Fish sounds of photic and mesophotic coral reefs: variation with depth and type of island

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In this document, you will find eleven supplementary tables, seven supplementary figures and a *Supplementary Sound Identification Key*.

Supplementary tables

Table SP1 Localisation and period of sampling for each island. See the text for details on the type of island.

	Date			GPS coordinates		Archipelago	Type of island
	Day	Month	Year	Lat	Long		
Bora Bora	21st – 24th	09	2018	S 16.43658°	W 151.75362°	Society	High Island
Mangareva	16th – 19th	04	2019	S 23.00102°	W 134.96052°	Gambier	High Island
Moorea	4th – 7th	09	2018	S 17.47730°	W 149.85138°	Society	High Island
Rangiroa	30th – 2nd	10-11	2018	S 14.98030°	W 147.61315°	Tuamotu	Atoll
Raroia	2nd – 5th	03	2018	S 16.02310°	W 142.46327°	Tuamotu	Atoll
Tikehau	15th – 18th	10	2018	S 15.01733°	W 148.28675°	Tuamotu	Atoll

Table SP2 Detail of the Pulse Series *stricto sensu* sounds. SD = standard deviation. Hz = Hertz, ms = millisecond.

Sound type	Duration (ms)		Peak frequency (Hz)		Number of pulses		Period (ms)	
	mean	SD	mean	SD	mean	SD	mean	SD
Fast Pulse Trains								
FPT1	774.24	411.30	188.02	39.27	28.80	13.81	27.72	10.45
FPT2	725.42	567.14	326.44	207.42	16.84	10.65	40.24	12.92
FPT3	124.84	60.75	336.80	152.56	7.20	3.91	19.14	4.65
FPT4	171.21	94.18	253.42	105.45	7.43	6.79	32.81	14.03
FPT5	86.04	45.19	761.10	423.34	5.30	4.95	22.76	18.22
FPT6	134.70	48.02	614.20	200.83	4.70	1.89	36.96	16.98
FPT7	250.02	143.63	696.50	417.21	11.78	14.38	37.94	18.58
Slow Pulse Series								
SPS	3244.40	2105.83	422.39	208.39	5.00	2.36	822.53	289.23
Others Pulse Series								
PS1	417.48	155.43	551.25	91.17	5.20	1.69	92.72	16.12
PS2	725.39	328.50	750.22	30.11	8.80	3.58	81.49	6.34
PS3	341.96	33.65	238.70	66.34	3.00	0.00	152.56	23.86
PS4	237.94	33.85	171.50	25.44	3.00	0.00	104.17	14.72
PS5	304.73	154.50	875.55	155.85	3.00	0.00	146.15	76.68
PS6	5683.91	7715.23	639.55	437.92	26.46	23.57	185.21	68.53
PS7	737.39	129.21	261.00	5.59	7.20	1.03	102.74	13.09
PS8	1549.50	12.23	169.82	2.21	9.00	0.00	186.10	2.15
PS9	1766.10	498.42	694.01	225.71	20.34	7.64	92.50	15.15
PS10	1539.19	552.95	220.68	25.29	18.42	6.00	84.68	21.30
PS11	2005.13	1383.01	935.10	198.50	24.50	15.33	81.44	13.55
PS12	975.80	428.63	239.31	201.51	6.60	3.13	186.34	96.17
PS13	1119.96	317.74	246.60	36.48	20.70	6.04	58.44	11.45
PS14	3104.31	2672.38	730.36	312.04	6.30	3.37	573.97	486.11
PS15	1446.60	1289.08	233.95	43.20	6.60	4.25	232.86	112.93
PS16	666.20	399.99	718.43	205.78	6.20	2.20	119.78	16.62
PS17	425.82	124.81	279.07	43.47	4.80	1.62	111.96	22.48

Table SP3 Detail of the frequency modulated and arched sounds. SD = standard deviation. Hz = Hertz, ms = millisecond.* These three sound types are similar in terms of temporal and frequential features and constitute a variation (downsweeping, upsweeping and arched) of the same pattern. ** Sometimes, these sounds were followed by an(some) additional peak(s), not included in the table. *** Sometimes, this sound had a harmonic-interval twice as large than usual, not included in the table.

	Duration (ms)		**Peal frequency (Hz)**		**Number of pulses**		**Period (ms)**	
	mean	**SD**	**mean**	**SD**	**mean**	**SD**	**mean**	**SD**
Downsweeping sounds								
DS1	109.41	50.78	239.10	62.93	13.29	5.65	8.43	3.57
DS2	177.10	123.92	742.30	412.47	15.87	5.91	11.07	4.30
DS3 *	137.04	47.94	246.58	24.79	31.00	14.65	4.76	1.19
DS4 **	546.98	131.40	858.43	56.89	6.10	1.37	103.09	10.32
DS5	200.73	106.14	248.39	95.60	40.50	25.03	5.25	0.93
DS6	215.03	114.24	194.00	101.43	23.42	10.06	10.00	5.58
DS7	214.64	32.45	886.79	128.54	2.00	0.00	162.93	16.13
DS8 **	454.87	29.03	715.75	51.17	4.00	0.00	138.75	9.40
Upsweeping sounds								
US1 **	334.69	79.50	224.80	48.88	32.24	6.07	10.78	0.24
US2	87.85	39.31	345.90	220.84	18.50	6.96	4.70	0.72
US3 *	111.56	21.88	214.40	31.61	23.60	4.95	4.77	0.60
Arched sounds								
AS1	172.99	118.92	211.10	80.57	11.38	6.51	15.74	5.53
AS2 ***	546.25	190.47	69.30	1.55	38.20	13.86	14.37	0.29
AS3 *	126.50	21.04	231.00	55.73	19.22	2.11	6.45	0.94
AS4 = *kwa*-like	182.85	7.27	846.90	147.61	12.30	1.16	14.95	1.06
AS5	110.33	38.31	643.84	113.98	6.90	2.28	16.57	4.02
AS6	57.25	11.56	374.70	225.62	5.30	2.98	14.39	6.37
AS7	141.89	223.16	297.00	75.60	4.00	0.82	20.63	2.81
Complex sounds								
CS1 = whoot	940.02	174.39	216.34	21.44	167.96	65.65	4.94	0.29
CS2	401.93	121.78	249.71	51.76	93.50	27.64	4.29	0.57

Table SP4 Number of sound types per 1 min per (pseudo-)replicate, i.e., for each sunset period, for each depth and for each island (N= 51). The ten most abundant sounds detailed in Fig. SP5 are highlighted in yellow.

	min	max	median	mean	SD
Fast Pulse Trains					
FPT1	0	1.83	0	0.16	0.41
FPT2	0	1.42	0.17	0.35	0.42
FPT3	0	1.00	0	0.08	0.18
FPT4	0	2.58	0.75	1.05	0.74
FPT5	0	10.42	0.92	1.41	1.91
FPT6	0	4.42	0.08	0.30	0.66
FPT7	0	0.67	0	0.05	0.13
Slow Pulse Series					
SPS	0	0.33	0	0.031	0.067
Others Pulse Series					
PS1	0	0.92	0	0.02	0.13
PS2	0	0.83	0.016	0	0.12
PS3	0.08	5.83	0.92	1.62	1.48
PS4	0	2.42	0.08	0.16	0.36
PS5	0	1.67	0.08	0.31	0.41
PS6	0	0.42	0	0.02	0.07
PS7	0	0.33	0	0.02	0.06
PS8	0	5.25	0	0.21	0.91
PS9	0	0.42	0	0.06	0.09
PS10	0	0.33	0	0.04	0.07
PS11	0	5.50	0	0.32	0.92
PS12	0	2.25	0.33	0.42	0.42
PS13	0	0.42	0	0.04	0.10
PS14	0	1.50	0.17	0.24	0.30
PS15	0	1.83	0	0.16	0.32
PS16	0	10.08	0.83	1.96	2.56
PS17	0	5.67	1.17	1.66	1.43
Downsweeping sounds					
DS1	0.08	2.08	0.42	0.53	0.39
DS2	0	1.25	0	0.14	0.26
DS3	0	0.83	0	0.11	0.23
DS4	0	6.00	0	0.42	1.29
DS5	0	0.33	0	0.07	0.09
DS6	0	0.33	0	0.03	0.07

DS7	0	0.33	0	0.06	0.08
DS8	0	1.25	0	0.04	0.19
Upsweeping sounds					
US1	0	5.67	0.08	1.01	1.76
US2	0	0.33	0	0.04	0.08
US3	0	0.92	0	0.05	0.17
Arched sounds					
AS1	0	0.50	0.08	0.10	0.12
AS2	0	1.42	0	0.06	0.27
AS3	0	1.25	0	0.11	0.26
AS4	0	40.42	7.75	10.65	10.03
AS5	0	1.75	0.25	0.37	0.40
AS6	0	1.42	0.08	0.12	0.23
AS7	0	0.58	0	0.03	0.11
Complex sounds					
CS1	0	4.08	0.17	0.51	0.84
CS2	0	0.75	0	0.03	0.14

Table SP5 Most abundant type of fish sounds for each depth and each island. Total% corresponds to the mean of the three temporal replicates. SS = sunset.

	Bora Bora	Mangareva	Moorea	Rangiroa	Raroia	Tikeahau
−20 m						
Most abundant type	FPT5	PS16		AS4 = *kwa*-like		
Total%	38.27	25.05	18.03	38.10	22.54	27.68
SS1%	23.95	14.17	15.63	24.55	31.02	32.81
SS2%	52.30	27.92	20.81	44.04	17.23	25.06
SS3%	39.16	33.06	17.65	45.70	19.37	25.17
−60 m						
Most abundant type	AS4 = *kwa*-like	PS17	AS4 = *kwa*-like			
Total%	63.12	20.88	34.34	77.53	44.14	47.45
SS1%	53.64	11.58	24.73	74.26	46.06	51.72
SS2%	63.41	25.19	40.44	80.29	37.56	46.98
SS3%	72.29	25.87	37.86	78.05	48.81	43.65
−120 m						
Most abundant type	AS4 = *kwa*-like		AS4 = *kwa*-like			
Total%	39.68		46.31	55.16	48.18	66.28
SS1%	27.06		34.58	45.86	47.88	69.33
SS2%	37.79		56.36	62.50	46.54	59.25
SS3%	54.19		47.97	57.12	50.11	70.26

Table SP6 Median and Interquartile range (IQR) of the acoustic fish α-diversity (Shannon) per depth and per island.

Island		**Acoustic fish α-diversity (Shannon)**		
		−20 m	**−60 m**	**−120 m**
Bora Bora	**Median**	1.76	1.57	1.69
	IQR	0.30	0.28	0.27
Mangareva	**Median**	2.27	2.60	
	IQR	0.22	0.05	
Moorea	**Median**	2.77	1.93	1.92
	IQR	0.03	0.04	0.18
Rangiroa	**Median**	2.11	0.99	1.70
	IQR	0.31	0.11	0.13
Raroia	**Median**	2.54	2.10	2.02
	IQR	0.07	0.18	0.10
Tikehau	**Median**	2.33	1.89	1.41
	IQR	0.04	0.07	0.19

Table SP7 Acoustic fish Shannon diversity, overlap and results of the variance model per depth and type of island (upper part of the table) and results of the linear model to test the influence of benthic cover features on Shannon diversity. Df = degree of freedom. Sum Sq = sum of squares. Mean Sq = mean squares. SD = standard deviation. IQR = interquartile range.

Shannon diversity					
Depth	**mean**	**SD**	**median**	**IQR**	
−20 m	2.35	0.27	2.38	0.28	
−60 m	1.86	0.50	1.92	0.61	
−120 m	1.77	0.18	1.78	0.18	
Type of island	**mean**	**SD**	**median**	**IQR**	
Atoll	1.93	0.44	1.97	0.47	
High island	2.10	0.41	1.92	0.58	
Overlap					
Depth	**all**	**20 vs 60m**	**20 vs 120m**	**60 vs 120 m**	
	61.90	59.92	60.09	73.91	
Type of island	**both**	**atoll**	**High island**		
	61.90	75.22	46.22		
Analyses of variance					
	Df	**Sum Sq**	**Mean Sq**	**Fvalue**	***P***
Depth	2	2.49	1.26	8.59	0.00068
Type of island	1	0.083	0.083	0.58	0.45
Residuals	46	3.76	0.082		
Linear model					
	Df	**Sum Sq**	**Mean Sq**	**Fvalue**	***P***
Macroalgae including *Halimeda* algae	1	4.93	4.93	$< 10^{24}$	< 0.0001
Non encrusting sponges	1	0.082	0.082	$< 10^{24}$	< 0.0001
Encrusting algae	1	0.013	0.013	$< 10^{24}$	< 0.0001
Fleshy algae	1	0.80	0.80	$< 10^{24}$	< 0.0001
Rubble	1	0.00020	0.00020	$< 10^{24}$	< 0.0001
Hydroids	1	0.24	0.24	$< 10^{24}$	< 0.0001
Turf	1	0.13	0.13	$< 10^{24}$	< 0.0001
Dead coral	1	0.036	0.036	$< 10^{24}$	< 0.0001
Anthoathecatae	1	0.18	0.18	$< 10^{24}$	< 0.0001
Sand	1	0.16	0.16	$< 10^{24}$	< 0.0001
Black coral and gorgonians	1	0.0012	0.0012	$< 10^{24}$	< 0.0001
Consolidate substrate	1	0.56	0.56	$< 10^{24}$	< 0.0001
Sessile invertebrates	1	0.28	0.28	$< 10^{24}$	< 0.0001
Encrusting sponges	1	0.0055	0.0055	$< 10^{24}$	< 0.0001
Scleractinian	1	0.91	0.91	$< 10^{24}$	< 0.0001
Calcifying algae	1	0.91	0.91	$< 10^{24}$	< 0.0001
Residuals	34	0	0		

Table SP8 Output of the permutation based-test of multivariate homogeneity of group variances on the β-diversity.

	Degrees of freedom	**Sum of squares**	**Mean square**	**F**	**Pr(>F)**
With logarithmic standardization					
Groups	2	0.011	0.0054	2.51	0.086
Residuals	48	0.10	0.0021		

Table SP9 Results of the PerMANOVAstests based on Bray-Curtis dissimilarities for the influence of the depth and type of island on acoustic communities composition. Df = degree of freedom.

	Df	Sums of squares	Mean squares	F of the model	R^2	Pr (>F)
Not nested in the season						
Depth	2	1.09	0.54	7.33	0.22	0.001
Type of island	1	0.44	0.44	5.86	0.09	0.001
Residuals	47	3.49	0.07		0.70	
Total	50	5.02			1.00	
Nested in the season						
Depth	5	1.58	0.32	4.79	0.32	0.001
Type of island	2	0.59	0.29	4.46	0.12	0.002
Residuals	43	2.84	0.07		0.57	
Total	50	5.02			1.00	

Table SP10 Results of the Canonical correspondence analysis testing for a link between acoustic communities and cover features. Df = degrees of freedom

	Df	χ^2	**F**	**P**
Macroalgae including *Halimeda* algae	1	0.14	9.57	0.001
Non encrusting sponges	1	0.081	5.66	0.001
Encrusting algae	1	0.064	4.48	0.001
Fleshy algae	1	0.058	4.05	0.001
Rubble	1	0.048	3.38	0.001
Hydroids	1	0.041	2.83	0.002
Turf	1	0.038	2.64	0.001
Dead coral	1	0.035	2.47	0.004
Anthoathecatae	1	0.033	2.31	0.005
Sand	1	0.032	2.26	0.008
Black coral and gorgonians	1	0.029	2.03	0.024
Consolidate substrate	1	0.028	1.97	0.014
Others sessile invertebrates	1	0.027	1.90	0.006
Encrusting sponges	1	0.031	2.14	0.005
Scleractinian	1	0.026	1.83	0.015
Calcifying algae		0.047	3.26	0.001
Residual	34	0.49		

Table SP11 Biplot information and scores for constraining variables of the Canonical correspondence analysis testing for a link between acoustic communities and cover features.

	CCA1	**CCA2**
Df	1	1
χ^2	0.18	0.11
F	12.57	7.65
P	0.001	0.001
	CCA1	**CCA2**
Macroalgae including *Halimeda* algae	−0.80	−0.31
Non encrusting sponges	0.75	−0.20
Encrusting algae	−0.23	0.48
Fleshy algae	−0.12	−0.29
Rubble	−0.12	0.25
Hydroids	0.32	−0.21
Turf	0.080	0.29
Dead coral	−0.57	0.067
Anthoathecatae	−0.090	−0.55
Sand	0.62	−0.0071
Black coral and gorgonians	0.38	−0.23
Consolidate substrate	−0.25	−0.35
Sessile invertebrates	0.26	−0.13
Encrusting sponges	−0.043	0.30
Scleractinian	−0.68	0.18
Calcifying algae	−0.34	0.19

Supplementary figures

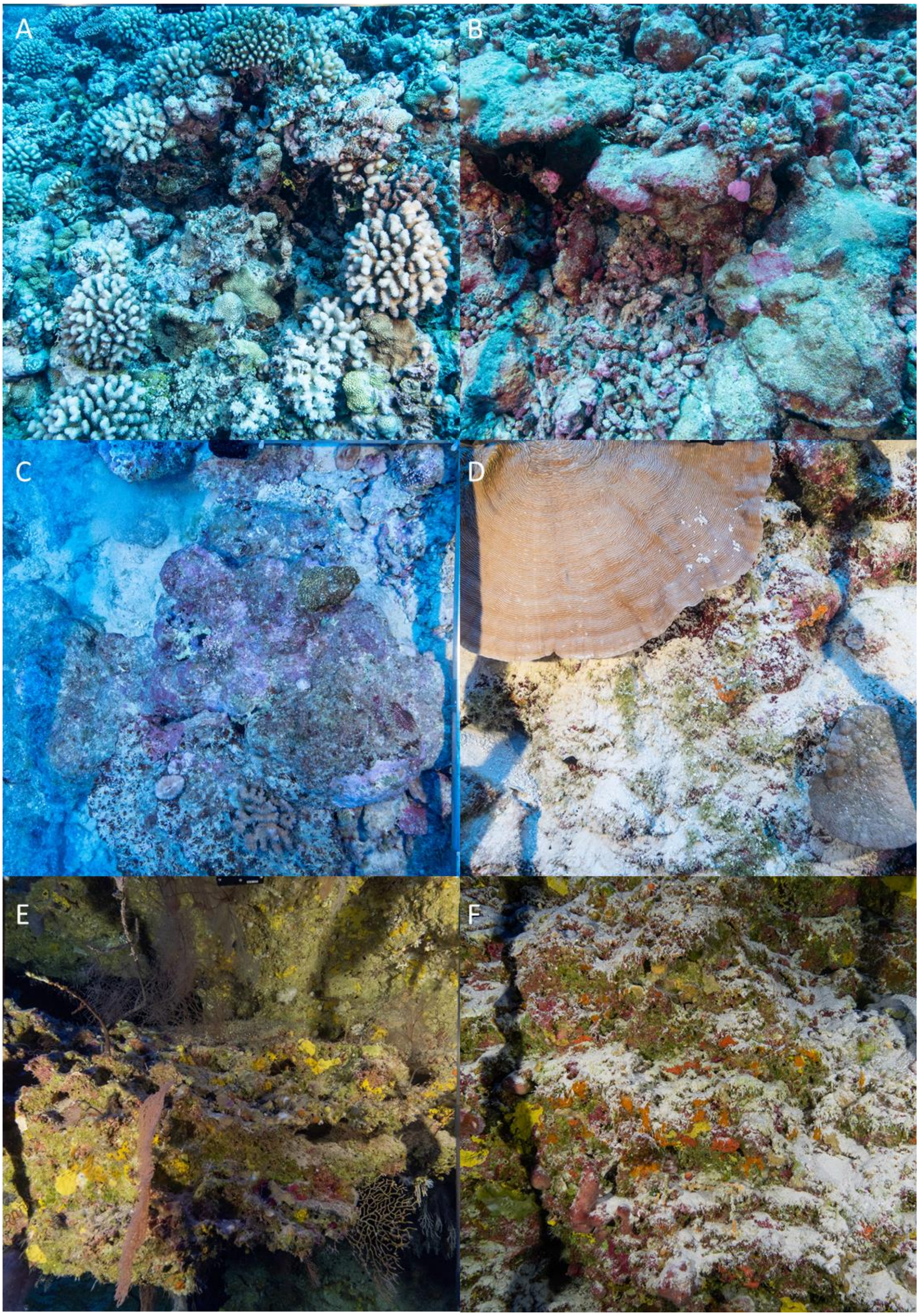

Fig. SP1 Pictures inside a quadrat of 1 m^2 in Moorea (left) and Rangiroa (right). A and **B** −20 m, **C** and **D** −60 m, **E** and **F** −120 m.

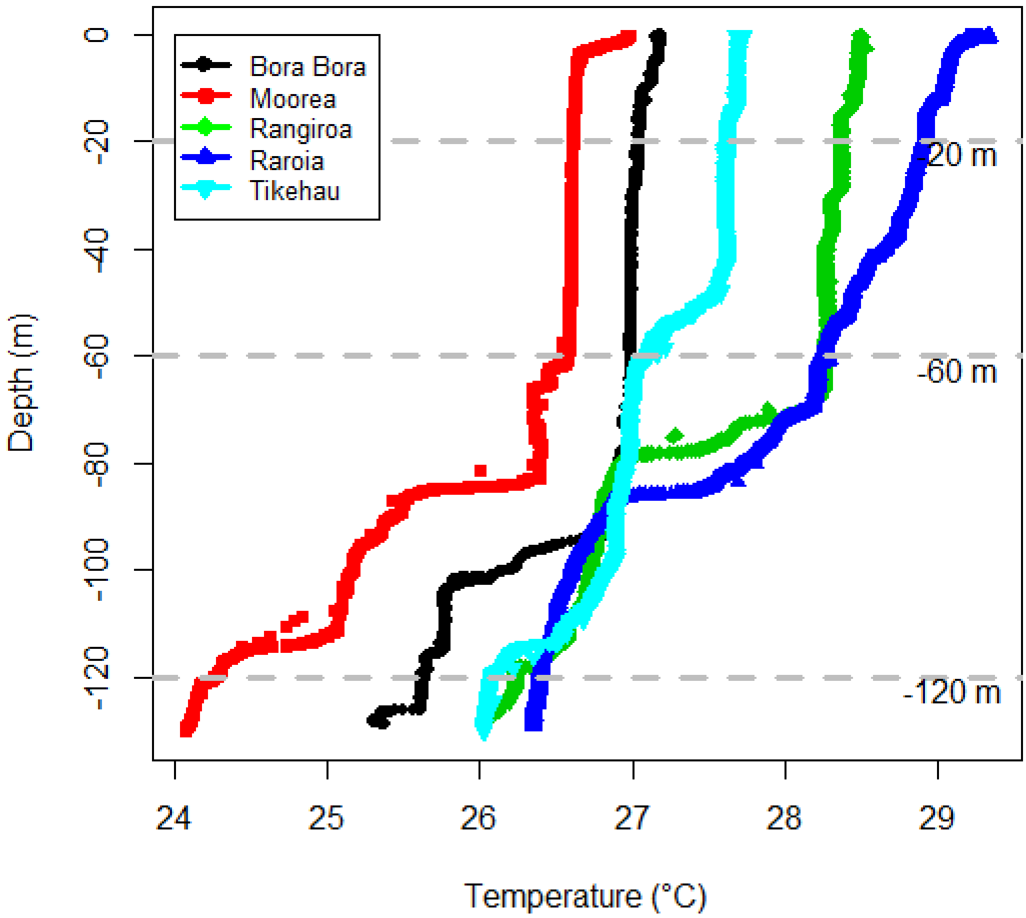

Fig. SP2 Plot of the temperature according to the depth. Bora Bora and Moorea are high islands while the three others are atolls.

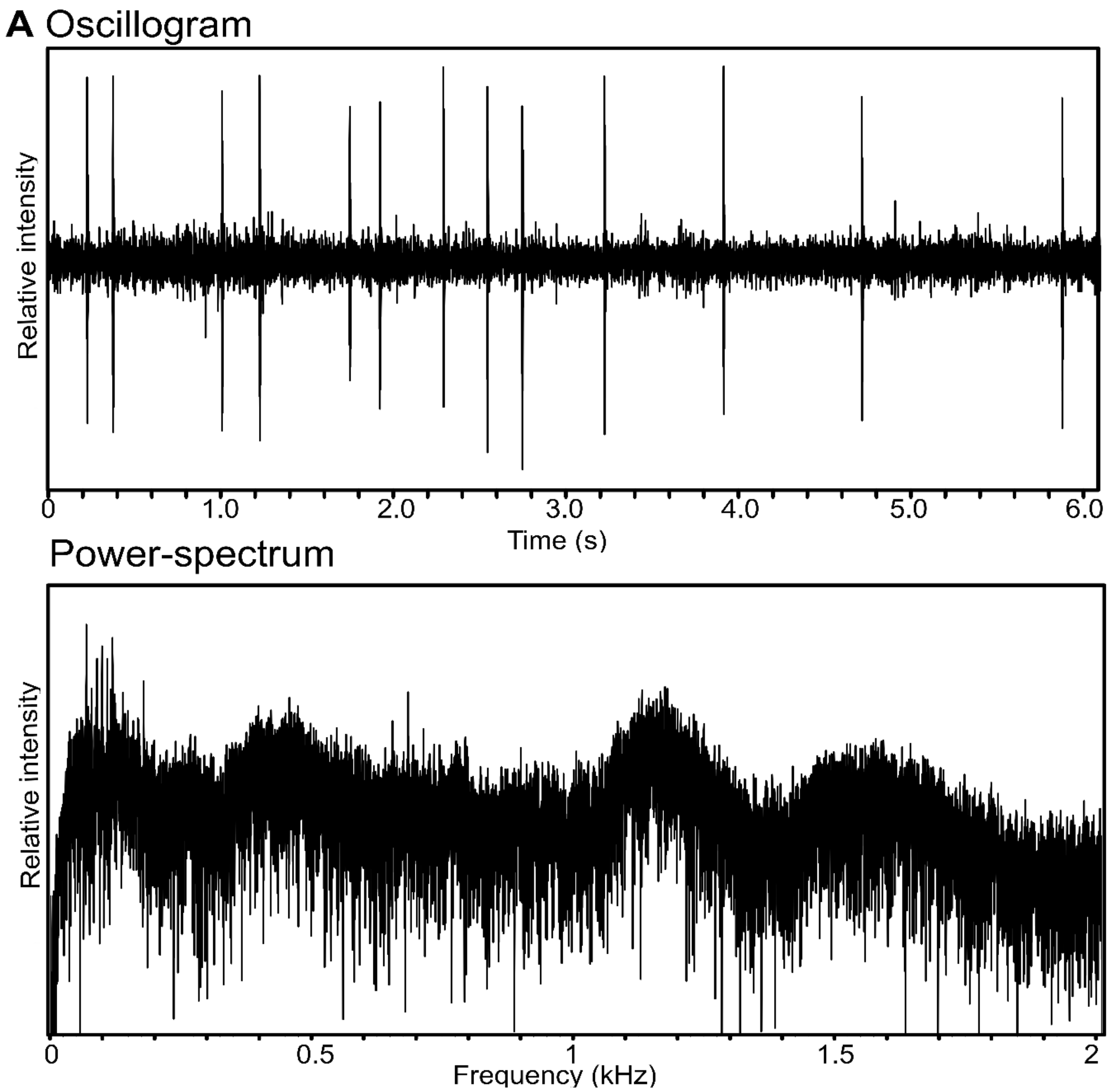

Fig. SP2 Oscillogram (top) and power-spectrum (bottom) of Pulse Series *stricto sensu* sounds. A PS14

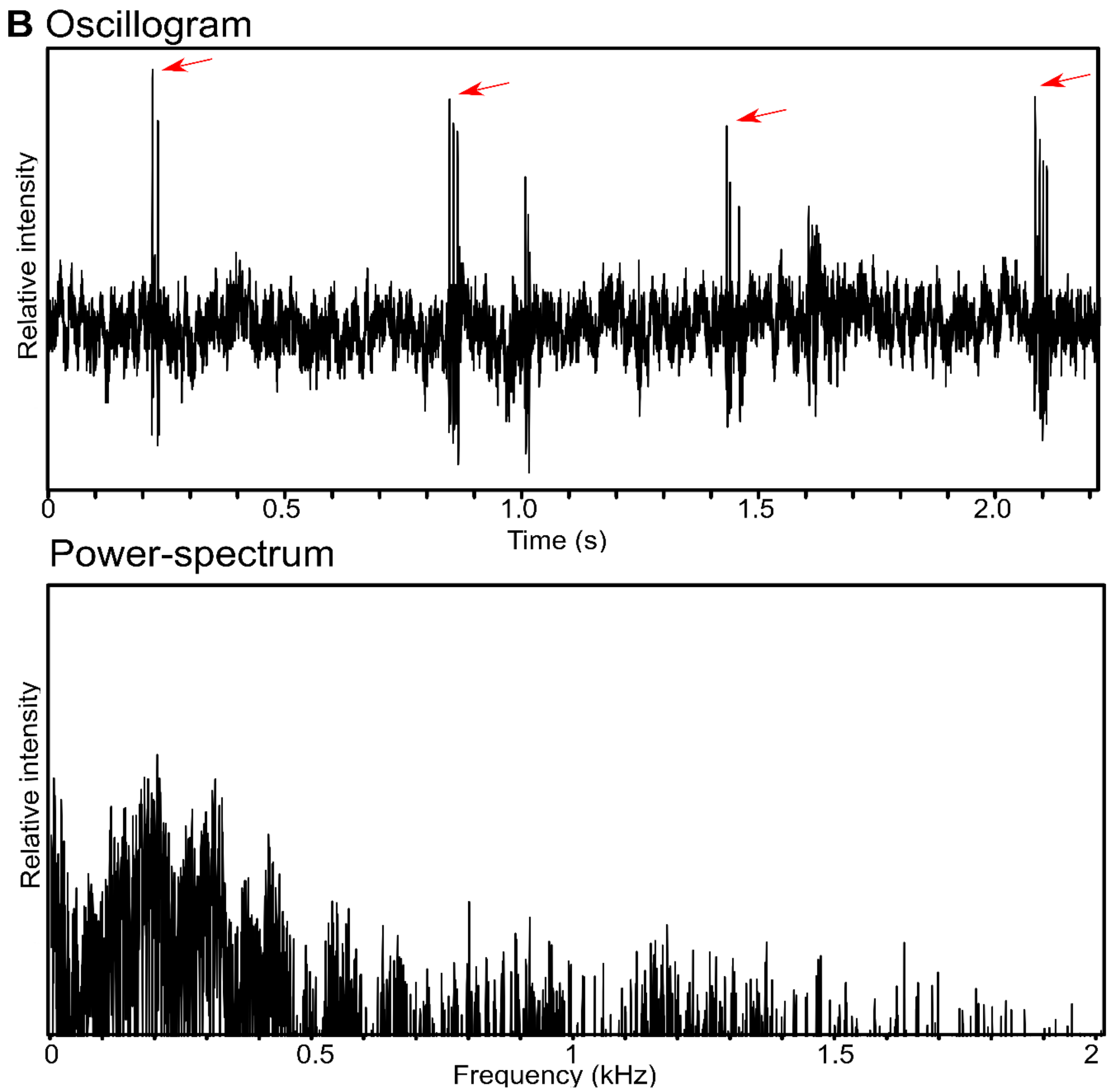

Fig. SP2 Oscillogram (top) and power-spectrum (bottom) of Pulse Series *stricto sensu* sounds. B SPS

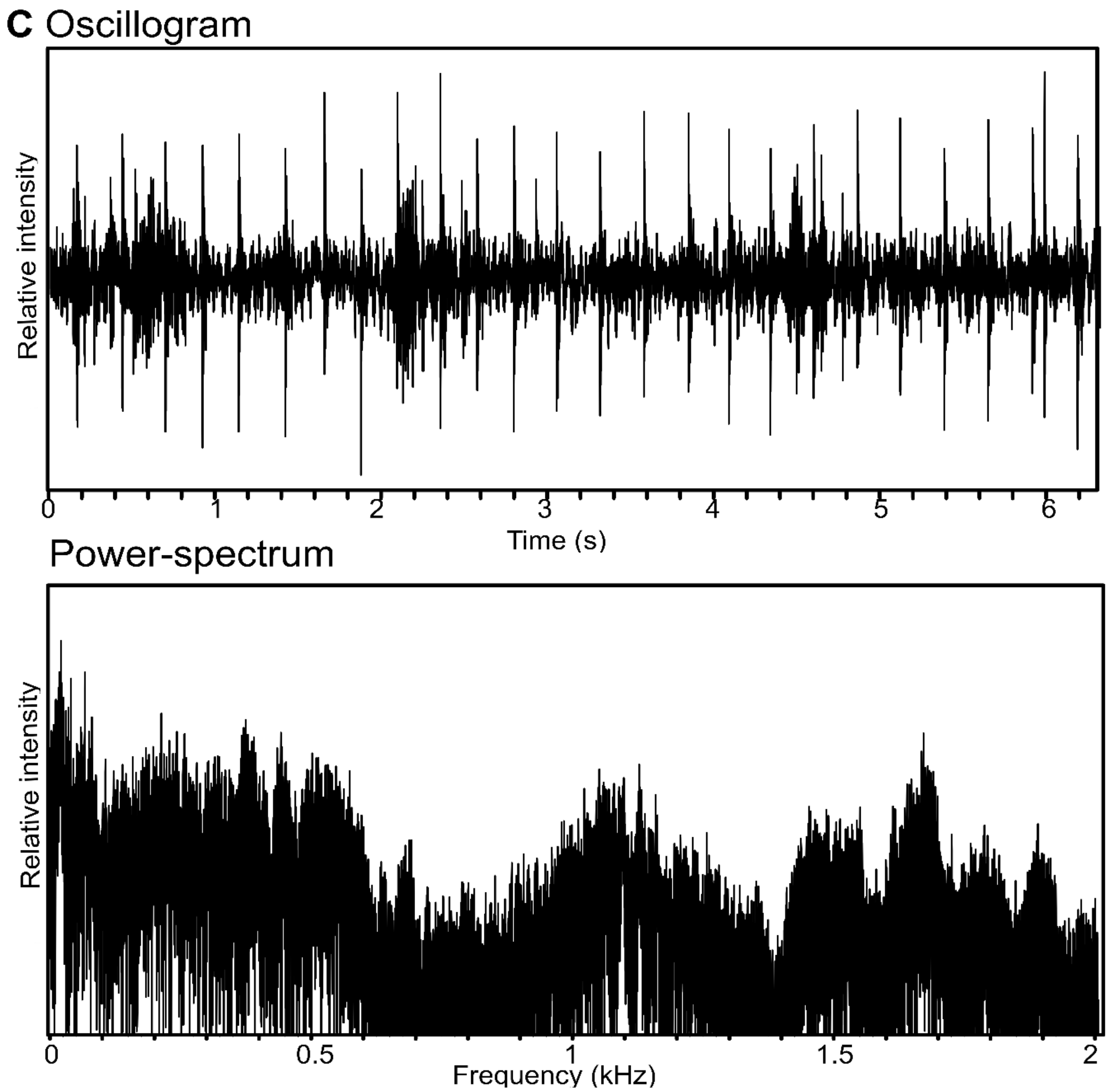

Fig. SP2 Oscillogram (top) and power-spectrum (bottom) of Pulse Series *stricto sensu* sounds. C PS6

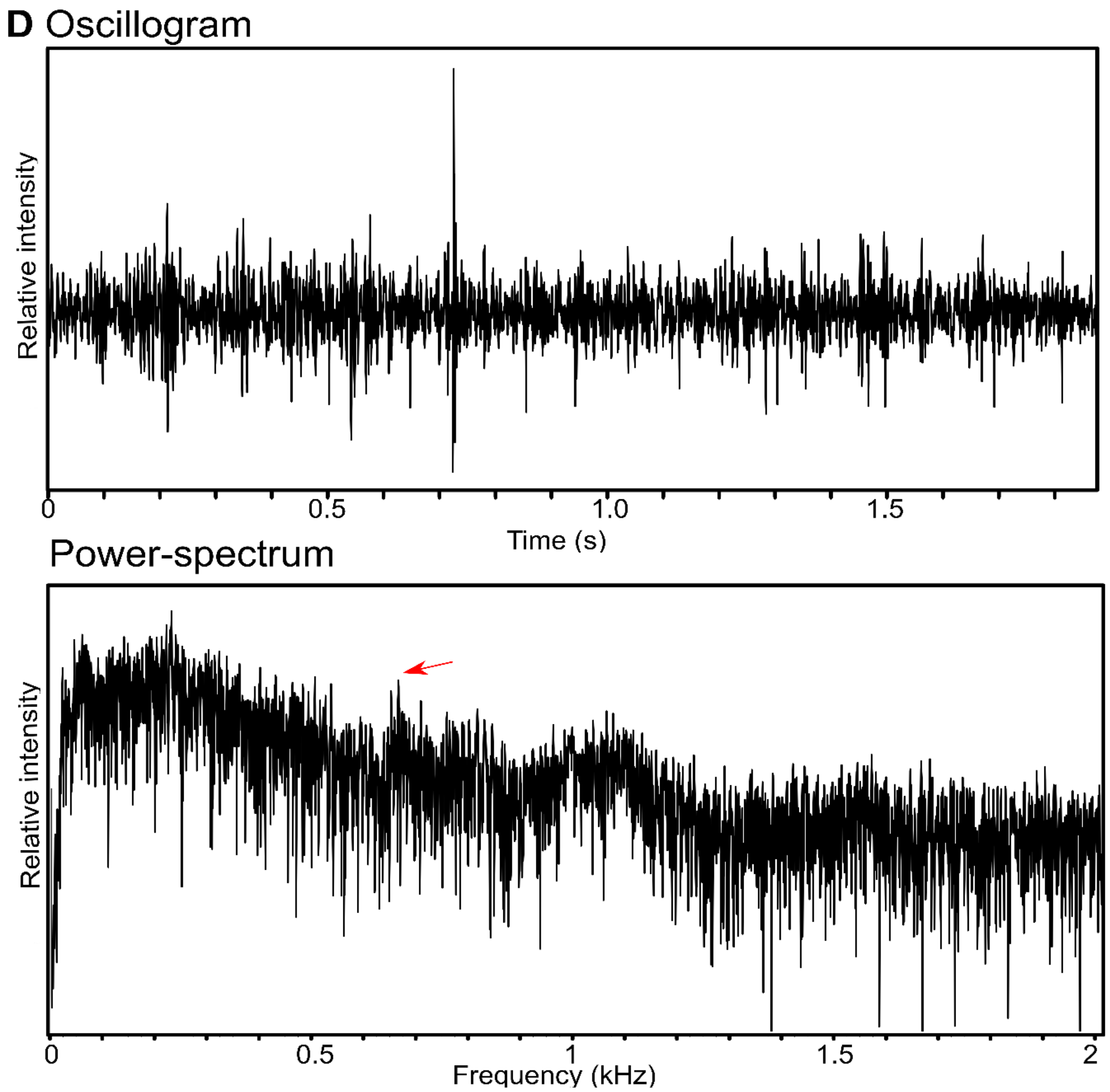

Fig. SP2 Oscillogram (top) and power-spectrum (bottom) of Pulse Series *stricto sensu* sounds. D PS9

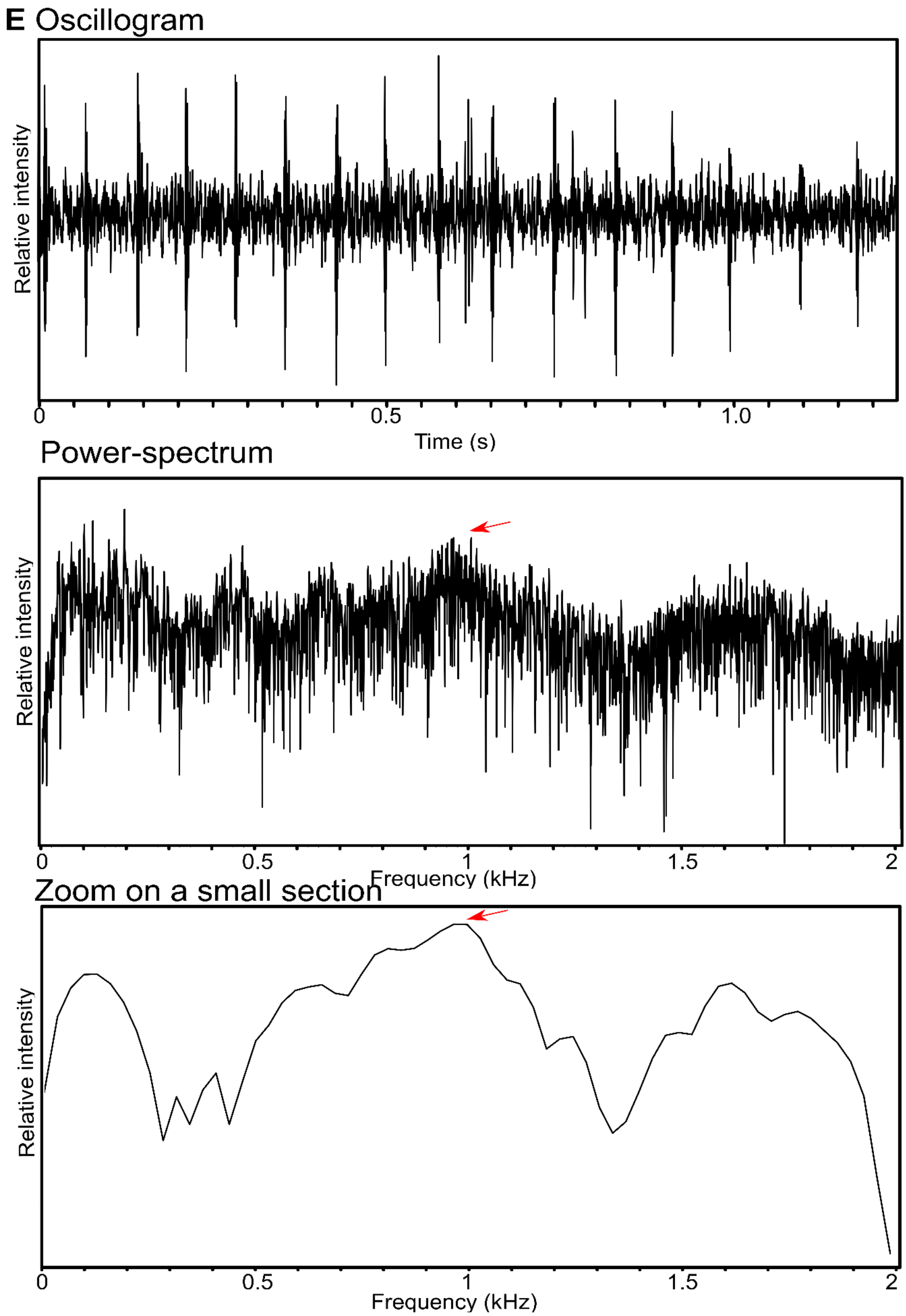

Fig. SP2 Oscillogram (top) and power-spectrum (bottom) of Pulse Series *stricto sensu* sounds. E PS11

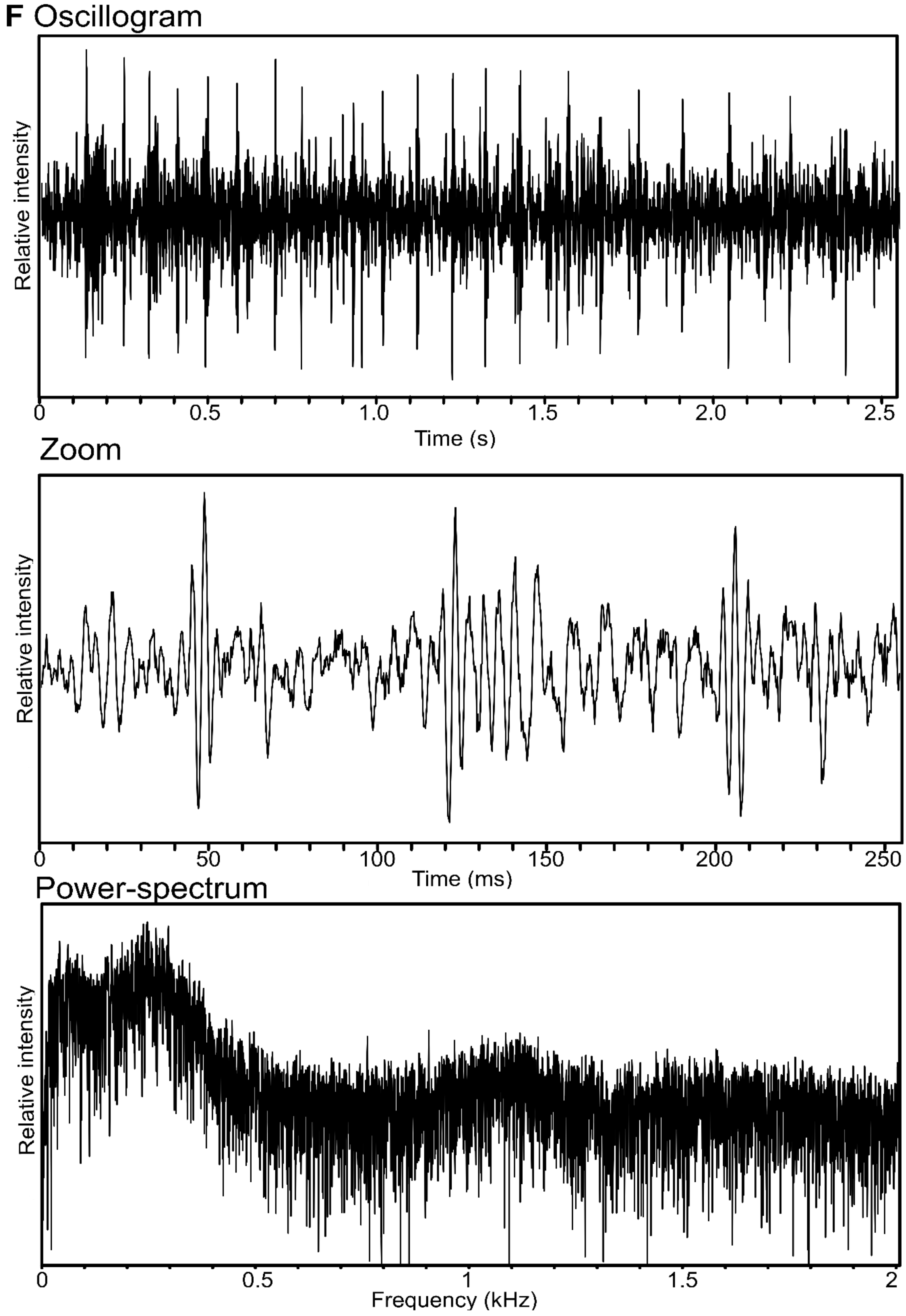

Fig. SP2 Oscillogram (top) and power-spectrum (bottom) of Pulse Series *stricto sensu* sounds. F PS10

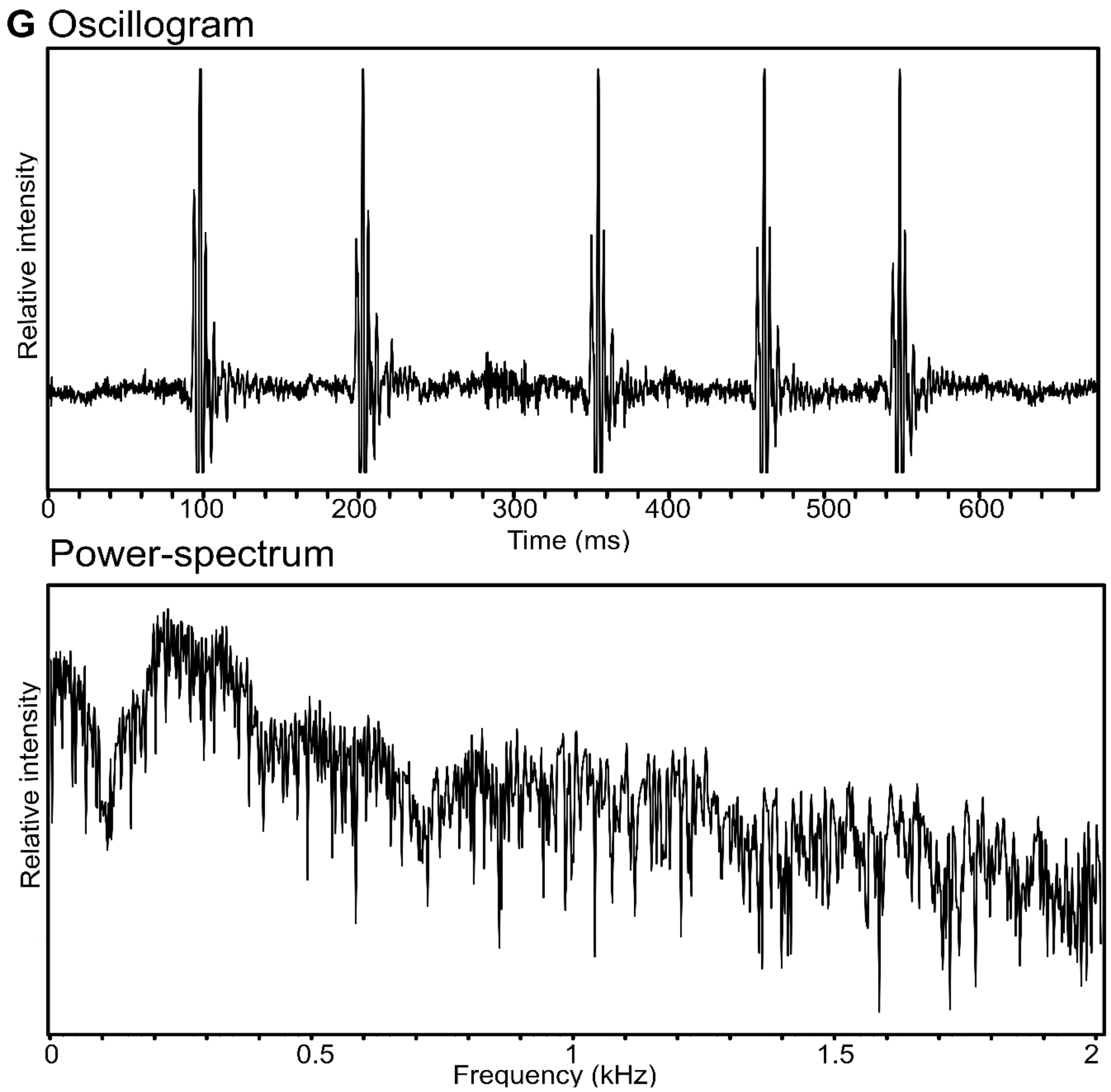

Fig. SP2 Oscillogram (top) and power-spectrum (bottom) of Pulse Series *stricto sensu* sounds. G PS15

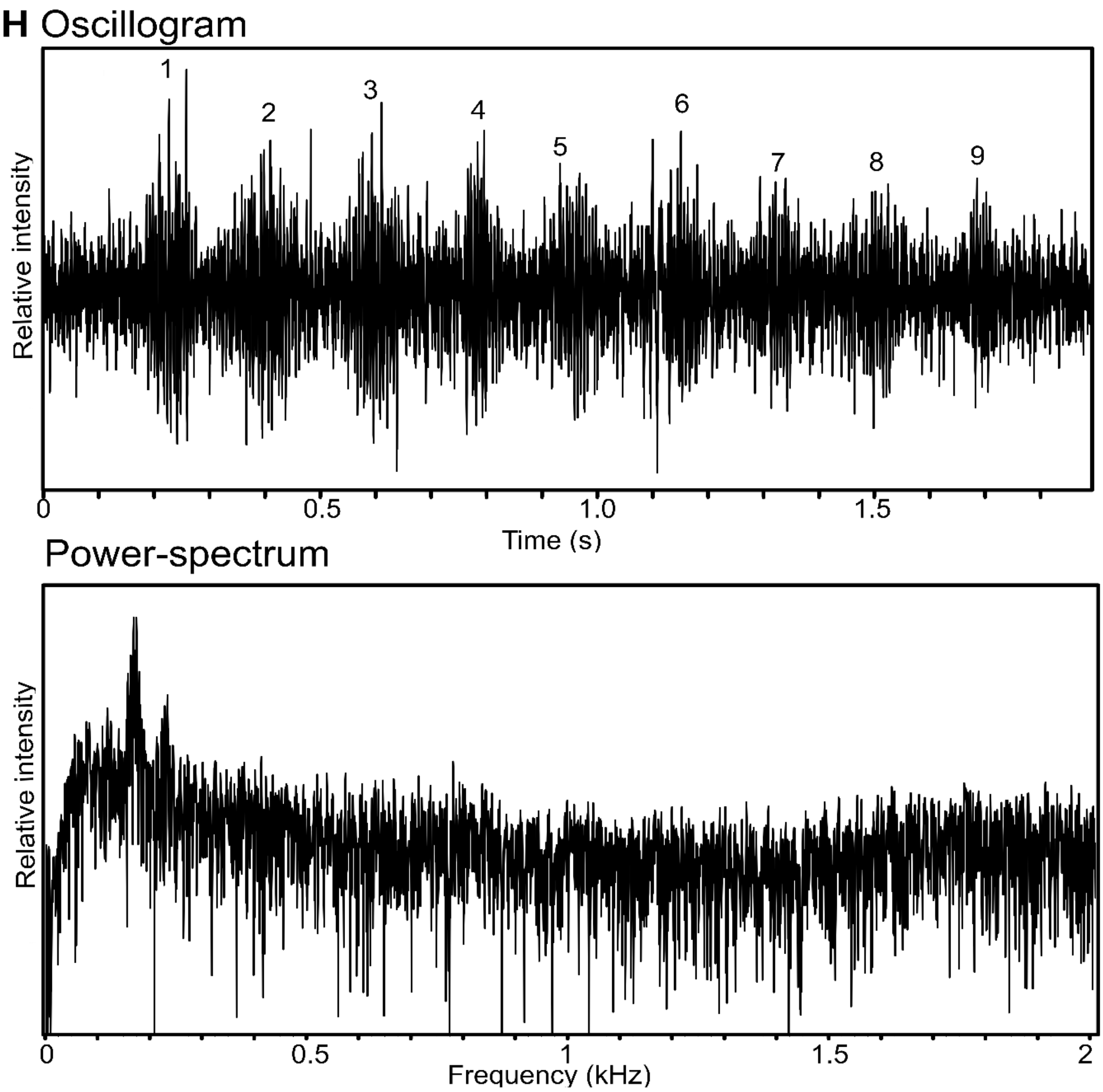

Fig. SP2 Oscillogram (top) and power-spectrum (bottom) of Pulse Series *stricto sensu* sounds. H PS8

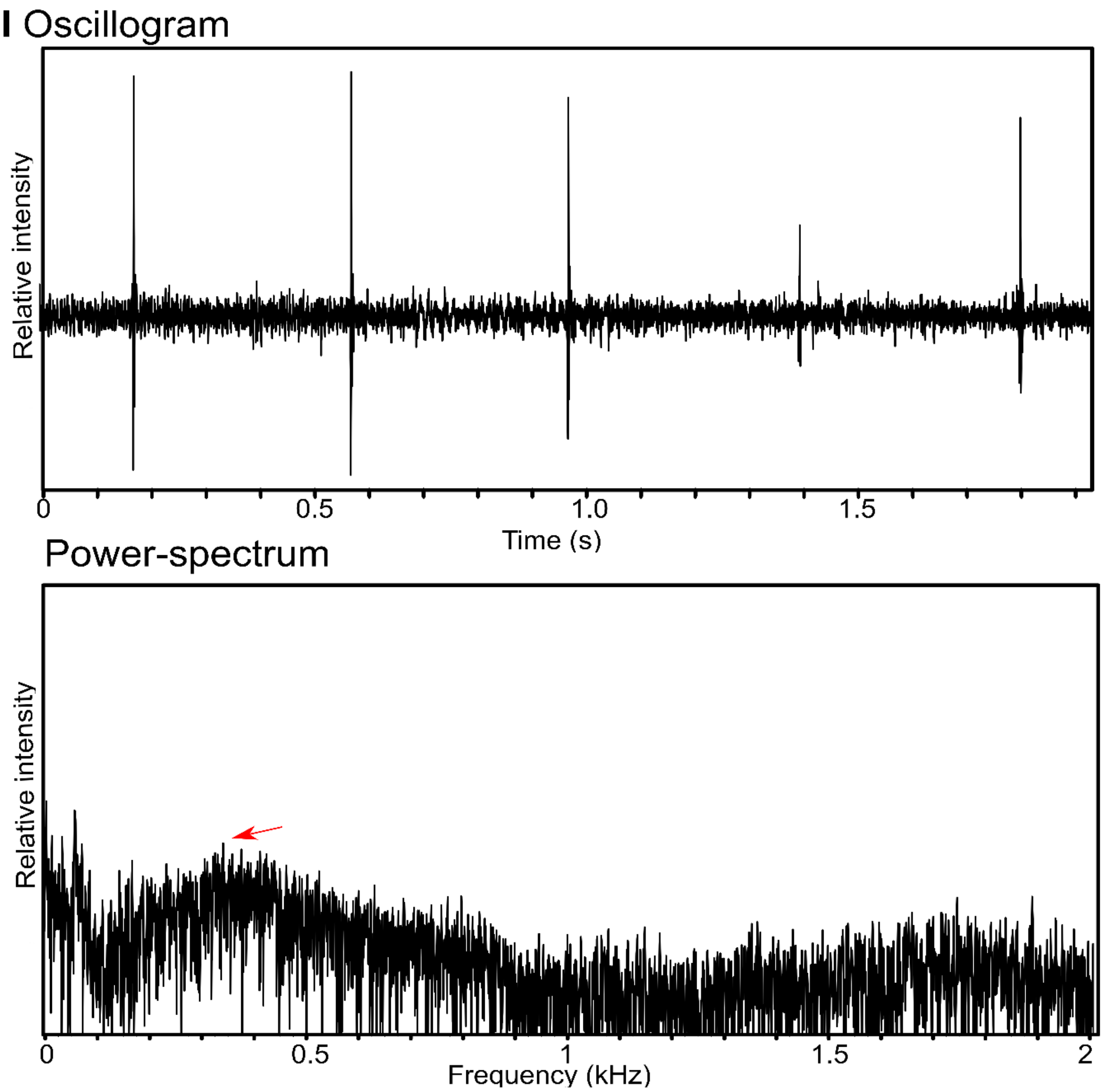

Fig. SP2 Oscillogram (top) and power-spectrum (bottom) of Pulse Series *stricto sensu* sounds. I PS12

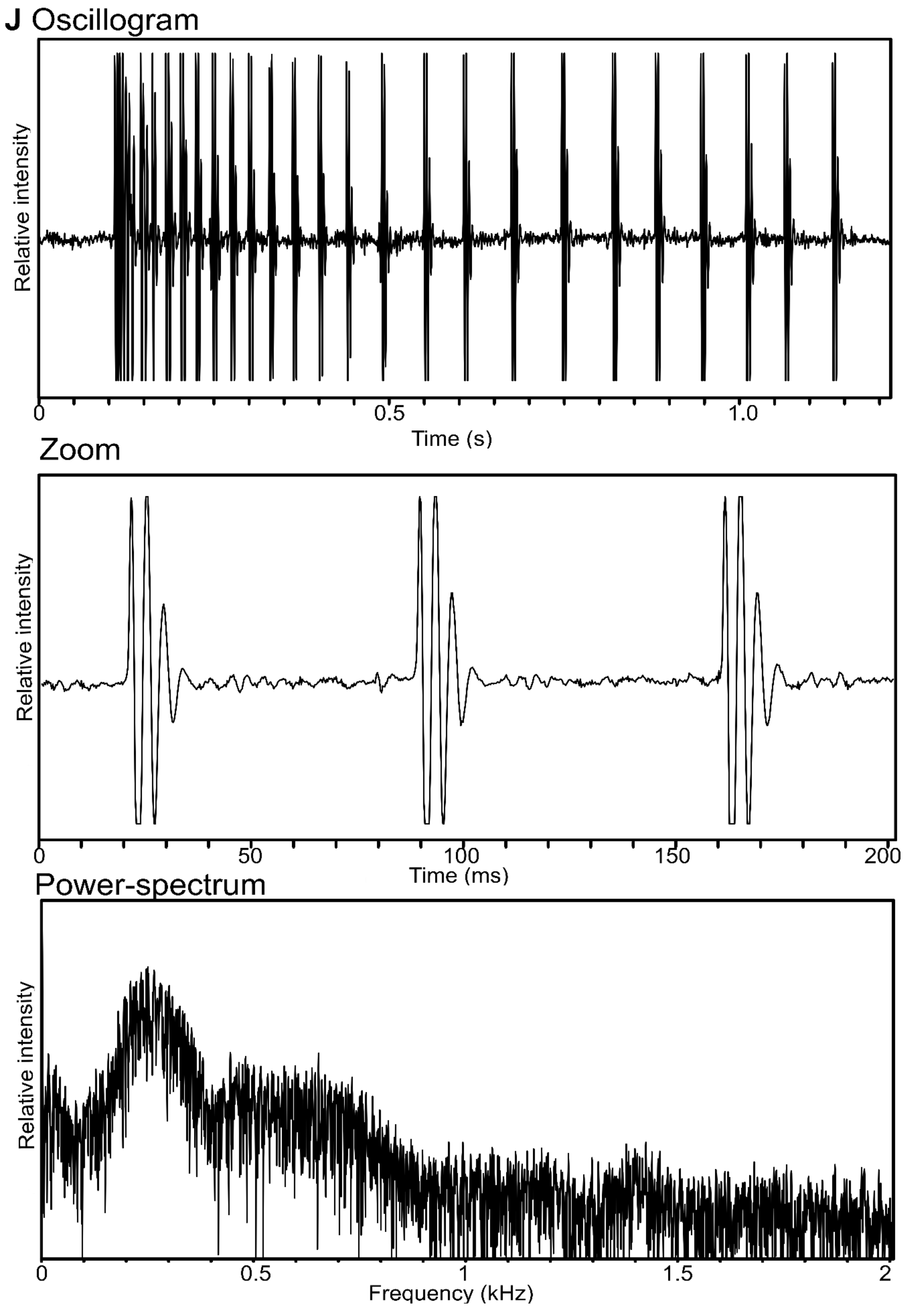

Fig. SP2 Oscillogram (top) and power-spectrum (bottom) of Pulse Series *stricto sensu* sounds. J PS13

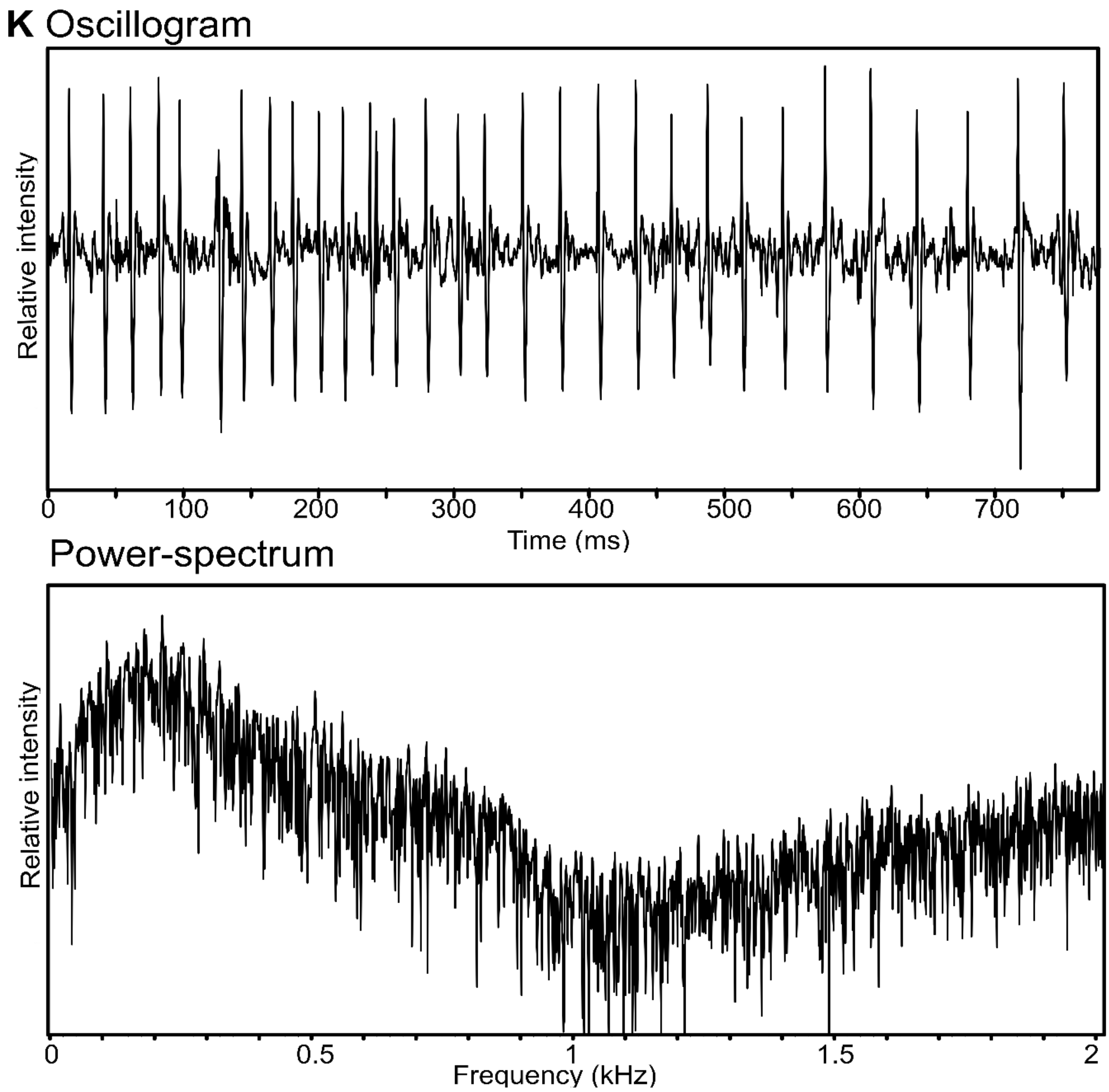

Fig. SP2 Oscillogram (top) and power-spectrum (bottom) of Pulse Series *stricto sensu* sounds. K FPT1

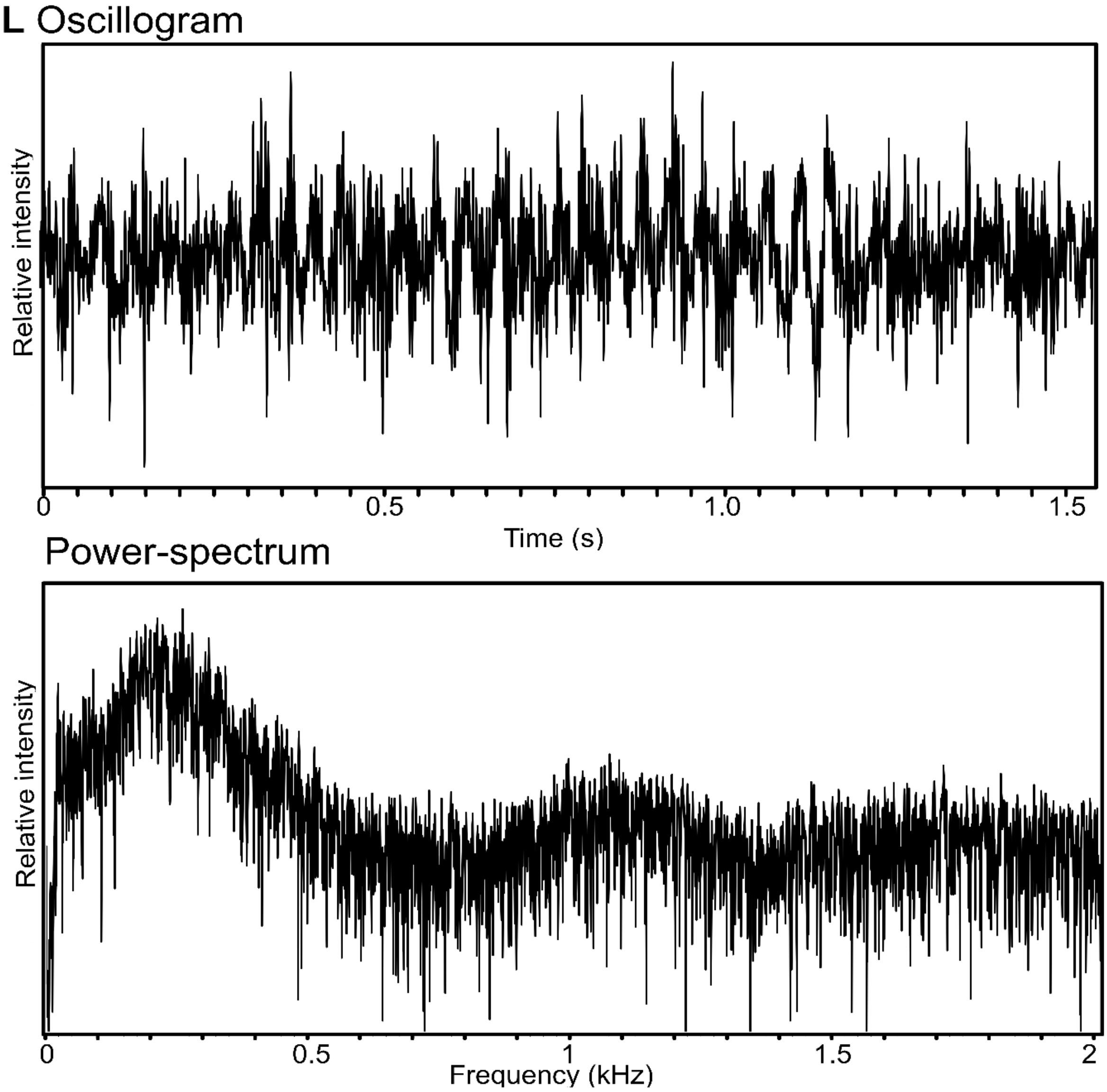

Fig. SP2 Oscillogram (top) and power-spectrum (bottom) of Pulse Series *stricto sensu* sounds. L FPT2

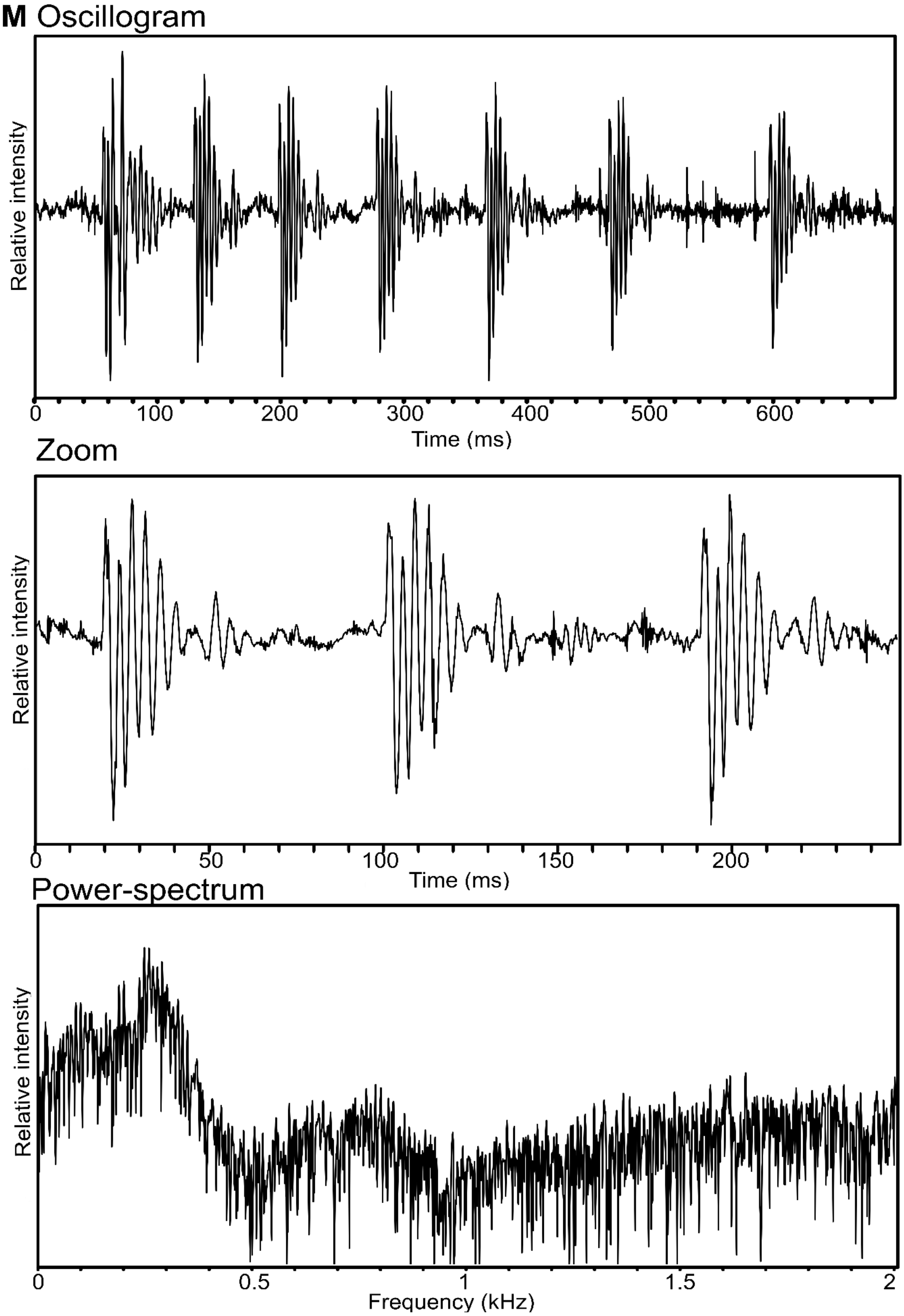

Fig. SP2 Oscillogram (top) and power-spectrum (bottom) of Pulse Series *stricto sensu* sounds. M PS7

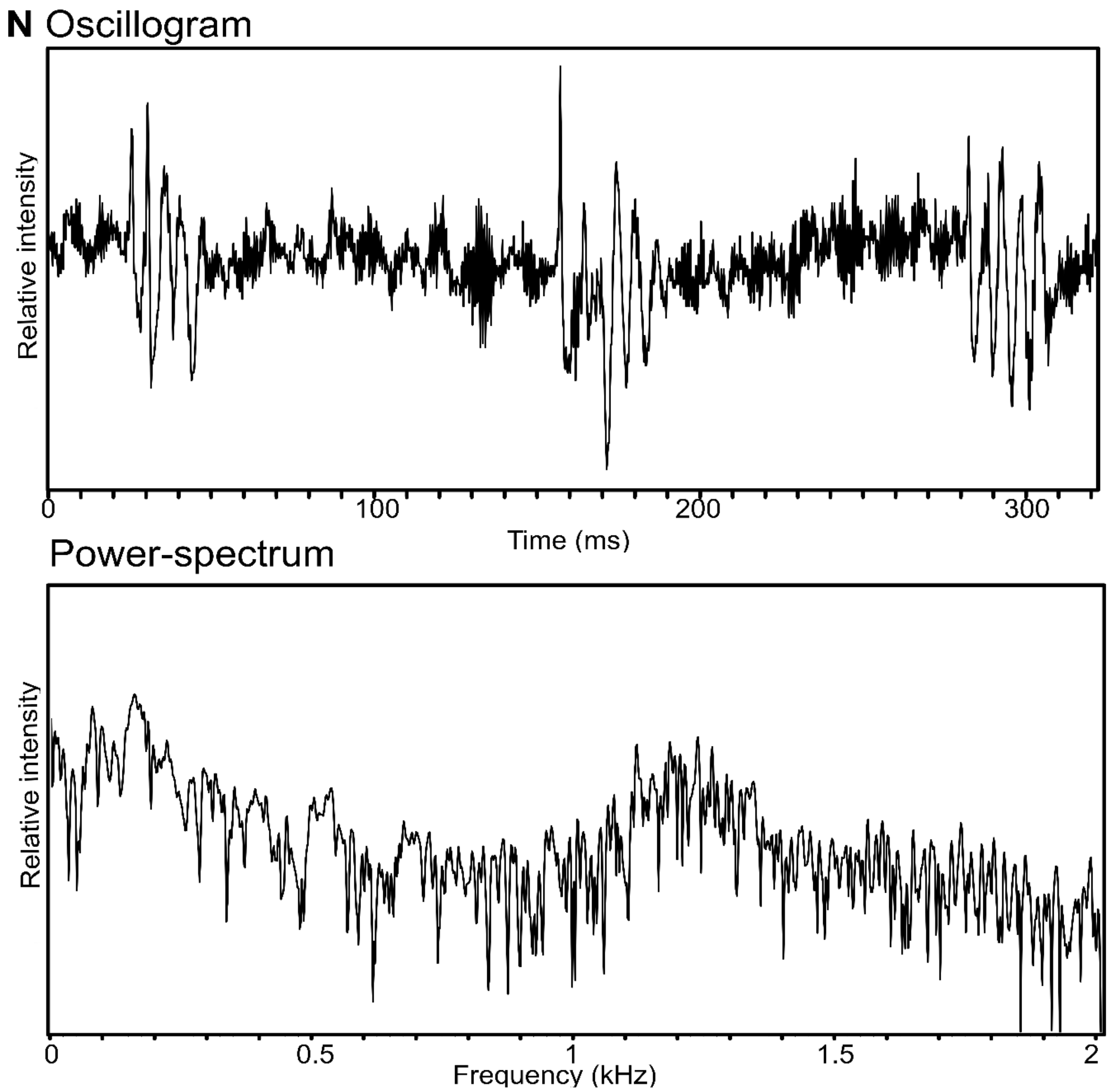

Fig. SP2 Oscillogram (top) and power-spectrum (bottom) of Pulse Series *stricto sensu* sounds. N PS4

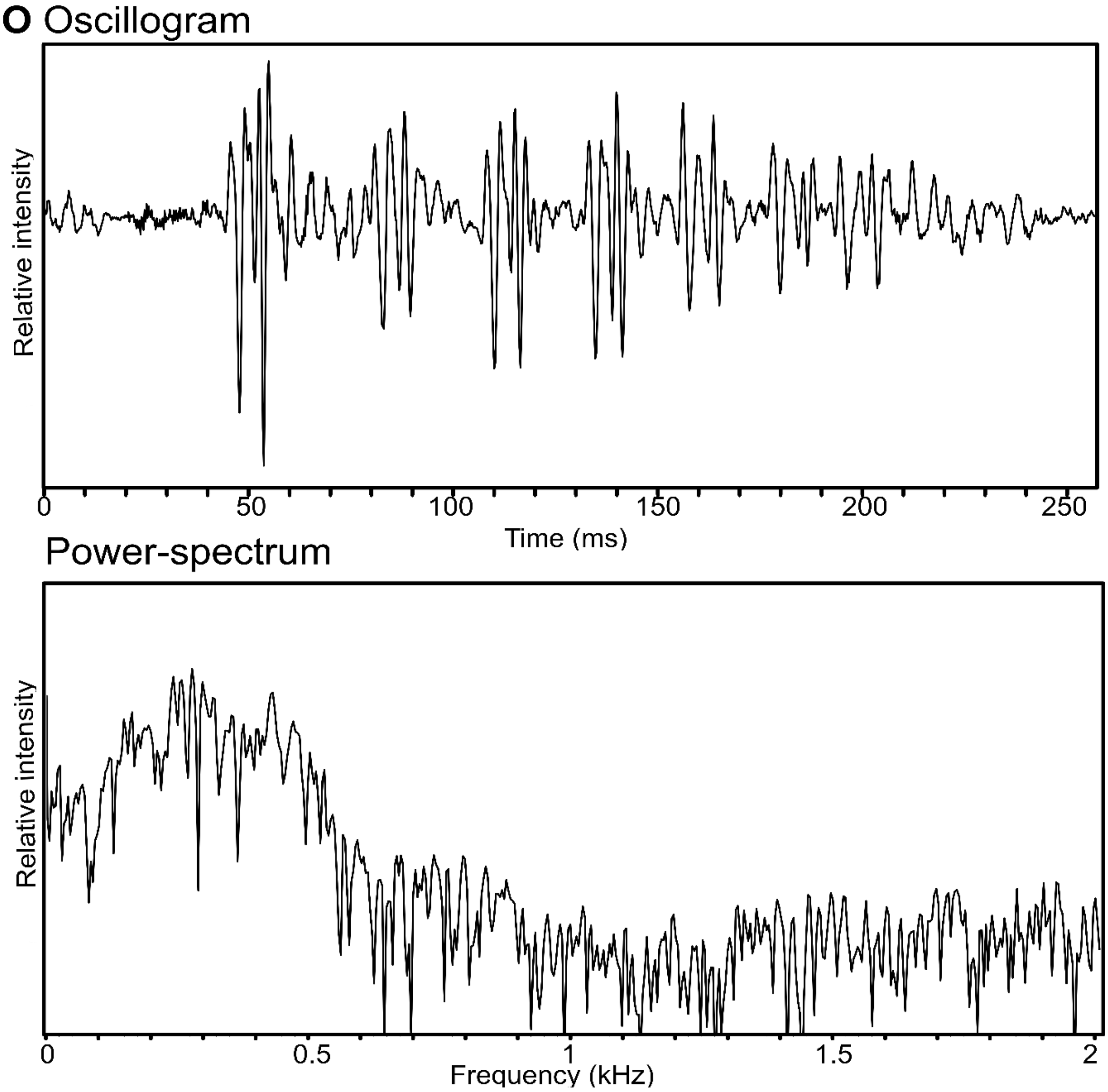

Fig. SP2 Oscillogram (top) and power-spectrum (bottom) of Pulse Series *stricto sensu* sounds. O FPT3

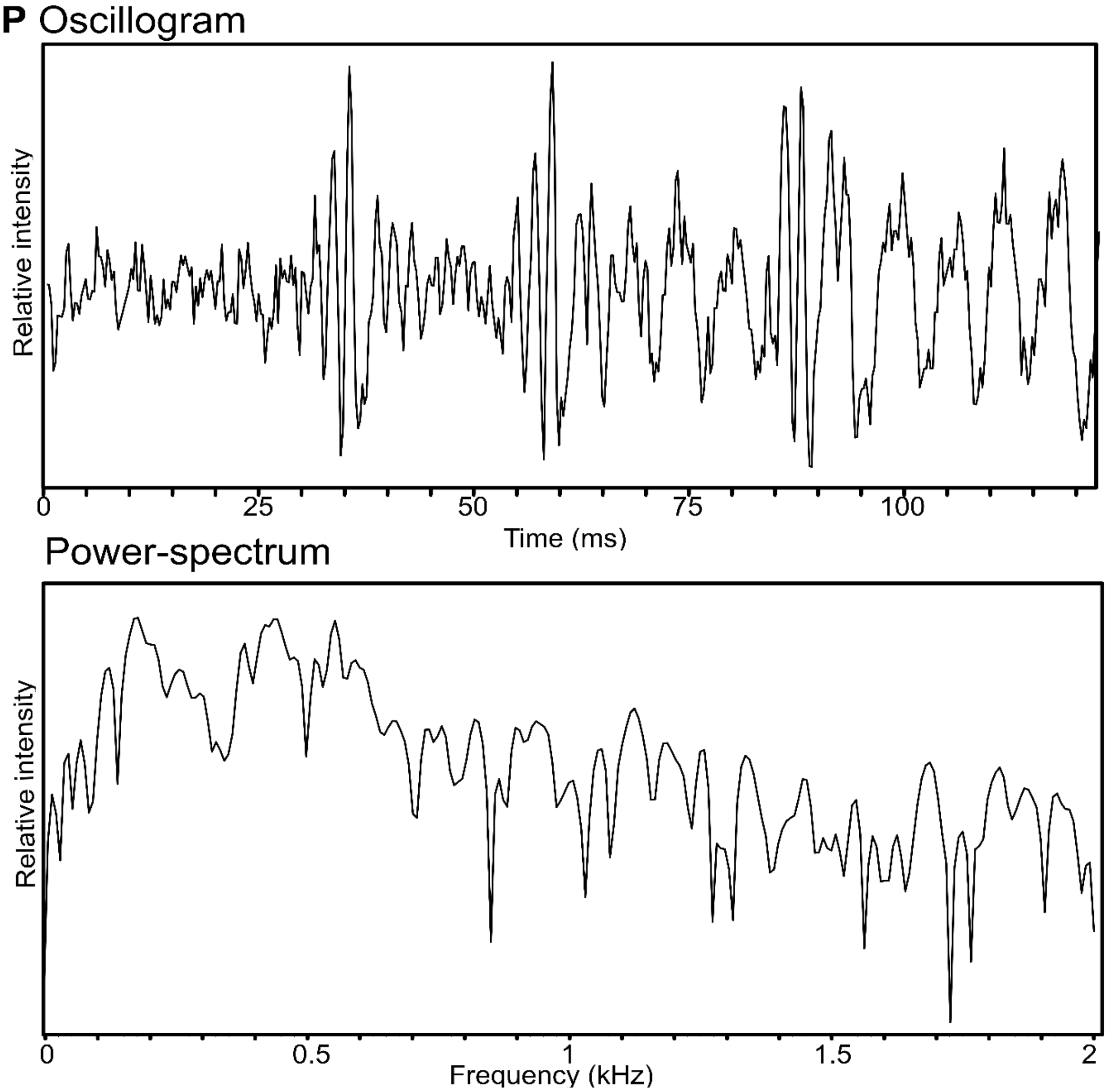

Fig. SP2 Oscillogram (top) and power-spectrum (bottom) of Pulse Series *stricto sensu* sounds. P FPT4

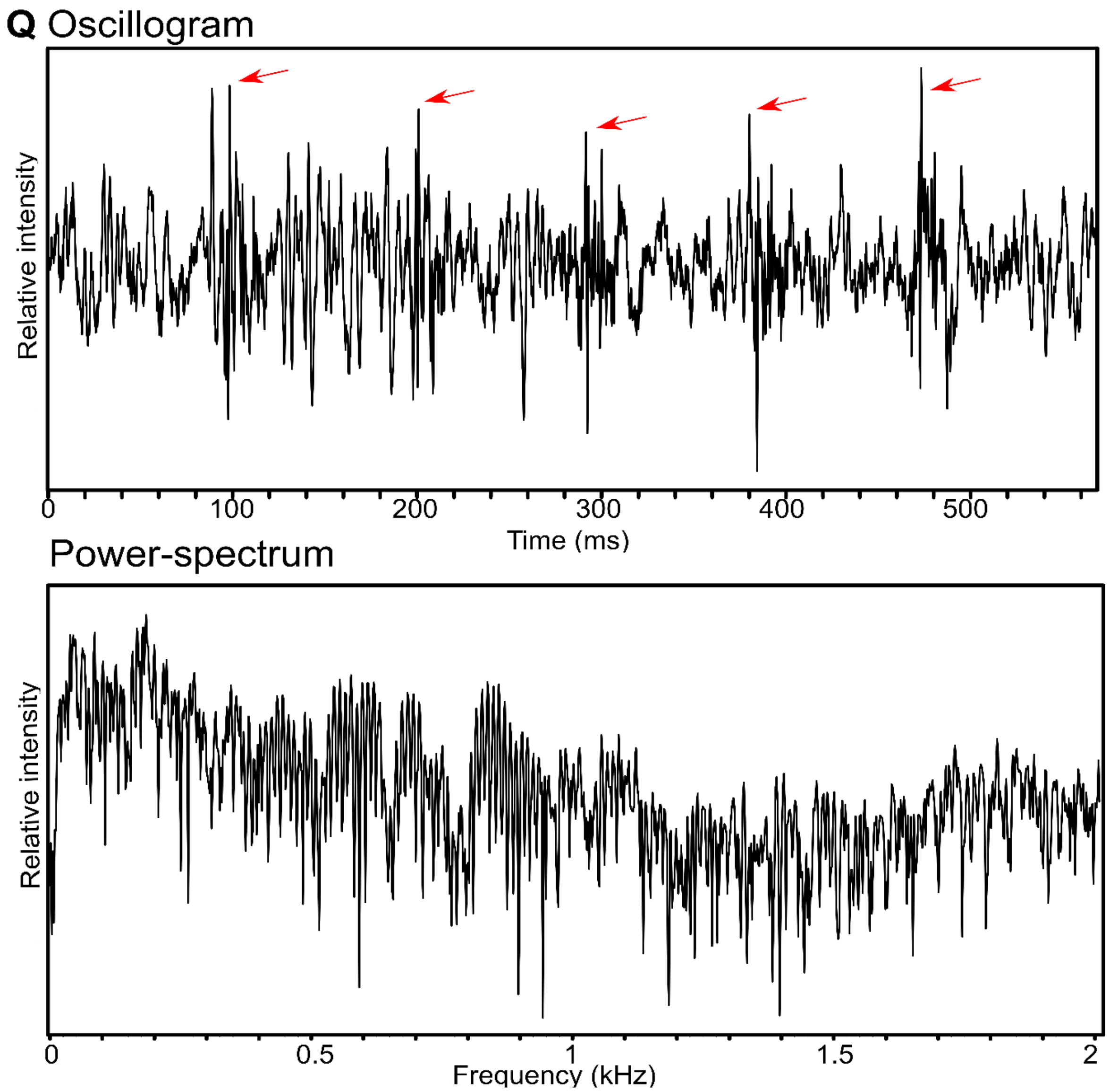

Fig. SP2 Oscillogram (top) and power-spectrum (bottom) of Pulse Series *stricto sensu* sounds. Q PS1

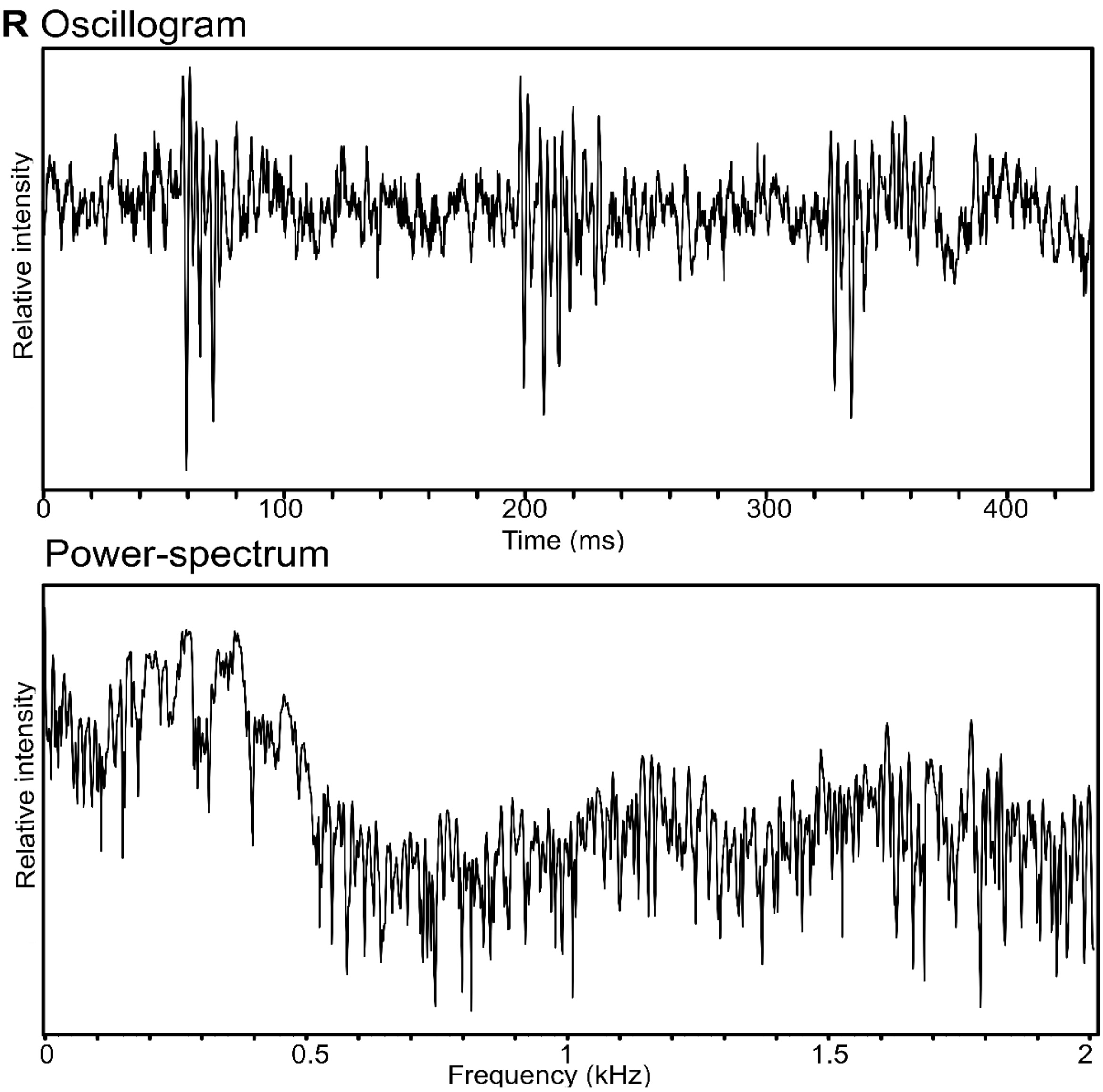

Fig. SP2 Oscillogram (top) and power-spectrum (bottom) of Pulse Series *stricto sensu* sounds. R PS3

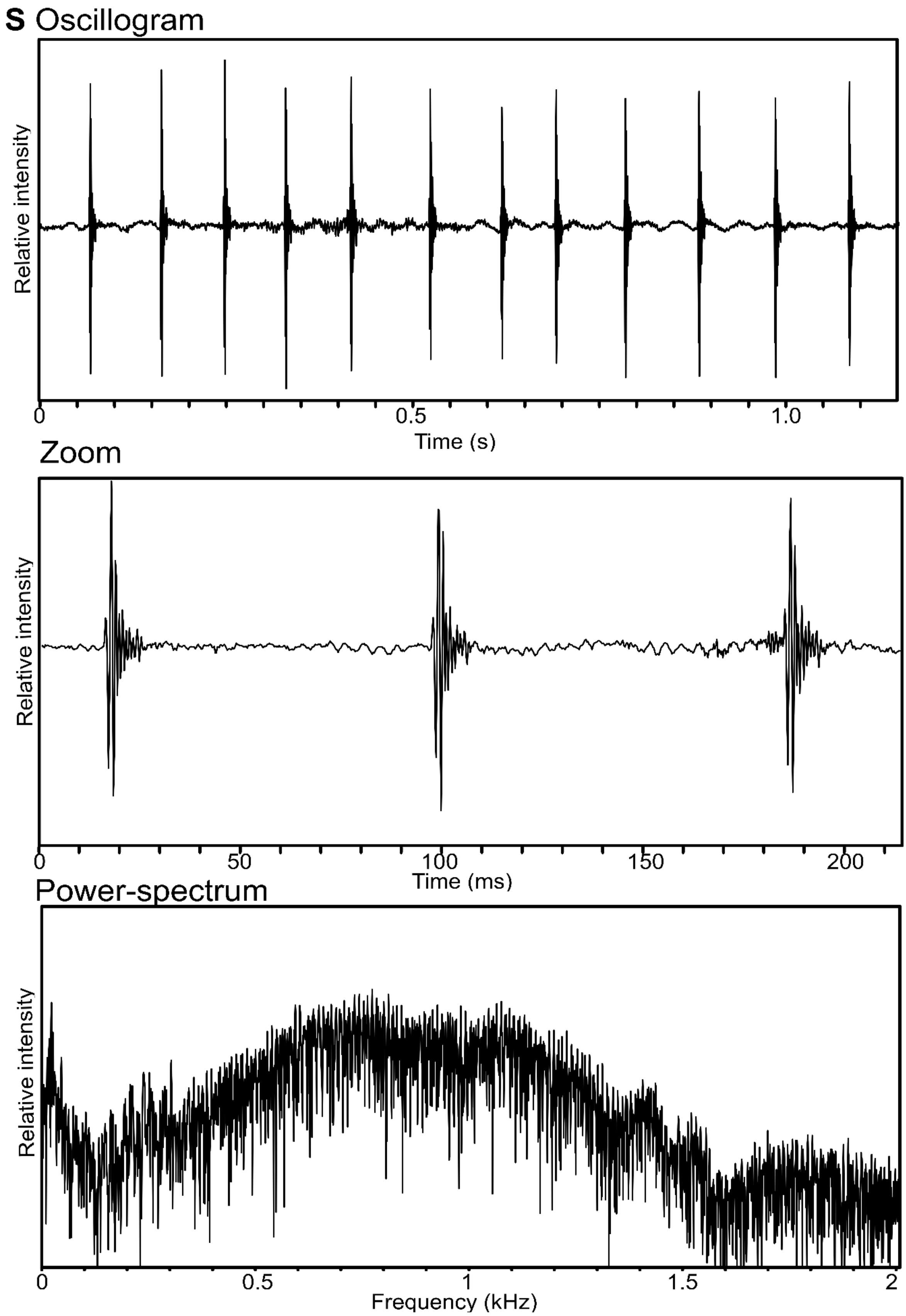

Fig. SP2 Oscillogram (top) and power-spectrum (bottom) of Pulse Series *stricto sensu* sounds. S PS2

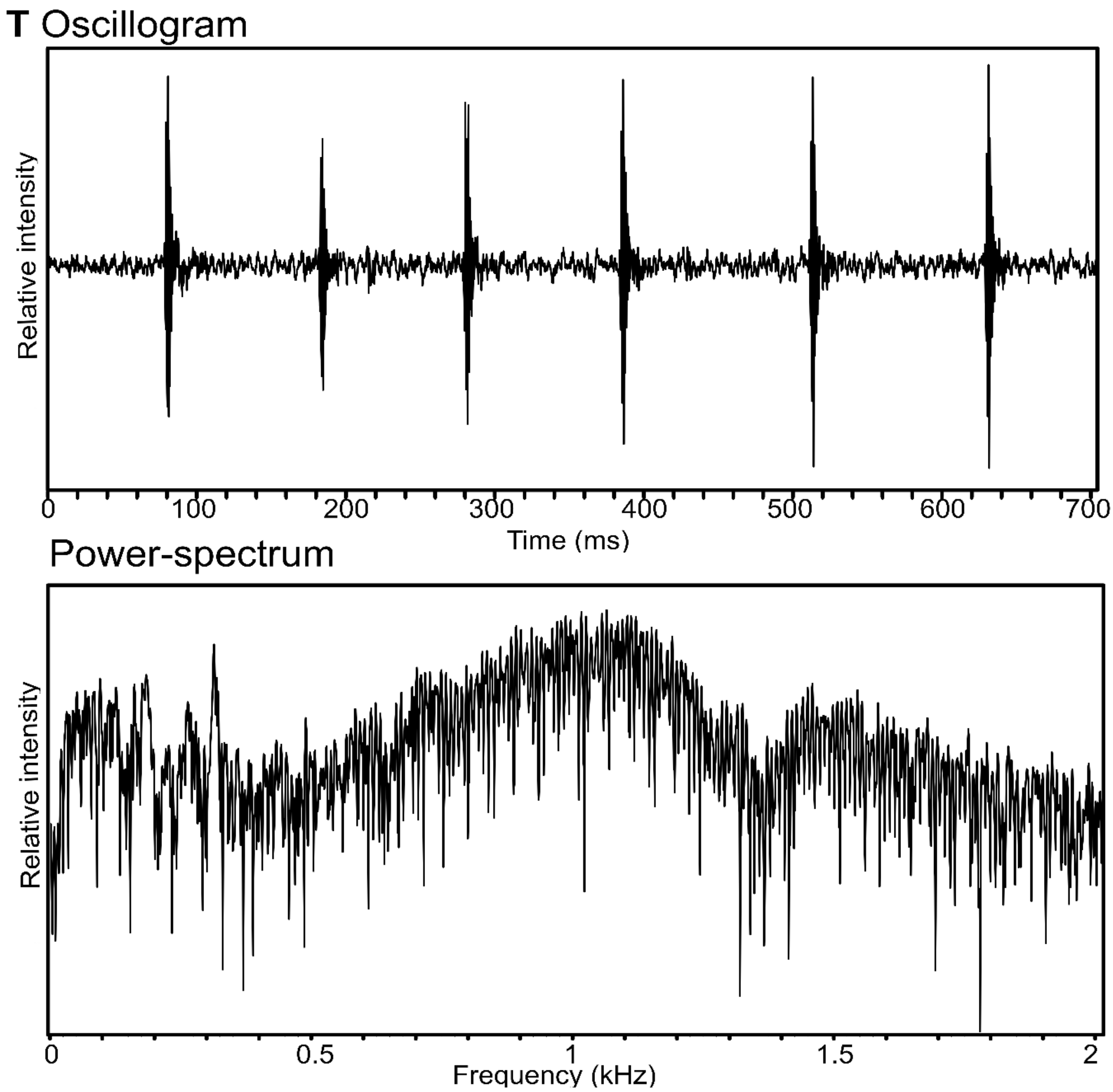

Fig. SP2 Oscillogram (top) and power-spectrum (bottom) of Pulse Series *stricto sensu* sounds. T PS16

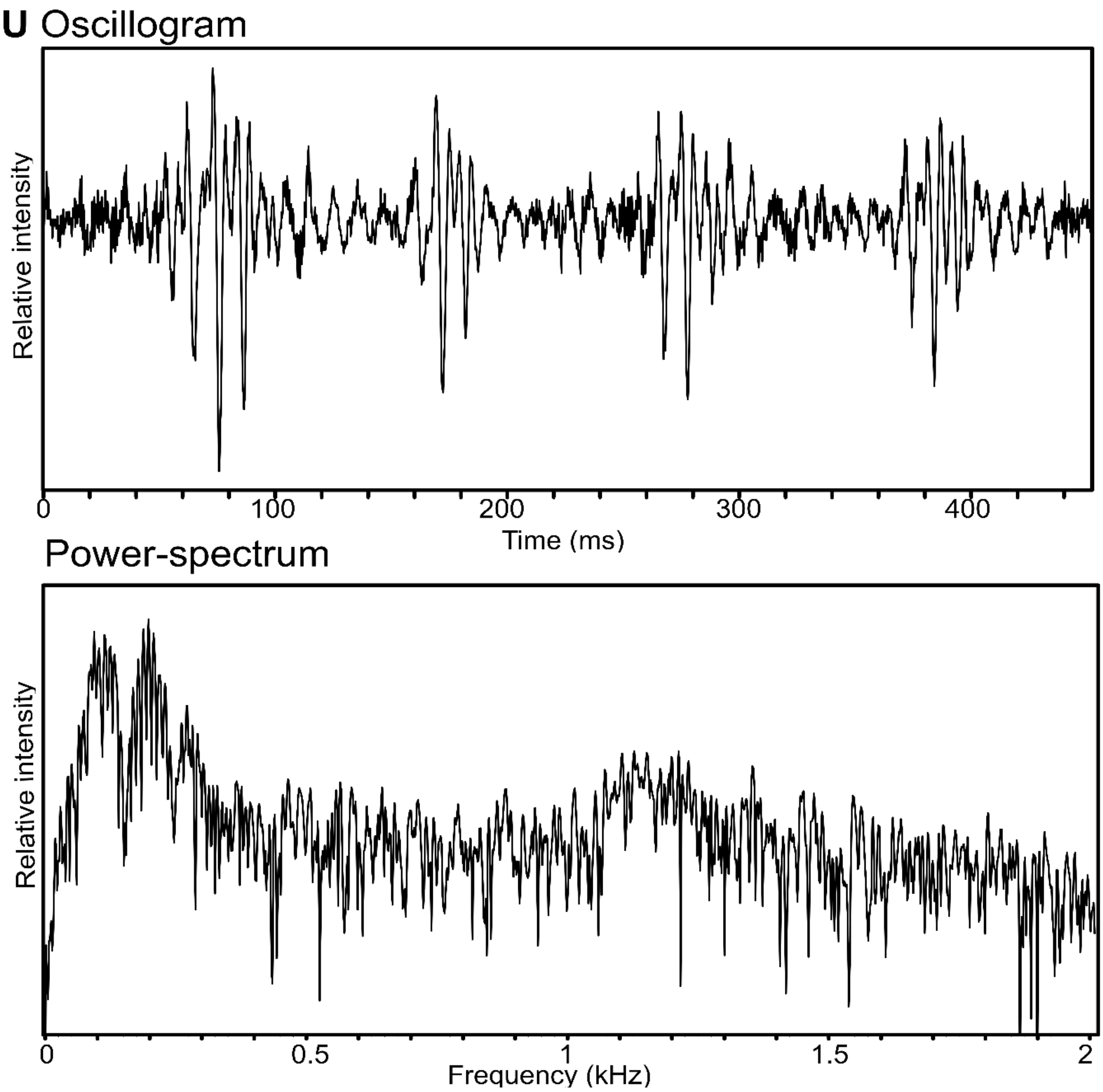

Fig. SP2 Oscillogram (top) and power-spectrum (bottom) of Pulse Series *stricto sensu* sounds. U PS17

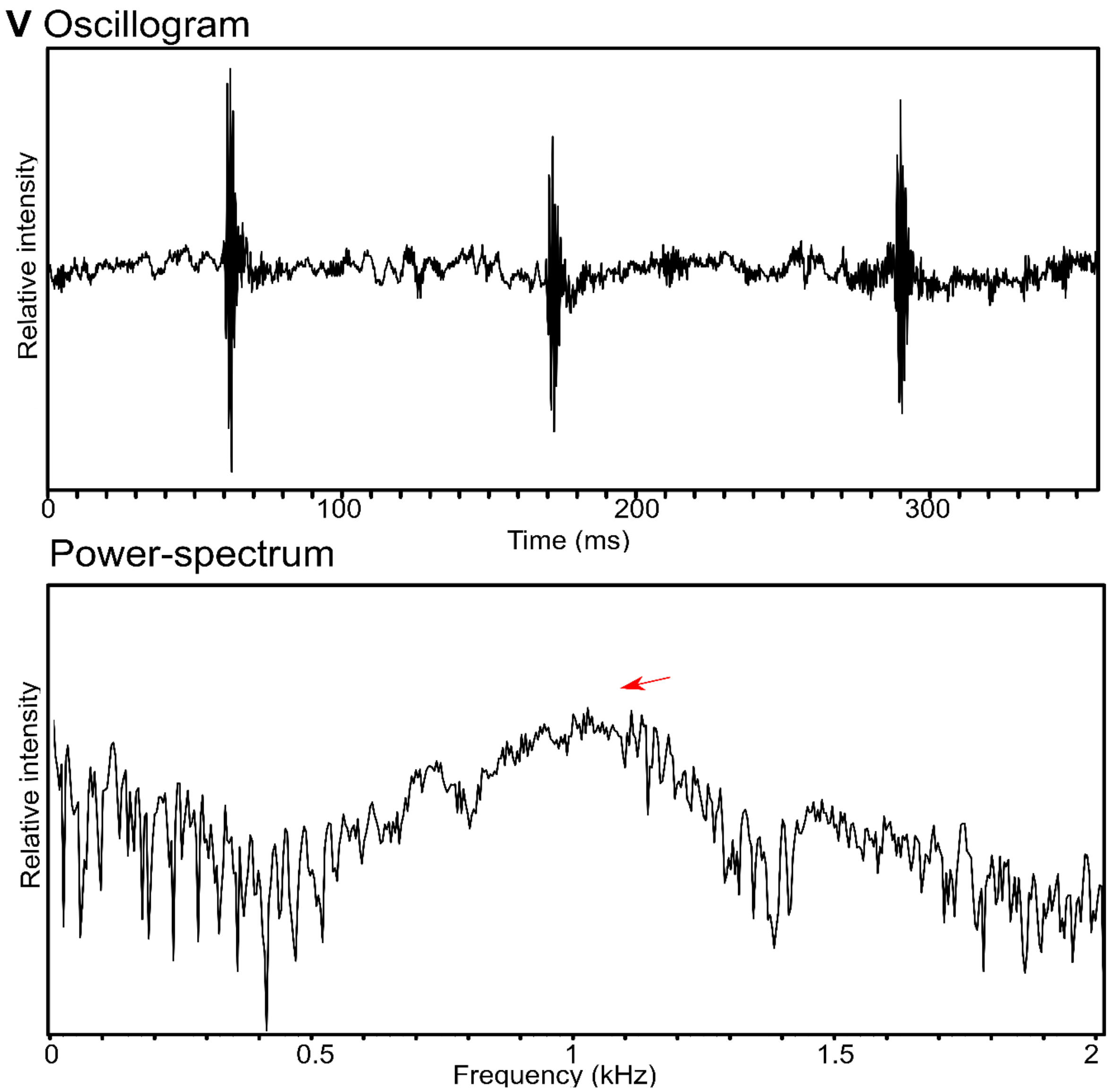

Fig. SP2 Oscillogram (top) and power-spectrum (bottom) of Pulse Series *stricto sensu* sounds. V PS5

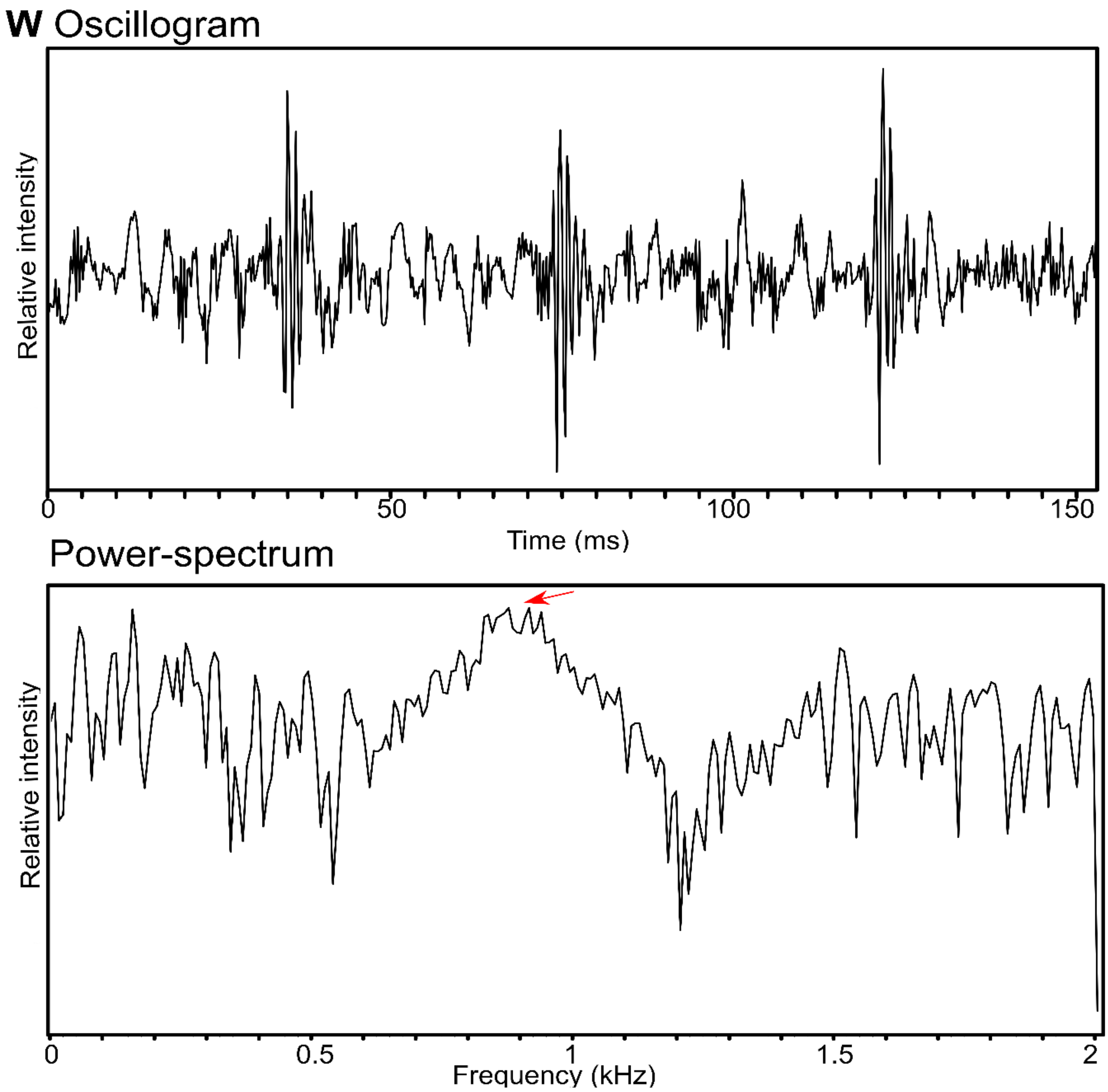

Fig. SP2 Oscillogram (top) and power-spectrum (bottom) of Pulse Series *stricto sensu* sounds., **W** FPT5

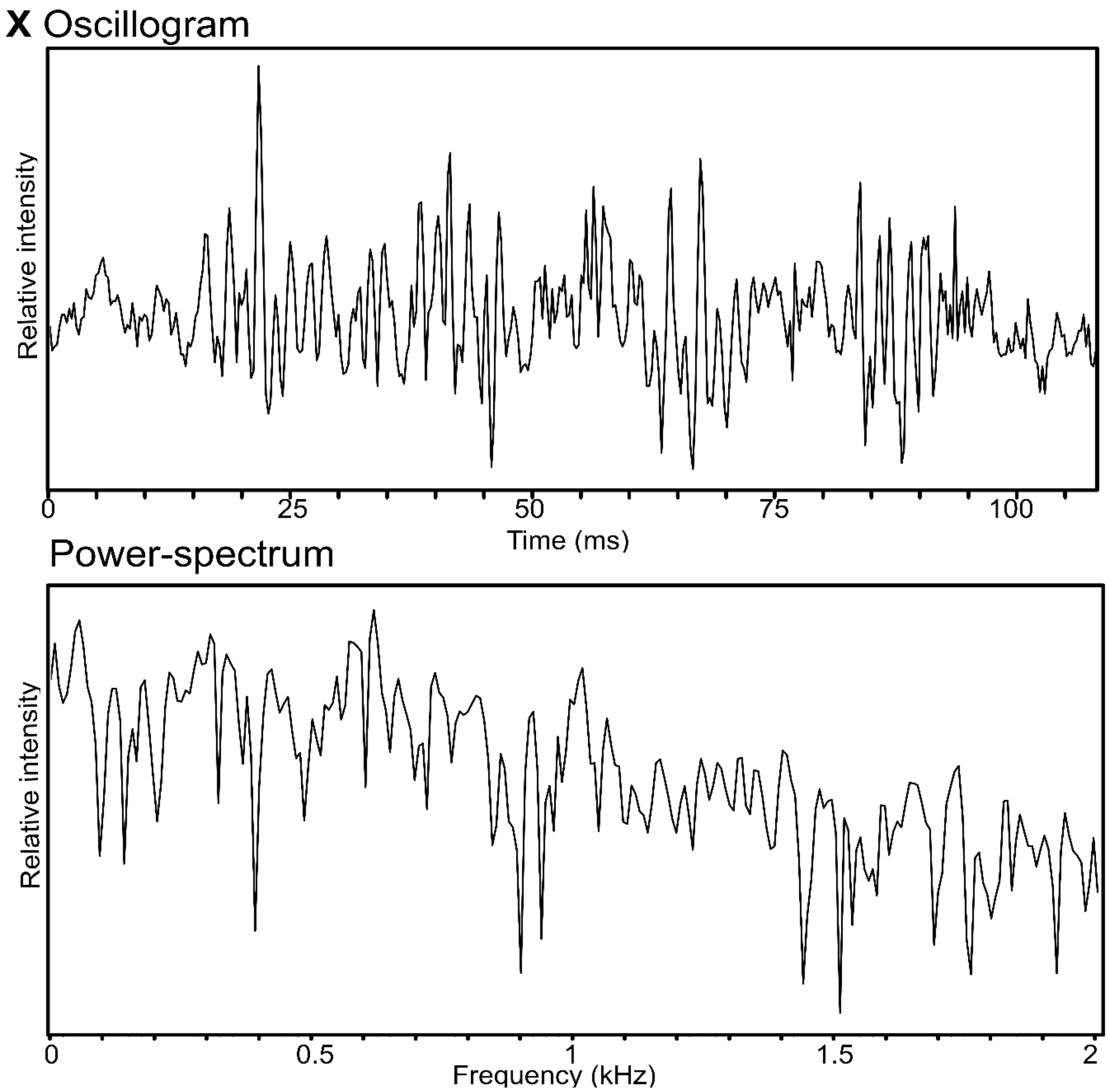

Fig. SP2 Oscillogram (top) and power-spectrum (bottom) of Pulse Series *stricto sensu* sounds. X FPT6

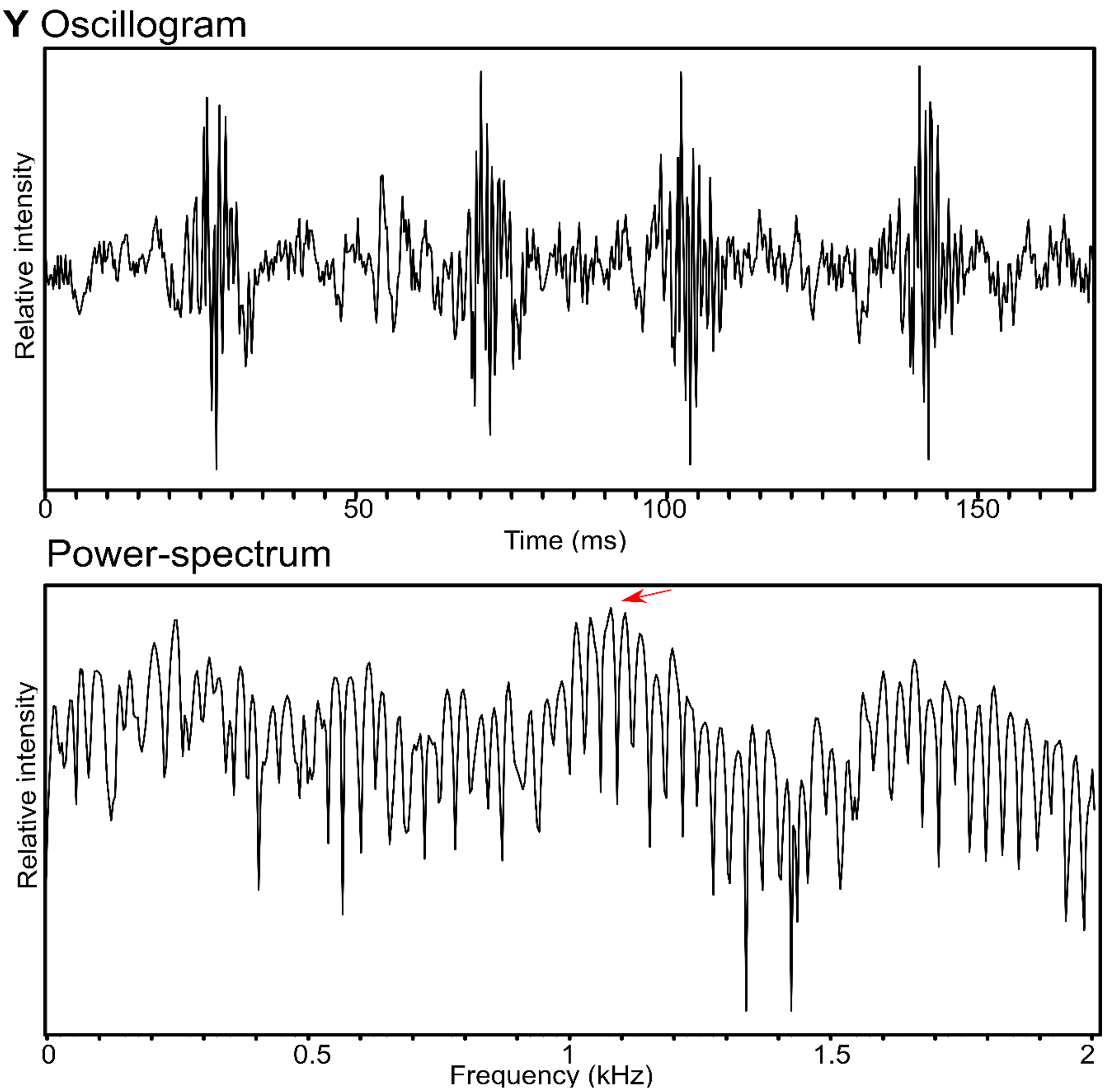

Fig. SP2 Oscillogram (top) and power-spectrum (bottom) of Pulse Series *stricto sensu* sounds. Y FPT7

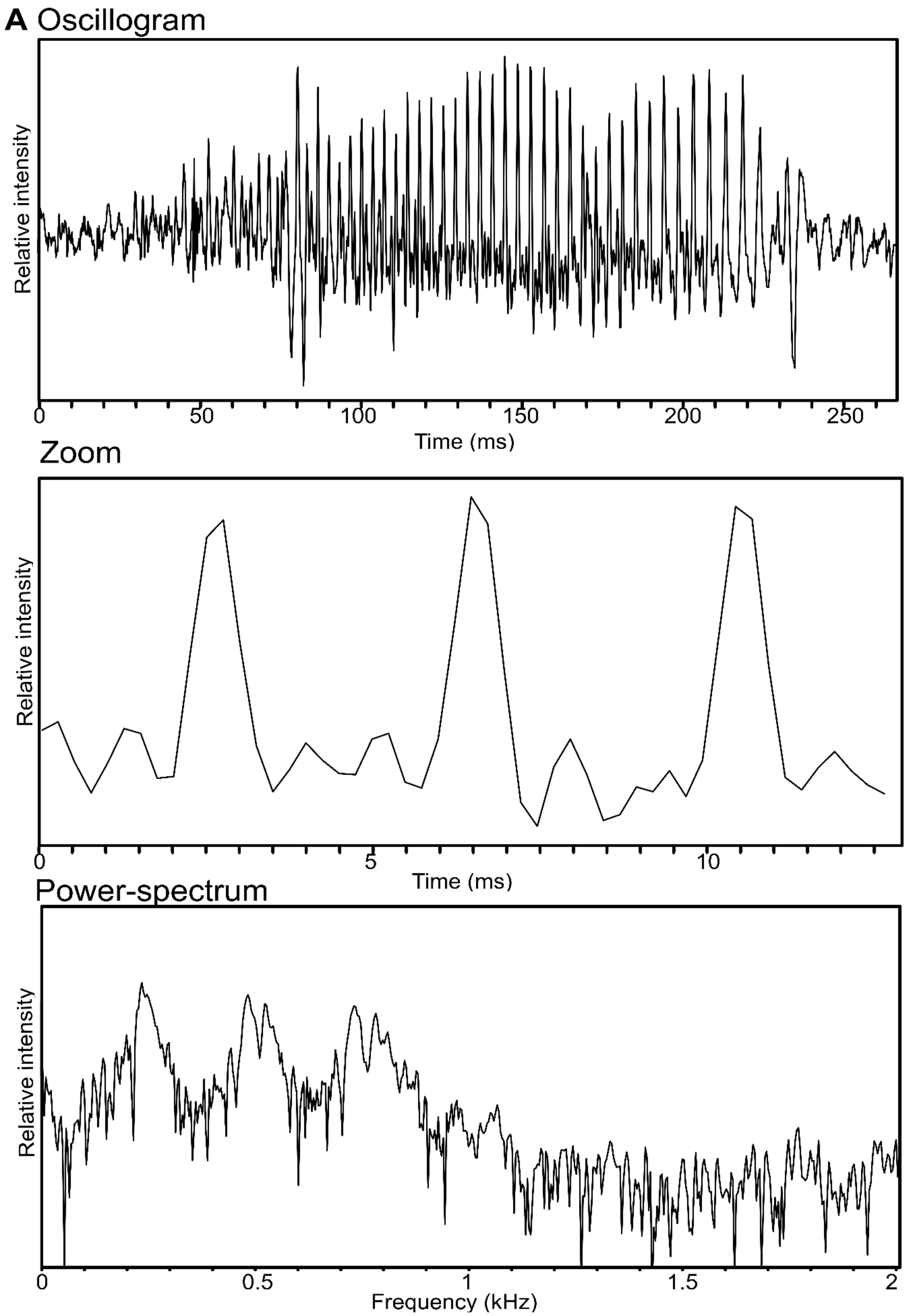

Fig. SP3 Oscillogram (top) and power-spectrum (bottom) of frequency modulated and arched sounds. A

DS3

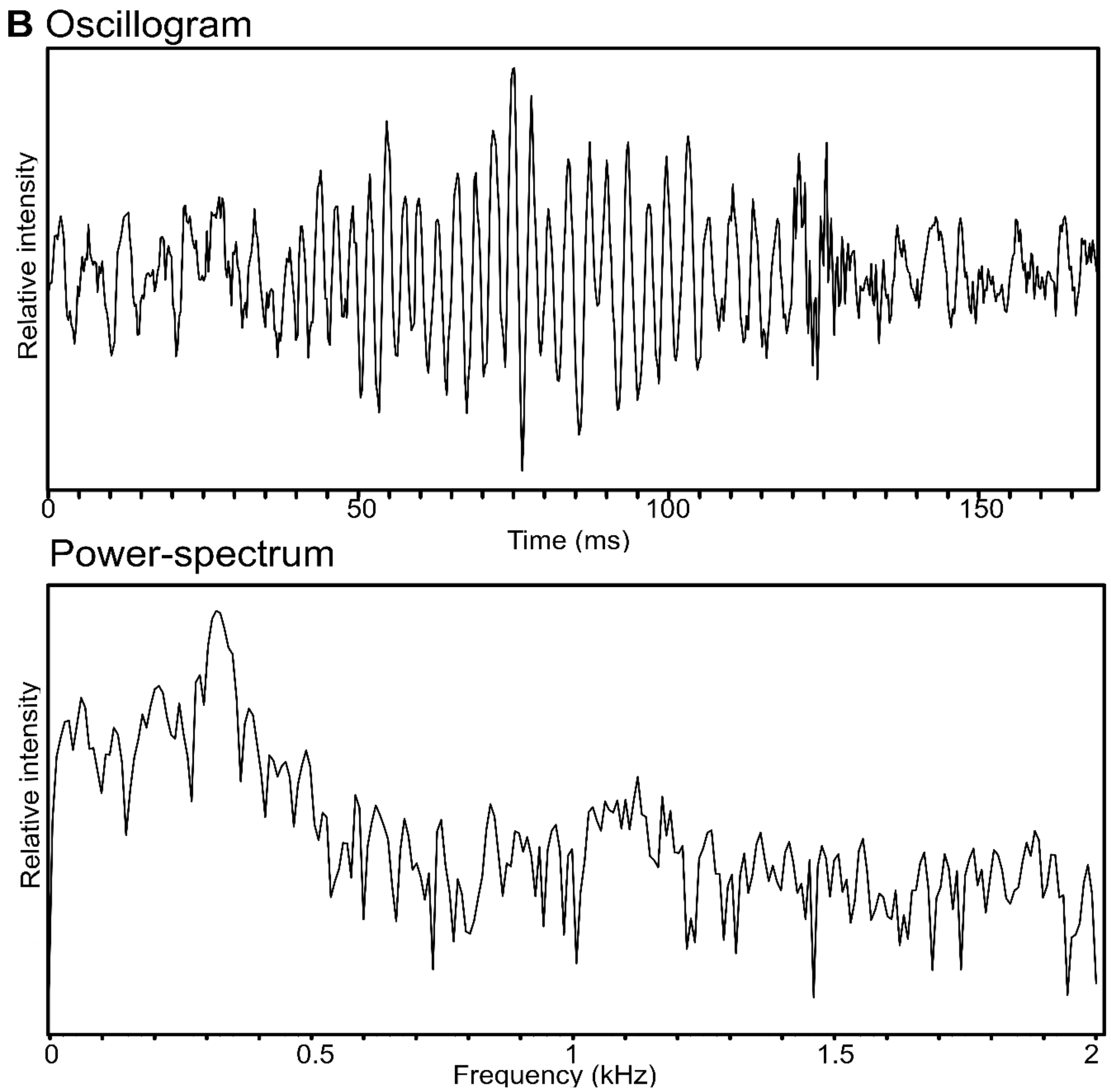

Fig. SP3 Oscillogram (top) and power-spectrum (bottom) of frequency modulated and arched sounds. B

DS1

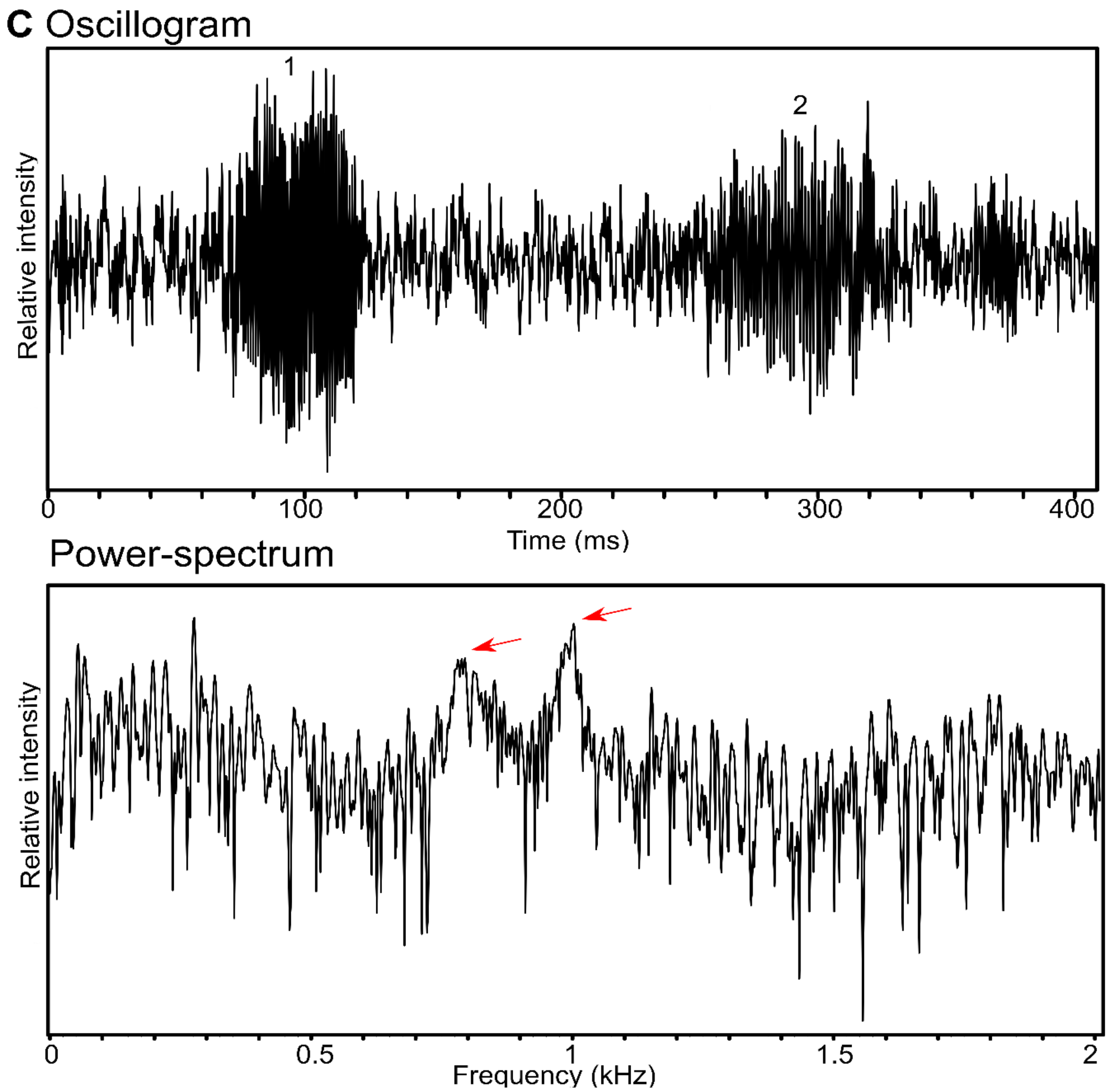

Fig. SP3 Oscillogram (top) and power-spectrum (bottom) of frequency modulated and arched sounds. C
DS7

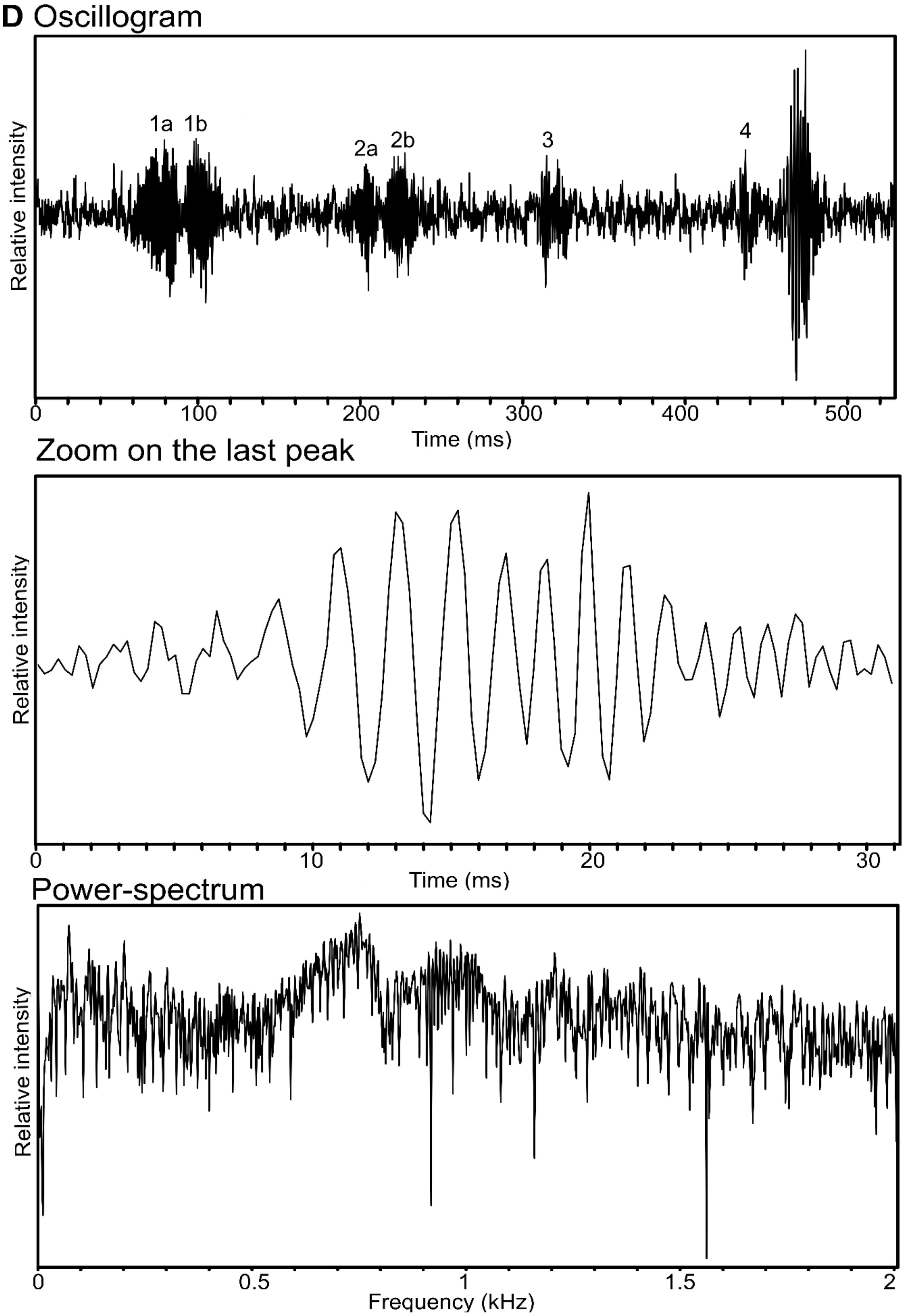

Fig. SP3 Oscillogram (top) and power-spectrum (bottom) of frequency modulated and arched sounds. D
DS8

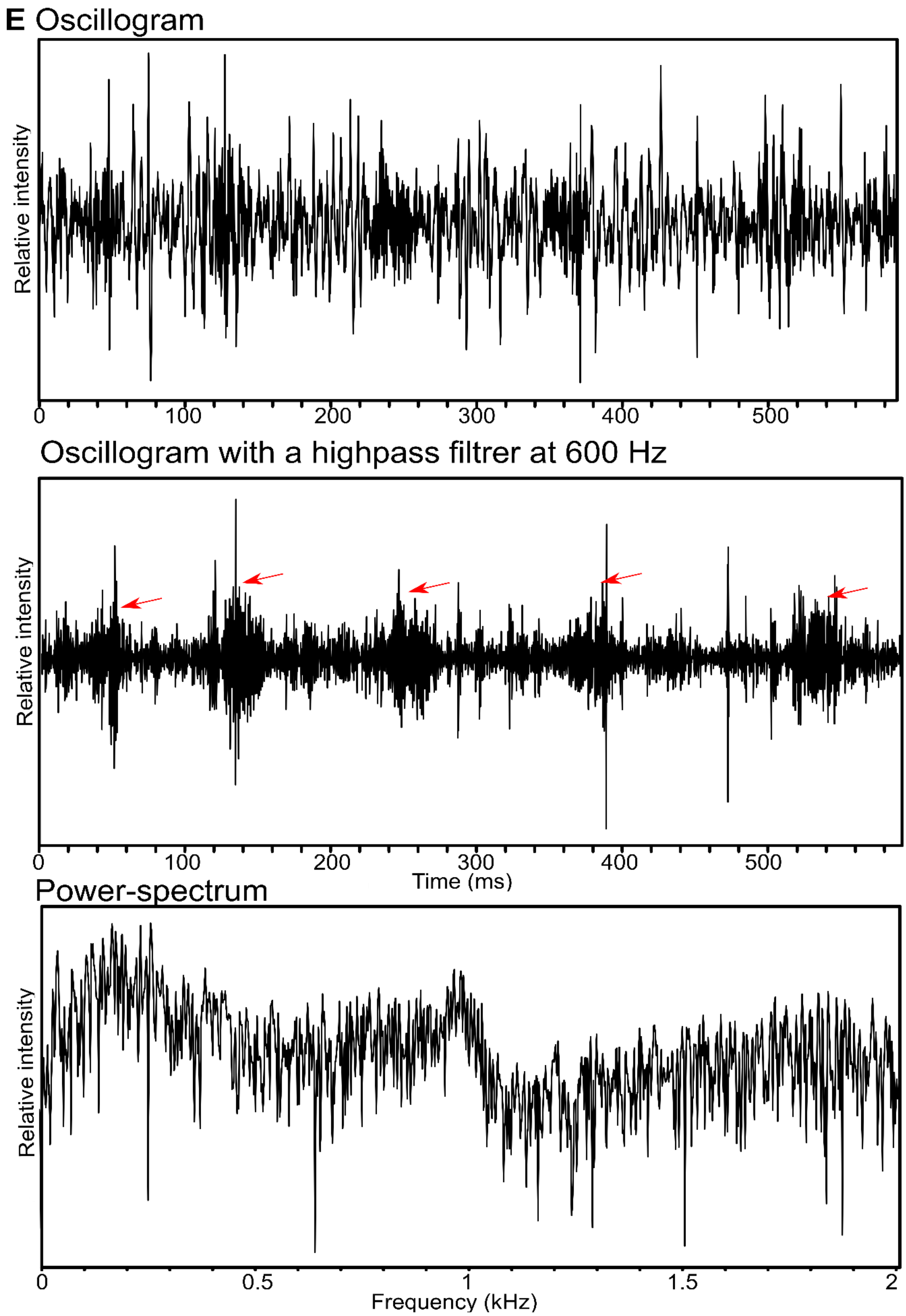

Fig. SP3 Oscillogram (top) and power-spectrum (bottom) of frequency modulated and arched sounds. E DS4

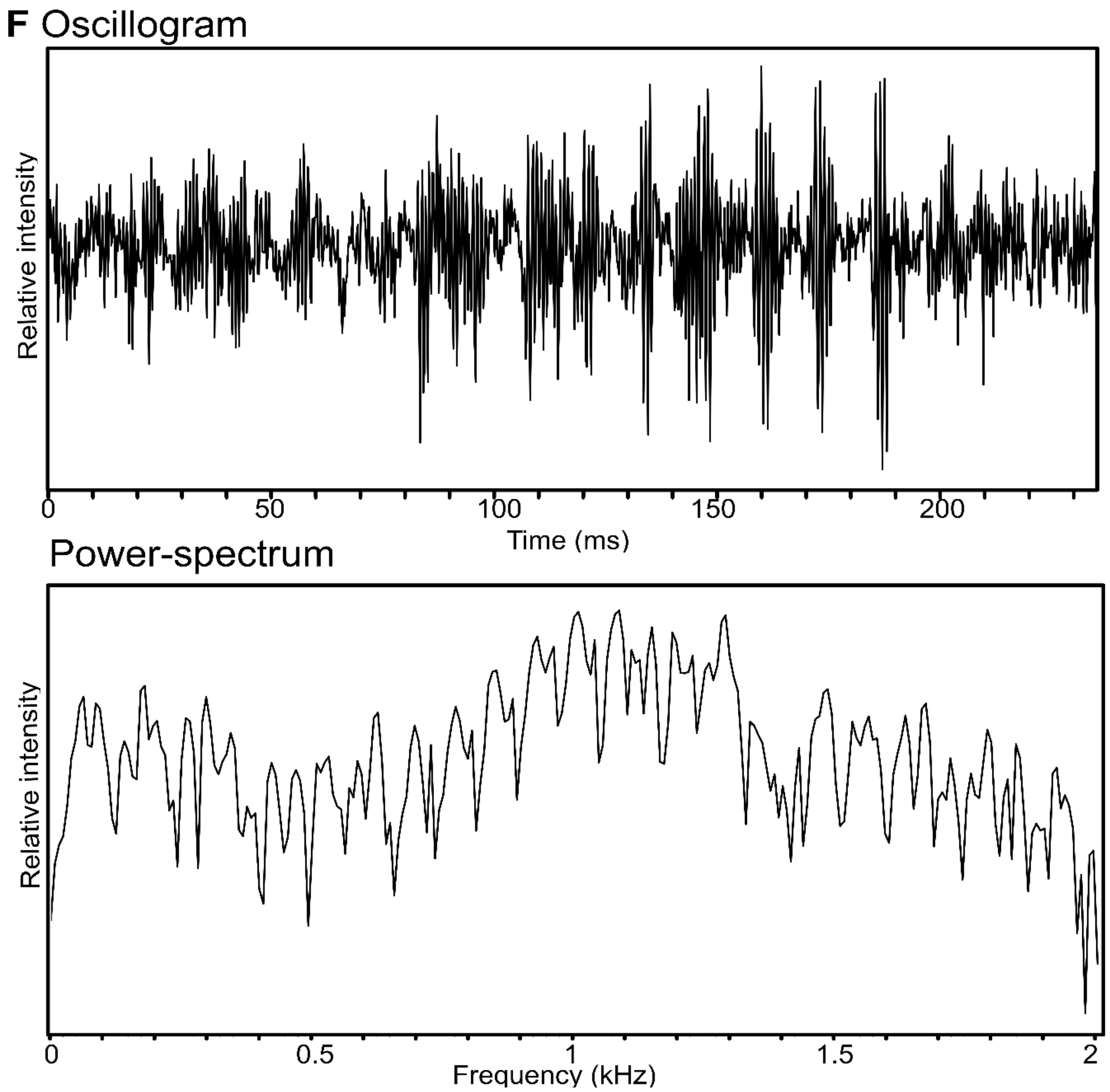

Fig. SP3 Oscillogram (top) and power-spectrum (bottom) of frequency modulated and arched sounds. F

DS2

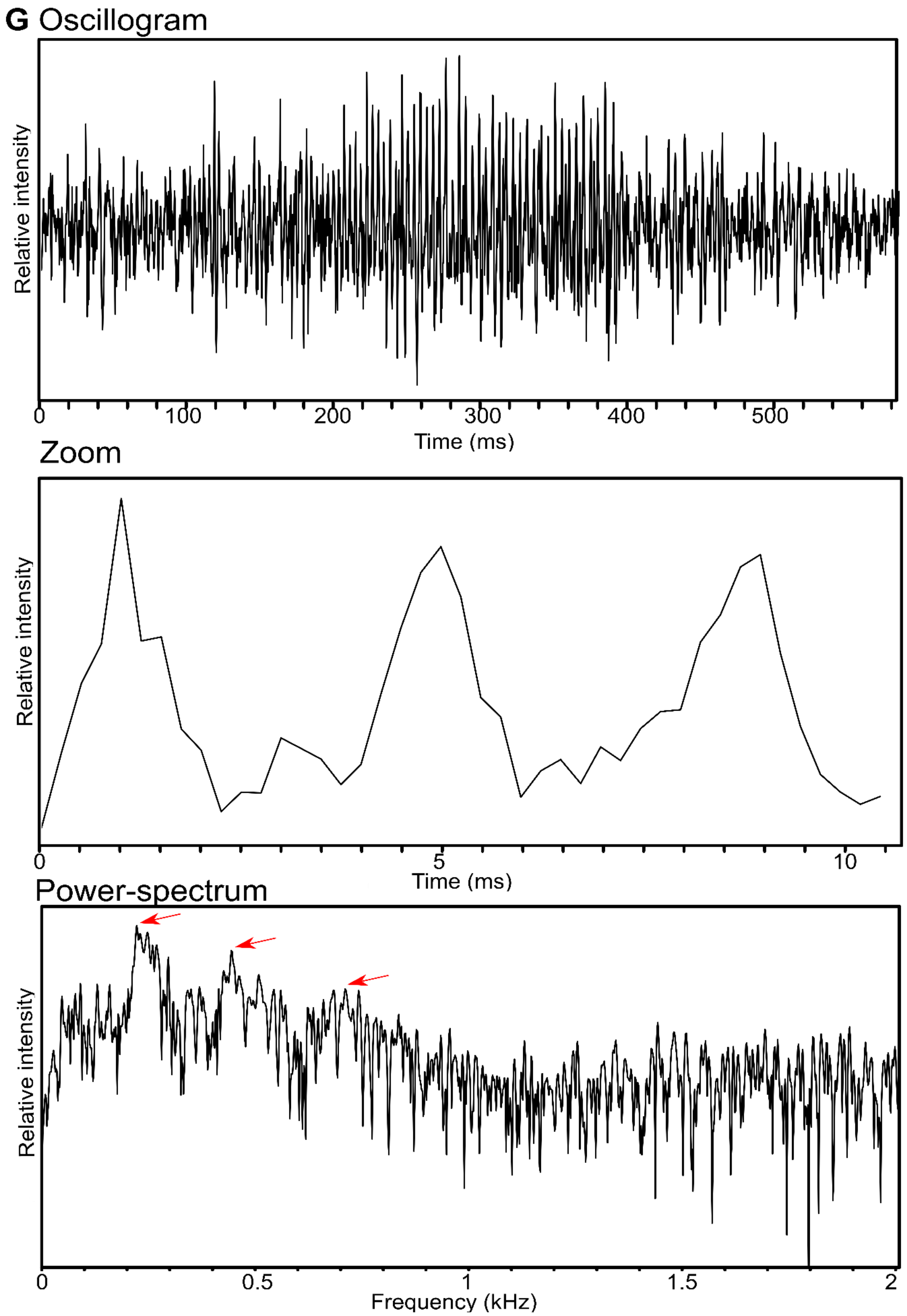

Fig. SP3 Oscillogram (top) and power-spectrum (bottom) of frequency modulated and arched sounds. G DS5

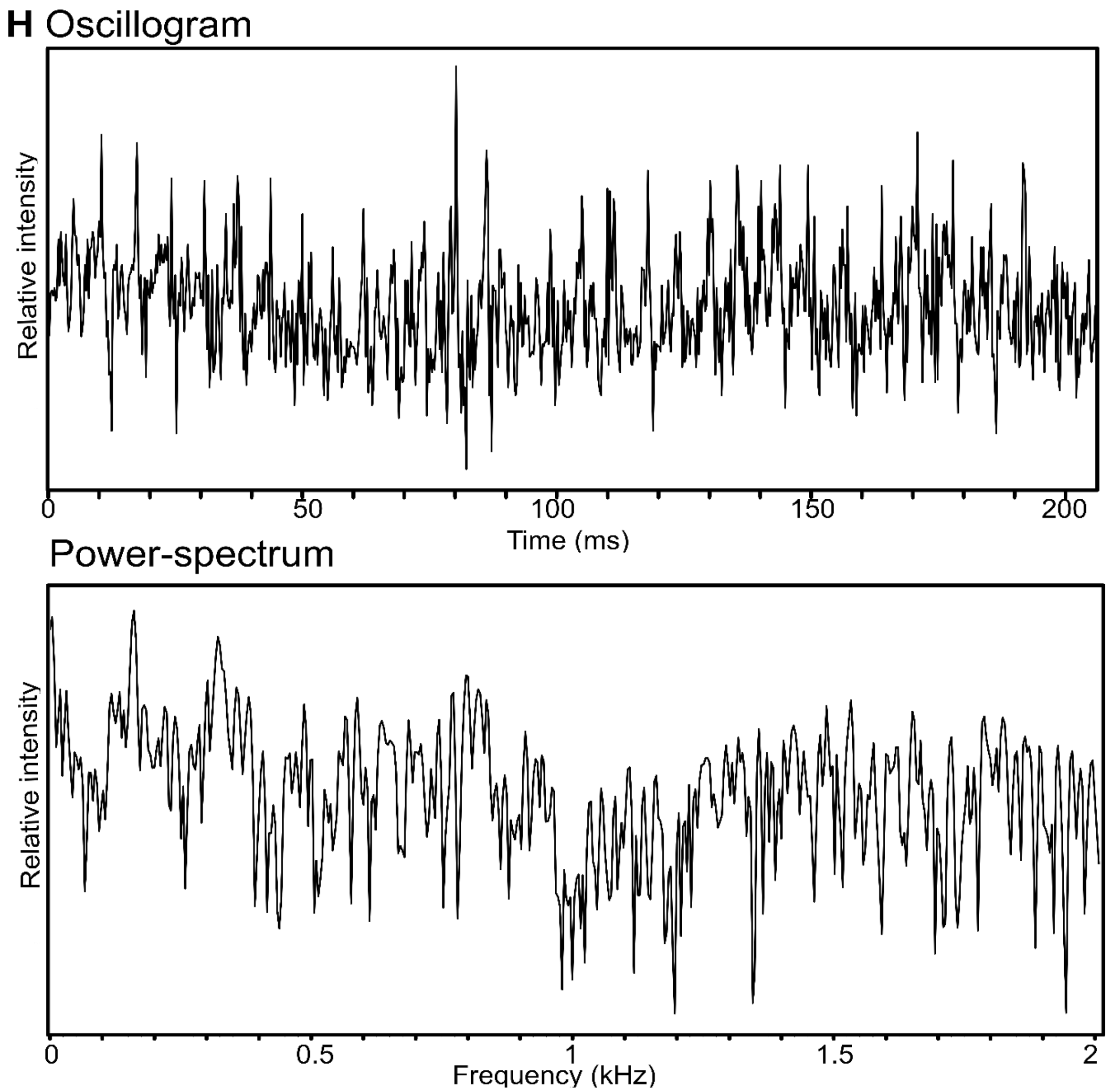

Fig. SP3 Oscillogram (top) and power-spectrum (bottom) of frequency modulated and arched sounds. H
DS6

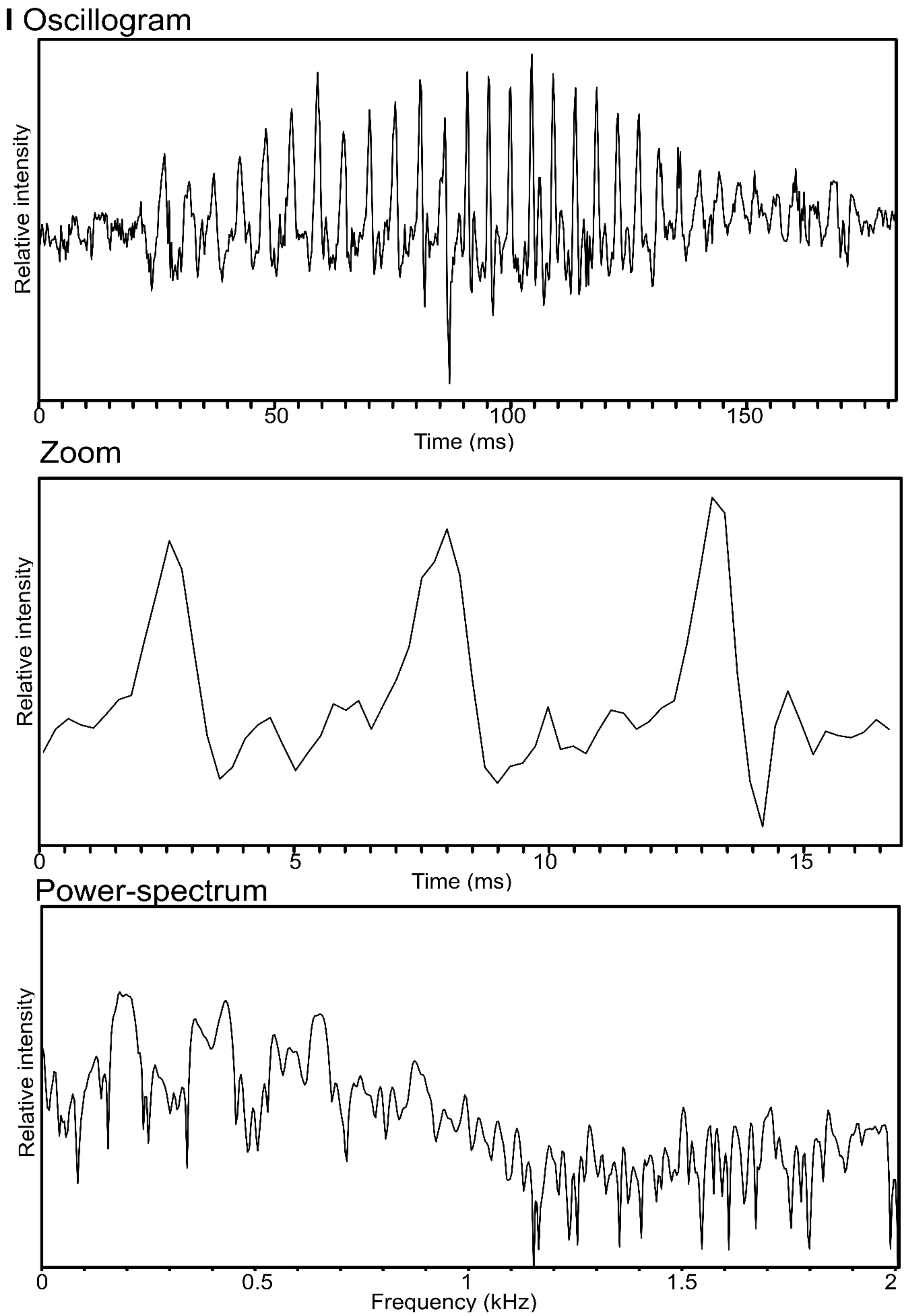

Fig. SP3 Oscillogram (top) and power-spectrum (bottom) of frequency modulated and arched sounds. I

US3

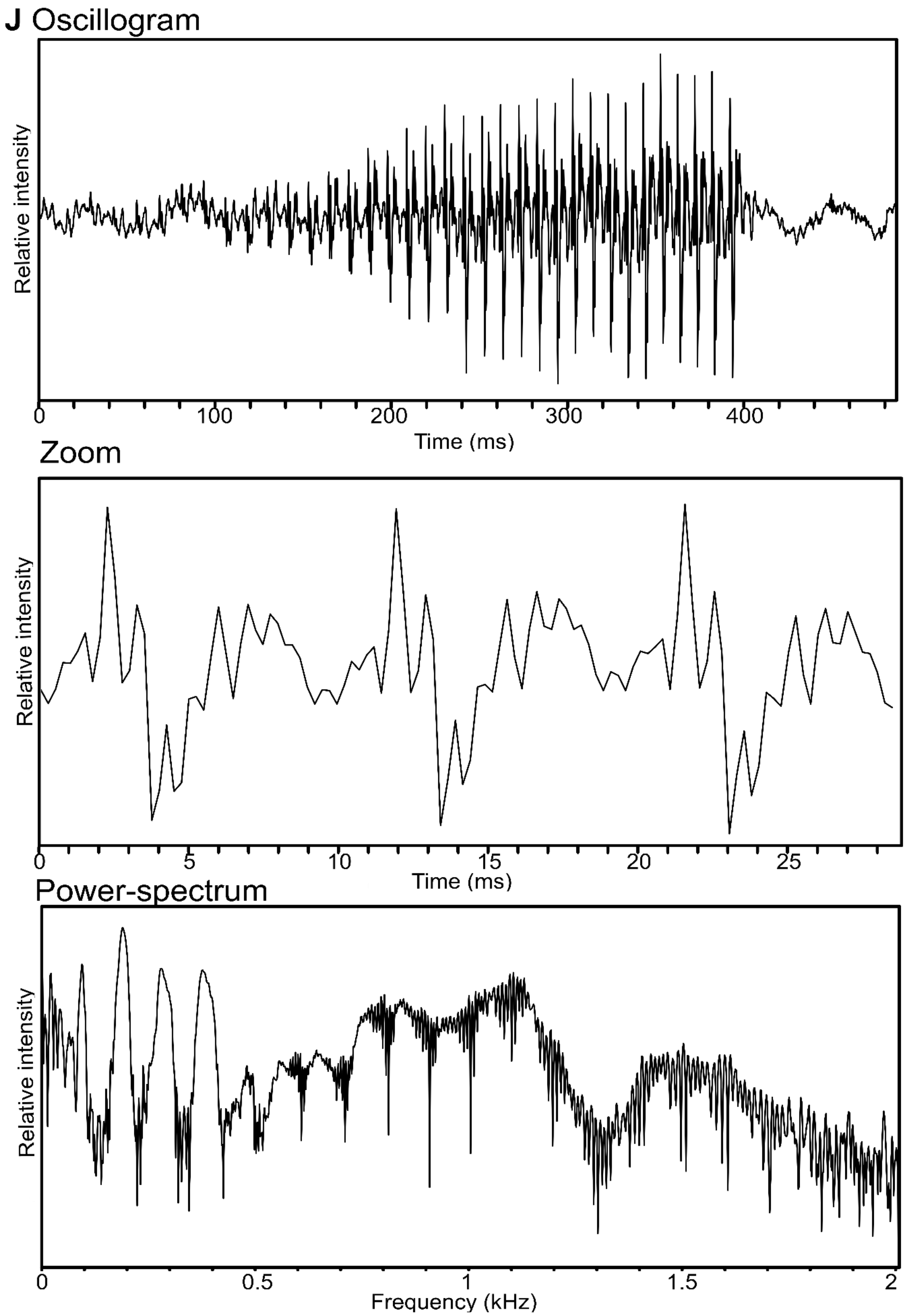

Fig. SP3 Oscillogram (top) and power-spectrum (bottom) of frequency modulated and arched sounds. J
US1

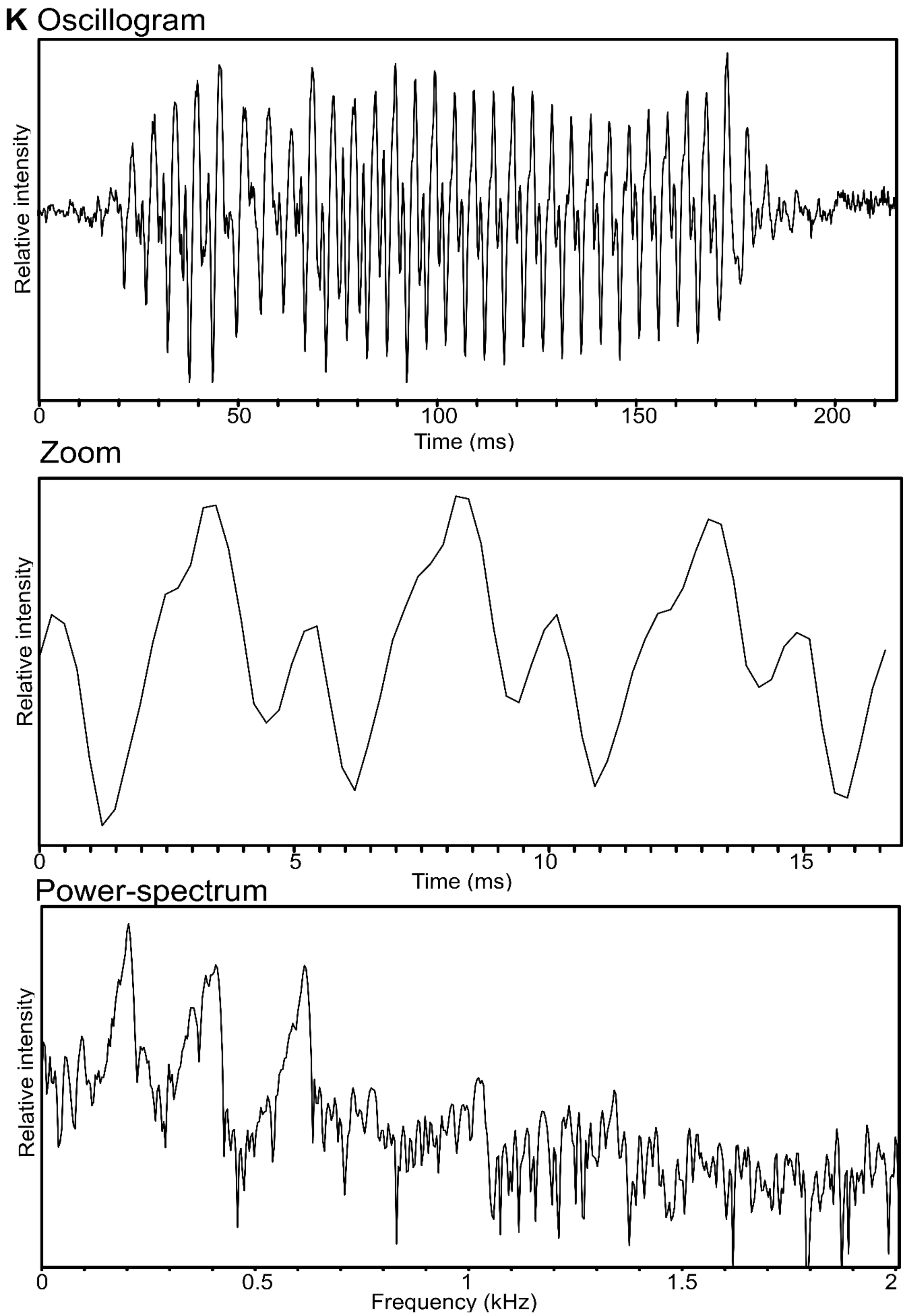

Fig. SP3 Oscillogram (top) and power-spectrum (bottom) of frequency modulated and arched sounds. K

US2

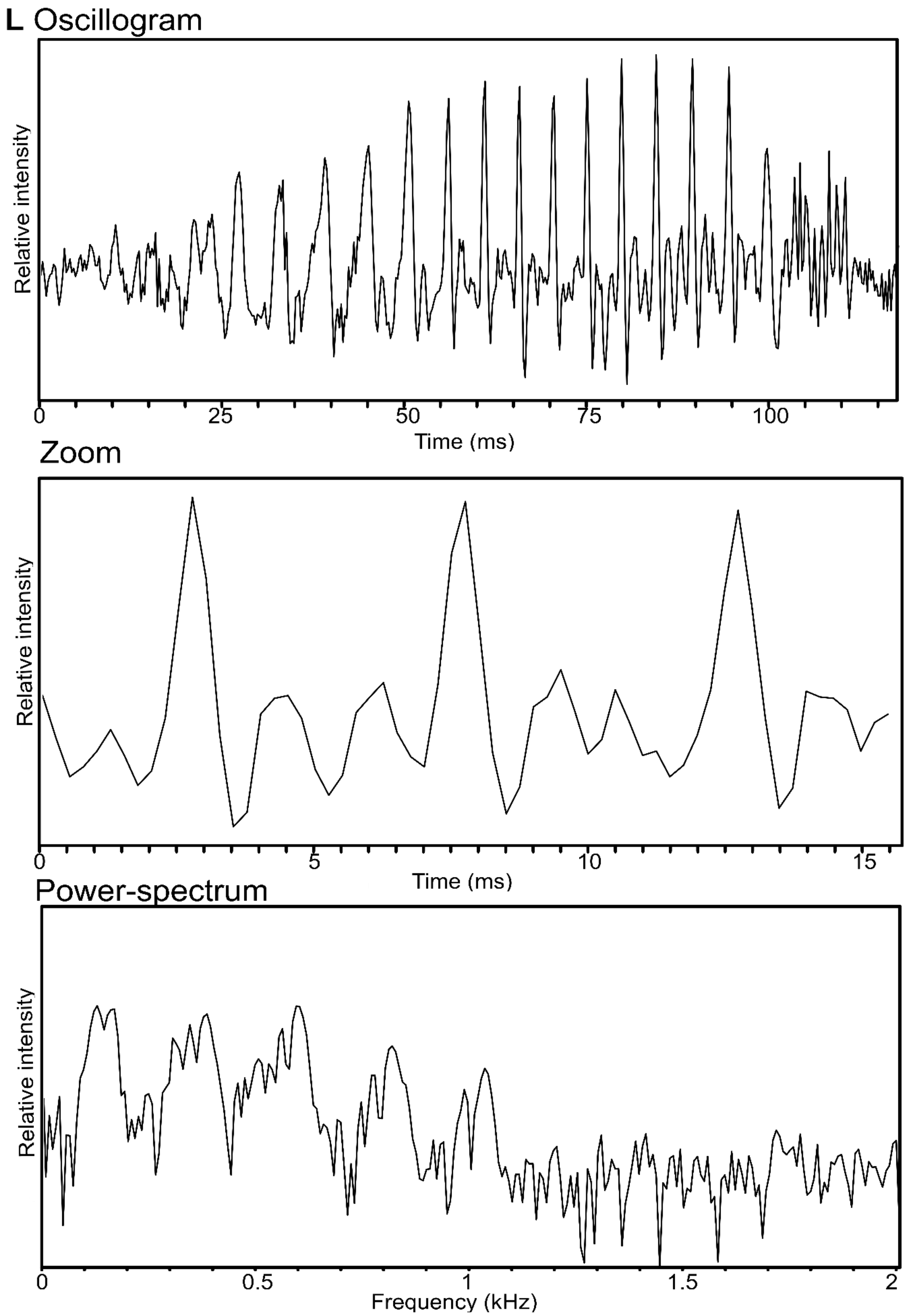

Fig. SP3 Oscillogram (top) and power-spectrum (bottom) of frequency modulated and arched sounds. L

AS3

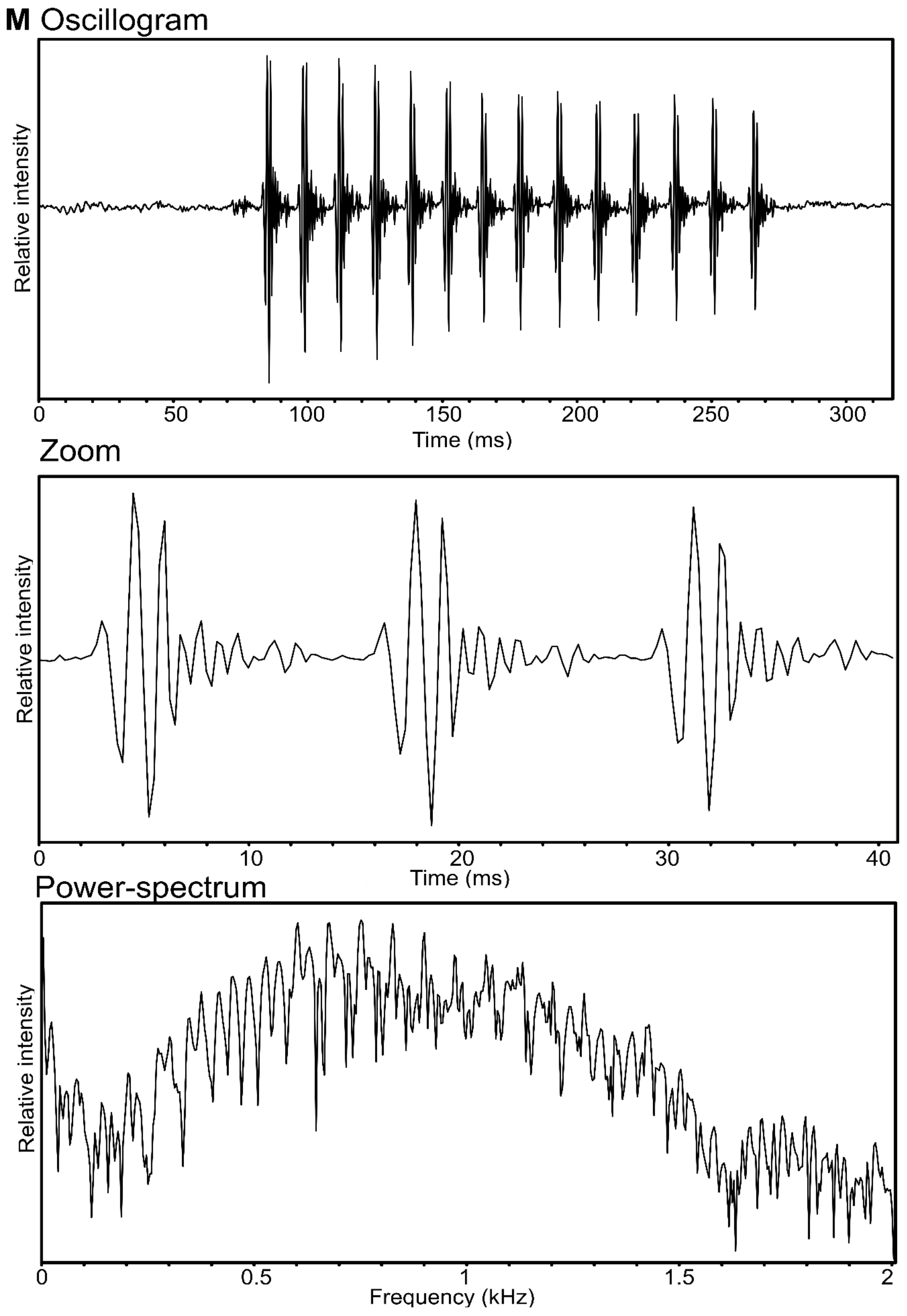

Fig. SP3 Oscillogram (top) and power-spectrum (bottom) of frequency modulated and arched sounds. M

AS4 = *kwa*-like

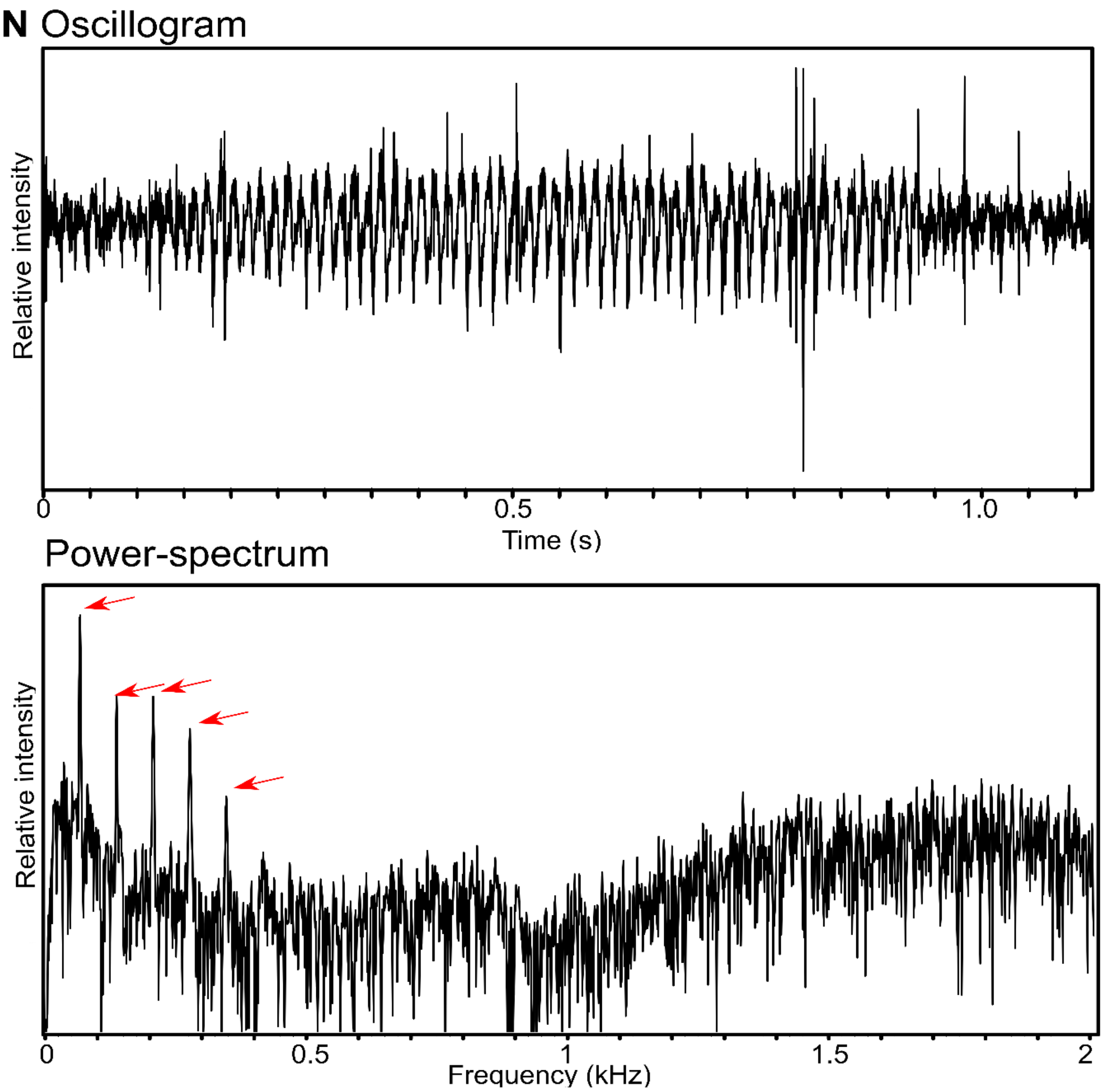

Fig. SP3 Oscillogram (top) and power-spectrum (bottom) of frequency modulated and arched sounds. N AS2

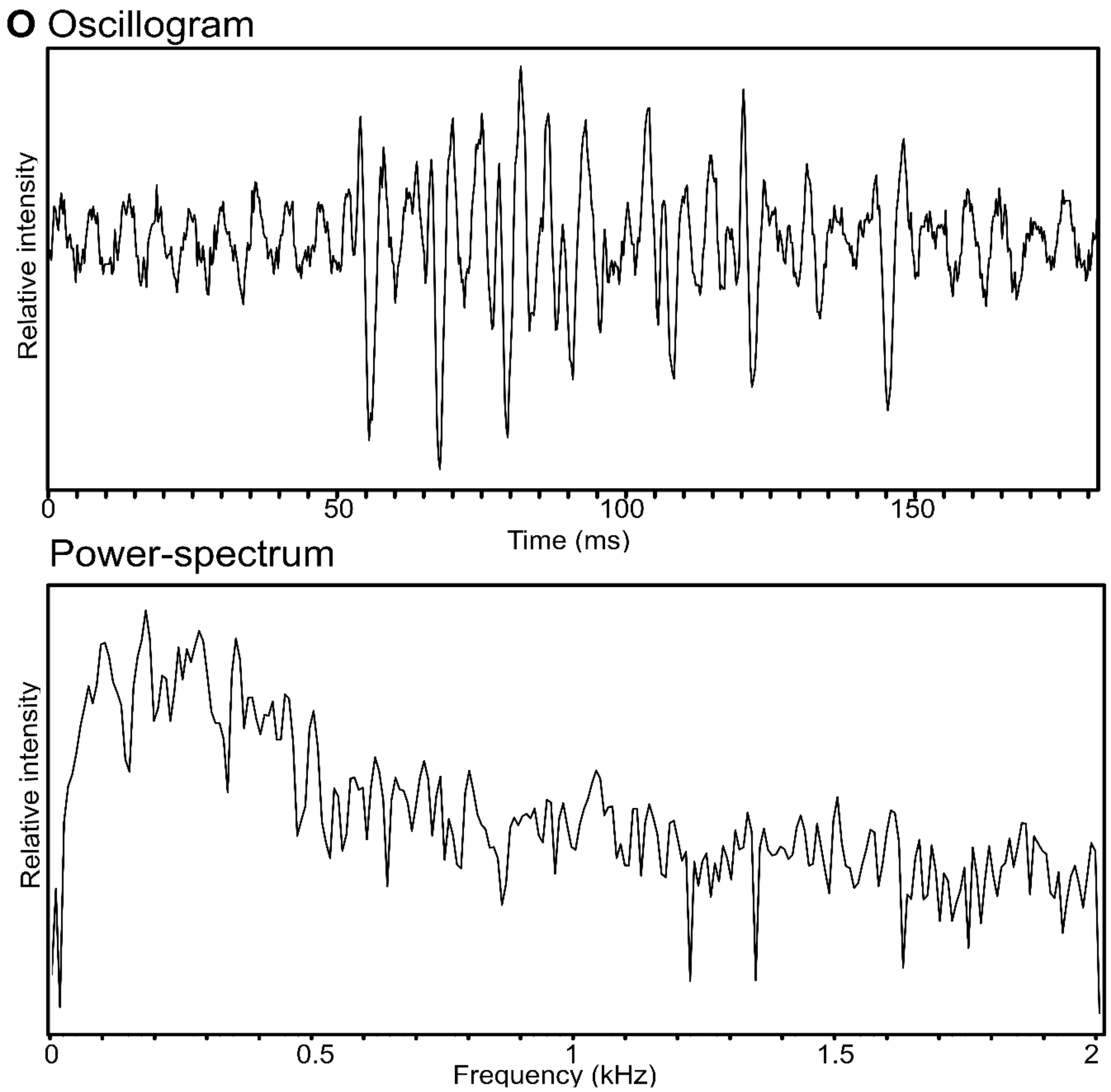

Fig. SP3 Oscillogram (top) and power-spectrum (bottom) of frequency modulated and arched sounds. O
AS1

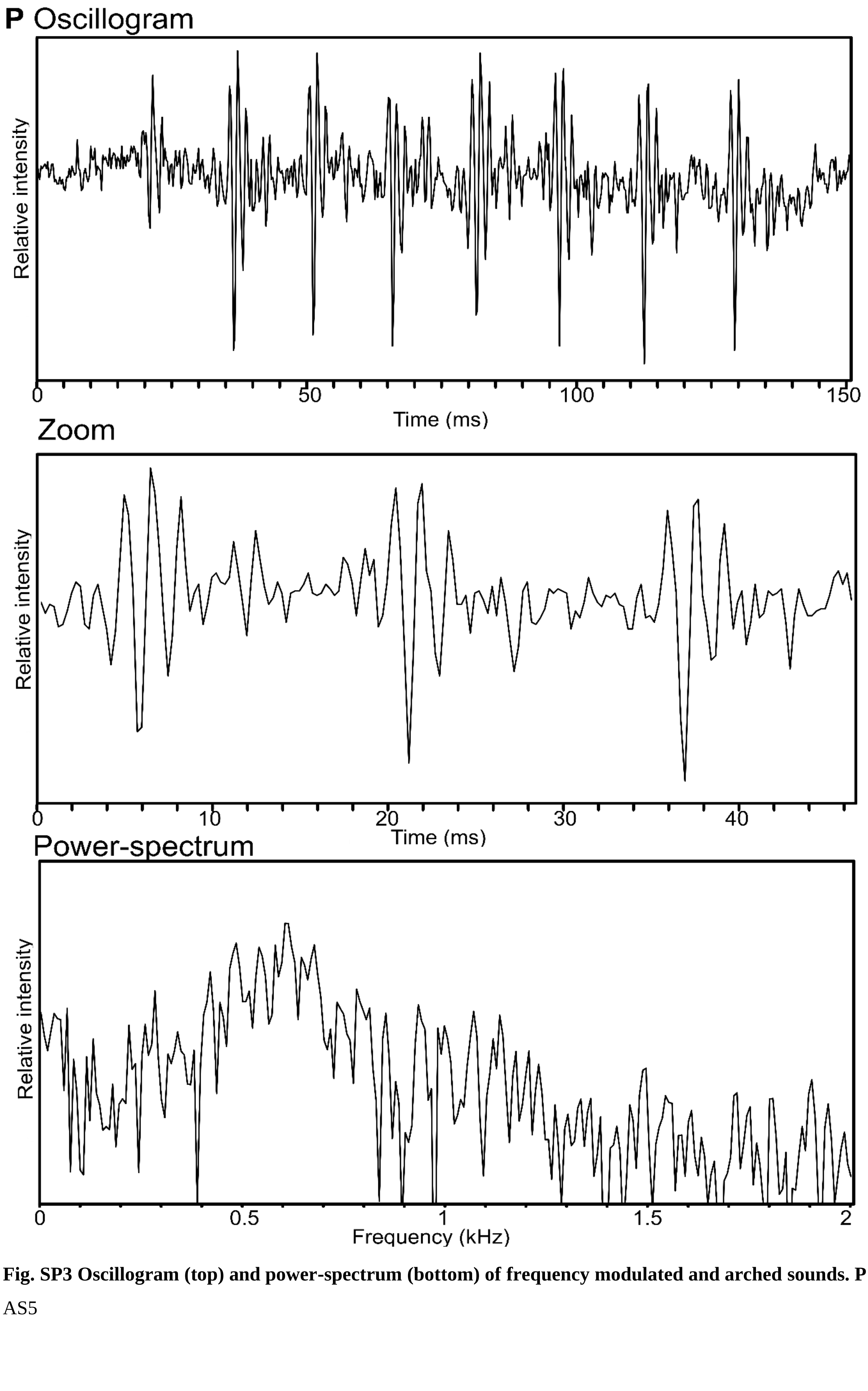

Fig. SP3 Oscillogram (top) and power-spectrum (bottom) of frequency modulated and arched sounds. P

AS5

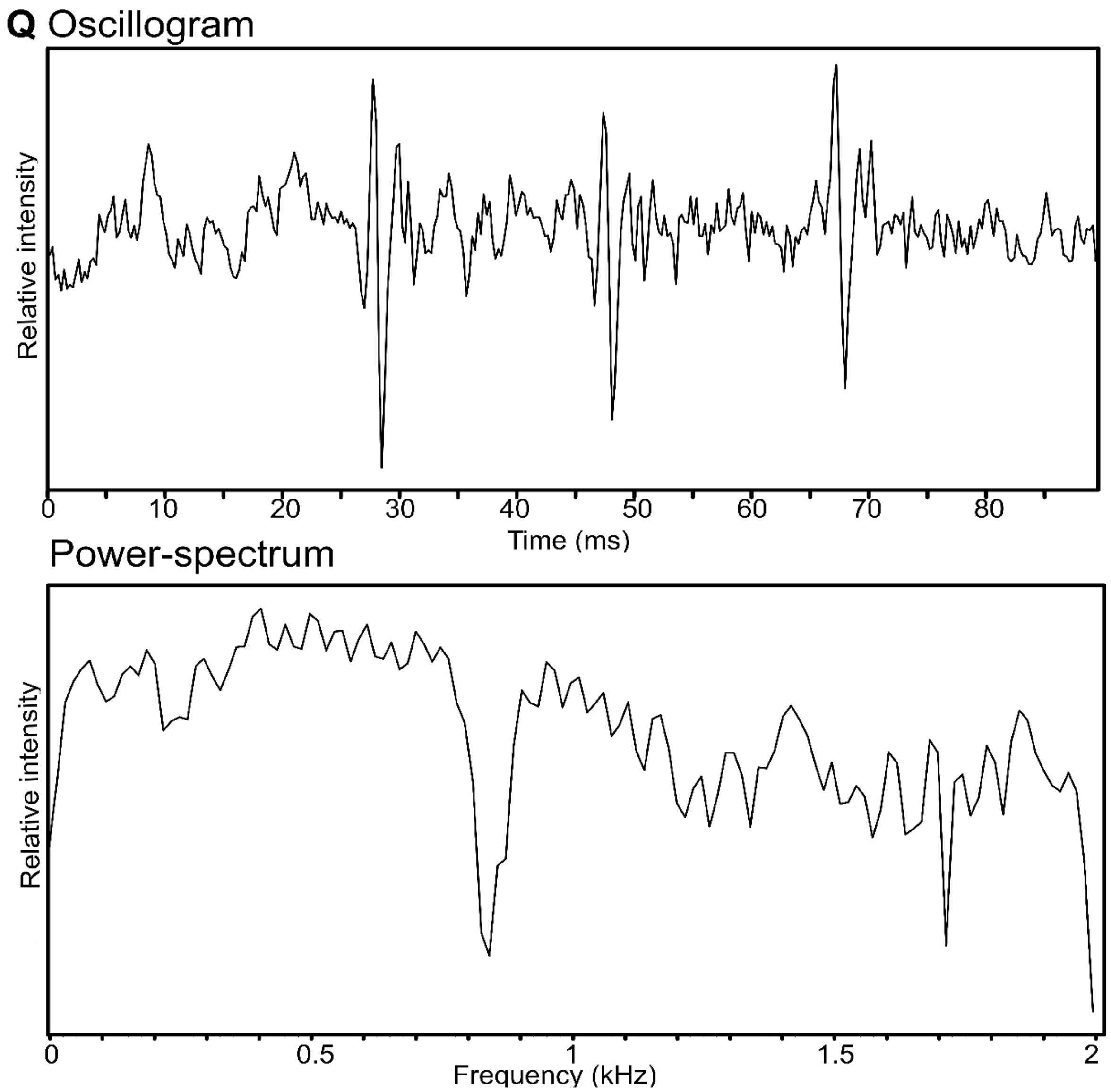

Fig. SP3 Oscillogram (top) and power-spectrum (bottom) of frequency modulated and arched sounds. Q
AS6

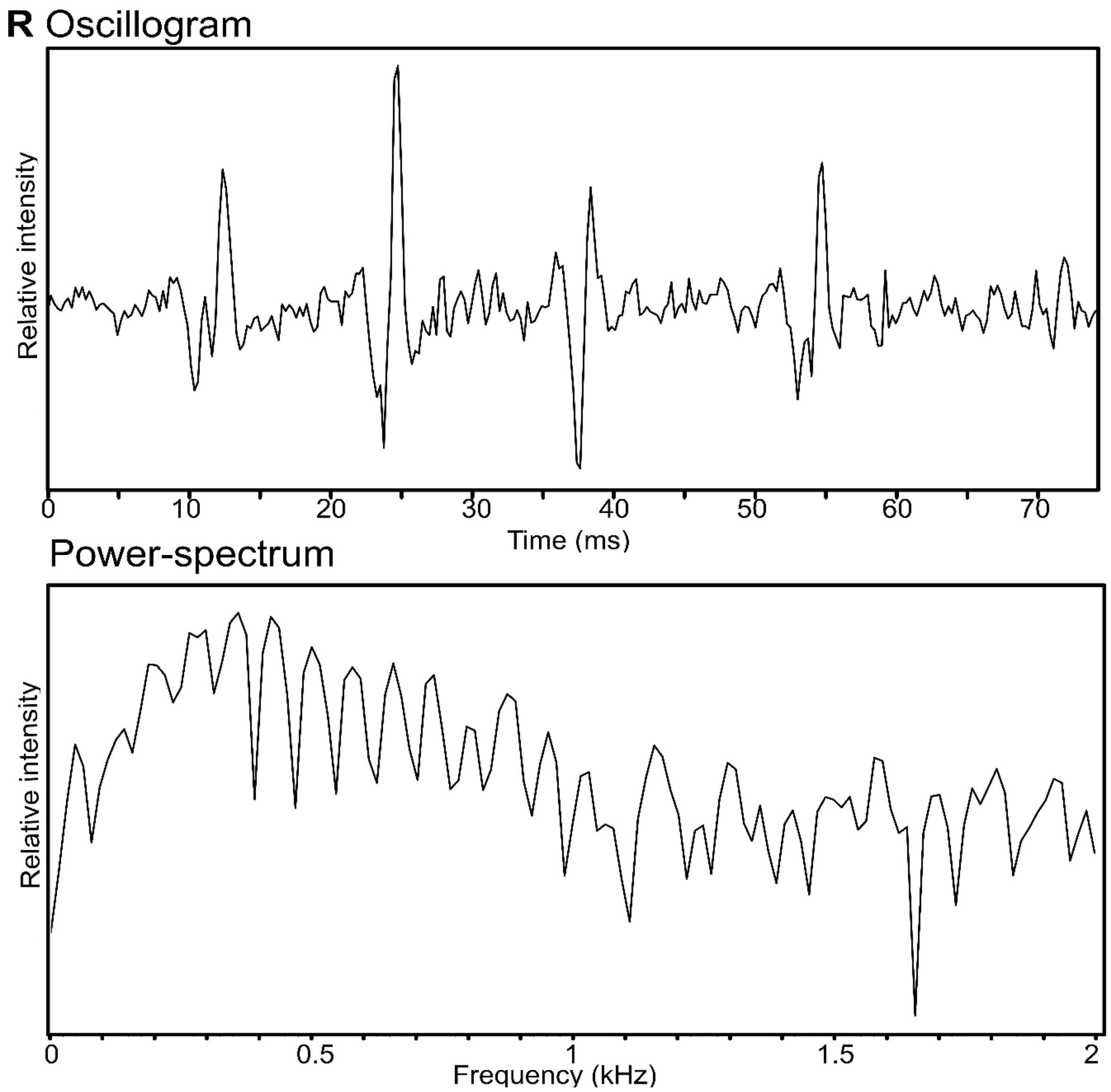

Fig. SP3 Oscillogram (top) and power-spectrum (bottom) of frequency modulated and arched sounds. R
AS7

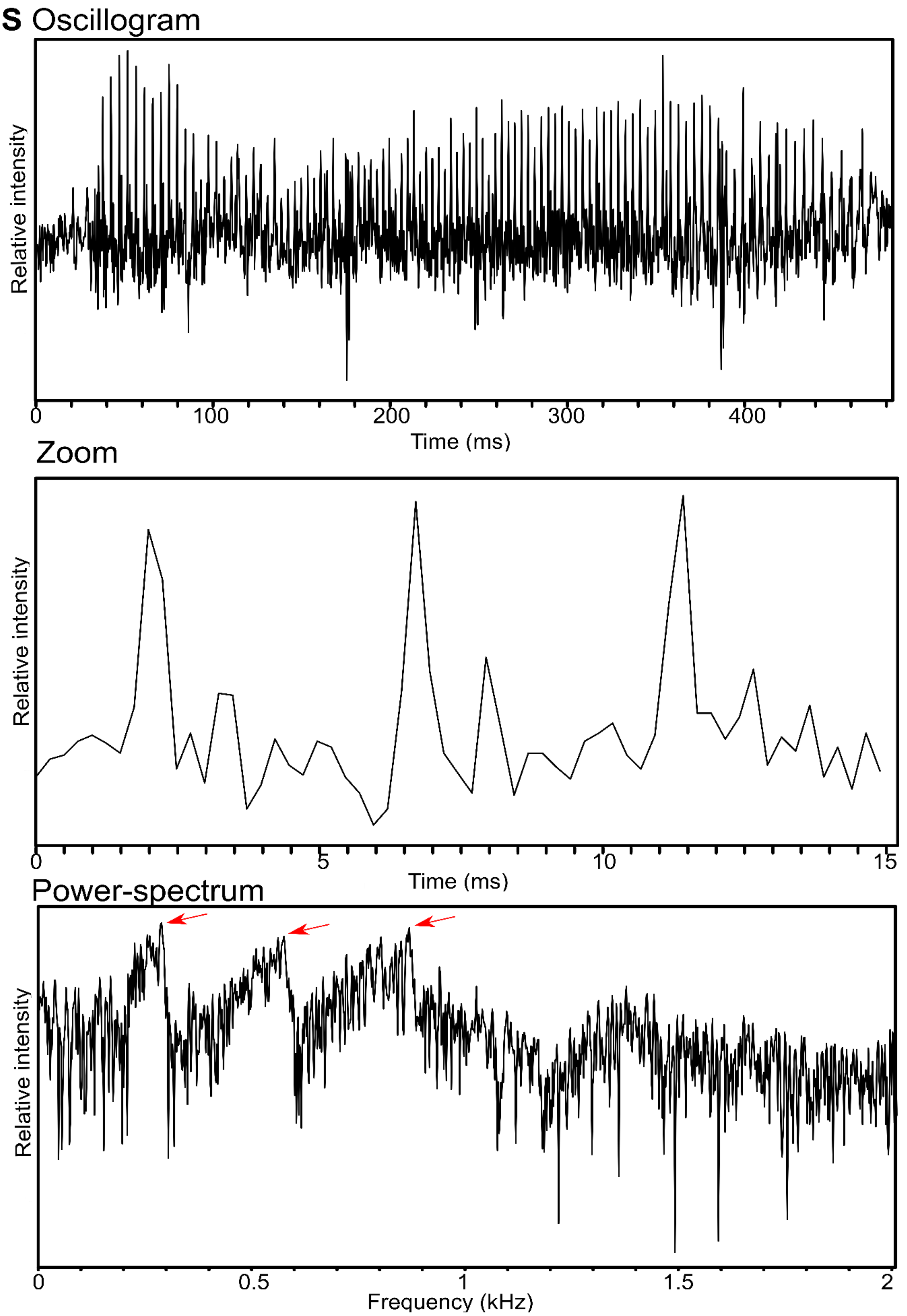

Fig. SP3 Oscillogram (top) and power-spectrum (bottom) of frequency modulated and arched sounds. S

CS2

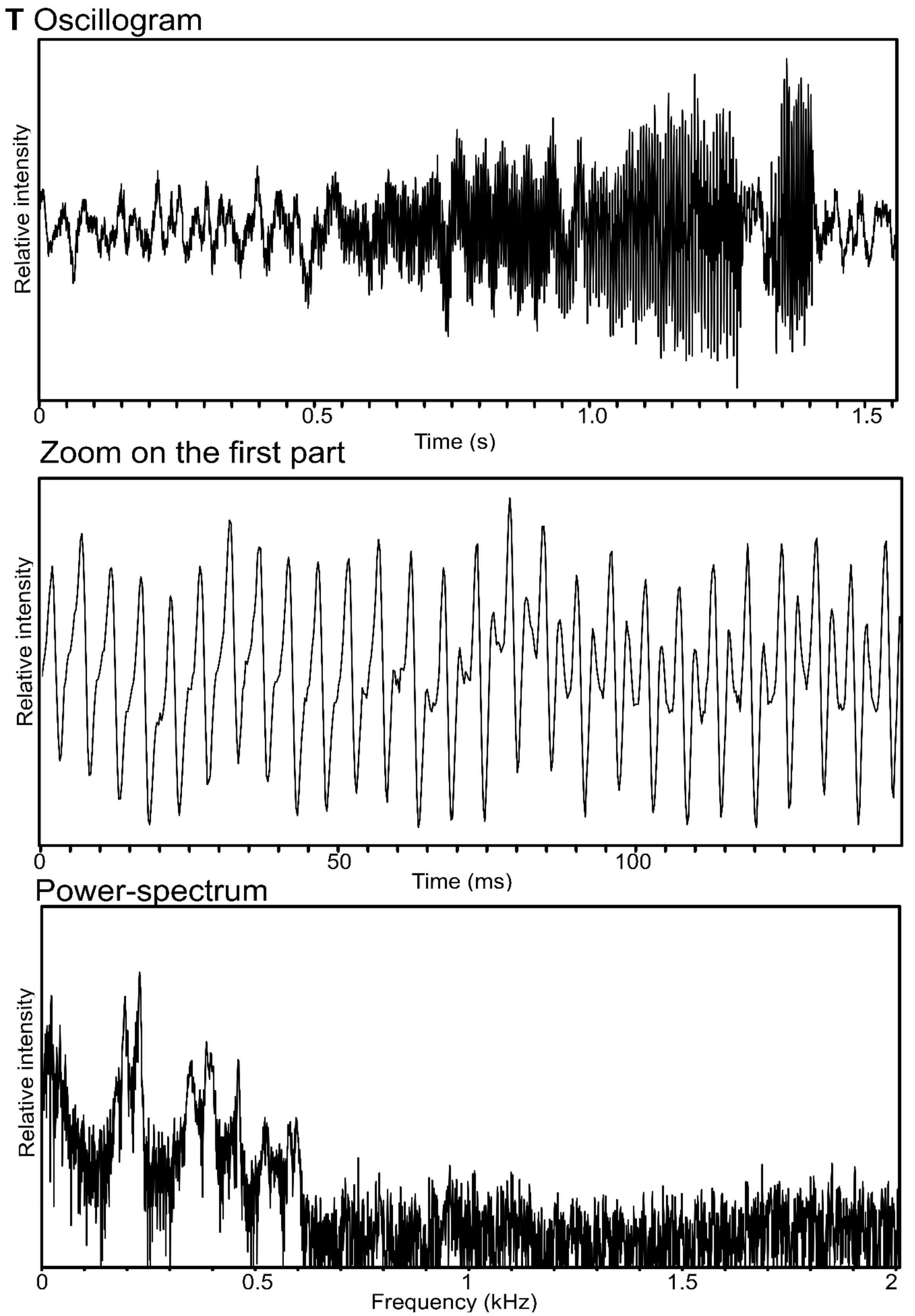

Fig. SP3 Oscillogram (top) and power-spectrum (bottom) of frequency modulated and arched sounds. T

CS1 = whoot.

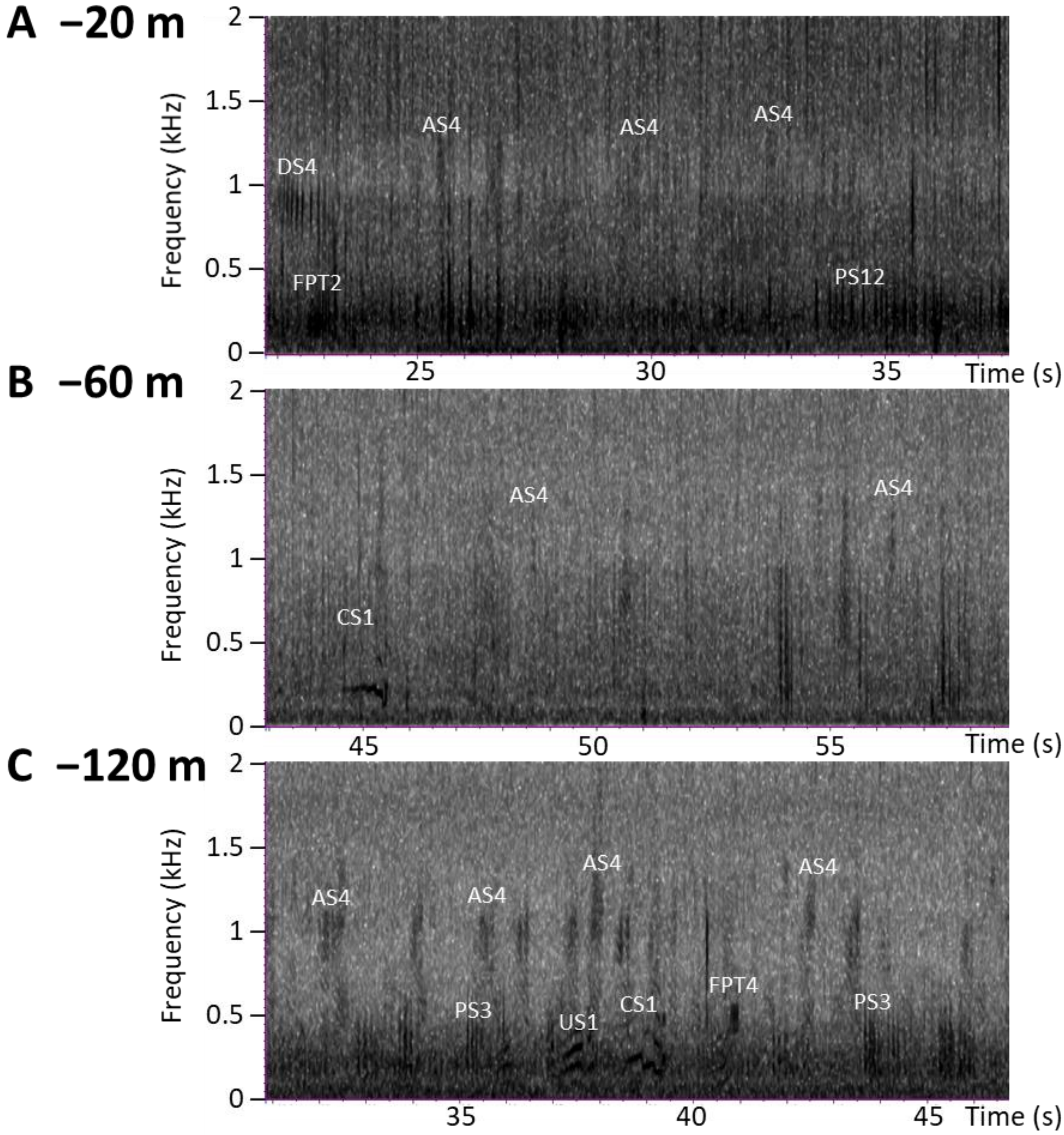

Fig. SP4 Spectrograms of a fragment of soundscape between 6:50 and 7:00 PM at Raroia Island. FFT = 256, 40 dB were added at each depth. **A** depth = −20 m, **B** −60 m and **C** −120 m. For better clarity, all the sounds are not annotated in this example.

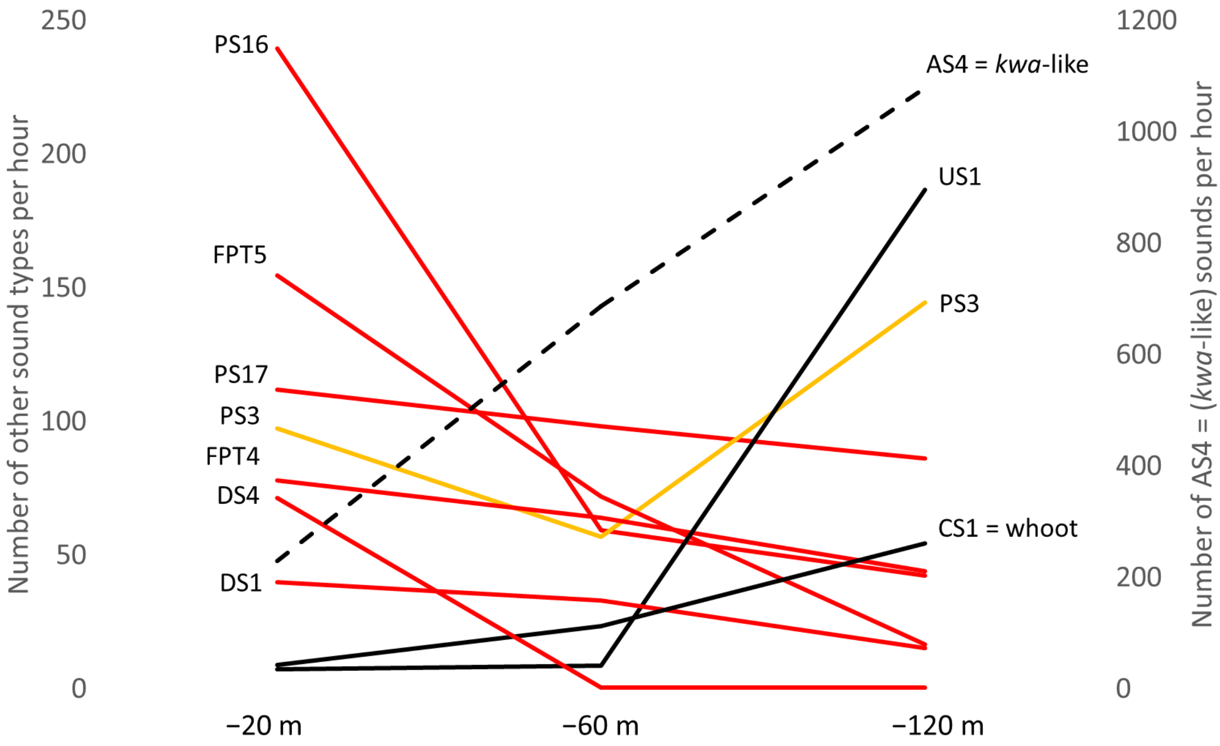

Fig. SP5 Number of the ten most abundant fish sounds at each depth. Dashed line (AS4 = *kwa*-like sounds) corresponds to right vertical axis while solid lines (others sounds) refer to left vertical axis. Red lines correspond to sounds with an abundance that that decreased with depth, yellow lines correspond to sounds with no clear pattern and black lines correspond to sounds with an abundance that increases with depth.

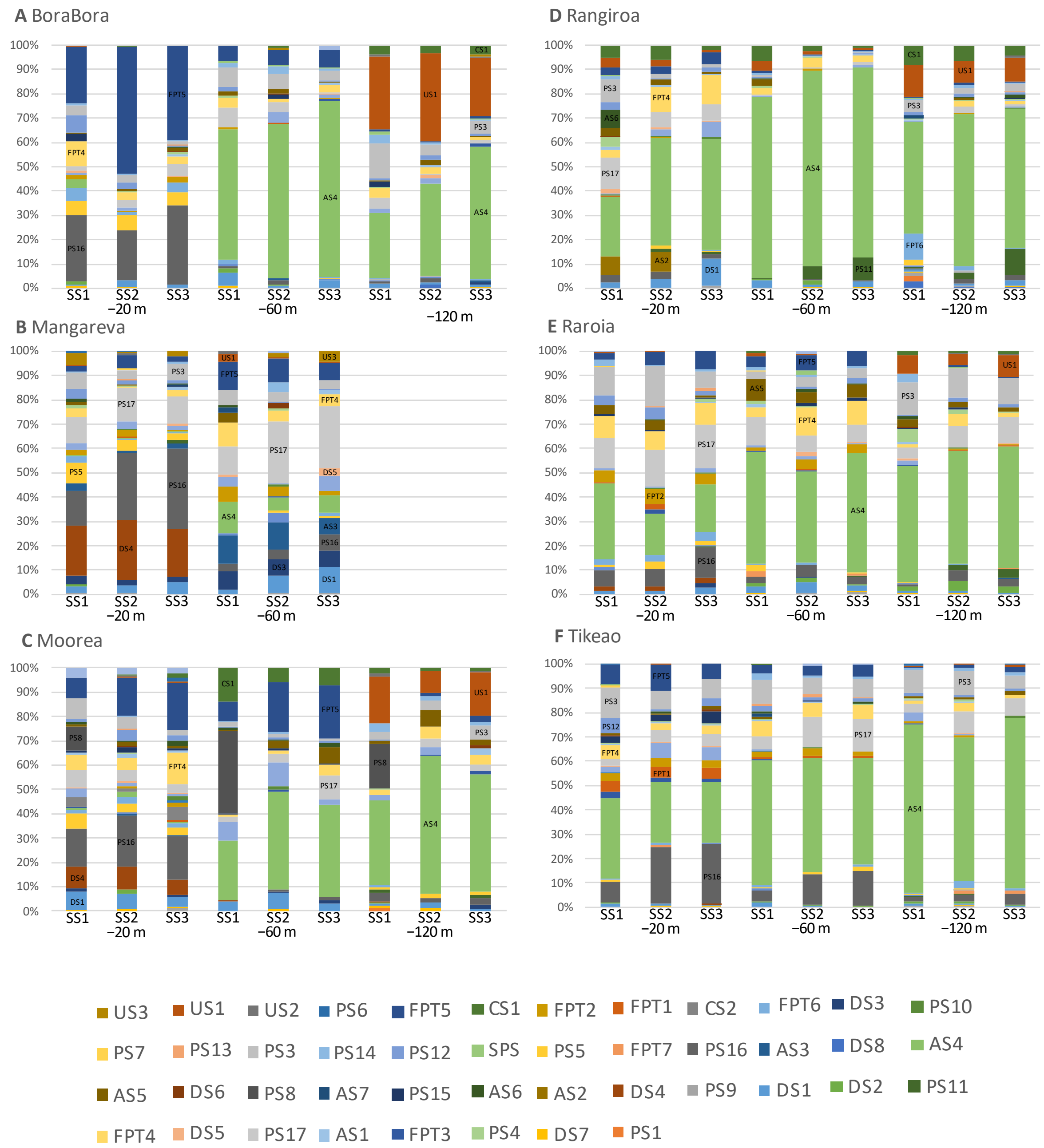

Fig. SP6 100% stacked column of the abundance of fish sounds for each depth (one column per temporal replicate, three columns per depth). **A** Bora Bora, **B** Mangareva, **C** Moorea, **D** Rangiroa, **E** Raroia and **F** Tikehau (all the three last islands are atolls).

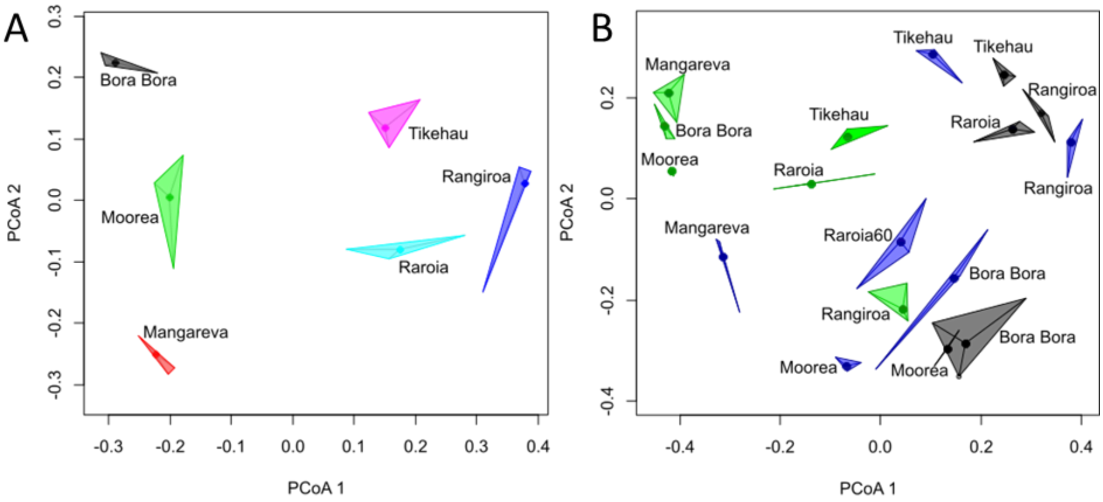

Fig. SP7 Plot of the acoustic fish β-diversity between the islands. A at −20 m (each colour represents an island) and **B** for all the depths: −20 m (green), −60 m (blue) and −120 m (black). Method = Bray.

Supplementary Sound Identification Key. Sound identification key for the frequencies bellow 2 kHz based on spectrograms. In bold: sound types described in Supplementary Table 1 and 2.

1 The frequency of the sound is not constant along time, i.e., the sound is frequency modulated..2

1’ The frequency of the sound is constant along time or the variations are very small. 39

2 The frequency modulation presents pattern (repetition of frequency modulations). 3

2’ The frequency modulation does not present patterns (no repetition of cycles).........8

3 Peak(s) are visible on the spectrogram...4

3’ No peak(s) are visible on the spectrogram...6

4 The difference of frequency between the of the sound beginning (F_{beg}) and the end of the sound (F_{end}) is higher than 100 Hz (F_{beg}-F_{end} > 100 Hz).........................5

4’ The difference of frequency between the beginning of the sound (F_{beg}) and the end of the sound (F_{end}) is smaller than 100 Hz (F_{beg}-F_{end} < 100 Hz)..............**CS1** = **Whoot**

5 One peak is visible on the spectrogram……Peculiar type of **CS1** more downsweeping

5’ Two peaks and one downsweep are visible on the spectrogram.........................Peculiar type of **CS1** more downsweeping and more complex

6 Whale vocalization (typically longer than 1 s)...Whale

6’ Not a whale vocalization...7

7 Bandwidth greater than 600 Hz...**CS2**

7’ Bandwidth < 600 Hz..............Rare fish sound or CS2, not used in the analysis

8 An inflexion point is visible...9

8’ No inflexion point is visible...13

9 Dolphin call (usually peculiar sound with a metallic aspect, with or without inflexion, peaks can be present)...Dolphin

9’ Different from above...10

10 Concave 11

10’ Convex 12

11 The entire sound is above 1 kHz .... Sound of unknown origin with a “hill” form on the spectrogram

11’ The entire sound is under 1 kHz .... Whale

12 The entire sound is usually above 1 kHz .... Sound of unknown origin with a “valley” form on the spectrogram

12’ The entire sound is usually under 400 Hz .... Whale

13 Upsweep 14

13’ Downsweep 26

14 The sound has two upsweeps .... Rare fish sound made of two US, not used in the analysis.

14’ The sound does not have two upsweeps 15

15 Peak(s) is(are) visible(s) on the spectrogram .... Particular type of **US1** sound followed by one or several peaks.

15’ No peak is visible on the spectrogram 16

16 The peak frequency is higher than 800 Hz and the bandwidth is usually shorter than 200 Hz 17

16’ Different from above 18

17 Fast pulse train aspect .... high-frequency US sound with an FPT aspect probably produced by dolphins

17’ No “fast pulse train” aspect .... high-frequency US sound produced by dolphins

18 (Pseudo)harmonics are visible on the spectrogram 19

18’ No (pseudo)harmonics are visible on the spectrogram 21

19 The frequency band between two (pseudo)harmonics is greater than 180 Hz 20

19’ Different from above **US1**

20 The fundamental frequency appears as longer than the (pseudo)harmonics .... **US3** (see also DS3 and AS3)

20’ Different from above **US2**

21 The sound is long and irregular (with “accidents”) without frequencies bellow 400 Hz .... Whale

21’ Different from above 22

22 Fast pulse train aspect .... rare low frequency US sound with an FPT aspect produced by fish, not used in the analysis

22’ No “Fast pulse train” aspect 23

23 There is a quick increase in frequency (sound peculiar) 24

23’ Different from above 25

24 The peak frequency is higher than 800 Hz .... Fast US sound produced by whales

24’ The peak frequency is usually lower than 700 Hz.. .... Low-frequency fast US sound produced by whales

25 All the sound is above 200 Hz (this sound can be very intense compared to others sounds) .... Whale Low-frequency US sound produced by whales

25’ Different from above .... Not considered

26 The sound contains more than one downsweep 27

26’ The sound only contains one downsweep 31

27 The sound contains more than two downsweeps 28

27’ The sound does not contain more than two downsweeps 30

28 There is more than one main frequency zone in the spectrogram ...... consecutive **DS1**s

28' Different from above 29

29 All the sound is above 200 Hz .... Rare fish sound made of several DSs, not used in the analysis

29' Different from above .... rare very-low frequency fish sound made of several DSs, not used in the analysis

30 Peak(s) are visible on the spectrogram **DS8**

30' No peaks are visible on the spectrogram **DS7**

31 The peak frequency is higher than 900 Hz .... high-frequency DS produced by dolphins

31' The peak frequency is lower than 900 Hz 32

32 The sound is made of at least three (pseudo)harmonics 33

32' Different from above 36

33 The peak frequency is lower than 400 Hz 34

33' The peak frequency is higher than 400 Hz 35

34 The sound has a pulsed aspect with very close (pseudo)harmonics **DS6**

34' Different from above **DS5**

35 The sound has a frequency downsweep with a high slope and has frequencies bellow 400 Hz .... **DS3** (see also US3 and AS3)

35' Different from above **DS2**

36 The duration is generally longer than 0.5 s and the sound is irregular .... DS produced by whales

36' Different from above 37

37 The peak frequency is lower than 200 Hz .... low DS of unknow origin

37’ The peak frequency is higher than 200 Hz 38

38 The sound has a pulsed aspect .... rare DS fish sound with a FPT aspect, not used in the analysis

38’ Different from above **DS1**

39 Peak(s) are visible on the spectrogram 40

39’ Different from above 77

40 More than two peaks are visible on the spectrogram 41

40’ Two peaks (or less) are visible on the spectrogram .... not considered

41 Three peaks are visible on the spectrogram 42

41’ More than three peaks are visible on the spectrogram 45

42 The peak period is regular 43

42’ The peak period is not regular .... not considered

43 The peak frequency is below 200 Hz **PS4**

43’ The peak frequency is higher than 200 Hz 44

44 In the sound, there are frequencies bellow 400 Hz **PS3**

44’ In the sound, there are no frequencies bellow 400 Hz **PS5**

45 The peak period is regular 46

45’ The peak period is not regular 73

46 The spectrogram has frequential discontinuities 47

46’ The spectrogram is continuous along all the frequencies of the sound 49

47 The bandwidth is larger than 1 kHz and the sound has frequencies above 1.3 kHz .... rare high frequency fish sound, not used in the analysis

47’ Different from above 48

48 The bandwidth is larger than 0.5 kHz and the sound has frequencies above 600 Hz .... rare fish sound, not used in the analysis

48’ Different from above .... rare low frequency fish sound, not used in the analysis

49 The peak period is longer than 0.75 s 50

49’ The peak period is shorter than 0.75 s 51

50 The peak frequency is higher than 1 kHz .... rare high frequency slow pulse series attributed to fish, not used in the analysis

50’ The peak frequency is lower than 1 kHz .... **SPS**

51 The sound is a “fast pulse train”, i.e. the pulse period is usually between 10 and 50 ms 52

51’ The sound is not a “fast pulse train”, i.e. the pulse period is longer than 60 ms 61

52 There is more than 4 consecutive “fast pulse trains”. In addition, their length diminished with time. Two frequency peaks are visible in the spectrogram .... Rare fish sound made of stereotyped fast pulse trains, not used in the analysis

52’ Different from above 53

53 There is more than one fast pulse train .... Sound made of two consecutive **FPT7**

53’ Different from above 54

54 There are frequencies above 2 kHz 55

54’ There are not frequencies above 2 kHz 56

55 Duration longer than 0.5 s .... High frequency clicks produced by dolphins

55’ Duration shorter than 0.5 s **FPT7**

56 Duration longer than 0.25 s 57

56’ Duration shorter than 0.25 s 58

57 Bandwidth higher than 500 Hz **FPT1**

57’ Bandwidth shorter than 500 Hz **FPT2**

58 All the frequencies in the sound are under 700 Hz **FPT4**

58’ Different from above 59

59 Sound hardly audible, bad signal-noise ratio **FPT5**

59’ Different from above 60

60 Bandwidth usually between 0 and 1 kHz. These sounds are usually very intense compared to others FPT **FPT3**

60’ Bandwidth usually between 0.4 and 1.4 kHz. **FPT6**

61 The sound has a period shorter than 0.10 s and contains at least 15 peaks 62

61’ Different from above 64

62 The sound contains only frequencies under 600 Hz **PS10**

62’ Different from above 63

63 The sound contains frequencies above 1 – 1.2 kHz .... **PS11** (do not confound with dolphin’s clicks)

63’ Different from above **PS9**

64 The sound contains at least 13 peaks **PS6**

64’ The sound contains less than 13 peaks 65

65 Period usually shorter than 0.15 s 66

65’ Period usually longer than 0.20 s 71

66 Only frequencies above 1 kHz ..... High-frequency fast pulse series of unknown origin

66’ Different from above 67

67 Only frequencies under 600 Hz **PS17**

67’ Different from above 68

68 Peak frequency above 0.4 kHz. This sound is usually stereotyped and could be more intense than others PSs. Different frequencies appear in the spectrogram “like a barcode”. **PS1**

68’ Different from above 69

69 The peak frequency diminish with time, all the sound is between 0.6 and 1.4 kHz. The sound contains 5 to 8 pulses and sound like “a bird song”. 70

69’ Different from above 93

70 The sound is followed by paced peaks .... Variation of **DS4** where one or several additional peaks are present

70’ The sound is not followed by spaced peaks **DS4**

71 The sound contains only frequencies above 1.2 kHz .... High-frequency pulse series or unknown origin

71’ Different from above 72

72 Peak frequency around 165 Hz, between 8 and 9 pulses, bandwidth smaller than 55 Hz. This sound usually do not appear alone. **PS8**

72’ Different from above **PS12**

73 The period increases with time 74

73’ Different from above 75

74 The first period is around 0.03 s and the peak frequency is between 250 and 300 Hz **PS13**

74’ Different from above **PS7**

75 Sound hardly audible, bad signal-noise ratio..Not considered.

75’ Different from above..76

76 The bandwidth is usually between 0.3 and 1.8 kHz......................................**PS14**

76’ The banddidth is usually between 0 and 1.2 kHz..**PS15**

77 The sound has at least 3 (pseudo)harmonics...78

77’ Different from above..86

78 The peak frequency is below 0.5 kHz and all the frequencies in the sound are under 0.7 kHz...79

78’ Different from above..81

79 H_0 is more intense and longer than the harmonics. The ΔF between two consecutives harmonics is around 70 Hz..**AS2**

79’ Different from above..80

80 All the frequencies are between 100 and 600 Hz. There are 3 to 4 clear harmonics. The ΔF between two consecutives harmonics is around 140 Hz.........**AS3** (see also DS3 and US3)

80’ Different from above..**AS1**

81 The ΔF between two consecutives harmonics is higher than 300 Hz..rare harmonic AS fish sound, not used in the analysis

81’ Different from above..82

82 The ΔF s between two consecutive harmonics is smaller than the ΔF of one harmonics...**AS7**

82’ Different from above..83

83 Peak frequency above 900 Hz..**AS4** = ***kwa*-like**

83’ Different from above..84

84 Longer than 0.4 s and there are frequencies bellow 400 Hz .... rare low-frequency AS fish sound with a “pulsed aspect”, not used in the analysis

84’ Different from above 85

85 The ΔF between two consecutives harmonics is around 140 Hz. Only some harmonics appears completely flat in the spectrogram. .... Sound similar to **AS3**

85’ Different from above **AS5**

86 On the spectrogram, only one flat energetic zone is visible 87

86’ On the spectrogram, two flat energetic zone are visible 92

87 “Coma” shape .... Sound of unknow origin

87’ Different from above 88

88 Peak frequency bellow 100 Hz. The fundamental frequency is longer in duration compared to the higher harmonics .... Peculiar type of **AS2**

88’ Different from above 89

89 Duration usually between 45 and 65 ms. **AS6**

89’ Different from above 90

90 Longer than 0.5 s 91

90’ Different from above .. Sound of unknow origin that appears “flat” on the spectrogram

91 Shorter than 2 s ...... Sound of unknown origin probably produced by whales or humans

91’ Longer than 2 s. The frequency of the sound is not exactly 100% constant. Irregularities are usually observed at the beginning .... Whale

92 There are two zones at different frequencies and flat .... Whale

92’ Different from above .... Sound of unknow origin that appears as a “stair” in the spectrogram

93 Usually short pulse period (around 81 ms), peak frequency around 750 Hz **PS2**

93’ Usually a longer pulse period (around 120 ms) **PS16**