
	11/14/12	13:37:36.89	44.3710	-124.3697	10.56	1.72	5	175	23.0	0.08	0.9	10.6
T, Tr, S	01/25/13	00:41:12.54	44.4378	-124.5800	14.71	2.82	19	108	5.0	0.33	0.9	0.4
	01/25/13	01:34:25.36	44.4097	-124.5185	5.92	1.64	9	179	46.6	0.27	1.3	2.1
	01/25/13	02:01:39.94	44.4492	-124.5825	15.39	2.17	13	110	4.0	0.30	0.6	0.6

T, Tr, S	01/25/13	03:43:08.53	44.4388	-124.6032	15.94	3.09	17	107	3.9	0.36	0.9	0.6
	01/25/13	03:50:35.27	44.4322	-124.6025	12.52	2.12	9	119	41.7	0.24	0.9	2.1
T, Tr, S	01/25/13	04:27:43.50	44.4307	-124.5827	16.39	2.95	16	117	43.0	0.31	0.9	2.3
	01/25/13	04:49:47.74	44.4312	-124.5708	14.66	2.39	14	114	6.0	0.37	1.0	0.6
	01/25/13	04:53:09.04	44.4152	-124.5865	25.51	1.96	11	117	41.9	0.55	1.7	24.6
	01/25/13	06:11:56.99	44.4173	-124.5233	13.69	2.32	14	117	9.9	0.56	1.2	1.5
	01/25/13	08:39:02.72	44.4557	-124.5953	20.13	1.97	15	109	43.5	0.67	1.7	57.0
	01/25/13	08:39:41.36	44.4395	-124.5932	16.11	2.55	16	112	4.2	0.38	1.0	0.8
T, Tr, S	01/25/13	08:58:34.39	44.4380	-124.6033	16.20	3.02	21	107	4.0	0.32	0.7	0.7
	01/25/13	18:47:51.95	44.4273	-124.5298	12.59	2.44	17	115	8.8	0.46	1.1	1.3
T	03/06/13	15:01:39.46	44.3502	-124.3267	8.69	2.61	14	125	46.3	0.18	0.6	1.4
	04/10/13	04:43:39.69	44.3877	-124.3782	8.04	2.21	9	261	52.7	0.07	0.9	1.9
T	04/18/13	08:32:13.87	44.2853	-124.6112	22.72	2.41	9	177	64.3	0.45	2.2	32.9
	05/06/13	18:02:46.80	44.3750	-124.3693	5.04	1.88	6	260	51.3	0.10	2.1	2.1
T	07/22/13	05:24:58.72	44.3903	-124.4415	2.31	2.38	12	278	40.8	0.12	2.8	0.8
	07/23/13	17:47:34.31	44.3795	-124.2178	0.01	2.44	13	244	30.4	0.13	1.4	0.4
S	11/02/13	13:21:08.74	44.4172	-124.5533	17.3	2.41	18	91	8.2	0.42	1.3	1
	11/20/13	15:35:48.53	44.3693	-124.4045	5.61	1.9	8	116	20.8	0.12	0.5	1.2
	11/27/13	02:18:42.48	44.2847	-124.5923	12.63	1.84	8	125	21.1	0.07	1.2	1.9
	02/02/14	17:57:55.77	44.3628	-124.5960	47.22	1.75	10	194	36.2	0.4	2.3	3.7
	03/25/14	05:57:34.67	44.3563	-124.3790	6.93	1.76	5	179	23.3	0.1	3.2	11
	04/04/14	02:08:07.40	44.3602	-124.4235	8.16	1.84	10	114	20.2	0.18	0.5	1.3
	04/04/14	02:08:51.20	44.3567	-124.4142	8.67	1.56	5	172	21	0.16	4.6	12.3
	05/14/14	07:53:43.46	44.2862	-124.5930	15.4	2.27	8	125	20.9	0.14	1.4	3.4
T	08/19/14	08:50:29.85	44.4348	-124.5870	25.04	2.70	14	141	66.7	0.56	1.7	35.9

	09/28/14	18:51:17.56	44.3618	-124.3770	6.81	1.77	6	325	51.0	0.16	4.8	17.6
	09/28/14	19:00:56.80	44.3682	-124.4045	6.26	1.87	7	262	53.2	0.17	2.0	8.2
	09/30/14	11:02:45.24	44.3145	-124.3463	6.81	1.64	6	235	41.9	0.15	4.0	15.6
	10/27/14	07:40:45.03	44.3580	-124.3968	6.09	2.48	25	56	21.6	0.34	0.5	1.1
T, S	10/27/14	07:41:40.28	44.3668	-124.4008	6.04	3.15	27	104	20.9	0.39	0.6	1.3
	10/27/14	07:45:38.12	44.3702	-124.3673	6.01	1.82	8	259	50.9	0.12	1.6	1.5
	10/27/14	07:55:15.39	44.3762	-124.3750	8.80	1.44	5	169	22.3	0.39	6.9	28.8
	10/27/14	16:00:33.49	44.3710	-124.4047	9.70	1.92	7	141	20.4	0.03	0.7	2.5
	11/02/14	08:37:42.09	44.4272	-124.4808	20.40	1.93	13	139	12.4	0.37	1.3	1.3
	11/06/14	04:15:07.18	44.3630	-124.3975	9.93	1.81	10	143	21.3	0.16	0.6	2.0
S	11/19/14	09:01:55.58	44.3438	-124.6342	16.23	2.24	18	109	12.5	0.38	0.8	1.3
	11/29/14	16:54:29.06	44.3985	-124.6665	34.34	1.85	8	138	7.1	0.48	2.8	3.8
	11/29/14	18:34:00.93	44.3920	-124.3568	9.25	1.55	6	131	23.0	0.30	1.3	4.7
	03/13/15	12:19:13.30	44.3327	-124.4562	9.00	2.12	8	162	19.6	0.54	6.7	8.3
	04/18/15	02:55:55.09	44.4165	-124.5068	20.89	2.24	15	133	10.8	0.49	1.2	1.3
T, S	04/19/15	00:57:17.75	44.4073	-124.5020	21.02	2.61	23	88	11.6	0.49	1.2	0.8
	05/24/15	11:00:57.22	44.3763	-124.5468	18.34	2.50	23	134	11.2	0.77	1.5	1.8
	06/11/15	03:19:51.64	44.3700	-124.4273	9.24	1.75	9	145	18.9	0.12	0.6	1.8
	06/11/15	04:00:30.82	44.3565	-124.4310	6.61	2.14	11	150	19.4	0.11	0.7	3.6
	06/21/15	02:42:15.95	44.4375	-124.4912	19.75	1.94	11	141	11.3	0.36	1.4	0.9
T, Tr, S	06/25/15	20:25:34.68	44.3797	-124.5172	18.45	2.83	30	54	12.5	0.72	1.1	1.0
	06/26/15	01:24:01.01	44.3195	-124.5562	12.20	2.31	20	97	16.4	0.78	1.9	2.1
	06/26/15	01:24:39.43	44.3155	-124.5588	11.87	2.30	18	98	16.7	0.75	2.3	2.7
	06/26/15	03:35:41.51	44.3910	-124.5297	13.13	1.95	9	131	10.9	0.35	3.4	2.0
	06/26/15	05:44:31.39	44.4010	-124.4282	15.96	1.83	7	193	17.3	0.21	4.4	1.9

	06/26/15	09:49:15.45	44.3592	-124.4533	7.77	2.27	19	140	17.8	0.32	0.8	1.5
	06/26/15	09:55:09.55	44.3692	-124.4385	9.68	2.00	8	148	18.2	0.07	0.8	2.4
	06/26/15	10:13:27.18	44.4142	-124.5017	20.84	2.18	16	132	11.3	0.38	1.5	1.0
	06/26/15	11:02:23.29	44.3857	-124.4573	14.21	2.08	13	137	15.9	0.21	0.7	0.9
T, Tr, S	06/26/15	13:29:46.00	44.3758	-124.5118	19.24	2.98	29	53	13.1	0.71	1.0	1.1
	06/26/15	18:01:13.64	44.4207	-124.4810	19.47	2.03	12	138	12.6	0.47	1.8	1.2
	06/26/15	18:38:33.24	44.4043	-124.4300	16.84	2.06	12	133	17.0	0.62	2.0	1.9
	06/26/15	19:03:12.04	44.3258	-124.5230	12.90	2.01	18	138	16.9	0.92	2.9	2.1
	06/26/15	19:46:51.34	44.3918	-124.4788	19.61	1.83	12	127	14.1	0.54	2.0	1.3
	06/26/15	19:47:46.18	44.4233	-124.4777	21.79	2.14	12	140	12.8	0.51	1.9	1.3
	06/27/15	13:06:22.57	44.3613	-124.4495	9.32	2.02	14	139	17.9	0.30	0.8	2.6
	06/27/15	20:28:04.26	44.3850	-124.4187	9.72	1.86	8	187	18.7	0.14	2.1	2.3
	06/27/15	22:33:21.32	44.3678	-124.4483	10.79	1.92	8	151	17.6	0.11	0.8	1.3
	06/27/15	23:28:33.90	44.3582	-124.4192	6.44	1.83	9	148	20.1	0.12	1.3	6.5
	06/28/15	00:13:40.28	44.3720	-124.4448	11.42	1.87	9	148	17.6	0.13	0.9	1.3
	06/28/15	00:31:39.55	44.3518	-124.3862	5.32	1.86	7	260	51.0	0.08	1.8	2.0
	06/28/15	01:46:41.04	44.3673	-124.3917	6.77	1.96	5	325	52.3	0.06	3.5	12.9
	06/28/15	02:07:39.01	44.3642	-124.4388	8.00	2.32	13	149	18.4	0.20	0.6	1.6
	06/28/15	02:41:03.33	44.3665	-124.4323	9.32	1.97	7	178	18.7	0.37	8.0	10.3
	06/28/15	02:41:35.72	44.3548	-124.4008	6.84	2.04	4	261	52.2	0.07	2.0	10.8
	06/28/15	04:05:28.40	44.3553	-124.3963	6.92	2.17	6	325	51.9	0.11	4.0	14.6
	06/28/15	05:20:22.91	44.3573	-124.3977	7.03	2.02	5	325	52.1	0.11	3.9	14.6
	06/28/15	11:59:43.22	44.4208	-124.5172	19.67	2.03	11	134	9.9	0.15	0.8	0.5
	06/28/15	15:50:17.19	44.3678	-124.4400	10.95	1.98	9	149	18.1	0.10	0.6	1.2
	06/29/15	11:44:27.27	44.3522	-124.3958	5.61	1.93	8	261	51.7	0.08	1.7	1.8

	06/29/15	11:50:40.14	44.3598	-124.4137	5.72	2.25	19	107	20.4	0.39	0.7	1.5
T, S	06/30/15	03:40:14.53	44.4180	-124.5155	20.60	2.15	12	132	10.1	0.19	0.8	0.5
	07/05/15	03:06:03.16	44.3648	-124.4347	5.79	1.95	8	149	18.7	0.06	0.5	1.1
	07/05/15	03:20:10.59	44.3548	-124.3907	5.37	1.94	8	261	51.5	0.07	1.8	1.9
T, S	07/22/15	02:37:51.05	44.3713	-124.4722	14.05	2.58	22	130	15.8	0.46	0.9	1.2
	08/27/15	04:52:56.66	44.3587	-124.3962	10.56	2.04	7	261	52.1	0.10	1.1	2.0
	08/29/15	00:55:23.40	44.4115	-124.4765	23.58	2.24	15	137	56.2	0.61	2.0	5.1
Northern Cluster Events												
	10/11/11	19:54:49.39	44.7203	-124.3307	25.17	2.40	10	309	44.3	0.65	4.8	55.3
	11/29/11	00:51:30.05	44.6093	-124.3090	16.61	2.35	14	101	29.1	0.27	0.7	1.2
	11/29/11	11:27:22.33	44.7142	-124.3275	18.56	2.56	8	174	35.6	0.24	0.9	1.2
T, S	12/20/11	00:00:21.21	44.6865	-124.3380	21.86	2.83	19	125	32.7	0.83	1.4	2.9
	12/20/11	00:01:29.99	44.6388	-124.2713	39.74	2.65	9	116	33.4	0.36	1.2	4.0
	12/20/11	01:24:53.10	44.6160	-124.2827	44.22	2.62	6	152	31.3	0.17	1.1	3.1
S	12/20/11	10:48:38.41	44.6402	-124.2895	11.94	2.83	13	141	32.3	0.28	0.8	1.3
	01/07/12	21:10:42.67	44.6225	-124.2527	23.65	-9.00	10	155	33.7	0.34	1.6	1.0
	01/07/12	21:10:59.13	44.5443	-124.2237	18.54	2.50	11	81	32.6	0.23	0.7	1.0
	02/13/12	02:51:12.86	44.6373	-124.3253	6.07	2.20	10	121	42.6	0.17	0.5	1.4
	02/17/12	16:40:53.94	44.6503	-124.3213	24.59	2.49	10	160	31.0	0.21	0.8	1.0
	04/04/12	05:23:22.13	44.6050	-124.3055	26.10	2.58	10	107	41.0	0.82	2.7	61.0
	04/06/12	18:08:18.59	44.5645	-124.3312	8.75	1.93	6	201	43.5	0.07	0.7	3.9
	04/16/12	06:47:53.71	44.6152	-124.4825	4.95	2.18	6	312	55.0	0.02	2.7	1.2
S	04/17/12	01:46:07.02	44.5757	-124.2913	15.45	2.80	17	93	28.6	0.33	0.7	1.3
	04/17/12	03:43:01.04	44.5733	-124.2875	12.65	2.16	7	195	39.9	0.03	1.1	1.2
	04/17/12	07:25:27.75	44.5647	-124.3048	10.35	2.20	7	197	41.4	0.07	0.6	0.8

S	04/17/12	15:41:19.38	44.5822	-124.2848	3.81	2.50	11	104	29.4	0.70	1.4	3.8
T, S	04/18/12	07:33:56.99	44.5805	-124.3132	14.72	2.84	17	79	21.7	0.46	1.0	1.7
T, Tr, S	04/18/12	15:21:00.14	44.6185	-124.2908	21.81	3.16	11	111	30.9	0.41	1.4	1.7
	04/18/12	15:24:17.87	44.5830	-124.3412	17.60	2.16	8	101	44.0	0.53	2.9	3.9
	04/18/12	15:25:18.34	44.5645	-124.2995	13.09	1.89	5	197	41.0	0.03	1.7	2.7
	04/18/12	15:58:37.78	44.5717	-124.3012	7.66	2.10	7	117	41.0	0.09	0.5	3.7
	04/18/12	18:00:14.36	44.5755	-124.2905	11.80	2.32	8	136	40.1	0.19	0.7	1.8
S	04/18/12	22:30:48.63	44.5785	-124.2847	5.07	2.29	13	102	29.2	0.55	1.0	2.7
	04/19/12	20:50:27.71	44.5720	-124.3027	9.37	2.10	7	117	41.1	0.04	0.5	12.9
	04/19/12	20:50:49.64	44.5637	-124.3142	9.52	2.30	8	118	42.2	0.07	0.4	13.3
	05/09/12	15:34:47.88	44.5772	-124.3172	7.12	2.40	8	119	42.2	0.04	0.4	3.2
	05/11/12	12:31:16.39	44.5672	-124.2833	14.54	2.29	11	101	28.9	0.08	0.4	1.1
	05/11/12	12:37:42.39	44.5735	-124.2735	13.89	2.53	8	114	38.8	0.07	0.5	1.5
	05/11/12	13:13:34.81	44.5837	-124.2923	12.98	2.16	8	135	28.9	0.09	0.5	1.2
	05/14/12	19:02:16.88	44.5575	-124.1722	52.32	2.79	9	144	31.2	0.53	2.2	4.6
	05/23/12	20:02:43.03	44.5773	-124.2630	18.00	2.28	10	104	30.8	0.29	0.9	1.3
	06/22/12	14:32:32.49	44.5652	-124.3070	11.42	2.36	13	100	27.0	0.27	0.6	1.2
	06/28/12	01:28:12.14	44.5812	-124.2933	16.88	2.50	11	103	28.7	0.13	0.5	1.1
T	06/28/12	19:35:52.52	44.5680	-124.2735	13.01	2.77	19	89	29.6	0.17	0.4	0.7
C	06/30/12	16:43:18.38	44.5700	-124.2808	16.82	2.63	8	101	29.2	0.14	0.6	1.5
	06/30/12	18:36:57.55	44.5698	-124.2760	14.10	2.56	9	102	29.5	0.11	0.5	0.9
	07/02/12	17:11:54.53	44.5760	-124.2742	15.22	2.28	8	103	29.9	0.25	0.9	2.0
	08/02/12	05:57:20.11	44.6065	-124.2918	14.87	2.47	17	98	19.6	0.37	0.8	1.1
	08/04/12	05:12:55.80	44.6457	-124.1912	18.86	2.02	12	124	11.8	0.25	0.9	0.8
	08/08/12	12:04:07.30	44.6125	-124.2855	14.69	2.13	12	110	31.0	0.32	0.9	2.2

T	08/29/12	07:54:54.48	44.6803	-124.3028	17.05	2.66	18	109	21.3	0.41	0.9	1.2
	08/29/12	08:00:29.33	44.6872	-124.2982	20.61	1.68	6	232	35.1	0.04	2.3	1.9
T	08/29/12	08:05:26.40	44.6647	-124.2970	15.73	2.48	18	106	20.4	0.37	0.8	1.3
	08/29/12	08:52:03.40	44.6207	-124.3338	11.80	1.88	6	304	43.2	0.06	1.5	0.9
	08/31/12	10:36:07.76	44.6250	-124.2557	13.84	1.40	6	210	33.7	0.06	2.1	2.4
	09/26/12	02:19:13.86	44.5538	-124.2767	7.13	1.92	5	186	28.9	0.08	4.1	12.5
	10/04/12	04:50:52.82	44.5168	-124.4793	3.05	2.26	8	116	12.4	0.88	2.8	5.3
	10/04/12	04:51:41.52	44.5288	-124.2460	7.16	1.77	4	175	30.5	0.17	5.4	17.8
T	10/04/12	05:07:27.29	44.6025	-124.2972	18.89	2.55	17	98	20.1	0.29	0.6	0.7
	10/04/12	05:34:57.35	44.5475	-124.2572	7.14	1.72	6	183	30.2	0.19	5.5	17.0
	10/09/12	04:39:00.51	44.5600	-124.2608	7.17	1.90	6	187	30.3	0.27	6.6	19.5
T, S	10/10/12	23:26:18.77	44.6093	-124.2890	19.02	2.45	16	98	19.3	0.33	0.7	0.8
	11/06/12	03:29:02.39	44.6317	-124.2775	6.89	1.74	5	147	32.6	0.12	3.3	14.4
	11/19/12	04:27:04.63	44.6058	-124.2842	15.00	2.19	14	105	19.0	0.27	0.7	1.6
	12/24/12	08:26:24.10	44.5877	-124.2967	16.01	2.47	12	194	20.3	0.23	1.0	1.8
	12/24/12	08:27:25.22	44.5668	-124.3090	8.21	1.91	6	297	41.7	0.08	1.2	0.9
	12/24/12	08:28:20.83	44.5758	-124.3295	11.50	2.10	9	200	43.2	0.15	0.7	1.2
	01/04/13	03:26:06.23	44.6007	-124.2820	20.52	-9.00	5	192	39.2	0.08	1.7	2.3
	02/12/13	01:41:57.87	44.6020	-124.3312	6.22	2.12	6	198	43.1	0.13	0.8	2.2
	03/05/13	08:04:46.14	44.5678	-124.3413	9.52	1.87	5	202	44.2	0.11	1.6	15.6
	03/19/13	16:48:58.92	44.6057	-124.2185	26.13	1.74	6	183	34.1	0.06	1.6	12.9
	04/16/13	11:32:34.05	44.5865	-124.3072	13.06	2.19	7	174	41.3	0.13	1.2	1.5
	05/18/13	05:06:26.98	44.5753	-124.2477	6.27	2.12	6	167	36.8	0.12	1.2	3.3
	05/18/13	09:55:32.94	44.5927	-124.3358	10.70	2.06	8	199	43.5	0.11	0.7	1.4
	05/22/13	11:01:07.07	44.5785	-124.3252	9.85	2.17	11	196	42.8	0.18	0.9	1.0

	05/29/13	22:17:53.53	44.7258	-124.1923	17.22	2.45	7	163	74.2	0.88	4.0	8.0
	07/06/13	09:39:41.96	44.5982	-124.3025	9.21	2.31	10	242	40.8	0.21	1.4	0.8
	07/07/13	13:37:23.18	44.6445	-124.1835	27.51	2.16	8	281	31.4	0.58	5.4	13.0
	04/22/15	08:24:50.54	44.5818	-124.3312	21.89	2.41	17	134	27.6	0.84	2.0	2.8
	04/22/15	08:50:26.23	44.5675	-124.2842	9.36	1.84	8	133	30.2	0.20	0.7	1.6
	04/22/15	09:23:48.31	44.5572	-124.2728	13.69	1.88	8	131	30.6	0.22	1.2	1.5
Non-Cluster Events												
C	08/03/11	08:14:49.15	45.2622	-122.9380	9.47	3.01	10	247	26.2	0.13	1.3	1.2
C	08/03/11	23:15:48.80	45.0547	-122.5383	12.49	3.19	10	278	59.7	0.16	1.3	2.0
C	08/04/11	20:01:14.29	45.0665	-122.6002	18.51	3.07	10	274	54.7	0.10	1.0	3.1
C	08/06/11	07:06:16.26	45.1463	-122.8637	21.74	2.77	10	251	32.3	0.09	1.1	2.2
	08/06/11	09:48:03.68	45.9188	-122.8917	13.63	2.67	6	324	56.2	0.07	2.1	2.8
C	08/22/11	11:07:16.86	45.0472	-122.4132	11.09	3.04	11	286	69.4	0.18	1.2	2.5
C	08/24/11	19:29:26.46	45.3382	-123.4717	23.20	2.37	6	132	21.5	0.14	0.8	2.5
C	08/27/11	18:35:09.91	45.7462	-123.0168	0.11	2.56	5	307	38.9	0.25	9.5	13.6
	08/31/11	16:07:39.74	45.0453	-122.8165	14.56	2.55	9	256	39.8	0.16	2.0	2.7
C	09/30/11	03:15:28.51	45.6065	-122.7563	28.29	3.05	7	288	57.4	0.67	5.7	5.7
T	10/03/11	00:52:12.19	45.2267	-123.8600	2.26	3.05	11	147	46.8	0.44	1.4	4.8
	10/24/11	18:45:24.41	45.2903	-124.1525	19.35	2.75	16	80	38.7	0.77	1.6	3.0
	10/28/11	13:29:58.21	45.0382	-123.4712	0.01	2.46	7	150	25.2	0.12	0.8	1.7
	11/10/11	08:20:59.24	45.0385	-123.3958	11.55	2.50	7	143	21.8	0.15	1.6	5.2
	11/11/11	22:46:22.17	45.4238	-122.8172	26.36	3.57	7	268	42.2	0.11	2.6	4.1
	11/14/11	05:47:39.77	44.0427	-124.6140	17.08	2.82	7	208	24.1	0.17	4.5	6.7
	11/14/11	09:16:18.05	44.0427	-124.6118	16.66	2.70	8	208	24.2	0.17	6.4	10.1
C	11/20/11	17:41:47.22	44.5502	-123.3925	18.31	2.56	7	225	8.0	0.08	0.9	1.1

	12/18/11	09:05:48.92	45.0375	-123.3545	16.36	2.52	8	155	20.6	0.14	0.8	2.2
T	12/28/11	14:24:39.17	45.4387	-123.8200	14.61	2.48	10	170	25.5	0.16	0.7	1.0
	12/29/11	21:36:23.94	43.8412	-125.4128	4.84	3.32	10	282	51.7	0.39	5.8	4.0
	12/31/11	11:02:18.90	44.5285	-123.6655	22.71	2.24	8	121	14.3	0.11	1.3	2.2
	01/02/12	23:37:12.39	44.6345	-124.7745	1.77	1.91	4	231	21.7	0.21	18.2	3.9
	01/11/12	08:41:57.95	44.1242	-125.4515	9.98	3.22	9	287	44.5	0.60	14.8	9.9
C	01/14/12	17:58:20.38	43.2662	-126.9840	6.97	3.61	7	330	193.2	0.10	7.8	12.1
	01/14/12	18:26:39.26	43.3168	-127.0897	5.98	3.33	6	331	198.0	0.31	21.5	17.4
S	01/14/12	21:26:35.79	45.6500	-124.8763	18.85	2.63	5	288	55.6	0.29	2.6	24.2
	01/18/12	14:37:39.47	45.0033	-122.0887	0.32	-9.00	5	333	133.2	0.39	7.1	10.2
	02/01/12	09:12:48.70	45.1033	-126.6853	15.36	3.92	8	325	102.8	0.79	6.3	60.9
	02/04/12	22:01:25.78	43.7592	-125.8693	13.62	3.34	8	302	87.8	0.24	2.9	23.4
	02/05/12	08:59:22.80	45.0783	-123.6142	2.14	2.22	5	213	31.3	0.12	1.1	5.2
	02/13/12	16:55:20.05	45.2135	-122.9963	21.66	2.42	4	309	21.0	0.01	2.3	1.6
C	02/15/12	08:12:33.98	43.5973	-127.4868	1.57	3.32	10	334	199.9	0.34	28.9	6.6
C	02/24/12	07:55:26.46	43.4737	-127.6217	5.17	3.41	10	335	230.9	0.33	22.6	18.2
S	03/03/12	12:22:32.97	44.8587	-124.8473	17.92	2.84	9	116	21.8	0.28	9.6	16.5
	03/08/12	21:20:19.76	45.4693	-123.1153	23.78	2.54	5	260	30.9	0.16	3.8	3.7
C	03/18/12	18:48:50.21	46.4998	-124.0023	6.83	3.51	10	325	198.0	0.77	43.1	27.7
	03/23/12	22:56:10.35	44.7568	-123.9312	13.50	2.41	16	80	17.4	0.40	0.9	1.5
	03/25/12	14:19:18.63	45.0503	-123.3758	18.97	2.77	10	147	19.9	0.29	1.1	2.9
C	03/26/12	13:16:55.55	45.0517	-122.2107	12.04	3.02	7	296	84.8	0.36	8.4	27.0
C	04/05/12	14:37:01.42	45.0460	-122.4018	12.37	3.18	6	287	70.3	0.08	3.3	11.4
C	04/08/12	13:36:29.02	45.1982	-121.7428	10.80	3.11	8	311	119.5	0.38	8.5	26.6
C	04/08/12	13:42:18.44	45.1792	-121.7283	5.25	3.02	7	312	120.7	0.26	9.0	17.2

C	04/08/12	14:42:04.07	45.1805	-121.7043	6.80	2.94	9	312	122.6	0.10	5.4	10.4
C	04/08/12	17:16:27.94	45.1955	-121.7500	0.93	3.46	12	311	119.0	0.24	3.2	3.3
	04/16/12	22:26:54.58	44.8355	-123.4805	7.25	2.37	10	156	31.1	0.56	1.5	5.4
	05/02/12	08:52:09.57	45.3420	-123.8668	13.62	2.51	13	96	16.8	0.16	0.5	0.9
C	05/28/12	03:40:15.72	44.1073	-122.6965	12.69	2.78	5	327	92.1	0.11	2.7	2.3
	06/08/12	00:24:14.44	45.4298	-123.4517	61.44	3.43	5	155	23.0	0.26	2.6	6.0
C	06/15/12	14:25:54.61	45.1338	-123.4440	14.68	2.50	8	151	16.6	0.10	1.3	1.3
C	06/16/12	05:14:37.84	45.2180	-122.7755	15.21	2.99	7	261	38.4	0.15	1.6	15.8
C	06/23/12	18:08:56.30	45.2572	-122.8105	21.22	2.98	7	259	36.0	0.08	1.3	3.1
C	06/27/12	06:29:42.31	45.5370	-123.3530	53.40	3.35	6	213	15.3	0.34	6.2	3.0
C	07/10/12	13:58:31.09	43.8660	-125.4978	8.35	3.16	8	296	55.9	0.73	20.5	25.5
	07/20/12	20:54:38.11	45.3065	-123.8567	1.63	2.54	7	283	47.7	0.24	10.3	6.0
	07/20/12	11:49:13.06	44.2687	-124.1163	12.52	1.19	4	171	28.1	0.72	51.7	31.3
	07/25/12	21:23:48.62	43.9127	-124.4607	5.85	2.21	8	231	37.6	0.15	1.4	1.4
	08/30/12	00:15:22.33	43.7253	-126.1070	10.78	3.13	12	271	102.3	0.81	5.3	68.8
C	09/08/12	04:57:45.85	45.0845	-122.6217	14.81	3.55	18	303	55.2	0.18	1.5	4.6
	09/17/12	01:59:15.38	42.5513	-126.5082	9.29	3.59	29	293	110.6	0.84	11.9	18.0
C, S	09/22/12	20:15:32.34	43.4235	-124.3117	2.81	2.89	9	337	42.2	0.21	3.2	2.3
	09/26/12	02:19:13.86	44.5538	-124.2767	7.13	1.92	5	186	28.9	0.08	4.1	12.5
	10/03/12	03:25:15.61	44.5047	-124.8293	10.49	1.16	5	249	16.9	0.30	8.1	5.4
	11/09/12	13:56:06.01	45.0127	-124.4783	7.01	2.25	10	150	12.7	0.28	1.6	2.8
	02/04/13	14:53:27.31	43.9935	-124.5002	3.83	2.05	6	272	45.1	0.11	2.1	1.4
	08/02/13	15:53:45.49	44.7218	-124.0050	6.91	-9	4	286	11.4	0.17	2.4	18.5
	08/10/13	21:08:29.64	45.4845	-123.7845	6.76	-9	5	315	82.1	0.14	7.6	15.1
	09/02/13	20:29:12.12	44.2022	-124.5110	21.71	2.12	6	153	31.4	0.58	17.9	32.9

	09/15/13	23:36:14.58	44.1465	-124.5662	20.22	1.73	5	170	26.5	0.11	0.9	15.6
	09/16/13	04:03:42.04	44.1782	-124.3745	8.57	2.04	7	230	38.2	0.68	3	12.9
C	12/15/13	18:20:59.04	43.7397	-126.0793	9.37	-9	13	300	104	0.5	15.3	22.5
C	01/16/14	15:38:23.79	43.7613	-125.9858	11.6	-9	20	291	96.1	0.47	3	40.3
C	01/24/14	13:53:30.20	42.7222	-124.4407	7.35	3.52	19	323	144.8	0.97	48.3	36.1
C	02/25/14	23:03:10.79	43.9453	-125.7132	10.72	3.27	22	278	68.3	0.43	2	37.6
	02/25/14	23:04:48.32	43.7230	-125.0027	15.51	2.98	6	328	44.8	0.52	7.8	5
	03/13/14	21:53:47.59	44.0537	-124.4360	6.9	1.45	5	200	37.5	0.51	8.7	32.2
C	05/16/14	09:23:37.77	43.7240	-126.0670	10.61	-9	13	301	103.8	0.59	3.4	50.9
	03/01/15	14:58:21.97	44.6578	-126.1678	10.64	2.91	11	144	24.0	0.39	1.1	34.5
	05/01/15	11:32:25.29	44.7338	-125.6840	7.70	2.74	8	188	19.2	0.14	1.1	1.2
	06/22/15	21:58:59.68	44.4968	-124.3740	25.07	2.31	10	212	60.5	0.68	6.2	57.8
	09/01/15	21:07:34.07	43.9253	-124.7472	24.19	2.02	10	132	18.7	0.39	3.0	5.4

*T indicates an event was used as a template for scanning; C indicates the event is in the regional catalogs but was not used for scanning; Tr indicates an event that was also in the catalogs of Tréhu et al. (2015; 2018); S indicates an event that was also in the catalog of Stone et al. (2018)

[†]M_D is duration magnitude.

[§]ERH indicates horizontal location error.

[#]ERZ indicates vertical location error.

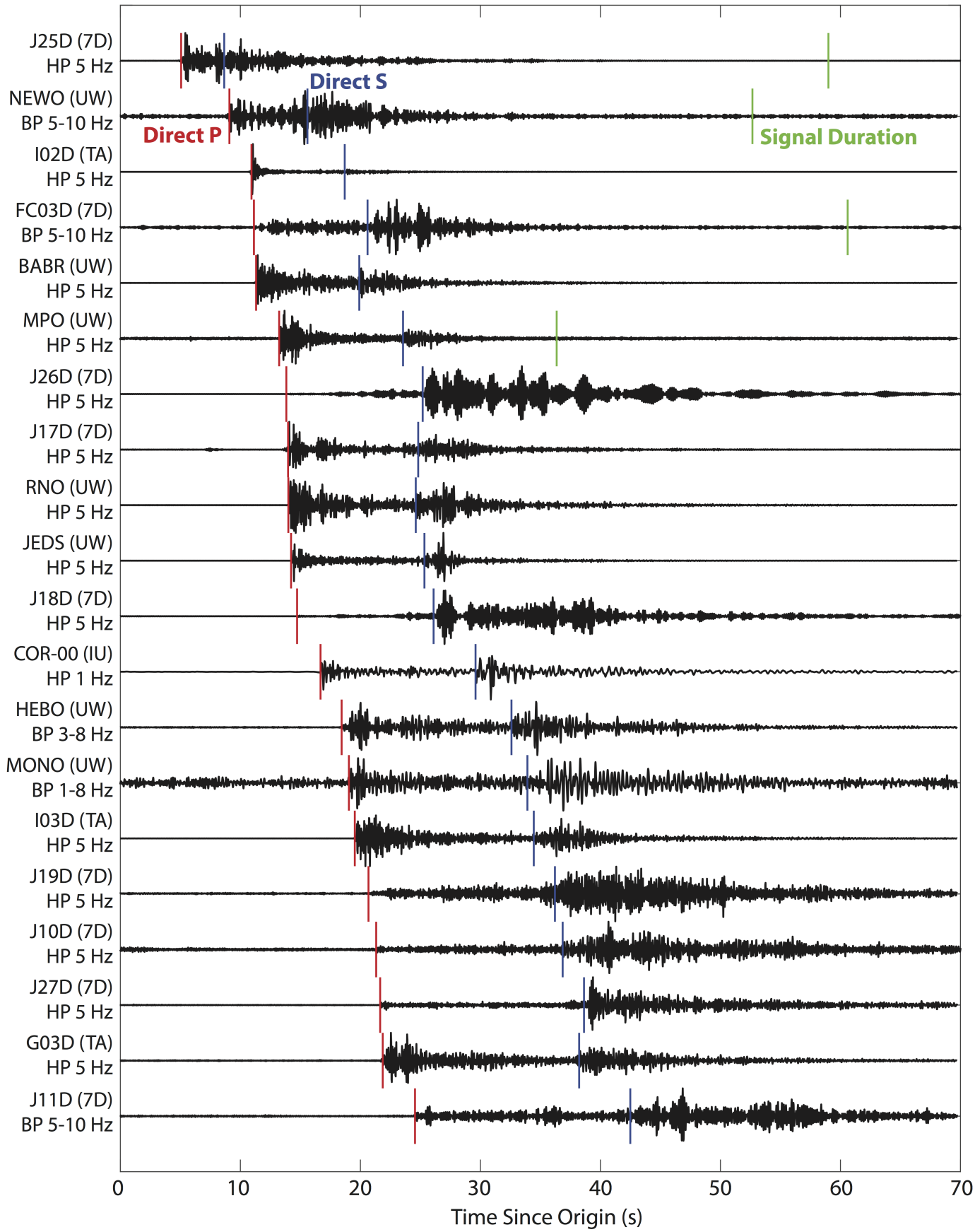

Figure DR1. Vertical component seismograms for one of the largest (M_D 3.15) seamount events, occurring on 27 October, 2014 at 07:41:40.28 UTC. Seismograms are labeled by station name, with corresponding IRIS DMC network code and filter used. Direct P, S and duration picks used for location and magnitude estimation are shown. Sixteen of the stations have duration picks that are outside the shown time window.

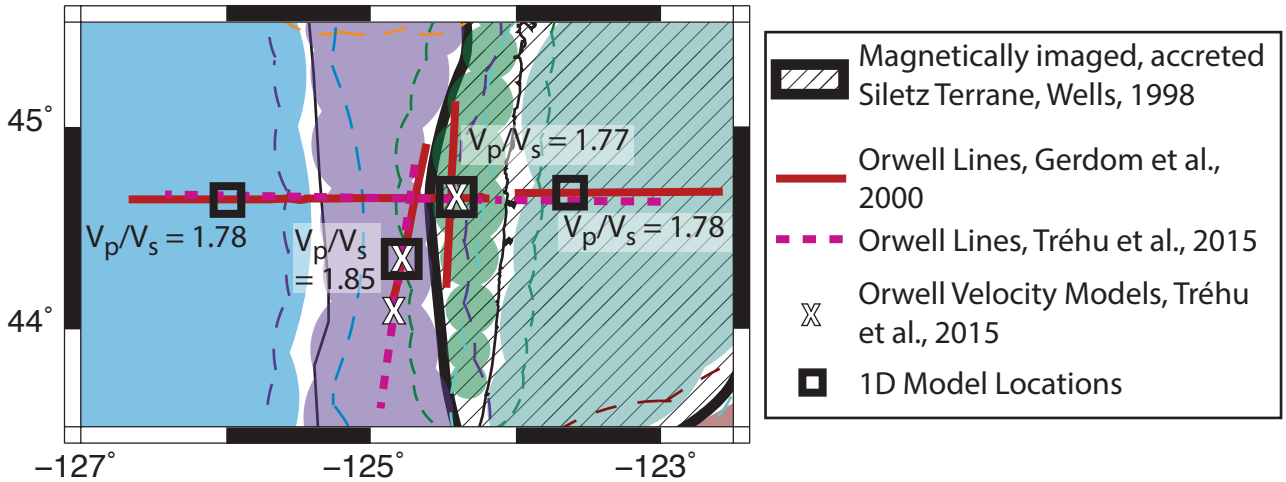

Figure DR2. Map of CSZ margin with regions colored by the extent of an applied velocity model. Regions were chosen to account for along-strike heterogeneity and to incorporate numerous velocity lines from multiple studies, as well as to account for differences where the crystalline Siletz terrane is present. One-dimensional velocity models are chosen from a series of seismic profile studies (Locations of 1-D models indicated by black squares) and include the ORWELL-1 and ORWELL-3 velocity models presented in Tréhu et al. (2015). Vp/Vs values used are noted by their corresponding 1-D model locations. Solid colored regions indicate where a single velocity model is applied; dashed lines indicate the extent of transition zones between single-model regions, where a mix of models is applied (Klein, 2002).

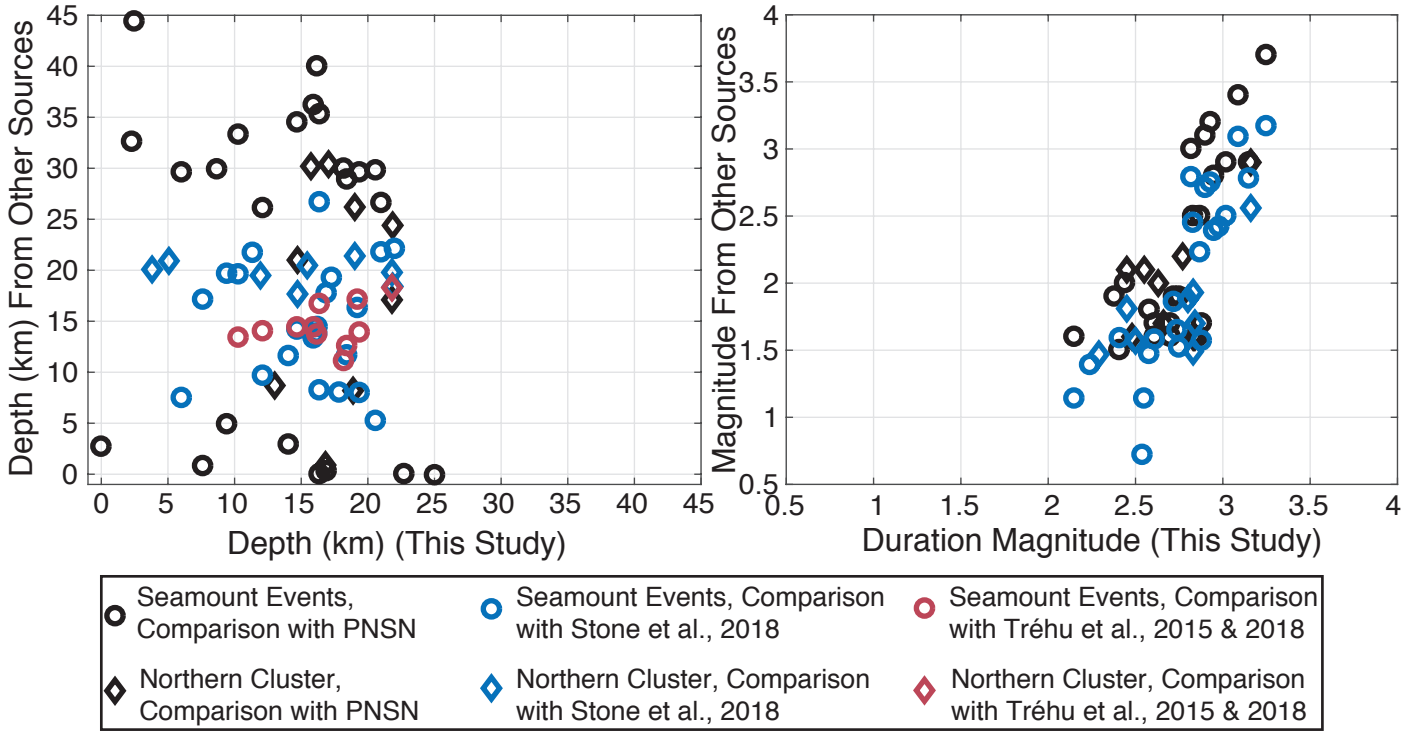

Figure DR3. Comparison of common event depths (left) and magnitudes (right) determined from this study with those determined by other studies (Tréhu et al. 2015; 2018; Stone et al., 2018) and the regional Pacific Northwest Seismic Network (PNSN). For comparison with the Stone et al. (2018) catalog, we use 1-D velocity models from some of the same studies along the margin, but exact 1-D model locations and extent of where they are applied differ, as well as the models used for the Juan de Fuca plate and on land. Similarly, the 1-D velocity models used by PNSN differ from those we use, and the extents of where they are applied differ from those we determined.

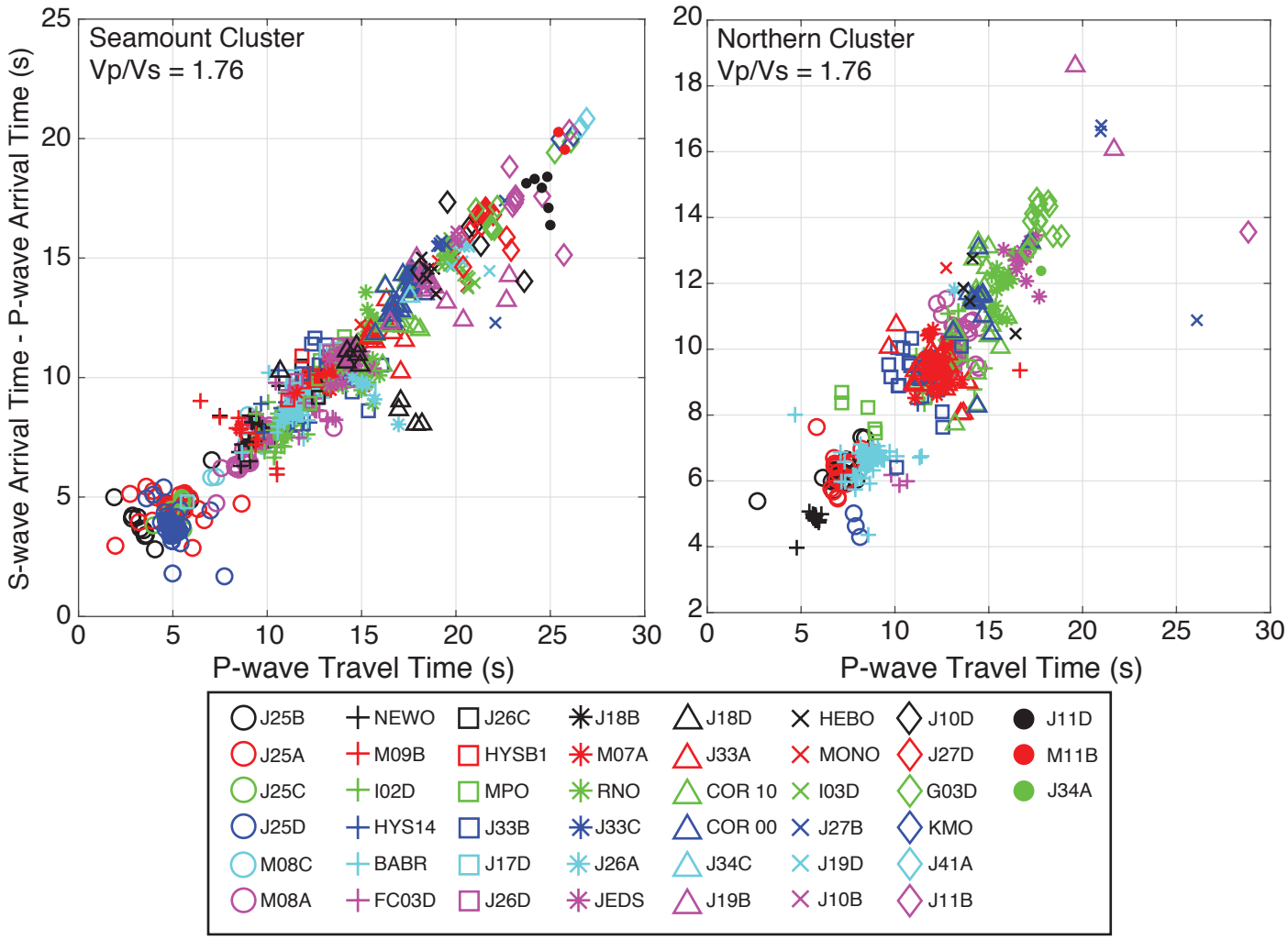

Figure DR4. Wadati diagrams for the seamount (left) and northern (right) clusters with pick-based Vp/Vs ratios. Symbols correspond to direct P- and S-wave picks on a given station. Linear arrival time (P or S) vs. S-P time behavior is expected for well-picked arrival times and is evident for our events. No event in the set has all station picks as outliers, indicating that the few outliers present are issues with individual station picks (although they appear acceptable) rather than issues with the location of the event.

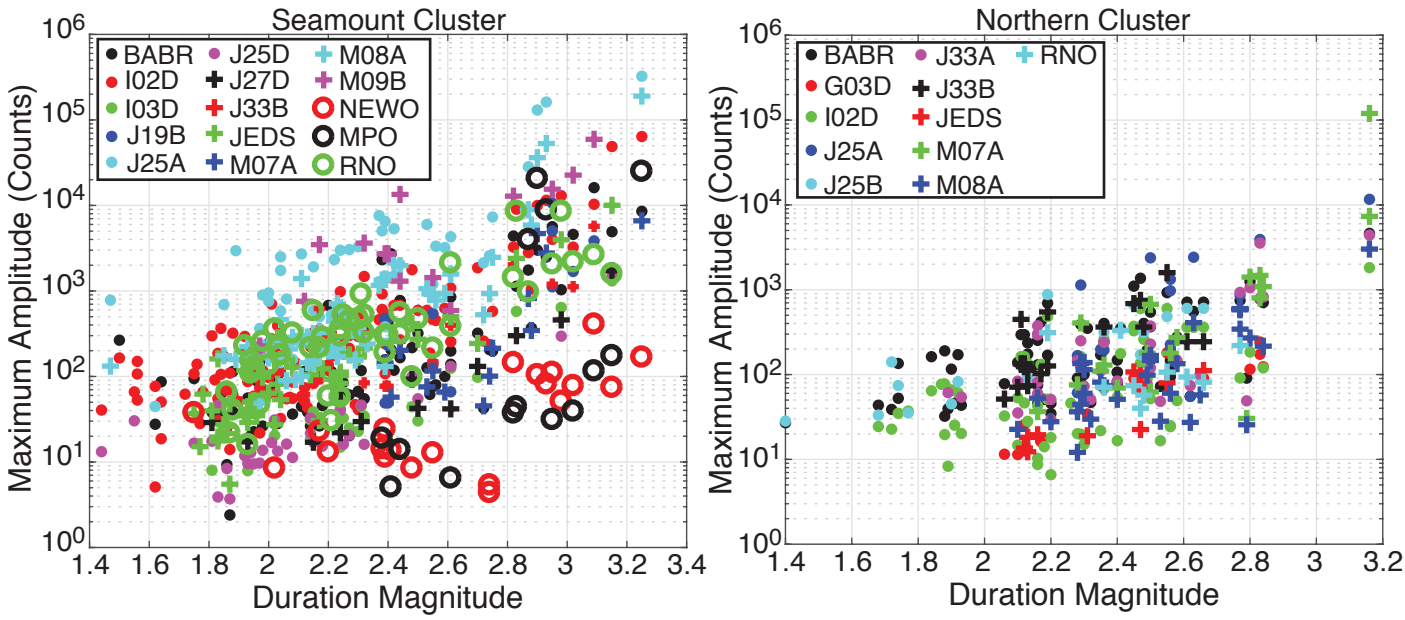

Figure DR5. Comparison of determined duration magnitudes with the maximum amplitude of stations that contributed to magnitude determination for seamount (left) and northern (right) clusters. The maximum amplitude was chosen between the direct P-wave arrival and signal duration picks. Only stations with 10 or more duration picks during the time period are shown.

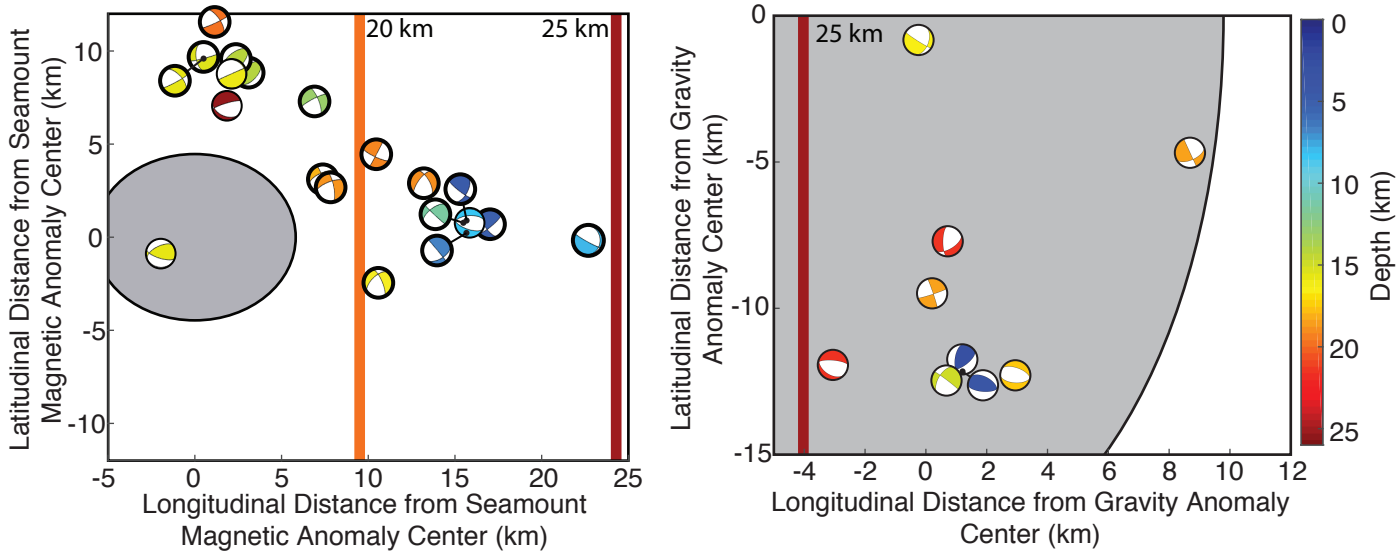

Figure DR6. Focal mechanisms determined for events in the seamount (left) and northern (right) clusters using the FocMec program (Snoke, 2003), colored by event depth. Events with multiple possible mechanism solutions show all solutions boxed together. Gray shaded regions are the M2 seamount magnetic anomaly (left) and G2 gravity anomaly (right). Colored vertical lines are the depth contours of the plate interface of Gerdom et al. (2000). Mechanisms with bold outlines (left) are consistent with the pattern predicted by the upper plate deformation model of seamount subduction (Dominguez et al., 1998; Wang and Bilek, 2011; 2014).

REFERENCES CITED

Dominguez, S., Lallemand, S.E., Malavieille, J., and von Huene, R., 1998, Upper plate deformation associated with seamount subduction: Tectonophysics, v. 293, p. 207-224.

Gerdom, M., Tréhu, A.M., Flueh, E.R., and Klaeschen, D., 2000, The continental margin off oregon from seismic investigations: Tectonophysics, v. 329, p. 79–97, doi: 10.1016/S0040-1951(00)00190-6.

Klein, F.W., 2002, HYPOINVERSE-2000: a Fortran Program to Solve for Earthquake Locations and Magnitudes: U.S. Geological Survey Open-File Report 02-171.

Snoke, J. A. (2003), FOCMEC: FOcal MEChanism determinations: International Handbook of Earthquake and Engineering Seismology (W. H. K. Lee, H. Kanamori, P.C. Jennings, and C. Kisslinger, eds.), Academic Press, San Diego (Part B: 1629-1630 and accompanying CD).

Stone, I., Vidale, J.E., Han, S., and Roland, E., 2018, Catalog of off-shore seismicity in Cascadia: Insights into the regional distribution of microseismicity and its relation to subduction processes: Journal of Geophysical Research: Solid Earth, v. 123, p. 1–12, doi: 10.1002/2017JB014966.

Tréhu, A.M., Braunmiller, J., and Davis, E., 2015, Seismicity of the Central Cascadia Continental Margin near 44.5° N: A Decadal View: Seismological Research Letters, v. 86, no. 3, p. 819–829, doi: 10.1785/0220140207.

Tréhu, A.M., Wilcock, W.S.D., Hilmo, R., Bodin, P., Connolly, J., Roland, E.C., and Braunmiller, J., 2018, The Role of the Ocean Observatories Initiative of the Cascadia Subduction Zone: Oceanography, v. 31, no. 1, p. 70–79, doi: 10.5670/oceanog.2018.116.

Wells, R.E., Weaver, C.S., and Blakely, R.J., 1998, Fore-arc migration in Cascadia and its neotectonic significance: Geology, v. 26, no. 8, p. 759–762, doi: 10.1130/0091-7613(1998).

Wang, K., and Bilek, S.L., 2011, Do subducting seamounts generate or stop large earthquakes? Geology, v. 39, no. 9, p. 819–822, doi: 10.1130/G31856.1.

Wang, K., and Bilek, S.L., 2014, Invited review paper: Fault creep caused by subduction of rough seafloor relief: Tectonophysics, v. 610, p. 1–24, doi: 10.1016/j.tecto.2013.11.024.