

**Cascadia2021 project: Field Report for the 2022 reoccupation of the
S1000 and S6000 linear arrays**
(December 2022)



Smiles all around after recovering all S6000 line nodes: (clockwise from lower left) Erin Wirth (USGS), Anne Tréhu (Oregon State Un.), Madeleine Lucas (Un. Washington), Charity Mann (Oregon State Un.), Ann Olesh (Oregon State Un.), Ian Stone (USGS). S6000 line field hands not pictured: Barrett Johnson (Un. Washington), Yiyu Ni (Un. Washington). S1000 line: Kevin Ward (South Dakota School of Mines and Technology), Jimmy Bradford (South Dakota School of Mines and Technology)

Objective:

To obtain three component data along two of the southernmost and northernmost linear arrays deployed in 2021 (see Casacadia2021 Field Data Report), when only vertical component data were recorded. Although reoccupying the entire 2021 network was not realistic, we decided to reoccupy the two longest linear arrays, for which the lack of horizontal component data most seriously limited the ability to achieve the science objectives.

(see <https://blogs.oregonstate.edu/cascadia2021> for more information about the project)

Field organization:

Ian Stone and Erin Wirth (USGS) led the effort to re-permit and reinstall the S6000 line from the coast at Tillamook across the Tualatin Basin to the Portland Hills. They were assisted in the field by Barrett Johnson (UW), Madeleine Lucas (UW), Yiyu Ni (UW), Ann Olesh (OSU), Charity Mann (OSU) and Anne Tréhu (OSU).

Kevin Ward (SDSMT) led the effort to re-permit and reinstall the S1000 line from the coast to the Cascade foothills of southern Oregon. He was assisted in the field by Jimmy Bradford (SDSMT).

Anne Tréhu coordinated vehicle reservations through the Oregon State motor pool and distribution of nodes and field gear to the field crew.

Nodes were installed during the Memorial Day weekend and the first week of June and recovered by the 4th of July. Unlike June 2021, when only 2 earthquakes with $M > 6$ occurred around the globe, 8 earthquakes with $M > 6$ occurred during the 2022 deployment.

Data availability:

All data are archived in PH5 format at the IRIS/EarthScope Data Management Center as temporary network 3A 2022-2022 22-015. Site locations are shown in Figures 1 and 2; coordinates are listed in Tables 1 and 2 (also available as a excel file). An example of recorded data on the S6000 line is shown in Figure 3.

Acknowledgements:

This project was funded by the geophysics program of the U.S. National Science Foundation through grants EAR-1946347 to OSU, EAR-1946426 to UO and EAR-1946396 to SDSMT. The U.S. Geological Survey also contributed personnel and funds to help cover expenses. Nodes were provided by the IRIS-PASSCAL program. Space for staging was provided by OSU at the Geological Sample Repository. We thank the many individuals who assisted with permitting, logistics and other aspects of the project. In addition to the participating landowners and agencies given in Appendix A of the 2021 Field Report, we would like to thank the following: Emanuel Lutheran Church , Cornelius, OR; Camp Ireland Boy Scout Camp; and the Jones family.

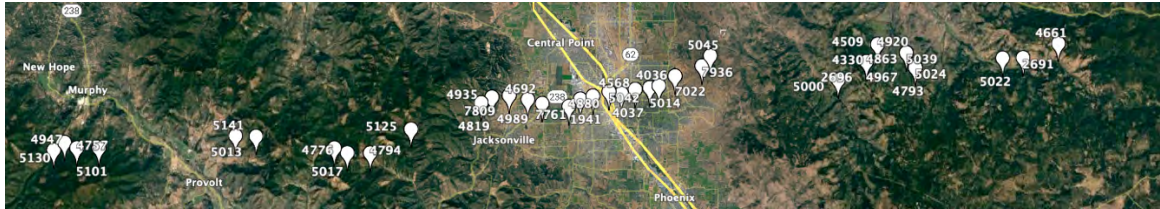


Figure 1. S1000 reoccupation.

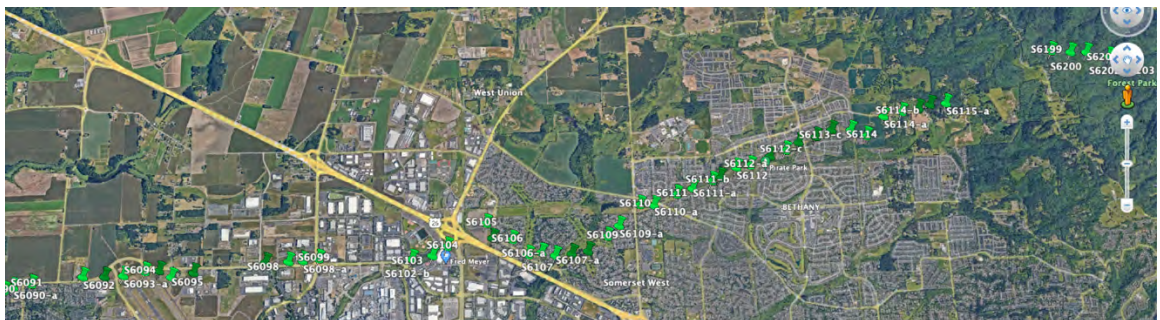


Figure 2. S6000 reoccupation from west (top) to east (bottom).

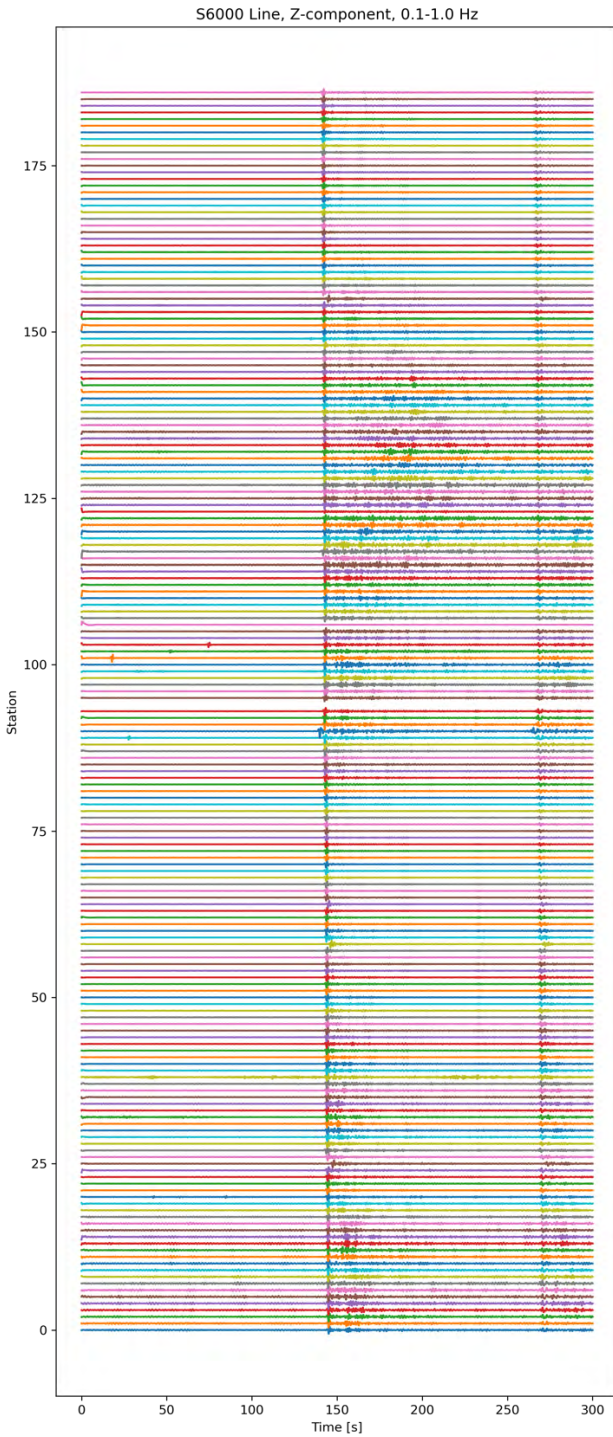


Figure 3. Data from a M6.5 deep intraslab earthquake in the Peru-Brazil border region recorded on the S6000 line. Data were filtered from 0.1-1 Hz, with the P-wave arrival showing up clearly on the Z-component shortly before ~150 seconds. Stations are ordered from east (lowest stations numbers; near the coast) to west (highest station numbers; near Portland).

10064	42.333134	-122.852292	434	4037	434339	4900391	44.2537906	-123.822489	6/2/22 21:00	7/5/22 20:43
10065	42.334189	-122.839468	469	5014	434439	4900391	42.334123	-122.8394759	6/2/22 21:26	7/5/22 20:54
10066	42.335376	-122.831459	461	4036	434539	4900391	42.3353004	-122.8314678	6/2/22 22:36	7/5/22 21:05
10067	42.341489	-122.817164	530	7022	434639	4900391	42.3414806	-122.817178	6/2/22 23:12	7/5/22 21:17
10068	42.347485	-122.793387	812	7936	434739	4900391	42.3475296	-122.7934243	6/2/22 23:50	7/6/22 0:25
10069	42.353762	-122.785999	1086	5045	434839	4900391	42.353836	-122.7859604	6/3/22 1:14	7/6/22 2:09
10070	42.337624	-122.674536	655	5000	433239	4900291	42.3375688	-122.6744541	6/3/22 23:53	7/5/22 18:59
10071	42.348781	-122.650046	1149	4967	432039	4900291	42.348729	-122.6500577	6/3/22 17:36	7/6/22 17:39
10072	42.348781	-122.650046	1149	4863	432139	4900291	42.3487408	-122.6500699	6/3/22 17:36	7/6/22 17:38
10073	42.348781	-122.650046	1149	2696	432239	4900291	42.3487262	-122.6500378	6/3/22 17:37	7/6/22 15:29
10074	42.360000	-122.640076	940	4509	431739	4900291	42.3600432	-122.6400678	6/3/22 15:42	7/6/22 18:43
10075	42.360000	-122.640076	940	4330	431839	4900291	42.3600438	-122.6400613	6/3/22 15:43	7/6/22 18:42
10076	42.360000	-122.640076	940	4920	431939	4900291	42.3600104	-122.6400817	6/3/22 15:44	7/6/22 18:43
10077	42.354455	-122.614937	890	5039	432939	4900291	42.3544738	-122.614926	6/3/22 22:36	7/5/22 16:07
10078	42.354455	-122.614937	890	4903	433039	4900291	42.3544691	-122.6149701	6/3/22 22:37	7/5/22 16:07
10079	42.354455	-122.614937	890	6927	433139	4900291	42.3544326	-122.6149407	6/3/22 22:38	7/5/22 16:07
10080	42.344784	-122.607214	904	4793	432639	4900291	42.3447544	-122.6071552	6/3/22 21:33	7/5/22 15:51
10081	42.344784	-122.607214	904	7493	432739	4900291	42.3447131	-122.607151	6/3/22 21:34	7/5/22 15:51
10082	42.344784	-122.607214	904	5024	432839	4900291	42.3447238	-122.6071787	6/3/22 21:35	7/5/22 15:51
10083	42.350506	-122.530495	649	5022	432439	4900291	42.3505631	-122.5304296	6/3/22 19:56	7/5/22 17:21
10084	42.350451	-122.512889	839	2691	432539	4900291	42.3504465	-122.5129468	6/3/22 20:25	7/5/22 17:06
10085	42.359322	-122.481825	706	4661	432339	4900291	42.3592715	-122.4818336	6/3/22 19:20	7/5/22 16:48

20143	45.549787	-122.97811	58	7914	45.5498155	-122.97812	5/28/22 20:16	7/1/22 2:10	S6091	y	0B	0	BOK	
20144	45.550462	-122.96877	65	4767	45.550537	-122.968788	5/28/22 19:54	7/2/22 12:18	S6092	y	1B	15	BF	
20145	45.550365	-122.96481	64	4606	45.5503345	-122.964769	5/27/22 18:24	6/30/22 19:05	S6093	y	0B	2	BF	
20146	45.550408	-122.96141	58	6990	45.5503959	-122.961429	5/27/22 16:32	6/27/22 13:23	S6093-a	y	0B	0	BF	
20147	45.550831	-122.95756	59	5020	45.5508501	-122.957551	5/27/22 16:59	6/30/22 21:18	S6094	y	1B	3	BF	moles
20148	45.550871	-122.95492	61	7490	45.5508389	-122.954932	5/27/22 17:21	6/30/22 21:26	S6094-a	y	1B	-3	BTS	
20149	45.549983	-122.95264	61	4760	45.5499344	-122.952661	5/27/22 17:40	7/1/22 16:00	S6095	y	1B	0	BTS	
20150	45.550425	-122.9486	63	4814	45.550378	-122.948588	5/27/22 18:03	7/1/22 12:06	S6095-a	y	1B	0	BOK	
20151	45.551373	-122.93545	66	7763	44.2463834	-123.851196	5/27/22 22:48	7/1/22 22:59	S6097-a	y	3B	0	BOK	
20152	45.55136	-122.93127	66	4803	45.5513366	-122.9312	5/27/22 23:34	7/2/22 4:07	S6098	y	0B	-5	BF	
20153	45.551378	-122.92863	78	6820	45.5513238	-122.928541	5/28/22 0:05	6/28/22 18:10	S6098-a	y	0B	-5	BOK	
20154	45.55156	-122.92577	68	4808	45.551674	-122.925748	5/28/22 18:47	6/30/22 19:01	S6099	y	2B	-5	BF	
20155	45.551058	-122.90866	67	4999	45.5510415	-122.908612	5/28/22 18:11	7/1/22 17:56	S6102-b	y	2B	0	BTS	
20156	45.551388	-122.90489	66	4643	45.5513892	-122.904912	5/28/22 17:43	7/1/22 6:46	S6103	y	1B	2	BF	
20157	45.552477	-122.90222	56	5112	45.5524969	-122.902182	5/28/22 17:13	7/1/22 17:29	S6104	y	2B	0	BF	
20158	45.555262	-122.89497	68	4308	44.2428394	-123.843627	5/30/22 0:20	7/2/22 19:11	S6105	n	3B	0	BTS	
20159	45.55334	-122.89381	71	4934	45.5533635	-122.893766	5/28/22 16:29	7/2/22 15:39	S6105-a	y	2B	0	BOK	
20160	45.553016	-122.89028	75	4771	45.5530511	-122.890198	5/28/22 15:57	7/2/22 12:51	S6106	y	1B	5	BOK	
20161	45.551007	-122.88737	60	7373	NA	NA	5/28/22 13:48		S6106-a	y	0B	N/A	N/A	Destroyed by mower
20162	45.551223	-122.88491	61	4804	45.5511995	-122.884914	5/28/22 13:22	7/2/22 11:07	S6107	n	1B	0	BTS	
20163	45.550782	-122.88239	58	4809	45.5507425	-122.882416	5/28/22 16:16	7/2/22 7:05	S6107-a	y	1B	0	BOK	Idle when found
20164	45.550929	-122.87932	51	4985	45.5509257	-122.879264	5/28/22 12:22	7/2/22 12:45	S6108	n	3B	10	BTS	
20165	45.55116	-122.87636	56	4612	44.2437789	-123.83863	5/28/22 12:42	7/2/22 12:57	S6108-a	n	3B	-5	BTS	
20166	45.552951	-122.87279	58	4749	45.5529345	-122.87276	5/28/22 16:40	6/29/22 23:59	S6109	y	0B	3	BOK	Deploy location better
20167	45.554289	-122.87044	63	4598	45.5542628	-122.870398	5/28/22 17:04	7/2/22 10:13	S6109-a	n	1B	-5	BF	Idle - recovery GPS
20168	45.556892	-122.8665	56	4822	45.5568559	-122.866504	5/29/22 23:20	7/2/22 16:01	S6110	n	3B	0	BF	better
20169	45.556752	-122.86383	56	4625	45.5566961	-122.863838	5/29/22 23:46	7/2/22 16:10	S6110-a	n	3B	-3	BF	near power lines
20170	45.558062	-122.85958	56	6530	45.5581062	-122.859532	5/29/22 22:23	7/1/22 12:01	S6111	n	0B	0	BF	near power lines
20171	45.558767	-122.85649	57	2692	45.5587572	-122.856511	5/29/22 22:47	6/30/22 3:04	S6111-a	n	0B	-5	BF	
20172	45.559621	-122.85287	61	1912	45.5596122	-122.85289	5/29/22 21:44	7/1/22 18:57	S6111-b	n	0B	0	BTS	
20173	45.560084	-122.85128	58	4995	44.2427824	-123.851138	5/29/22 21:20	7/2/22 16:59	S6111-c	n	3B	0	BF	
20174	45.561262	-122.84816	66	2687	NA	NA	5/29/22 20:48		S6112	n	0B	-2	BF	
20175	45.561485	-122.84558	78	1924	45.5615743	-122.845534	5/29/22 20:23	6/28/22 21:51	S6112-a	n	0B	5	BF	
20176	45.562549	-122.84176	66	4748	44.2427542	-123.854894	5/29/22 19:21	7/1/22 12:46	S6112-b	n	0B	-3	BTS	
20177	45.563244	-122.8338	80	7408	45.5624395	-122.839288	5/29/22 18:56	6/26/22 22:10	S6112-c	n	0B	No Info	No Info	
20178	45.564229	-122.83626	92	5010	45.5642719	-122.836247	5/29/22 18:28	7/2/22 18:09	S6113	n	3B	0	BOK	
20179	45.564877	-122.83301	101	4747	44.243929	-123.817342	5/29/22 16:33	7/2/22 18:24	S6113-a	n	4B	-10	BTS	Very wet site
20180	45.565667	-122.82997	113	4798	45.565737	-122.83016	5/29/22 16:01	7/2/22 18:33	S6113-b	y	3B	10	BOK	Left with 3B; 2B on day
20181	45.565543	-122.82643	122	4875	45.56553	-122.826461	5/29/22 15:36	7/2/22 18:44	S6113-c	y	2B	0	BF	2; 3B on recovery
20182	45.564648	-122.82371	120	5056	45.5645887	-122.82371	5/27/22 21:26	7/1/22 13:59	S6114	y	1B	10	BOK	
20183	45.567143	-122.82015	142	5007	45.5671282	-122.820172	5/28/22 17:34	7/1/22 18:47	S6114-a	y	2B	2	BTS	
20184	45.567641	-122.81666	137	5097	45.5676489	-122.816678	5/28/22 17:51	7/1/22 18:55	S6114-b	y	2B	-4	BOK	
20185	45.568046	-122.81346	131	7619	45.5679835	-122.81341	5/28/22 18:18	6/29/22 3:54	S6114-c	y	1B	5	BF	
20186	45.568446	-122.8113	143	4977	45.5684609	-122.811255	5/28/22 18:40	7/1/22 19:13	S6115	y	2B	0	BOK	
20187	45.568514	-122.80835	159	4200	45.5683574	-122.808448	5/27/22 20:38	7/1/22 19:24	S6115-a	y	2B	0	BF	
20188	45.574578	-122.78857	327	4530	45.5746487	-122.78858	5/28/22 19:25	6/26/22 18:05	S6199	y	0B	10	BF	
20189	45.574296	-122.78497	316	5033	45.57428	-122.784907	5/28/22 19:50	7/1/22 21:57	S6200	y	2B	5	BF	
20190	45.574232	-122.78195	306	4668	45.5742672	-122.781888	5/28/22 20:17	7/1/22 11:09	S6201	y	1B	-5	BOK	
20191	45.573603	-122.77764	300	4974	45.5735283	-122.777564	5/28/22 20:43	7/1/22 21:33	S6202	y	2B	0	BF	No spike
20192	45.572671	-122.77527	303	4981	45.5727348	-122.775268	5/28/22 21:04	7/1/22 21:24	S6203	y	2B	5	BOK	

Preferred latitude/longitude from field notes.

RU latitude/longitude recorded internally by the node

GPS on deployment: yes is a lock was obtained; no the node had not yet locked when deployers had to move on.

GPS on recovery