



Supplement of

Multi-array analysis of volcano-seismic signals at Fogo and Brava, Cape Verde

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S1 Array transfer function

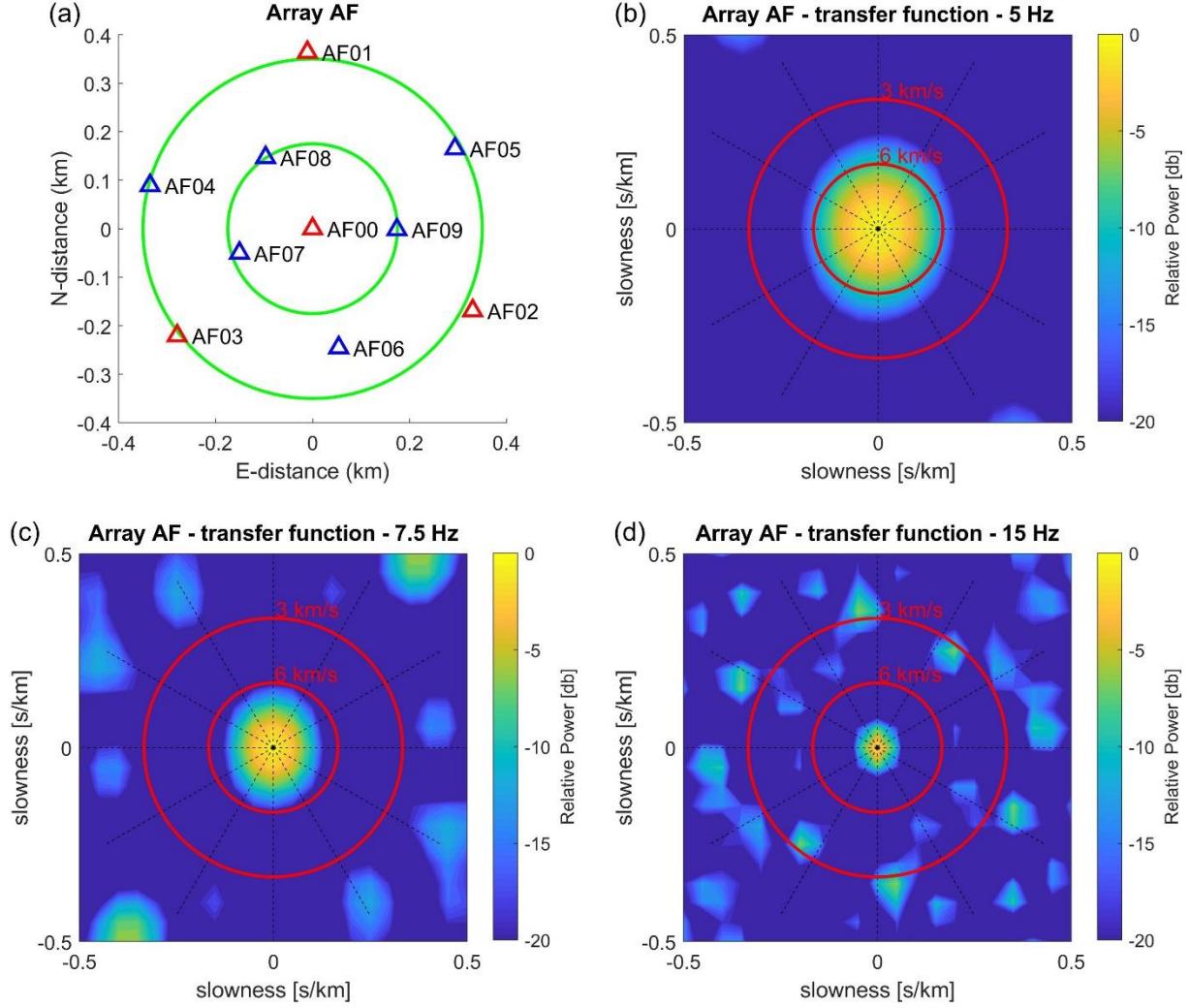


Figure S1 (a) Array configuration of the array AF. Red triangles: broadband stations; blue triangles: short-period stations. The green circles mark diameters of 700 m and 350 m, respectively.

(b) Array transfer function of the array AF for a reference frequency of 5 Hz. Red circles correspond to apparent velocities of 3 and 6 km/s, respectively. **(c)** Same as in (b) for a reference frequency of 7.5 Hz. **(d)** Same as in (b) for a reference frequency of 15 Hz.

S2 Time-domain array analysis

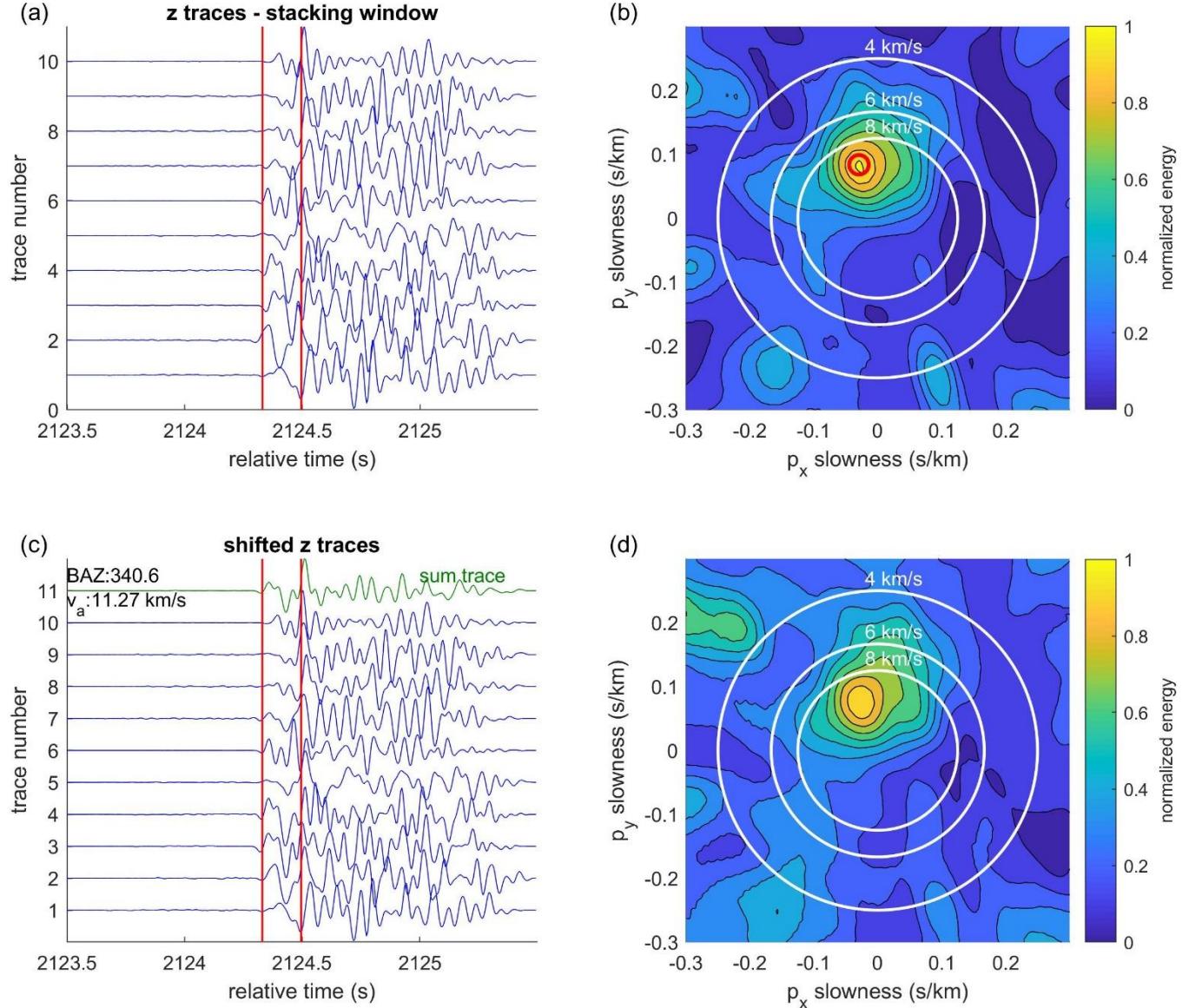


Figure S2.1 Time-domain array analysis of an earthquake on 22 July 2017 (23:35 UTC) at the array BR. **(a)** Analysis window of 2 s length with the stacking window marked in red. Traces are displayed before shifting and stacking and are filtered between 2 and 24 Hz. **(b)** Resulting time-domain energy stack. Red circle: maximum beam energy. **(c)** Time-shifted traces. The upper green trace represents the sum trace. **(d)** To retrieve the standard deviation of the back azimuth, the stacking window is varied 100 times by values between -0.2 and 0.2 s. The standard deviation is estimated from the 100 resulting back-azimuth values. Shown here is the stack of the 100 energy plots.

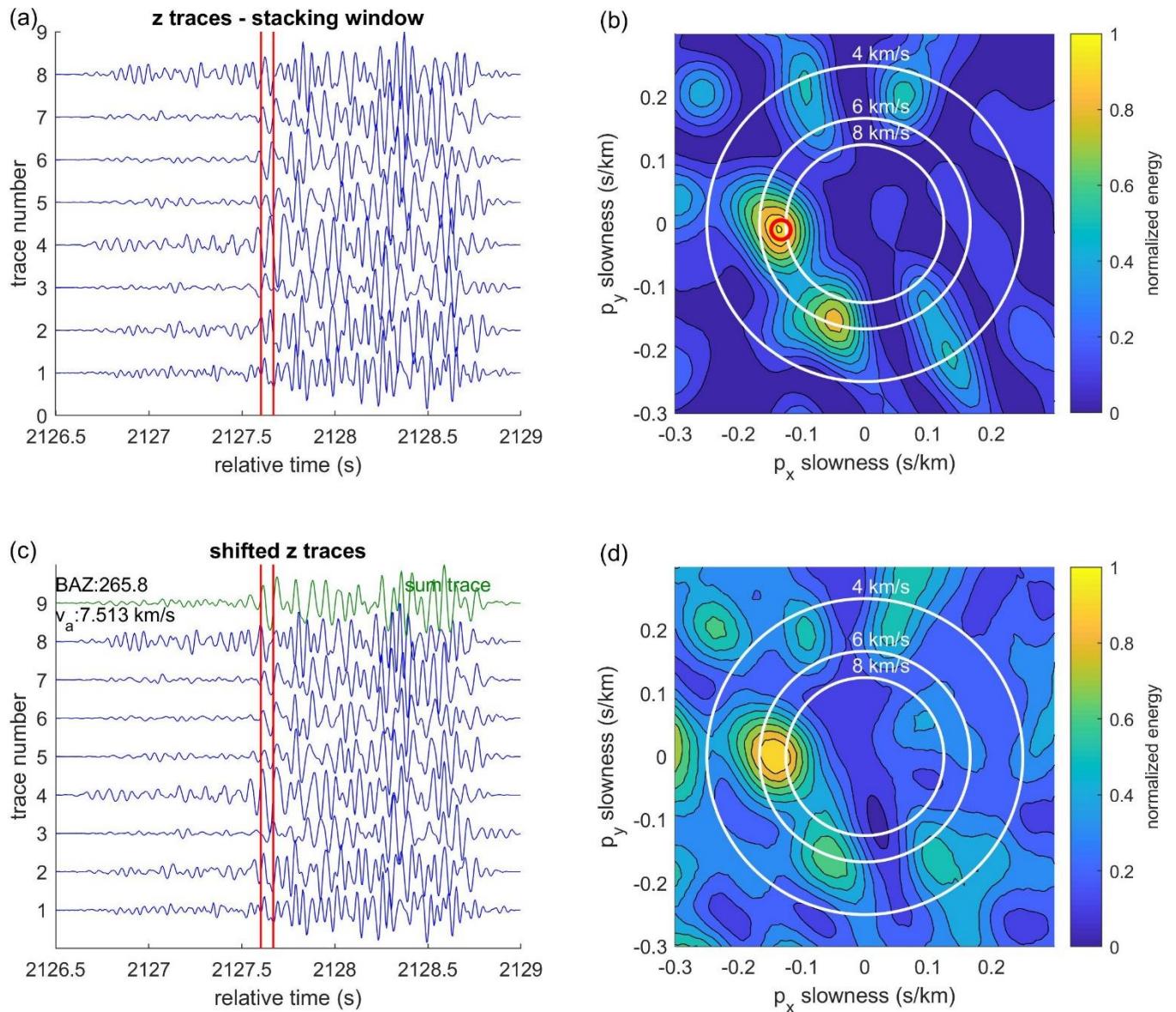


Figure S2.2 Same as in Figure S2.1 for array CG. Traces are filtered between 2 and 21 Hz.

S3 Beam determination

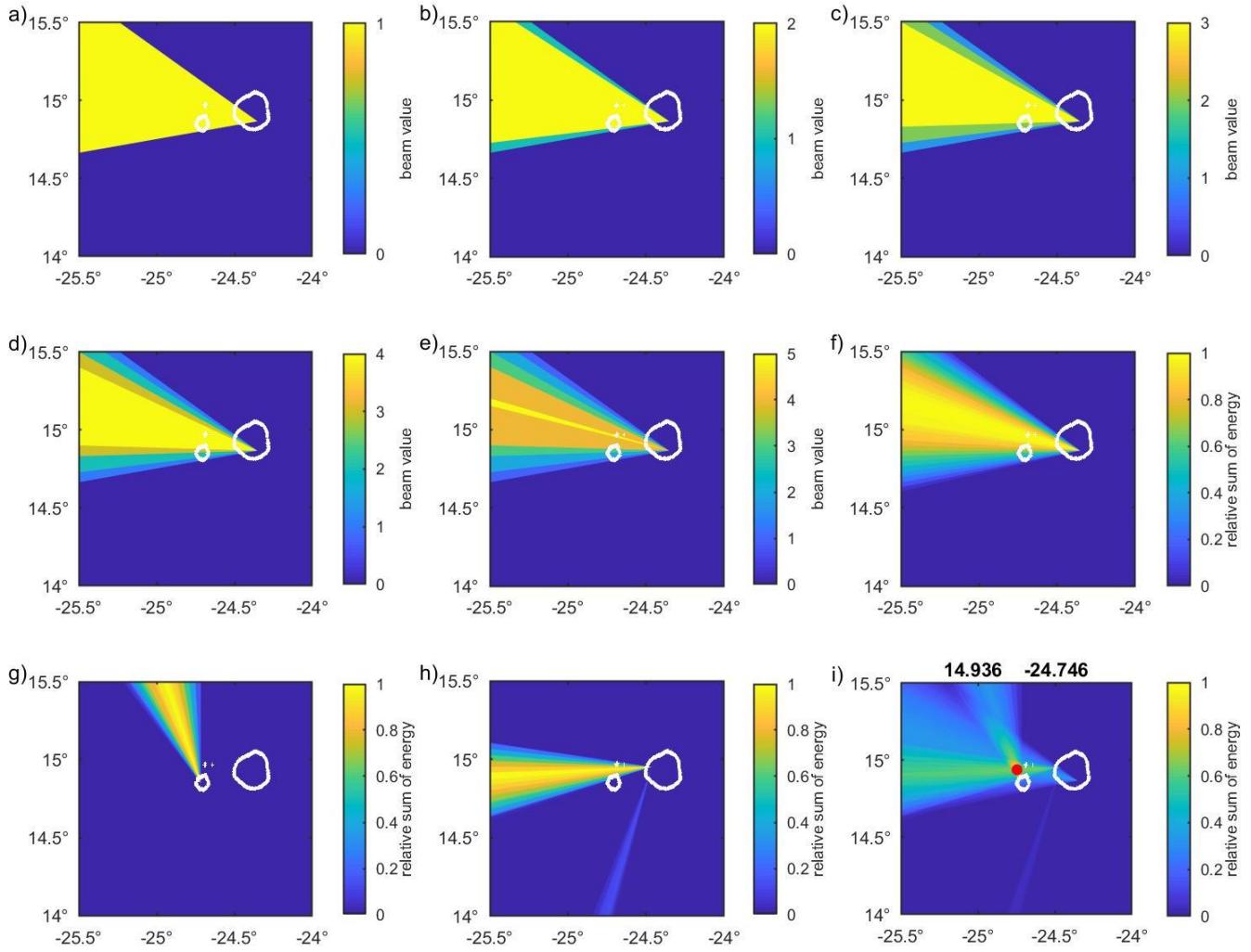


Figure S3 Intersection of the beams during the multi-array analysis. For this purpose, the error associated to the standard deviation of the back azimuth is determined (e.g. a standard deviation of 90° corresponds to an error of 25%). These errors are used to determine the width of the beams (i.e. in the example before a beam with a width of 100% of the error contains all energy values $\geq 75\%$ of the highest energy value). The event shown is an earthquake on 22 July 2017 (23:35 UTC). Fogo and Brava are outlined in white. **a)** A beam with a width corresponding to 80% of the error is projected on a map of the study area. It is assigned the value 1, whereas the area outside the beam has the value 0. **b)** In the next step the beam containing all energy values $\geq 60\%$ of the error is projected on top of the first beam. It is assigned the value 2. **c)** The third beam comprises the energy values $\geq 40\%$ of the error with the value 3. **d)** The fourth beam the energy values $\geq 20\%$ with the value 4 and **e)** the narrowest beam the energy values $\geq 1\%$ of the error with the value 5. **f)** For a finer intersection of the beam, the steps are chosen as 1% steps. Therefore, the broadest beam corresponds to 100% of the error and is assigned the value 1, the second beam to 99% with value 2, the third beam to 98% with value 3. The last (narrowest) beam contains the energy values of 1% of the error and is assigned the value 100. Finally, the values are normalized. The result is the final stepped beam of array AF shown. **g)** Final stepped beam of array BR. **h)** Final stepped beam of array CG. **i)** Intersected stepped beams with the determined epicenter marked in red. The determined epicenter corresponds to the highest value of the intersected beams.

S4 Standard deviation for varying frequencies

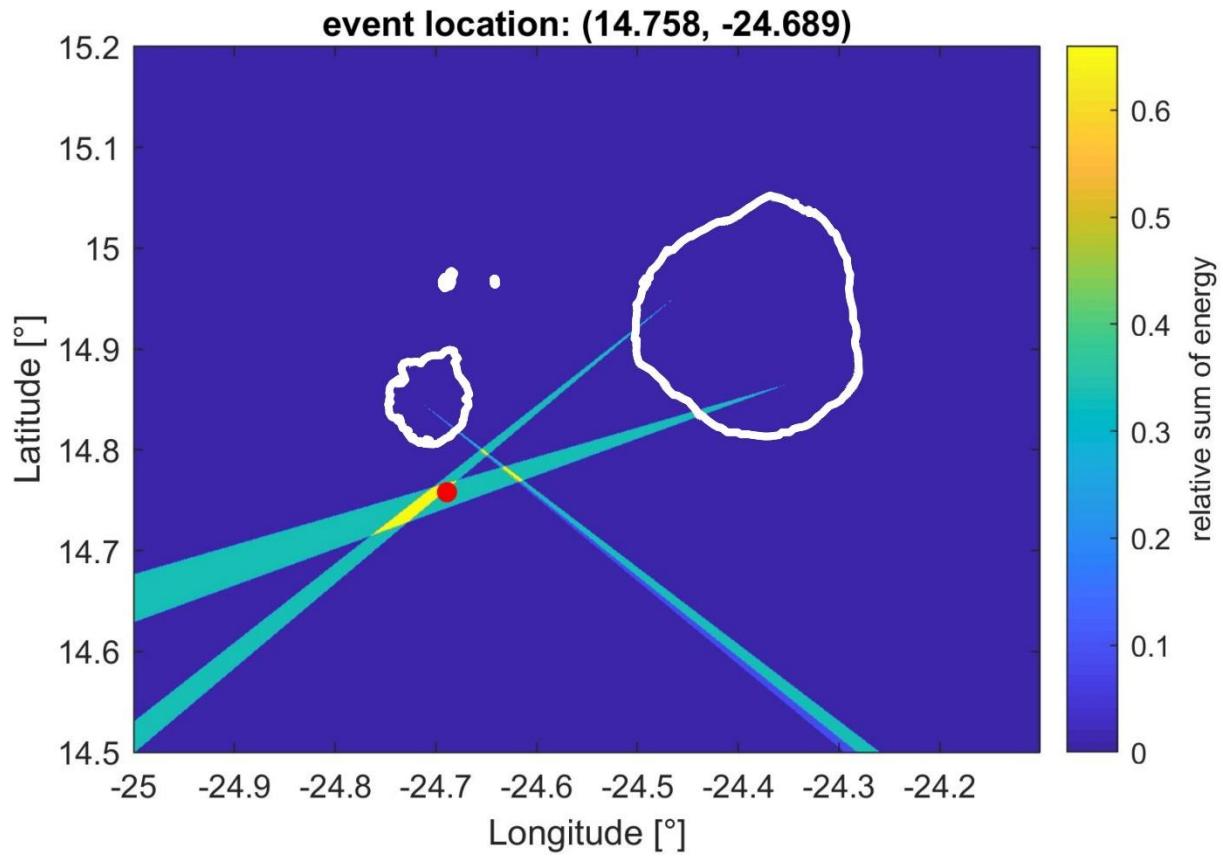


Figure S4 Intersection of the beams resulting from the standard deviation analysis of varying frequencies. The analysis frequencies for each array are varied between 2 Hz and 8 Hz for the lower and between 15 Hz and 30 Hz for the upper cut-off frequency. This variation is performed 100 times. The resulting standard deviation of the back-azimuth values is small leading to narrow beams. Thus, the effect of the chosen cut-off frequency on the result is negligible.

S5 Reference earthquakes located with a classical localization technique

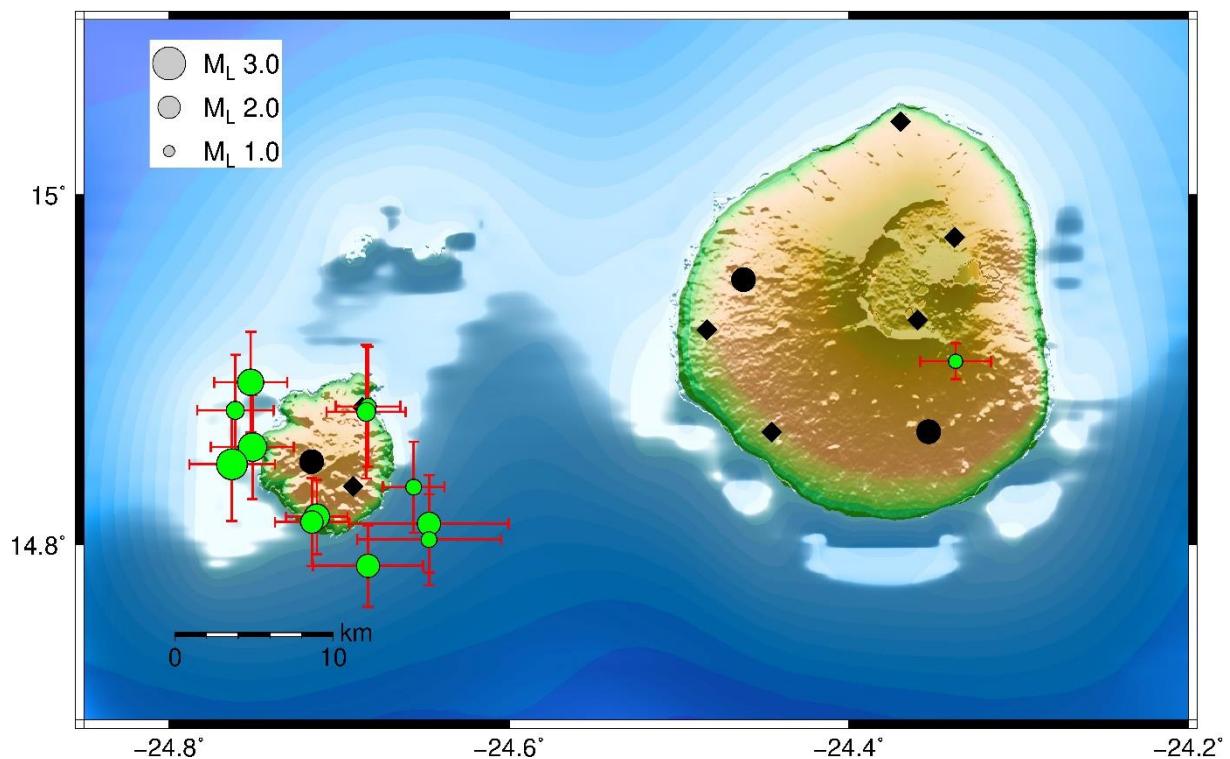


Figure S5 Locations of the reference earthquakes, which are used to determine the systematic deviation of back-azimuth and apparent slowness values at the arrays on Fogo and Brava. The earthquakes are located using a classical localization technique. For more details see the text. Green circles represent the earthquake locations; black circles: array locations; black diamonds: single station locations. Topography and bathymetry data are from Ryan et al. (2009).

S6 Comparison of earthquake traces and spectrograms, recorded on Fogo and Brava

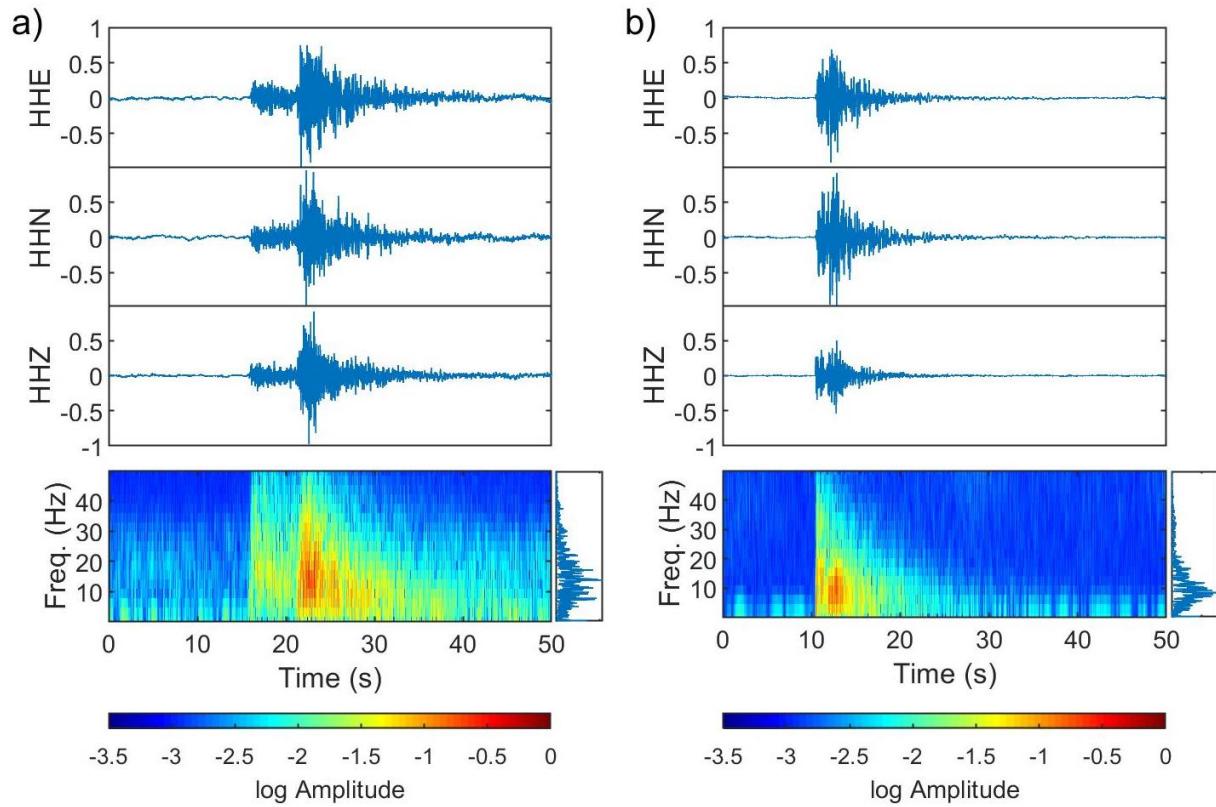


Figure S6 a) Top: example of a typical earthquake recorded at the broad-band station AF00 on Fogo on 13 Dec 2017 (08:12 UTC). Bottom left: spectrogram of the vertical component, bottom right: corresponding frequency content. **b)** Same earthquake, recorded at the broadband station BR01 on Brava. The event is located close to Brava.

S7 Earthquake locations including error bars

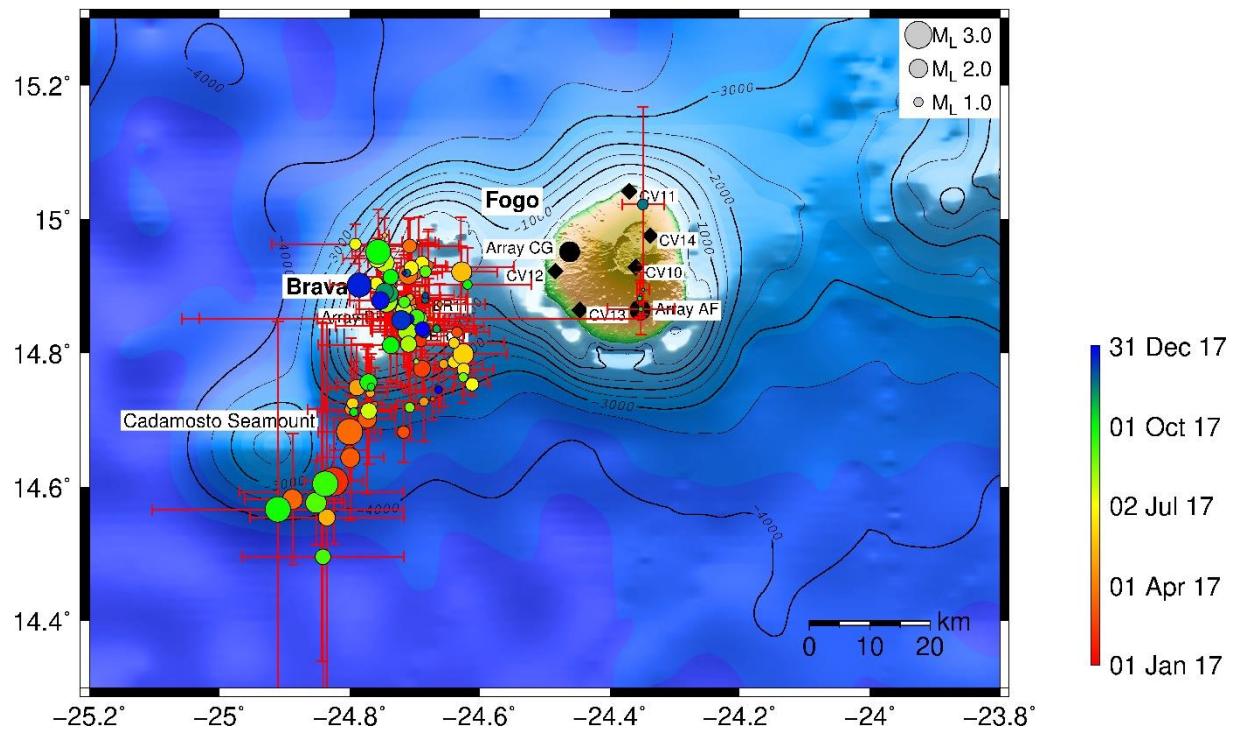


Figure S7 Earthquake locations including error bars from 18 Jan 2017 to 12 Jan 2018. Black circles: array locations, black diamonds: short-period single stations. Topography and bathymetry data are from Ryan et al. (2009).

S8 Vertical traces of a hybrid event recorded on Fogo

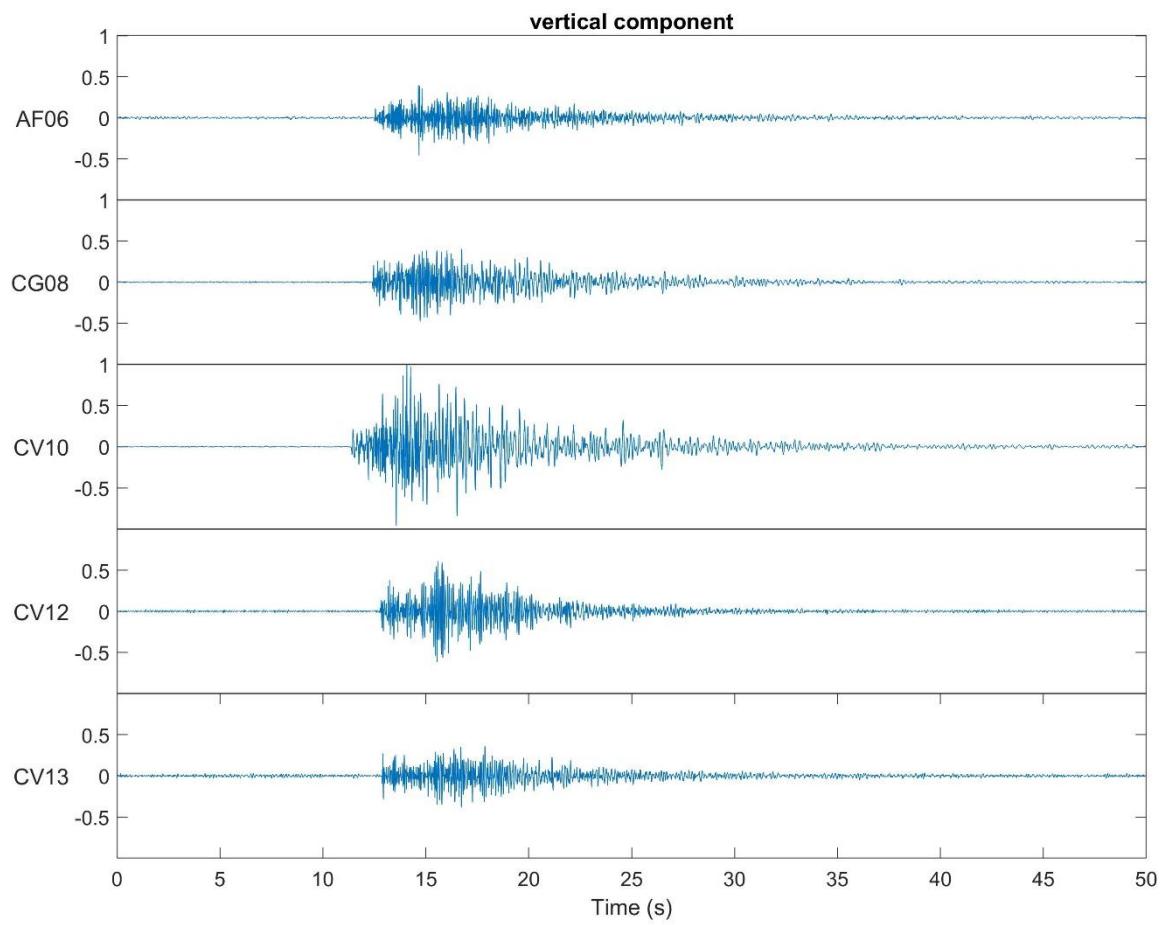


Figure S8 Vertical traces of a hybrid event recorded on 17 Aug 2017 (02:54 UTC) occurring in the collapse scar of Fogo. Traces of short-period stations are normalized for a better comparison.

S9 Spectrograms of the three components of a hybrid event

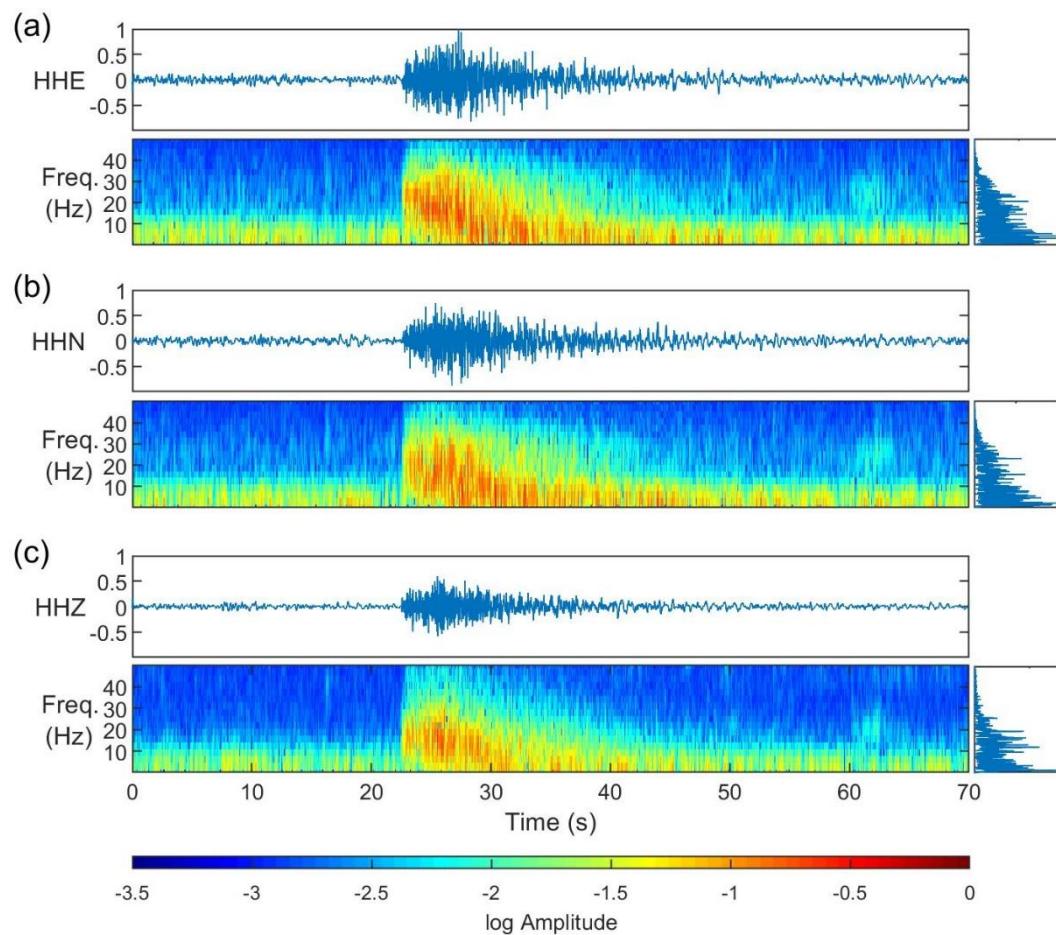


Figure S9 Traces and corresponding spectrograms of a hybrid event recorded on Fogo on 17 Aug 2017 (02:54 UTC). Top: traces filtered between 1 and 50 Hz to remove ocean noise. Bottom left: spectrogram of the corresponding trace. Bottom right: corresponding frequency content. **(a)** E component, **(b)** N component and **(c)** vertical Z component.

S10 Array analysis of hybrid event

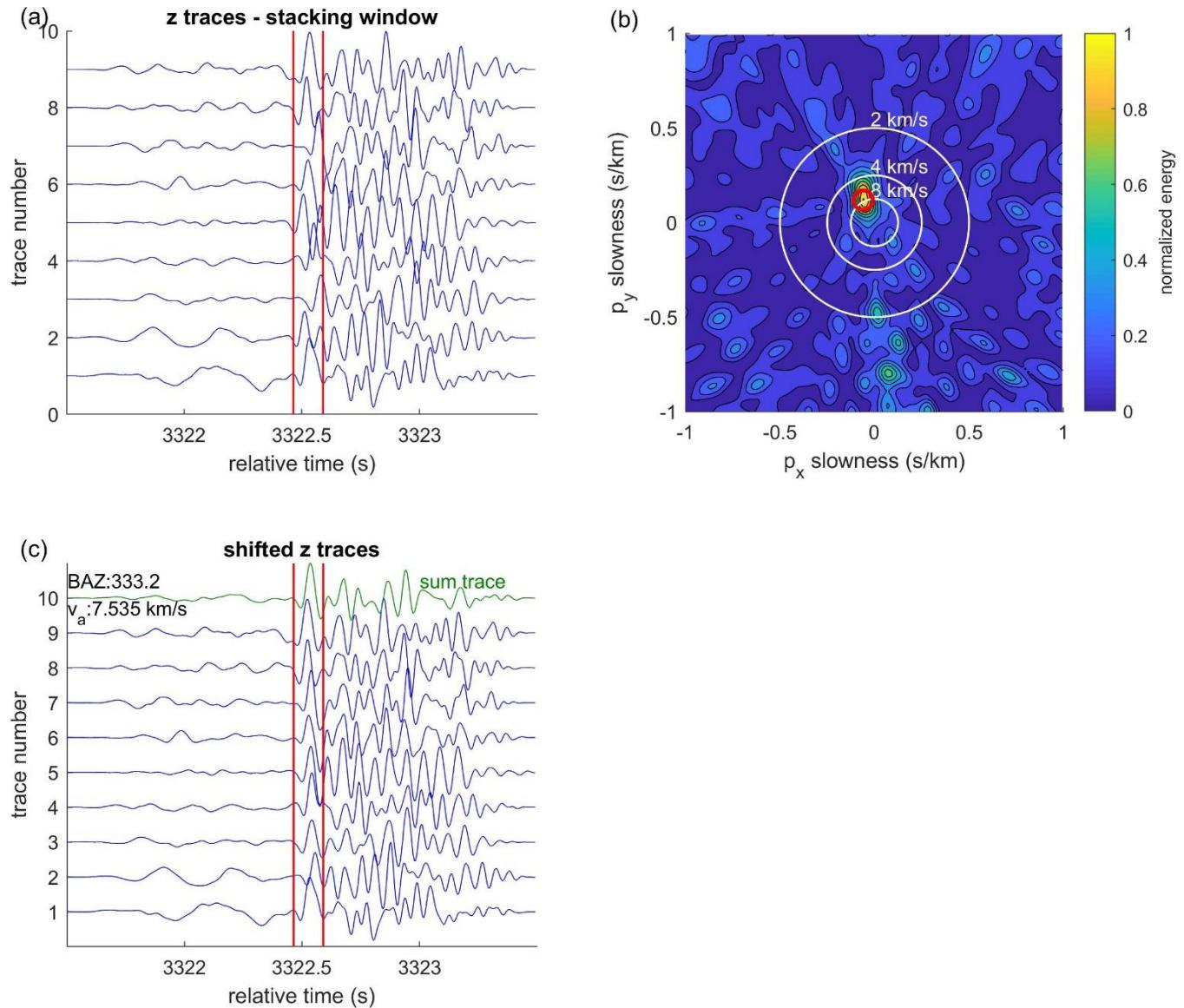


Figure S10.1 Time-domain array analysis of a hybrid event on 17 August 2017 (02:54 UTC) at the array AF. **(a)** Analysis window of 2 s length with the stacking window marked in red. Traces are displayed before shifting and stacking and are filtered between 2 and 16 Hz. **(b)** Resulting time-domain energy stack. Red circle: maximum beam energy. **(c)** Time-shifted traces. The upper green trace represents the sum trace.

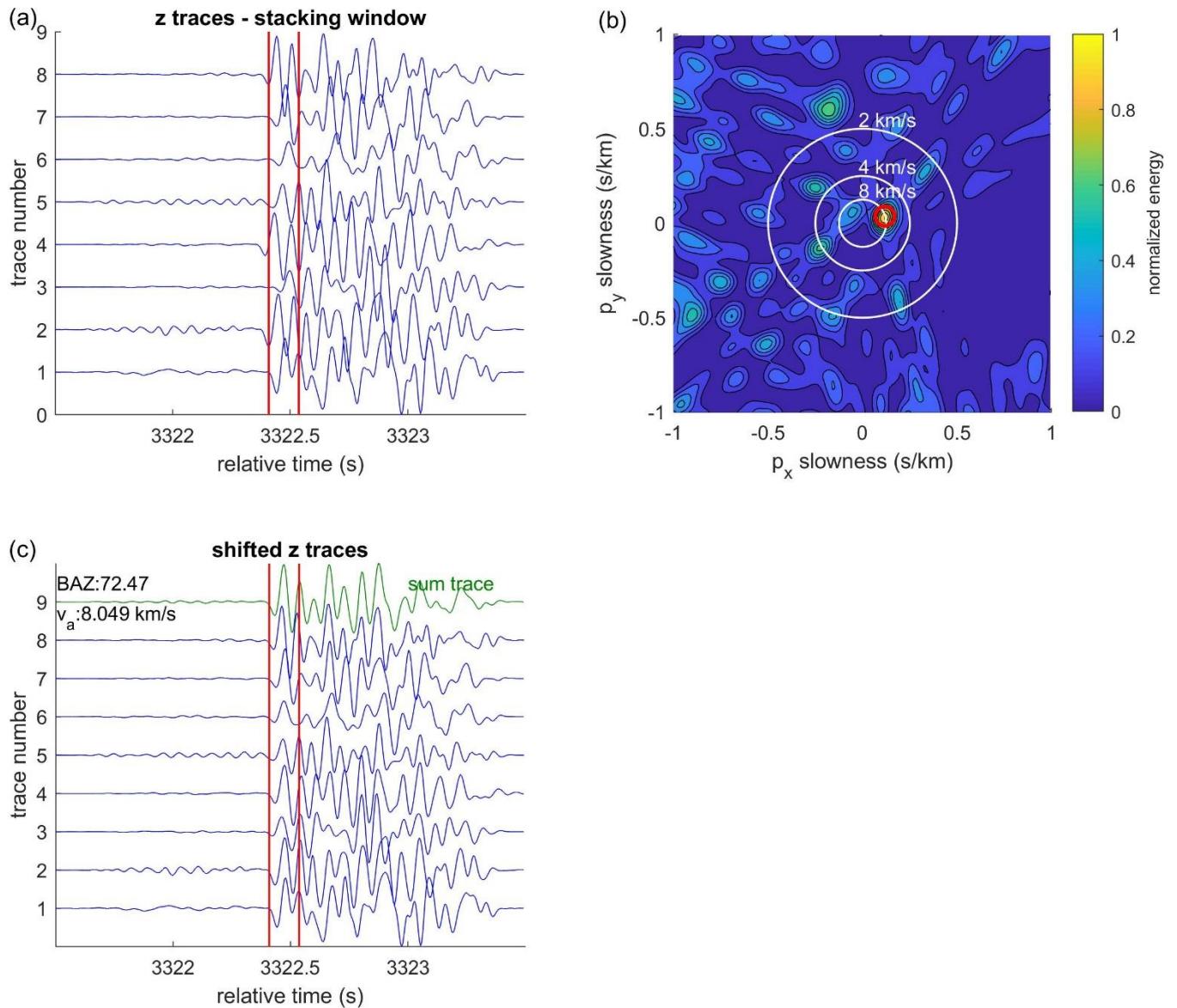


Figure S10.2 Time-domain array analysis of a hybrid event on 17 August 2017 (02:54 UTC) at the array CG. **(a)** Analysis window of 2 s length with the stacking window marked in red. Traces are displayed before shifting and stacking and are filtered between 2 and 16 Hz. **(b)** Resulting time-domain energy stack. Red circle: maximum beam energy. **(c)** Time-shifted traces. The upper green trace represents the sum trace.

S11 Locations of earthquake swarms beneath Fogo in August 2016 and September 2017

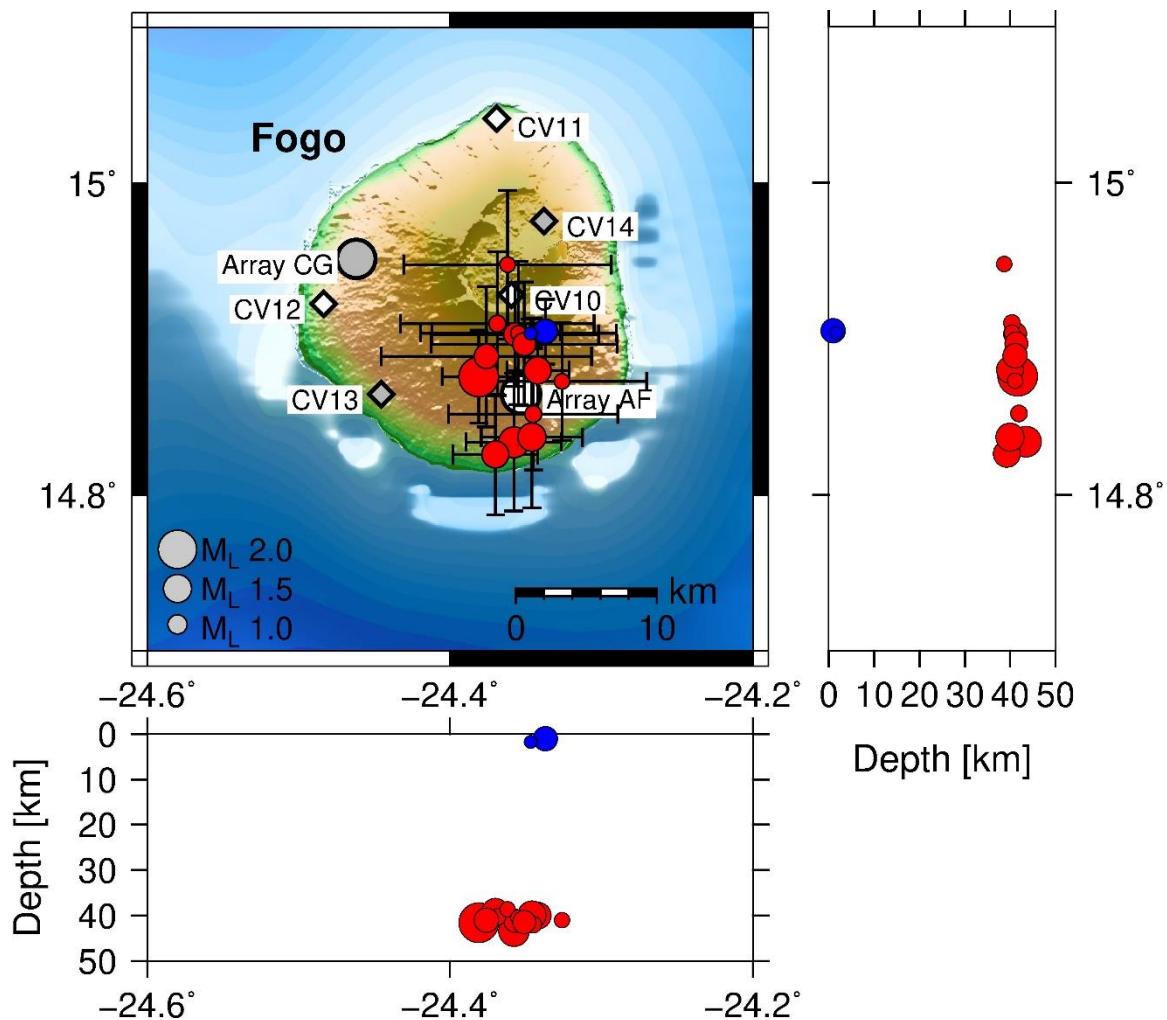


Figure S11 Locations of the subcrustal earthquake swarm of August 2016 (Leva et al., 2019) in red and locations of the shallow crustal earthquakes in September 2017 in blue. White and grey circles mark the array locations, white and grey diamonds mark the single station locations. White stations/arrays were operational in 2016 and 2017, grey stations/ arrays were operational in 2017. Topography and bathymetry data are from Ryan et al. (2009).

S12 Comparison of the number of hybrid events and precipitation data

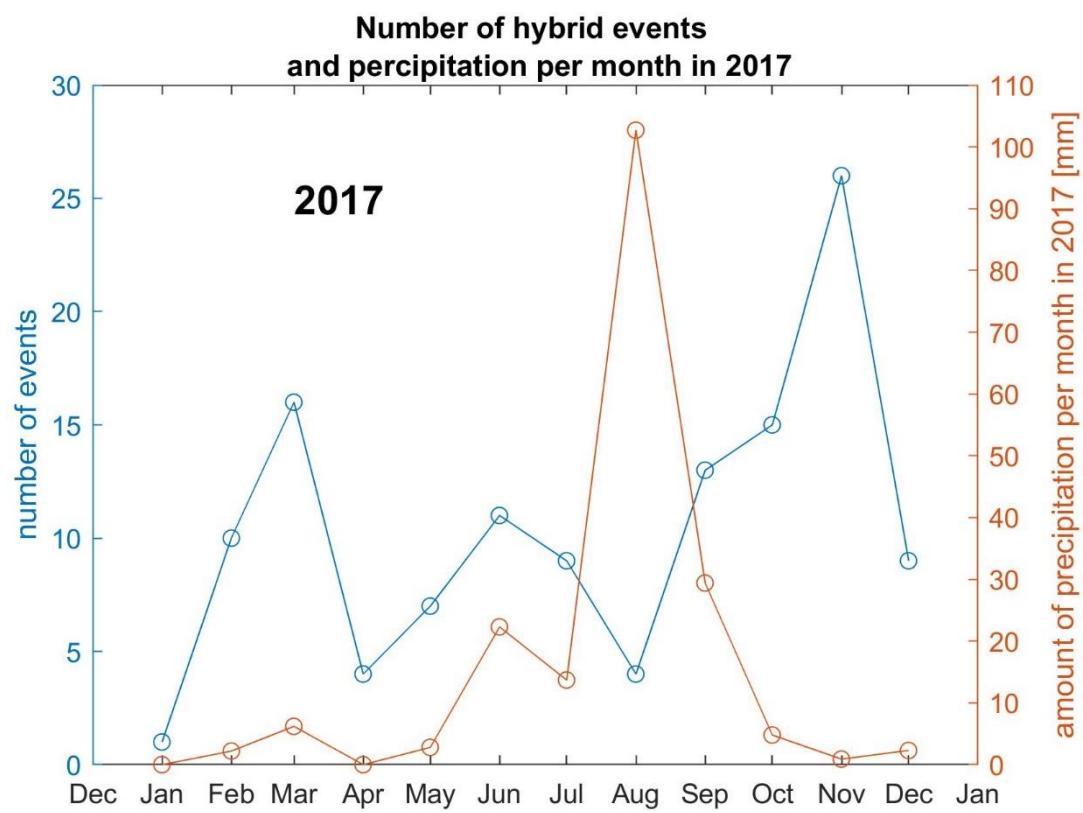


Figure S12 Number of hybrid events per month in 2017 compared to the amount of precipitation per month in 2017. The precipitation data are taken from WorldWeatherOnline.com (2021) for a weather station in Praia.

S13 Distribution of backazimuth values

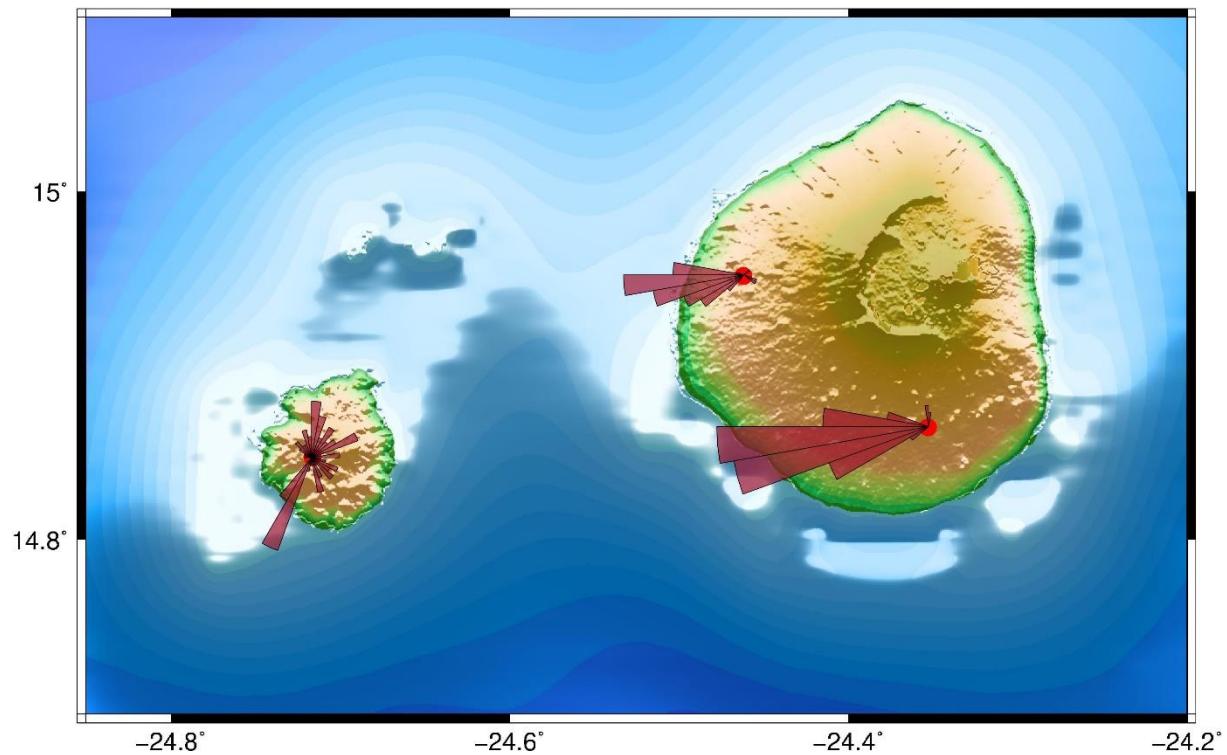


Figure S13.1 Distribution of back-azimuth values of earthquakes at the three arrays binned in 10° steps. Topography and bathymetry data are from Ryan et al. (2009).

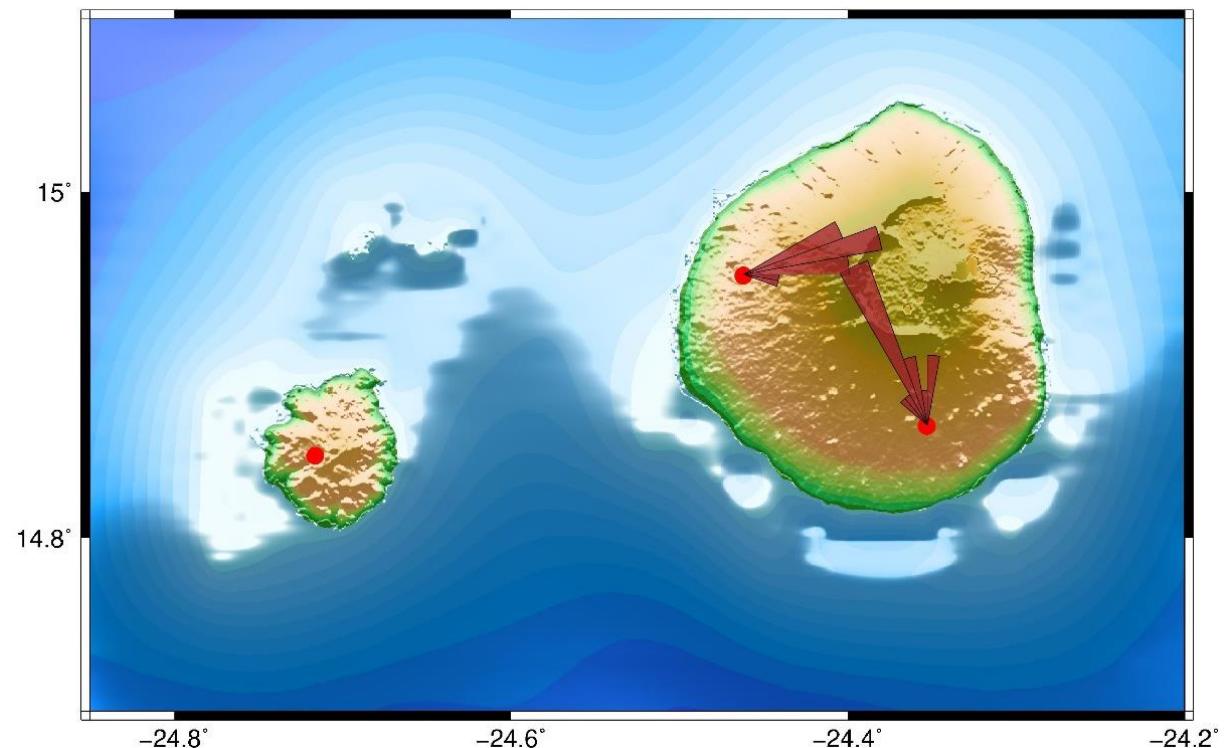


Figure S13.2 Distribution of back-azimuth values of hybrid events at the three arrays binned in 10° steps. Topography and bathymetry data are from Ryan et al. (2009).

References

Leva, C., Rümpker, G., Link, F., and Wölbern, I.: Mantle earthquakes beneath Fogo volcano, Cape Verde: Evidence for subcrustal fracturing induced by magmatic injection, *J. Volcanol. Geoth. Res.*, 386, 106672, doi:10.1016/j.jvolgeores.2019.106672, 2019.

Ryan, W. B. F., Carbotte, S. M., Coplan, J. O., O'Hara, S., Melkonian, A., Arko, R., Weissel, R. A., Ferrini, V., Goodwillie, A., Nitsche, F., Bonczkowski, J., and Zemsky, R.: Global Multi-Resolution Topography synthesis, *Geochem. Geophys. Geosy.*, 10, Q03014, doi:10.1029/2008GC002332, 2009.

World Weather Online, <https://www.worldweatheronline.com/prai-a-weather-averages/prai/cv.aspx>, last access: 30 March 2021.

S14 Table of station locations

Station	Latitude [°]	Longitude [°]	Elevation [m]	
AF00	14.865133	-24.351583	751	
AF01	14.8684	-24.351683	805	
AF02	14.863617	-24.348517	716	
AF03	14.86315	-24.354183	711	
AF04	14.865933	-24.3547	760	
AF05	14.866617	-24.34885	781	
AF06	14.862933	-24.351083	716	
AF07	14.864683	-24.352983	744	
AF08	14.86645	-24.352483	734	
AF09	14.865117	-24.349967	746	
CG00	14.951517	-24.461833	578	
CG00	14.95181	-24.46188	570	From 19 Oct '17
CG01	14.954617	-24.461883	572	
CG01	14.95474	-24.46220	617	From 14 June '17
CG02	14.949917	-24.459267	609	
CG03	14.949417	-24.464333	551	
CG04	14.952283	-24.464883	521	
CG05	14.953283	-24.459183	613	
CG06	14.94925	-24.461133	596	
CG07	14.951033	-24.463367	562	
CG07	14.95111	-24.46336	550	From 28 Nov '17
CG08	14.952917	-24.4626	558	
CG08	14.95312	-24.46288	538	From 4 Dec '17
CG09	14.951533	-24.46025	594	
BR00	14.84755	-24.716233	643	
BR01	14.8506	-24.716183	666	
BR01	14.85024	-24.71664	659	From 18 Oct '17

BR02	14.8459	-24.7135	664	
BR03	14.845417	-24.718733	642	
BR04	14.848233	-24.719383	616	
BR05	14.84905	-24.713417	672	
BR06	14.845267	-24.715483	650	
BR07	14.847033	-24.717833	647	
BR08	14.848867	-24.7171	625	From 24 Jan '17
BR08	14.84879	-24.71729	625	From 08 Apr '17
BR08	14.848669	-24.717414	617	From 18 June '17
BR09	14.847483	-24.7146	650	
CV10	14.928417	-24.359517	1777	
CV11	15.0397	-24.370667	415	
CV12	14.922967	-24.48345	346	
CV13	14.864567	-24.44535	336	
CV14	14.975844	-24.337828	1659	From 29 Aug '17
BR10	14.833533	-24.691633	619	
BR11	14.878533	-24.686133	274	

S15 Table of results from the multi-array analysis

Table S15.1: Table of analyzed hybrid events

Array	Date [dd_mm_yyy]	Time [hh:mm]	baz [°]	app. velocity [km/s]	baz std. [°]	app. velo. std. [km/s]	longitude [°]	latitude [°]	error lon. Min [°]	error lon. Max [°]	error lat. Min [°]	error lat. Max [°]	Magnitude M _L
AF	03_03_2017	09:47	2.2	7.8	140.5	1.4	-24.350	14.961	-24.375	-24.319	14.952	14.979	1.4
CG			84.3	6.7	52.6	2.5							
AF	05_02_2017	21:12	315.1	9	56	2.2	-24.426	14.942	-24.454	-24.400	14.929	14.950	0.4
CG			104	9.9	82.2	2.6							
AF	17_02_2017	12:58	338.6	6.8	94.2	1.2	-24.387	14.958	-24.399	-24.378	14.952	14.968	1
CG			84.3	6.7	82.8	1.9							
AF	17_08_2017	02:54	334.5	8	100.2	2.3	-24.400	14.969	-24.417	-24.385	14.957	14.978	0.9
CG			75.4	8.5	99.9	2.6							
AF	18_09_2017	14:45	338.8	10.5	119.9	12.2	-24.391	14.967	-24.414	-24.377	14.954	14.979	0.5
CG			76.5	7.9	94.4	2.7							
AF	20_03_2017	06:34	349.9	7.1	133.9	1.6	-24.365	14.949	-24.380	-24.354	14.926	14.969	1
CG			93.1	11.3	63	3.8							
AF	20_10_2017	12:40	330.7	5.5	55.7	1.9	-24.411	14.970	-24.426	-24.401	14.953	14.984	1.1
CG			68.2	7.5	102	2.1							
AF	23_06_2017	04:39	0	8.5	103.4	2.5	-24.351	14.982	-24.372	-24.327	14.957	15.017	0.9
CG			73.3	9.7	86	1.9							
AF	23_06_2017	15:57	357.3	9.7	116.1	1.7	-24.360	14.989	-24.395	-24.302	14.960	15.038	1.7
CG			73	8.4	104	5.5							
AF	25_02_2017	17:42	337.9	7	106.7	1.9	-24.392	14.964	-24.403	-24.378	14.949	14.974	0.8
CG			80.9	8	101.9	2.4							
AF	27_04_2017	12:58	342.5	5.1	109.6	4	-24.388	14.981	-24.397	-24.375	14.967	14.991	0.8
CG			68.2	7.5	106.8	2.6							
AF	27_05_2017	07:08	329.1	8.7	113.3	2.3	-24.418	14.973	-24.434	-24.400	14.962	14.982	1.5
CG			65.5	8.4	120.4	2.5							

Table S15.2: Table of analyzed earthquakes

Array	Date [dd_mm_YYYY]	Time [hh:mm]	baz [°]	app. velocity [km/s]	baz std. [°]	app. velo. std. [km/s]	longitude [°]	latitude [°]	error lon. Min [°]	error lon. Max [°]	error lat. Min [°]	error lat. Max [°]	Magnitude M _L
AF	01_03_2017	08:58	271.9	6.8	74.0	1.3	-24.738	14.907	-24.748	-24.728	14.893	14.916	1.4
BR			340.9	7.4	122.9	3.2							
CG			280.9	7.7	97.3	2.2							
AF	01_06_2017	20:19	253.2	5.9	59.9	1.2	-24.625	14.799	-24.692	-24.569	14.773	14.835	2.3
BR			116.5	8.3	75.9	2.8							
CG			253.8	8.1	115.5	2.1							
AF	01_09_2017	17:54	240.0	6.8	74.0	1.6	-24.852	14.577	-24.896	-24.818	14.530	14.640	2.3
BR			206.6	5.7	89.6	1.5							
CG			--	--	--	--							
AF	01_10_2017	05:17	--	--	--	--	-24.737	14.914	-24.774	-24.716	14.872	14.952	1.7
BR			341.6	12.8	151.9	3.7							
CG			262.3	9.2	92.3	2.2							
AF	02_02_2017	08:27	237.3	6.1	38.4	1.5	-24.824	14.609	-24.865	-24.779	14.560	14.703	3.1
BR			203.7	3.3	88.9	1.2							
CG			237.4	6.9	69.0	1.9							
AF	02_05_2017	02:00	266.5	6.3	67.0	5.6	-24.734	14.851	-24.850	-24.716	14.827	14.865	-0.1
BR			281.4	13.3	98.6	11.2							
CG			--	--	--	--							
AF	02_05_2017	17:37	--	--	--	--	-24.713	14.851	-24.716	-24.654	14.848	14.905	0.5
BR			32.0	21.5	111.6	13.2							
CG			241.0	9.9	92.4	3.6							
AF	02_08_2017	05:00	259.1	6.4	68.6	2.8	-24.710	14.851	-24.716	-24.683	14.848	14.865	0.2
BR			60.9	9.9	95.8	3.0							
CG			258.7	8.0	108.2	2.3							
AF	02_08_2017	05:06	264.7	6.3	97.6	1.9	-24.710	14.851	-24.716	-24.653	14.848	14.876	-0.3
BR			60.9	9.9	97.9	3.1							
CG			--	--	--	--							
AF	02_08_2017	17:48	271.9	6.8	106.9	1.9	-24.743	14.878	-24.800	-24.716	14.848	14.930	2.5
BR			318.5	16.9	91.5	14.1							
CG			--	--	--	--							
AF	03_03_2017	02:12	251.6	6.4	87.3	1.2	-24.673	14.732	-24.682	-24.660	14.701	14.750	0.5
BR			159.4	4.8	72.2	1.9							
CG			220.0	5.0	65.9	1.7							
AF	03_06_2017	00:49	252.7	6.1	59.1	1.4	-24.794	14.727	-24.837	-24.755	14.680	14.787	1.2
BR			212.6	3.4	97.3	6.1							
CG			--	--	--	--							
AF	03_06_2017	03:12	260.2	6.9	75.2	3.2	-24.639	14.816	-24.716	-24.572	14.790	14.848	1.2
BR			112.8	9.9	93.8	2.7							
CG			--	--	--	--							
AF	03_07_2017	05:55	264.1	7.0	56.2	1.4	-24.759	14.904	-24.782	-24.739	14.878	14.926	1.5
BR			323.2	10.2	69.9	4.1							
CG			264.3	6.7	72.5	2.0							
AF	03_07_2017	20:00	246.8	6.7	68.8	2.8	-24.612	14.754	-24.639	-24.598	14.736	14.769	1.4
BR			131.9	7.6	65.2	2.5							
CG			--	--	--	--							
AF	03_10_2017	04:27	250.9	7.4	90.9	1.9	-24.793	14.712	-24.850	-24.760	14.650	14.762	0.9
BR			209.7	8.4	74.4	3.7							
CG			266.1	7.0	85.3	1.9							
AF	04_05_2017	02:09	268.3	6.0	74.3	1.3	-24.742	14.866	-24.790	-24.716	14.848	14.918	0.4
BR			305.1	16.7	114.6	16.5							
CG			--	--	--	--							
AF	04_10_2017	02:14	253.5	7.2	61.2	1.7	-24.767	14.750	-24.820	-24.739	14.700	14.782	0.8
BR			208.0	12.0	102.5	4.3							
CG			--	--	--	--							
AF	05_02_2017	21:56	263.1	6.1	59.3	1.3	-24.691	14.819	-24.713	-24.659	14.787	14.844	1.4
BR			138.0	7.6	96.5	2.2							
CG			266.3	6.5	58.4	1.4							
AF	05_03_2017	02:09	248.6	6.8	73.5	2.0	-24.773	14.702	-24.807	-24.730	14.650	14.813	2
BR			201.1	3.3	78.6	1.0							
CG			240.5	7.7	88.0	2.4							
AF	05_03_2017	02:11	251.0	6.6	85.8	1.2	-24.762	14.724	-24.796	-24.748	14.670	14.759	0.7

BR			200.3	3.5	83.9	2.2								
CG			--	--	--	--								
AF	05_03_2017	15:57	243.4	6.5	90.1	1.5	-24.799	14.644	-24.850	-24.761	14.600	14.738	2.1	
BR			202.1	5.9	75.2	1.3								
CG			228.4	8.4	88.3	2.2								
AF	05_09_2017	06:17	233.5	6.1	59.3	1.3	-24.841	14.496	-24.890	-24.717	14.450	14.845	1.7	
BR			199.8	5.3	116.7	2.1								
CG			253.3	9.7	81.9	2.3								
AF	05_12_2017	04:19	252.6	5.5	73.1	6.2	-24.683	14.887	-24.716	-24.639	14.848	14.930	0.7	
BR			39.5	9.2	83.4	3.2								
CG			262.9	8.4	99.7	2.6								
AF	05_12_2017	10:23	264.7	6.3	77.0	1.5	-24.685	14.832	-24.716	-24.605	14.793	14.848	1.3	
BR			116.5	13.0	104.9	3.3								
CG			--	--	--	--								
AF	06_03_2017	23:29	262.9	6.3	62.6	1.6	-24.707	14.854	-24.716	-24.671	14.848	14.876	0.3	
BR			57.2	12.2	104.4	5.1								
CG			257.2	9.0	71.1	2.6								
AF	06_09_2017	16:50	271.8	6.2	66.7	1.6	-24.716	14.876	-24.735	-24.691	14.848	14.930	1.3	
BR			0.1	16.9	111.7	7.9								
CG			--	--	--	--								
AF	07_03_2017	07:52	281.3	6.6	83.6	1.7	-24.679	14.931	-24.705	-24.653	14.877	14.969	1.1	
BR			25.5	8.7	105.9	3.8								
CG			--	--	--	--								
AF	07_05_2017	04:20	253.3	6.5	52.0	1.1	-24.768	14.740	-24.793	-24.754	14.690	14.761	0.9	
BR			205.8	6.3	87.4	1.7								
CG			--	--	--	--								
AF	07_05_2017	05:39	259.1	6.4	66.2	2.0	-24.705	14.850	-24.716	-24.647	14.848	14.863	0.8	
BR			80.2	6.9	83.5	7.3								
CG			254.1	7.0	89.4	2.0								
AF	07_05_2017	05:40	266.3	6.5	85.9	3.7	-24.710	14.848	-24.716	-24.656	14.847	14.862	1.1	
BR			84.1	7.0	98.4	2.6								
CG			254.1	7.0	78.2	1.8								
AF	07_11_2017	04:54	264.5	6.5	47.4	1.2	-24.746	14.892	-24.800	-24.716	14.848	14.977	1.9	
BR			325.6	10.5	130.4	10.9								
CG			271.8	6.4	99.6	2.2								
AF	08_05_2017	06:15	237.3	6.1	55.5	1.3	-24.835	14.555	-24.869	-24.717	14.510	14.845	1.8	
BR			202.1	5.9	105.2	1.5								
CG			242.1	10.6	80.9	2.4								
AF	08_07_2017	02:55	282.6	5.5	99.6	1.7	-24.791	14.963	-24.840	-24.663	14.939	14.992	1.3	
BR			--	--	--	--								
CG			272.0	7.0	106.7	1.5								
AF	08_08_2017	03:10	258.3	6.9	65.9	2.5	-24.698	14.788	-24.711	-24.680	14.749	14.829	0.6	
BR			163.7	8.1	115.4	2.2								
CG			--	--	--	--								
AF	08_09_2017	18:52	251.0	6.6	56.3	1.7	-24.705	14.851	-24.716	-24.352	14.798	14.915	1.6	
BR			72.5	5.5	98.0	1.3								
CG			--	--	--	--								
AF	10_06_2017	09:47	251.0	6.6	70.8	1.8	-24.707	14.841	-24.716	-24.594	14.752	14.847	1.8	
BR			128.0	7.0	81.5	2.5								
CG			253.3	6.5	98.1	1.3								
AF	10_06_2017	09:56	251.0	6.6	57.7	1.6	-24.639	14.788	-24.669	-24.617	14.768	14.811	1.4	
BR			128.0	7.0	77.3	2.7								
CG			230.9	9.9	111.6	3.8								
AF	10_06_2017	15:07	252.8	6.7	75.4	1.6	-24.624	14.776	-24.671	-24.594	14.752	14.812	1.4	
BR			128.0	7.0	75.1	2.8								
CG			--	--	--	--								
AF	11_09_2017	09:10	241.8	6.4	74.0	1.7	-24.843	14.593	-24.890	-24.717	14.540	14.846	2.8	
BR			206.6	5.7	106.9	1.2								
CG			249.0	7.3	73.3	1.9								
AF	12_03_2017	00:29	266.8	5.8	66.8	1.5	-24.700	14.920	-24.723	-24.657	14.905	14.939	1.6	
BR			18.5	21.4	81.4	2385								
CG			263.7	3.7	90.8	1.6								
AF	12_03_2017	08:56	271.9	6.8	75.4	1.1	-24.709	14.877	-24.716	-24.691	14.848	14.914	1.5	
BR			14.1	9.9	96.5	3.5								
CG			--	--	--	--								
AF	12_03_2017	20:28	281.7	6.9	94.8	1.0	-24.629	14.929	-24.710	-24.576	14.854	14.972	0.7	
BR			47.3	11.5	76.4	3.3								
CG			--	--	--	--								
AF	12_03_2017	20:41	266.8	5.8	47.7	1.5	-24.715	14.851	-24.716	-24.709	14.848	14.865	1	

BR			13.4	9.4	102.0	2.6								
CG			--	--	--	--								
AF	12_03_2017	20:55	257.7	6.2	57.4	5.8	-24.716	14.851	-24.716	-24.712	14.848	14.865	0.1	
BR			10.1	11.8	91.7	4.2								
CG			--	--	--	--								
AF	12_07_2017	16:42	263.1	6.1	98.3	1.8	-24.757	14.941	-24.810	-24.738	14.911	14.963	1.9	
BR			337.1	7.2	93.8	876.0								
CG			270.0	7.3	87.2	1.9								
AF	13_12_2017	08:12	261.1	6.3	64.2	1.6	-24.721	14.850	-24.770	-24.716	14.839	14.865	2.1	
BR			296.7	22.7	85.3	8.5								
CG			249.0	7.3	84.5	2.5								
AF	14_02_2017	03:53	252.7	6.1	63.9	1.8	-24.688	14.777	-24.704	-24.669	14.750	14.813	1.9	
BR			159.1	9.0	84.1	2.6								
CG			239.4	6.5	89.9	2.2								
AF	14_03_2017	20:51	242.6	6.7	56.1	1.5	-24.887	14.582	-24.940	-24.812	14.530	14.680	2.2	
BR			212.3	5.7	49.5	1.3								
CG			--	--	--	--								
AF	15_05_2017	06:08	271.9	6.8	72.9	1.4	-24.707	14.884	-24.725	-24.660	14.855	14.926	0.7	
BR			26.6	30.2	101.5	1231								
CG			261.3	7.7	106.3	2.7								
AF	15_05_2017	06:10	257.3	6.4	67.8	1.5	-24.707	14.864	-24.716	-24.676	14.848	14.909	1.3	
BR			33.7	28.1	110.2	874.9								
CG			258.7	8.0	107.1	2.6								
AF	16_02_2017	05:20	259.1	6.4	73.4	1.9	-24.727	14.800	-24.735	-24.717	14.766	14.845	0.2	
BR			192.8	4.5	84.5	2.9								
CG			--	--	--	--								
AF	16_04_2017	16:34	--	--	--	--	-24.797	14.717	-24.820	-24.731	14.710	14.823	1.3	
BR			211.8	6.0	112.1	1.4								
CG			235.0	8.3	59.7	2.1								
AF	16_08_2017	06:02	261.1	6.3	74.0	1.7	-24.692	14.852	-24.716	-24.352	14.837	14.873	1.6	
BR			80.2	6.9	83.2	2.3								
CG			--	--	--	--								
AF	16_11_2017	00:58	--	--	--	--	-24.712	14.920	-24.722	-24.688	14.887	14.952	0.8	
BR			3.6	12.7	112.5	5.0								
CG			262.9	6.3	101.0	1.6								
AF	17_02_2017	04:27	266.3	6.5	70.2	1.4	-24.717	14.851	-24.730	-24.710	14.848	14.878	-0.4	
BR			0.1	16.9	150.1	7.8								
CG			--	--	--	--								
AF	17_03_2017	12:28	247.9	7.0	43.3	2.0	-24.800	14.683	-24.848	-24.768	14.630	14.737	2.9	
BR			206.6	6.1	68.6	1.6								
CG			225.0	6.9	86.1	2.5								
AF	17_05_2017	01:00	262.2	6.9	75.2	1.8	-24.627	14.922	-24.682	-24.581	14.883	14.938	2.2	
BR			54.4	11.8	88.3	4.5								
CG			262.9	6.3	59.5	2.6								
AF	17_05_2017	01:33	270.0	6.6	81.5	1.4	-24.700	14.860	-24.716	-24.629	14.848	14.903	0.3	
BR			54.4	11.8	89.7	4.4								
CG			--	--	--	--								
AF	18_02_2017	04:13	266.3	6.5	73.9	1.5	-24.721	14.852	-24.752	-24.716	14.848	14.879	0	
BR			310.7	22.1	75.9	14.2								
CG			--	--	--	--								
AF	18_02_2017	13:31	257.7	6.2	82.7	1.6	-24.712	14.851	-24.716	-24.694	14.848	14.862	2.4	
BR			54.1	5.7	41.1	1.1								
CG			241.7	6.9	73.3	2.1								
AF	18_02_2017	15:12	265.0	6.0	84.6	1.2	-24.709	14.851	-24.716	-24.638	14.848	14.883	1	
BR			60.5	5.9	91.3	1.8								
CG			--	--	--	--								
AF	18_04_2017	06:20	242.4	8.6	69.0	8.9	-24.686	14.728	-24.704	-24.668	14.668	14.757	1	
BR			165.9	8.2	92.4	2.4								
CG			236.3	14.1	69.2	6.7								
AF	18_04_2017	06:30	260.6	6.7	70.4	1.8	-24.708	14.851	-24.716	-24.609	14.848	14.901	1.2	
BR			67.1	9.9	121.5	3.2								
CG			255.5	7.3	66.8	2.1								
AF	18_07_2017	10:56	271.9	6.8	93.8	2.5	-24.716	14.865	-24.740	-24.699	14.848	14.920	1.7	
BR			0.1	16.9	152.5	7.3								
CG			--	--	--	--								
AF	18_08_2017	03:42	247.6	11.1	54.7	2.1	-24.707	14.719	-24.713	-24.686	14.670	14.767	1.1	
BR			175.2	5.6	87.3	4.1								
CG			--	--	--	--								
AF	18_11_2017	04:19	2.0	7.0	137.9	3.1	-24.349	15.022	-24.372	-24.317	14.877	15.065	1.2	

BR			80.9	8.0	66.5	4.9								
CG			53.1	8.1	123.9	2.6								
AF	19_02_2017	23:23	254.8	5.9	94.6	1.4	-24.775	14.750	-24.830	-24.741	14.700	14.806	0.6	
BR			210.9	8.7	72.7	3.7								
CG			--	--	--	--								
AF	19_12_2017	01:04	271.8	6.2	109.0	1.6	-24.785	14.902	-24.830	-24.746	14.873	14.945	2.6	
BR			308.2	11.4	90.1	13.3								
CG			264.3	6.7	83.4	2.8								
AF	20_07_2017	21:12	240.8	7.1	73.0	2.0	-24.770	14.714	-24.805	-24.738	14.670	14.794	1.8	
BR			202.1	5.9	84.3	1.9								
CG			243.5	11.4	73.9	4.1								
AF	20_08_2017	00:58	249.7	7.1	65.8	2.2	-24.625	14.764	-24.652	-24.588	14.726	14.788	1	
BR			131.9	7.6	71.5	2.7								
CG			--	--	--	--								
AF	21_03_2017	23:02	265.1	5.8	67.4	2.3	-24.710	14.918	-24.739	-24.665	14.848	15.002	2.1	
BR			3.6	12.7	143.8	3.9								
CG			279.5	6.7	106.9	1.8								
AF	21_04_2017	01:36	270.0	6.6	72.4	1.7	-24.699	14.871	-24.716	-24.672	14.848	14.906	0.4	
BR			37.2	6.5	97.0	7.3								
CG			--	--	--	--								
AF	21_10_2017	03:22	282.1	7.1	58.7	1.2	-25.235	14.979	-25.360	-24.884	14.899	15.050	1.9	
BR			270.1	17.0	69.8	5.9								
CG			--	--	--	--								
AF	22_02_2017	16:43	264.7	6.3	68.1	1.6	-24.718	14.864	-24.734	-24.707	14.848	14.893	2.1	
BR			353.0	25.2	105.7	21.4								
CG			255.6	6.4	86.3	1.8								
AF	22_03_2017	11:49	284.1	6.2	69.0	3.1	-24.707	14.960	-24.766	-24.631	14.930	15.001	1.5	
BR			4.5	15.6	149.5	4.1								
CG			272.0	7.0	88.5	1.8								
AF	22_07_2017	00:53	--	--	--	--	-24.694	14.966	-24.707	-24.669	14.952	15.004	0.3	
BR			10.8	9.5	92.3	3.1								
CG			272.3	8.1	104.4	1.9								
AF	22_07_2017	23:35	285.7	6.1	72.8	1.7	-24.746	14.936	-24.771	-24.731	14.904	14.963	2.1	
BR			340.6	11.3	54.4	4.6								
CG			265.8	7.5	65.0	2.0								
AF	22_11_2017	22:55	271.8	6.2	119.2	2.1	-24.684	14.880	-24.716	-24.621	14.848	14.922	0.7	
BR			45.0	13.0	103.2	2.7								
CG			--	--	--	--								
AF	23_02_2017	19:46	243.4	6.1	72.4	1.4	-24.717	14.683	-24.728	-24.710	14.636	14.719	1.4	
BR			181.1	4.0	80.2	0.8								
CG			223.4	8.2	75.4	2.0								
AF	23_03_2017	02:00	268.3	6.0	72.6	1.6	-24.661	14.873	-24.716	-24.592	14.848	14.904	0.6	
BR			67.0	5.7	57.6	1.5								
CG			260.6	6.7	69.9	1.3								
AF	23_12_2017	10:51	271.9	6.8	82.0	1.4	-24.753	14.879	-24.800	-24.716	14.848	14.925	2	
BR			310.3	11.9	92.0	15.8								
CG			--	--	--	--								
AF	24_05_2017	05:16	--	--	--	--	-24.746	14.977	-24.754	-24.743	14.964	15.003	0.5	
BR			200.8	9.1	83.5	3.5								
CG			275.0	8.8	76.1	4.0								
AF	24_09_2017	01:14	353.1	6.1	93.9	3.2	-24.353	14.882	-24.357	-24.352	14.866	14.910	0.5	
BR			--	--	--	--								
CG			122.7	12.2	86.0	4.2								
AF	24_09_2017	03:38	5.5	9.6	101.2	3.3	-24.349	14.895	-24.353	-24.339	14.866	14.932	0.3	
BR			--	--	--	--								
CG			118.5	16.2	70.1	5.3								
AF	24_09_2017	04:26	255.5	7.3	67.6	2.0	-24.771	14.757	-24.820	-24.739	14.710	14.810	1.9	
BR			210.9	11.6	104.7	4.0								
CG			--	--	--	--								
AF	24_09_2017	04:51	356.2	6.8	81.4	6.3	-24.353	14.887	-24.358	-24.352	14.867	14.921	0.2	
BR			--	--	--	--								
CG			119.7	12.6	92.8	4.5								
AF	24_09_2017	06:09	241.8	6.4	65.5	3.2	-24.910	14.566	-24.960	-24.716	14.520	14.847	2.8	
BR			213.7	6.3	97.1	1.6								
CG			259.5	7.4	101.9	1.9								
AF	24_12_2017	06:37	--	--	--	--	-24.716	14.920	-24.727	-24.703	14.893	14.942	0.5	
BR			0.1	11.9	86.4	3.0								
CG			262.9	8.4	114.7	1.8								
AF	25_02_2017	14:01	264.1	7.0	91.9	1.6	-24.635	14.832	-24.684	-24.612	14.824	14.844	1.2	

BR			102.2	8.6	84.5	2.5							
CG			235.3	6.4	105.6	1.7							
AF	25_06_2017	13:49	--	--	--	--	-24.689	14.935	-24.709	-24.668	14.900	14.952	1.5
BR			18.5	8.0	112.3	1.8							
CG			265.8	7.5	77.2	3.4							
AF	25_06_2017	13:50	--	--	--	--	-24.705	14.927	-24.721	-24.683	14.900	14.952	1.6
BR			6.1	10.6	84.4	2.7							
CG			264.3	6.7	93.3	1.9							
AF	25_09_2017	00:36	356.2	6.8	104.3	2.9	-24.352	14.866	-24.354	-24.300	14.827	14.885	0.5
BR			91.4	5.0	56.8	1.8							
CG			124.6	12.9	60.5	4.6							
AF	25_10_2017	06:35	264.8	6.1	68.9	1.2	-24.666	14.837	-24.716	-24.610	14.825	14.848	0.9
BR			102.5	7.3	84.1	2.4							
CG			--	--	--	--							
AF	26_09_2017	05:19	257.9	7.1	62.2	2.0	-24.756	14.952	-24.794	-24.716	14.889	14.976	2.7
BR			341.6	12.8	124.7	4.0							
CG			270.0	7.5	84.3	1.4							
AF	27_01_2017	05:37	255.1	6.6	110.3	1.5	-24.698	14.773	-24.712	-24.683	14.720	14.830	0.2
BR			166.8	6.6	80.5	1.2							
CG			--	--	--	--							
AF	27_01_2017	11:31	263.4	7.8	113.4	3.9	-24.715	14.849	-24.716	-24.699	14.848	14.865	0.4
BR			39.3	14.3	117.8	5.4							
CG			--	--	--	--							
AF	27_04_2017	06:49	251.0	6.6	65.4	1.6	-24.656	14.784	-24.716	-24.599	14.747	14.848	1
BR			134.9	9.6	79.5	3.0							
CG			247.8	8.6	102.7	3.5							
AF	27_04_2017	16:03	255.1	6.6	69.8	1.1	-24.788	14.749	-24.827	-24.741	14.701	14.813	1.8
BR			216.2	6.3	73.7	2.1							
CG			--	--	--	--							
AF	27_09_2017	23:04	277.2	6.3	74.4	2.5	-24.618	14.903	-24.716	-24.557	14.848	14.927	1
BR			60.6	11.1	83.1	2.8							
CG			--	--	--	--							
AF	27_10_2017	01:20	268.2	6.6	69.7	1.5	-24.739	14.889	-24.768	-24.719	14.854	14.934	1.9
BR			330.3	12.6	147.7	16.4							
CG			276.4	7.5	89.6	1.5							
AF	28_01_2017	05:15	242.7	6.2	34.4	0.7	-24.800	14.656	-24.830	-24.774	14.610	14.702	1.1
BR			203.7	3.3	71.7	1.8							
CG			236.8	6.5	107.6	1.7							
AF	28_01_2017	05:29	--	--	--	--	-24.678	14.881	-24.712	-24.639	14.852	14.906	0.2
BR			48.4	5.6	100.1	2.4							
CG			252.0	5.2	77.3	0.9							
AF	29_06_2017	22:34	270.0	6.6	90.3	1.9	-24.717	14.860	-24.733	-24.701	14.848	14.902	0.9
BR			353.8	22.4	118.7	7.4							
CG			--	--	--	--							
AF	29_09_2017	19:15	262.2	6.9	83.1	4.2	-24.736	14.812	-24.790	-24.624	14.760	14.856	1.9
BR			--	--	--	--							
CG			244.8	10.8	69.2	2.8							
AF	30_06_2017	00:46	271.8	6.2	83.6	1.6	-24.716	14.871	-24.734	-24.697	14.848	14.908	1.5
BR			354.4	20.2	138.3	7.4							
CG			--	--	--	--							
AF	30_12_2017	02:36	266.1	7.0	70.3	1.7	-24.688	14.837	-24.716	-24.608	14.805	14.848	1.6
BR			111.3	8.2	89.4	1.6							
CG			--	--	--	--							
AF	30_12_2017	07:50	249.9	6.4	56.6	9.5	-24.663	14.746	-24.684	-24.646	14.714	14.778	0.8
BR			152.5	7.2	87.0	2.7							
CG			--	--	--	--							
AF	31_07_2017	04:59	250.5	6.2	72.0	1.4	-24.711	14.832	-24.716	-24.691	14.780	14.847	2
BR			161.5	9.2	78.8	2.7							
CG			253.8	8.1	77.1	2.3							
AF	31_07_2017	05:03	257.3	6.4	70.3	1.8	-24.709	14.814	-24.716	-24.691	14.740	14.847	1.8
BR			168.1	10.5	74.8	2.4							
CG			260.2	6.9	71.1	2.0							
AF	31_08_2017	16:12	278.6	6.1	83.7	1.5	-24.680	14.929	-24.703	-24.649	14.878	14.966	1.3
BR			24.0	6.9	83.4	2.2							
CG			270.1	15.7	117.0	4.8							
AF	31_12_2017	06:07	261.1	6.3	59.3	2.1	-24.708	14.851	-24.716	-24.663	14.848	14.865	1.2
BR			66.8	13.3	115.9	4.5							
CG			260.2	6.9	104.3	1.9							