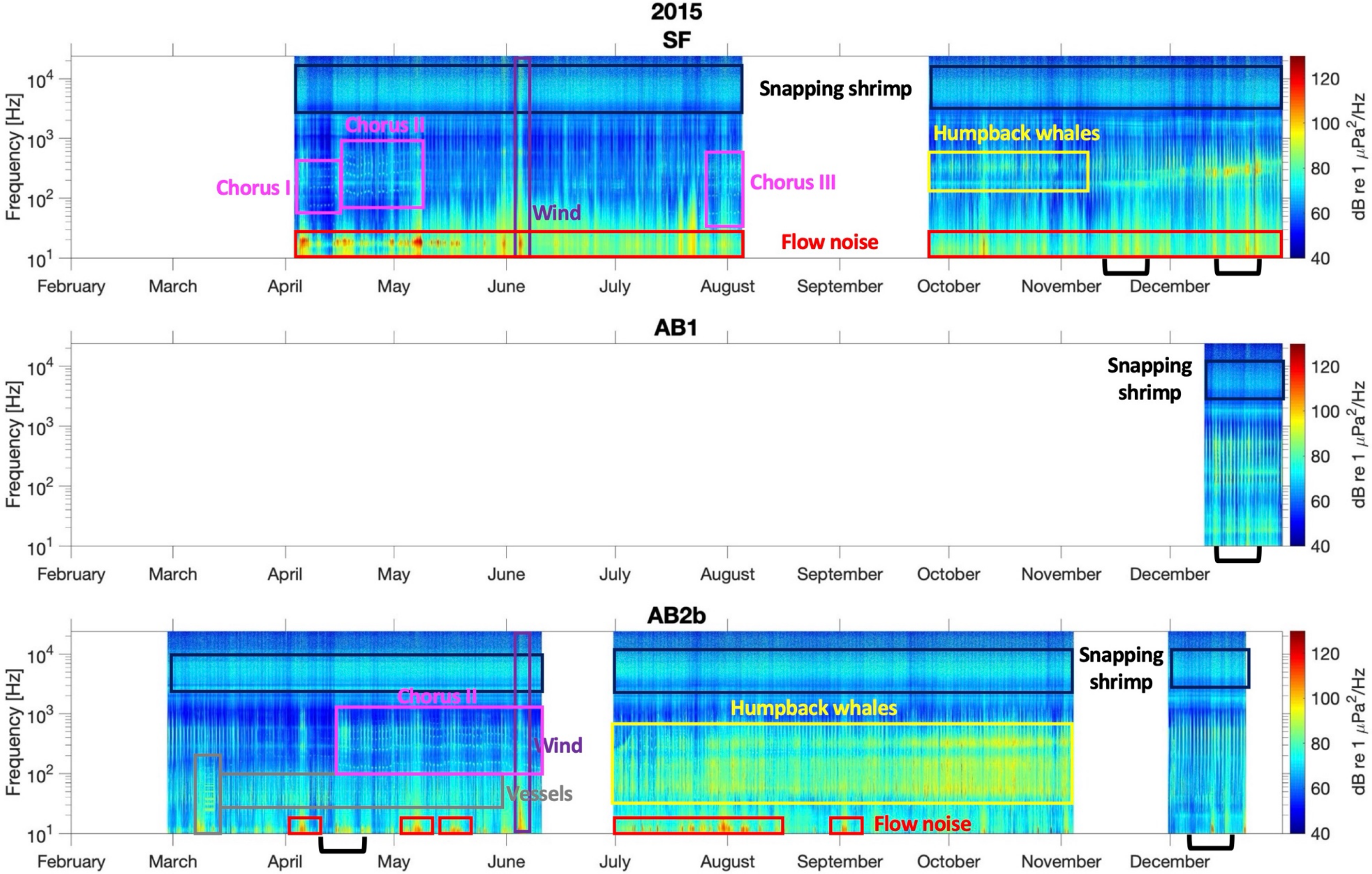
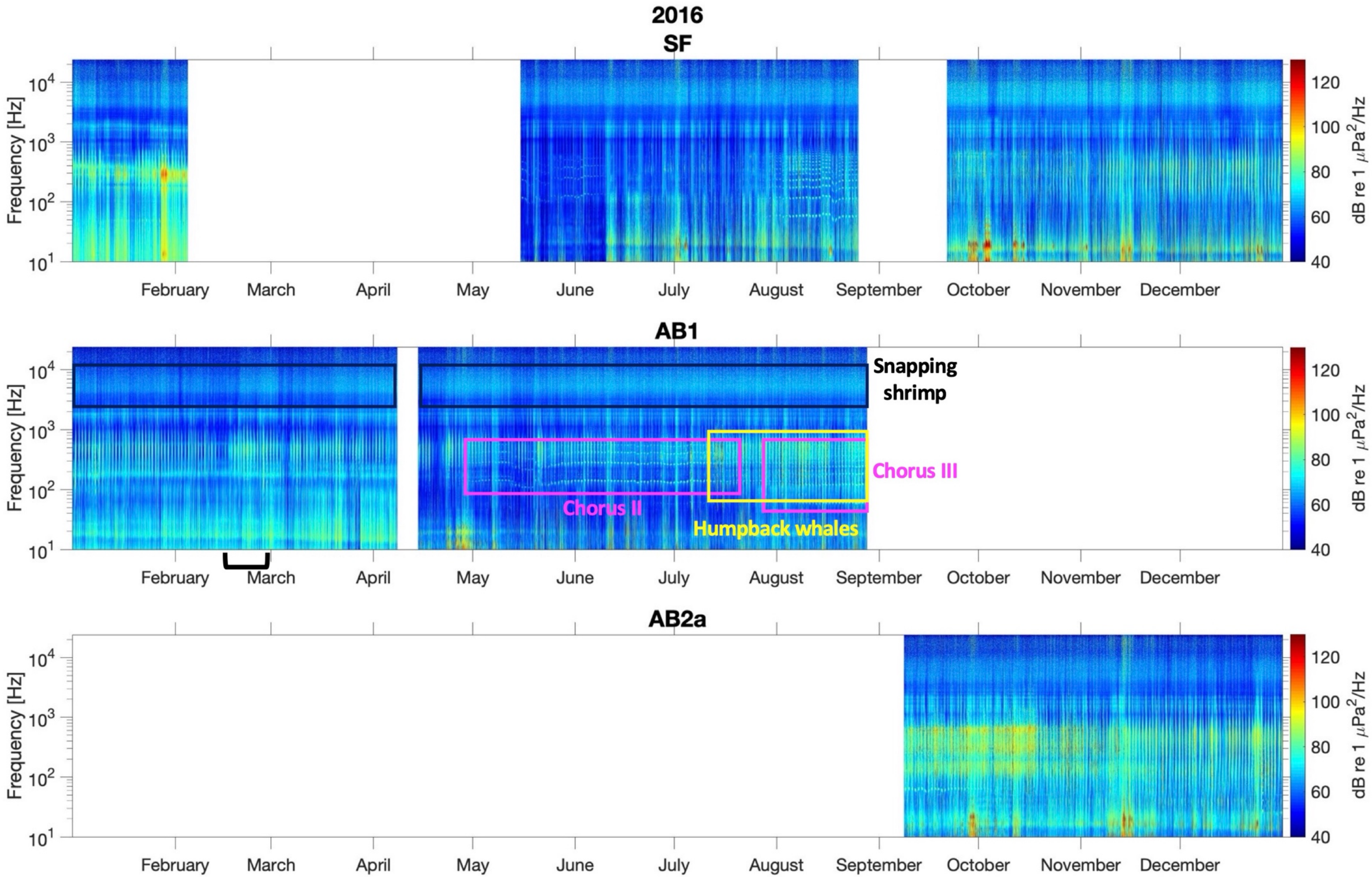
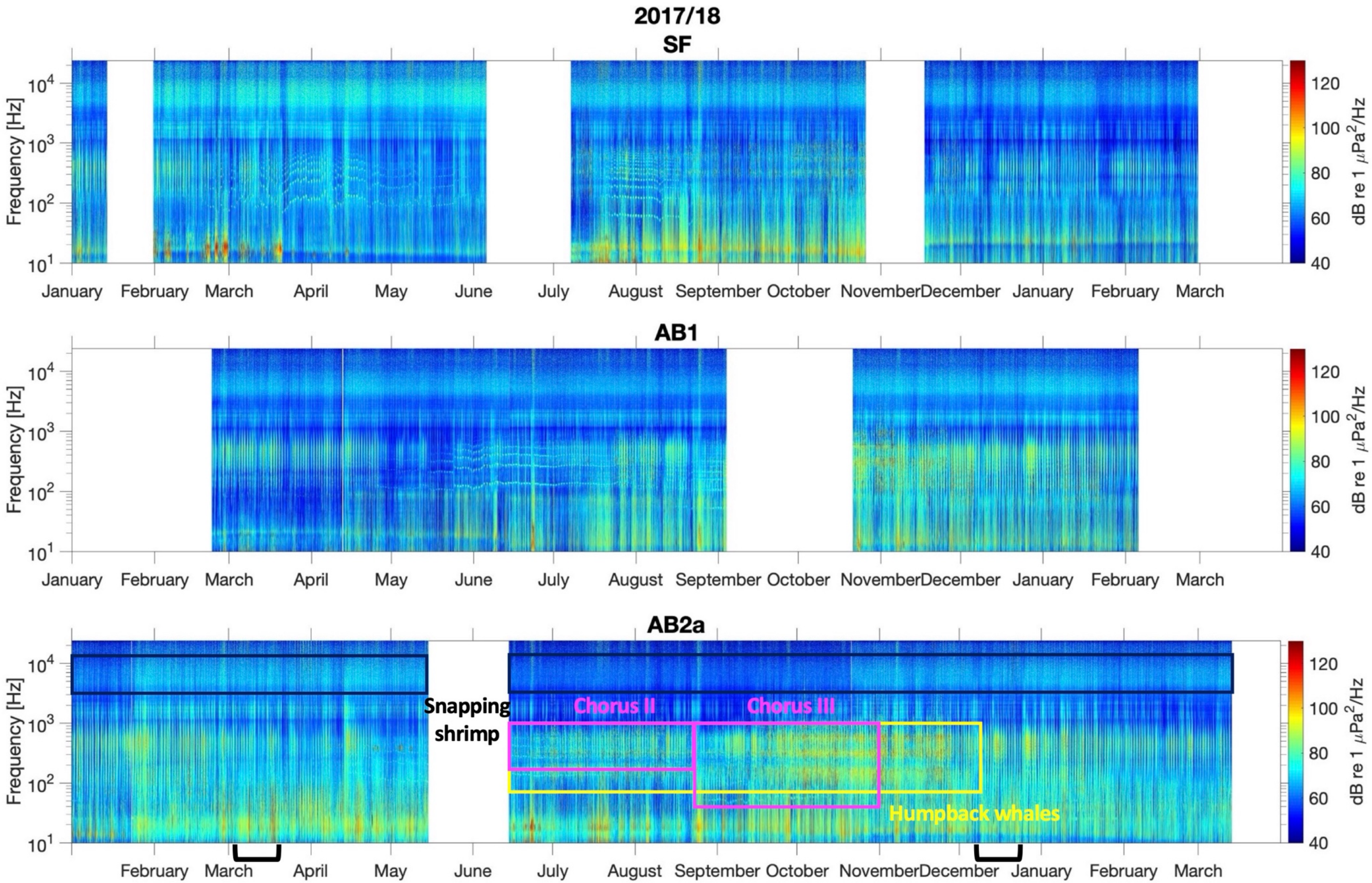
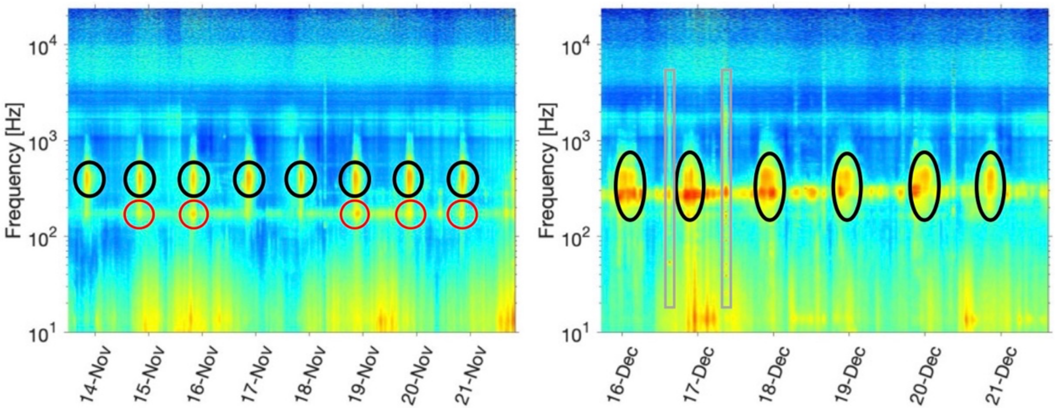
Figure S1 Long-term spectral averages for each site by year. Prominent sound sources are indicated for each site for the same year that was used to create PSD%PD plots. Annual LTSA plots are followed by shorter LTSA snippets to illustrate fish choruses (black arrow, Chorus I; red arrow, Chorus II; blue ellipses, Chorus IV; red circles, Chorus V; purple ellipses, Chorus VI), squid choruses (black ellipses), the unknown chorus (green box), and vessel presence (grey boxes). Black brackets on annual LTSAs indicate time blocks covered by shorter snippets.



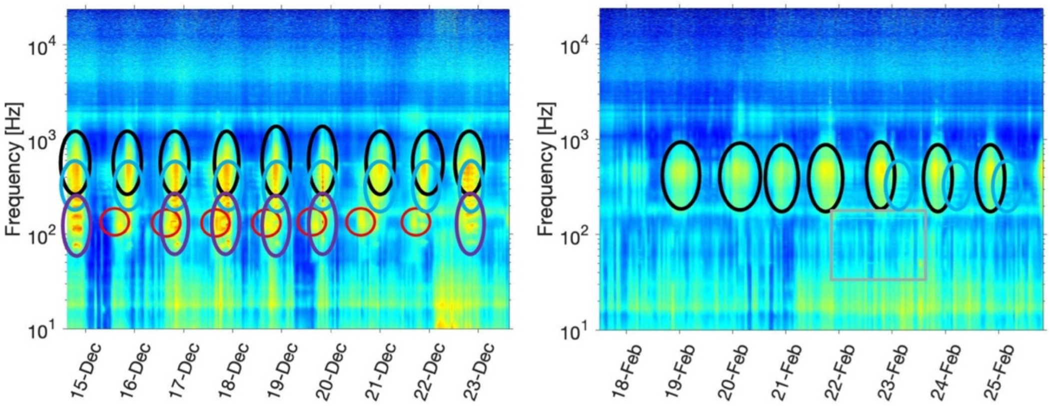

2016
SF
AB1
AB2a
Frequency [Hz]
10^1
10^2
10^3
10^4
February
March
April
May
June
July
August
September
October
November
December
dB re 1 $\mu Pa^2/Hz$
40
60
80
100
120
Snapping shrimp
Chorus II
Chorus III
Humpback whales


2017/18
SF
AB1
AB2a
Frequency [Hz]
dB re 1 $\mu Pa^2/Hz$
January
February
March
April
May
June
July
August
September
October
November
December
Snapping shrimp
Chorus II
Chorus III
Humpback whales

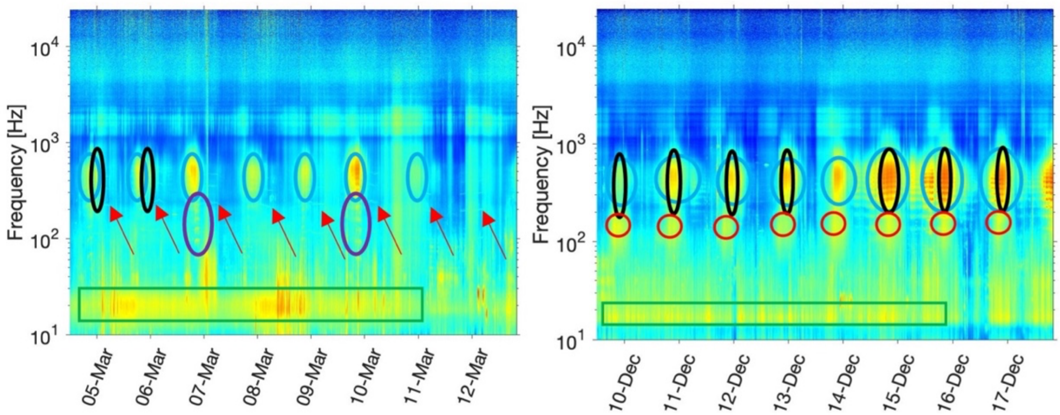
SF 2015:



AB1 2015-2016:



AB2a 2017:



AB2b 2015:

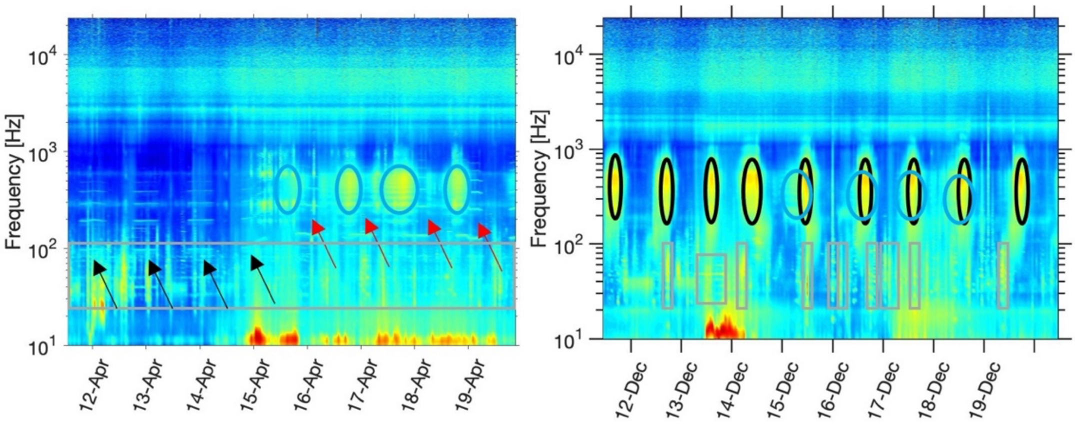


Table S1 List of the 25 acoustic zones with their bathymetric, hydroacoustic, and geoacoustic properties. Unconsolidated sediment abbreviations stand for: medium (M), coarse (C), medium to fine (MF), and fine (F). Compressional wave velocity (C_p), shear wave velocity (C_s), and density with depth in sand/silt and gravel were calculated following [1-3] and [4], respectively. Compressional and shear wave attenuation (i.e., α_p and α_s) for all sediments were derived from [4].

Zone	Mean depth [m]	Sound Speed Profile (SSP)	Consolidated sediment	Unconsolidated sediment	Unconsolidated sediment thickness [m]	C_p [m/s] Top	C_p [m/s] Bottom	C_s [m/s] Top	C_s [m/s] Bottom	α_p [dB/λ]	α_s [dB/λ]	Density [kg/m^3] Top	Density [kg/m^3] Bottom
1	113	Shelf offshore	Sandstone	M pebbles	0.7	1825	1825	48	173	0.6	1.5	2106	2106
2	119	Shelf offshore	Quartzite	M pebbles	0.5	1825	1825	48	156	0.6	1.5	2106	2106
3	121	Shelf offshore	Sandstone	C silt	1.1	1626	1703	116	121	0.9	2.2	1656	1743
4	614	Slope	Sandstone	F Pebbles	0.5	1815	1815	47	152	0.6	1.5	2103	2103
5	114	Shelf offshore	Sandstone	MF silt	0.8	1526	1526	116	119	0.5	1.2	1542	1542
6	108	Shelf offshore	Quartzite	MF silt	0.5	1526	1526	116	118	0.4	1.2	1542	1539
7	42	Shelf offshore	Quartzite	MF sand	9.1	1768	1912	25	208	0.6	1.7	1817	1980
8	17	Shelf bay	Quartzite	MF sand	7.5	1768	1906	25	196	0.6	1.7	1817	1974
9	61	Shelf bay	Sandstone	MF sand	7.5	1768	1906	25	196	0.6	1.7	1817	1974
10	45	Shelf bay	Sandstone	MF sand	13.0	1768	1922	25	232	0.6	1.7	1817	1991
11	53	Shelf bay	Sandstone	MF sand	6.5	1768	1902	25	187	0.6	1.7	1817	1969
12	45	Shelf bay	Sandstone	MF sand	11.0	1768	1917	25	220	0.6	1.7	1817	1986
13	59	Shelf offshore	Quartzite	MF sand	11.6	1768	1919	25	224	0.6	1.7	1817	1988
14	42	Shelf bay	Sandstone	MF sand	16.0	1768	1928	25	248	0.6	1.7	1817	1998
15	70	Shelf offshore	Quartzite	MF sand	14.5	1768	1925	25	240	0.6	1.7	1817	1995
16	104	Shelf offshore	Sandstone	F sand	6.8	1754	1888	25	190	0.7	1.8	1801	1953
17	31	Shelf bay	Sandstone	MF sand	0.5	1768	1830	25	84	0.6	1.7	1817	1887
18	70	Shelf offshore	Quartzite	F sand	0.8	1754	1836	25	97	0.7	1.8	1801	1894
19	1980	Slope	Sandstone	MF sand	0.5	1768	1830	25	84	0.6	1.6	1817	1904
20	1565	Slope	Quartzite	MF sand	0.5	1768	1830	25	84	0.6	1.6	1817	1904
21	4157	Deep	Sandstone	MF sand	0.5	1768	1830	25	84	0.6	1.6	1817	1913
22	115	Shelf offshore	Sandstone	MF sand	0.5	1768	1830	25	84	0.6	1.6	1817	1904
23	82	Shelf offshore	Quartzite	MF sand	6.3	1768	1900	25	185	0.6	1.6	1817	1995

24	99	Shelf offshore	Quartzite	M sand	9.1	1805	1952	25	208	0.6	1.5	1859	2025
25	25	Shelf bay	Quartzite	MF sand	0.5	1768	1830	25	84	0.6	1.7	1817	1887

[1] Hamilton, E.L. Geoacoustic modeling of the sea floor. J. Acoust. Soc. Am. 1980, 68, 1313–1340, doi:10.1121/1.385100.

[2] Hamilton, E.L. Sound velocity-density relations in sea-floor sediments and rocks. J. Acoust. Soc. Am. 1978, 63, 366–377, doi:10.1121/1.381747.

[3] Hamilton, E.L. Shear-wave velocity versus depth in marine sediments: A review. Geophysics 1976, 41, 985–996, doi:10.1190/1.1440676.

[4] Jensen, F.B.; Kuperman, W.A.; Porter, M.B.; Schmidt, H. Computational Ocean Acoustics; Springer: New York, United States., 2011. doi: 10.1007/978-1-4419-8678-8.

Figure S2 Example plots of clustered source-receiver transects for vessels of Class 5 in Zone 20. The thick black line indicates the centroid bathymetry along which sound propagation loss was modelled. Y-axes provide the water depth in meters below the sea surface and X-axes provide the range in kilometres.

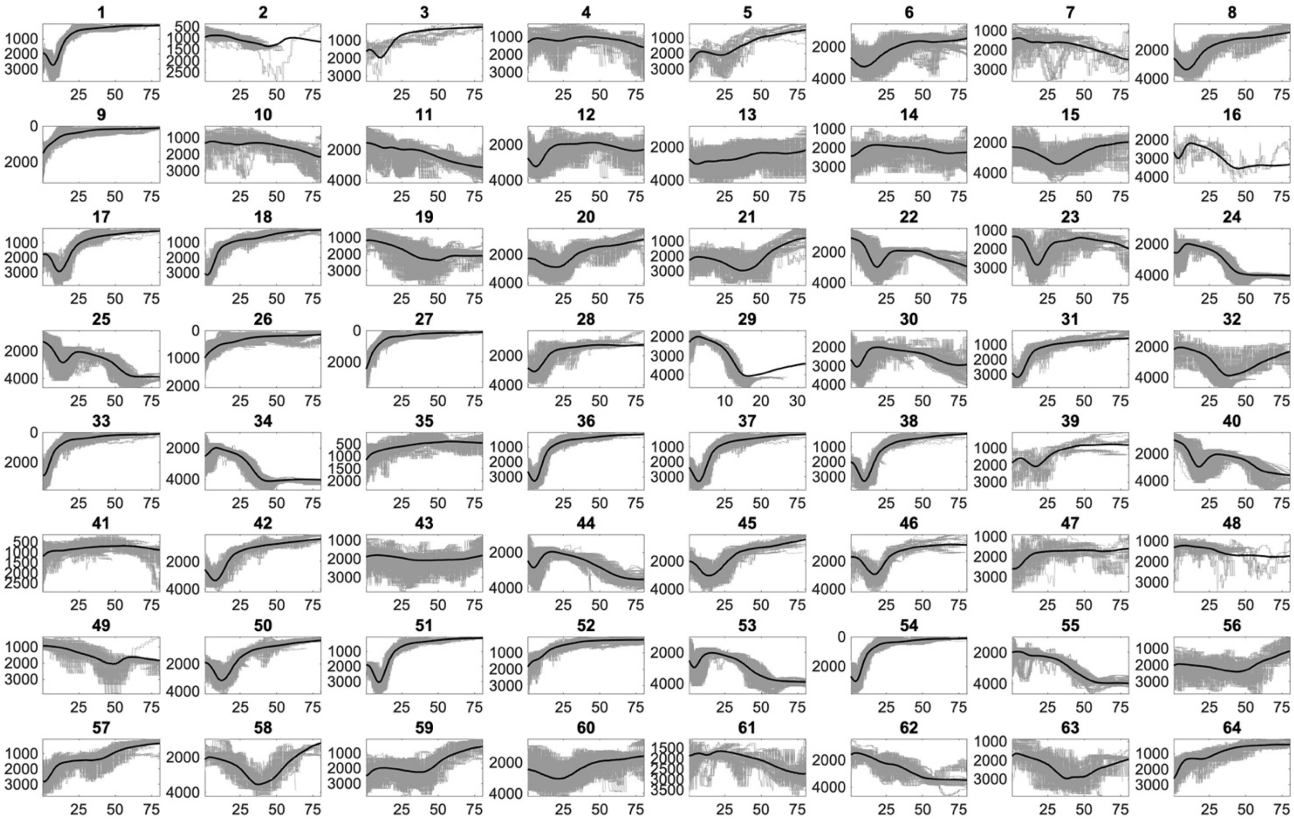


Figure S3 Example plots of propagation loss (i.e., over range and depth for 125 Hz) along the 64 bathymetry cluster centroids obtained for vessels of Class 5 in Zone 20. Propagation loss for this vessel class was modelled with a source depth of 7 m. Y-axes provide the water depth in metres below the sea surface and X-axes provide the range in kilometres.

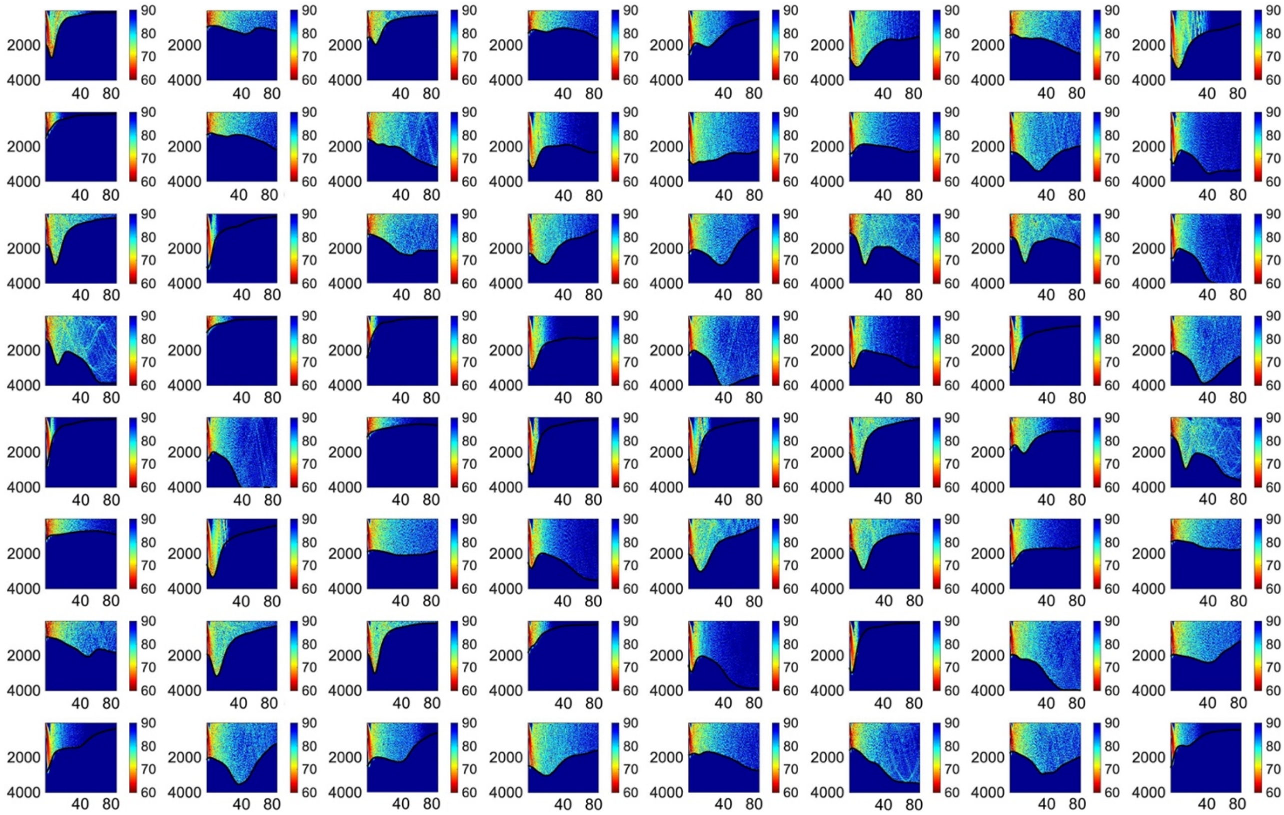
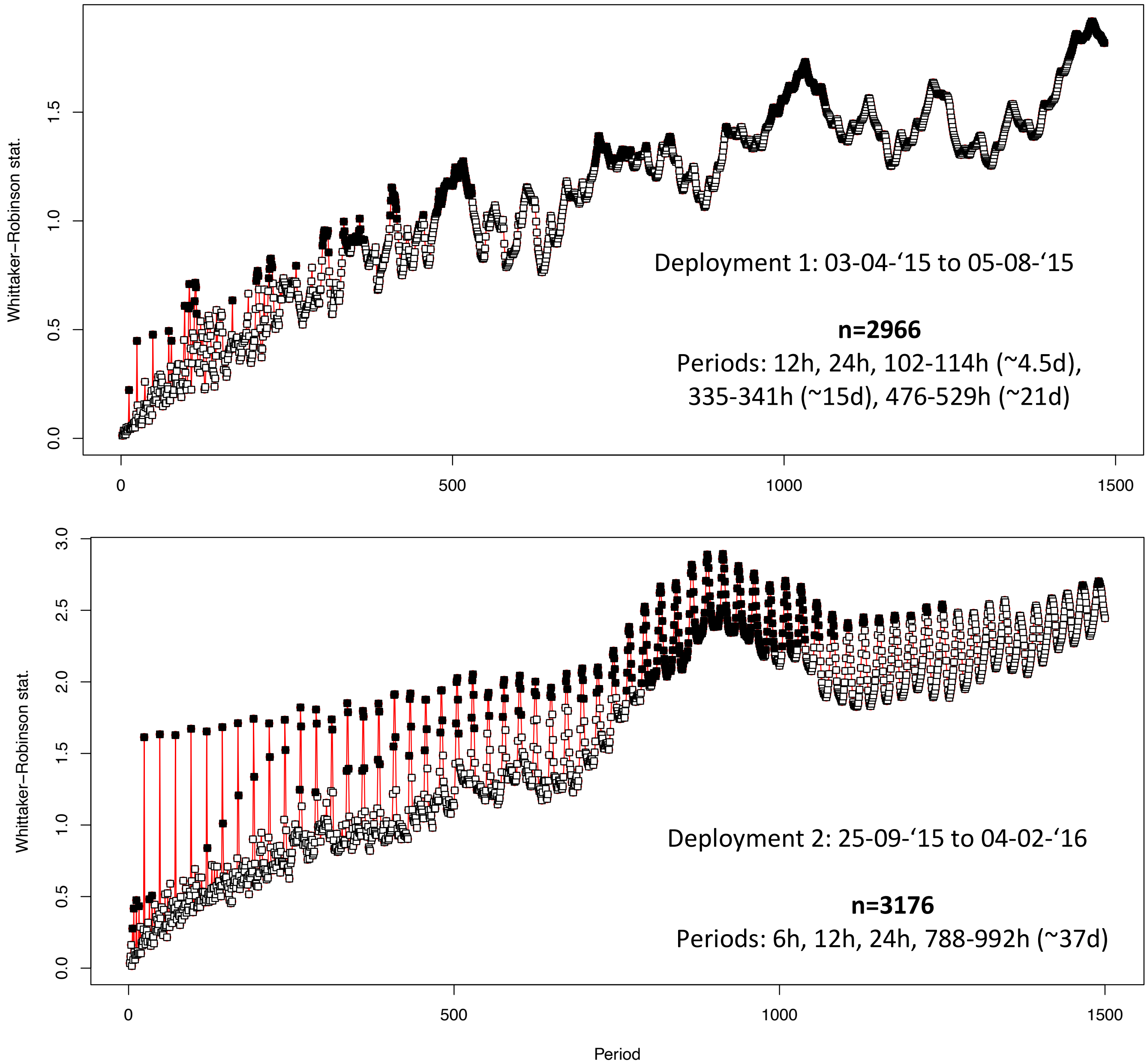
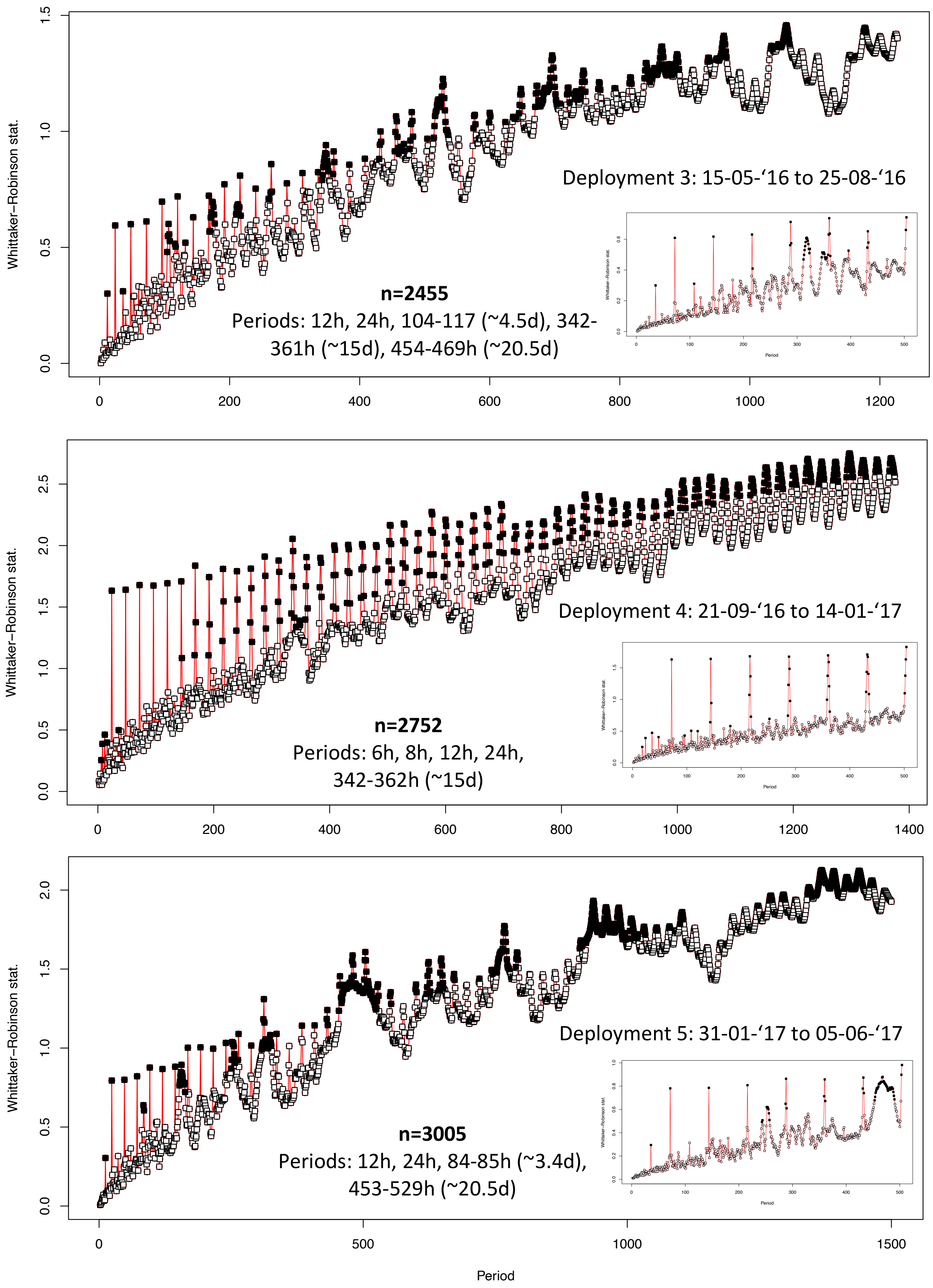


Figure S4 Whittaker-Robinson periodograms for recorded broadband (30 Hz - 24 kHz) Sound Pressure Levels during deployments at site SF. "n" indicates the number of hourly samples used to calculate the full periodogram. However, for each site, a maximum of 1500 periods are shown (i.e., 3000 h). Black squares indicate significant (i.e., p<0.05) periods and harmonics. Deployments where the recording duty cycle increased to 5 min every 20 min have inserts with periodograms based on this higher sampling duty. Insert periodograms cover 504 periods (i.e., 7 days).





Whittaker–Robinson stat.
Deployment 3: 15-05-‘16 to 25-08-‘16
n=2455
Periods: 12h, 24h, 104-117 (~4.5d), 342-361h (~15d), 454-469h (~20.5d)
Deployment 4: 21-09-‘16 to 14-01-‘17
n=2752
Periods: 6h, 8h, 12h, 24h, 342-362h (~15d)
Deployment 5: 31-01-‘17 to 05-06-‘17
n=3005
Periods: 12h, 24h, 84-85h (~3.4d), 453-529h (~20.5d)
Period

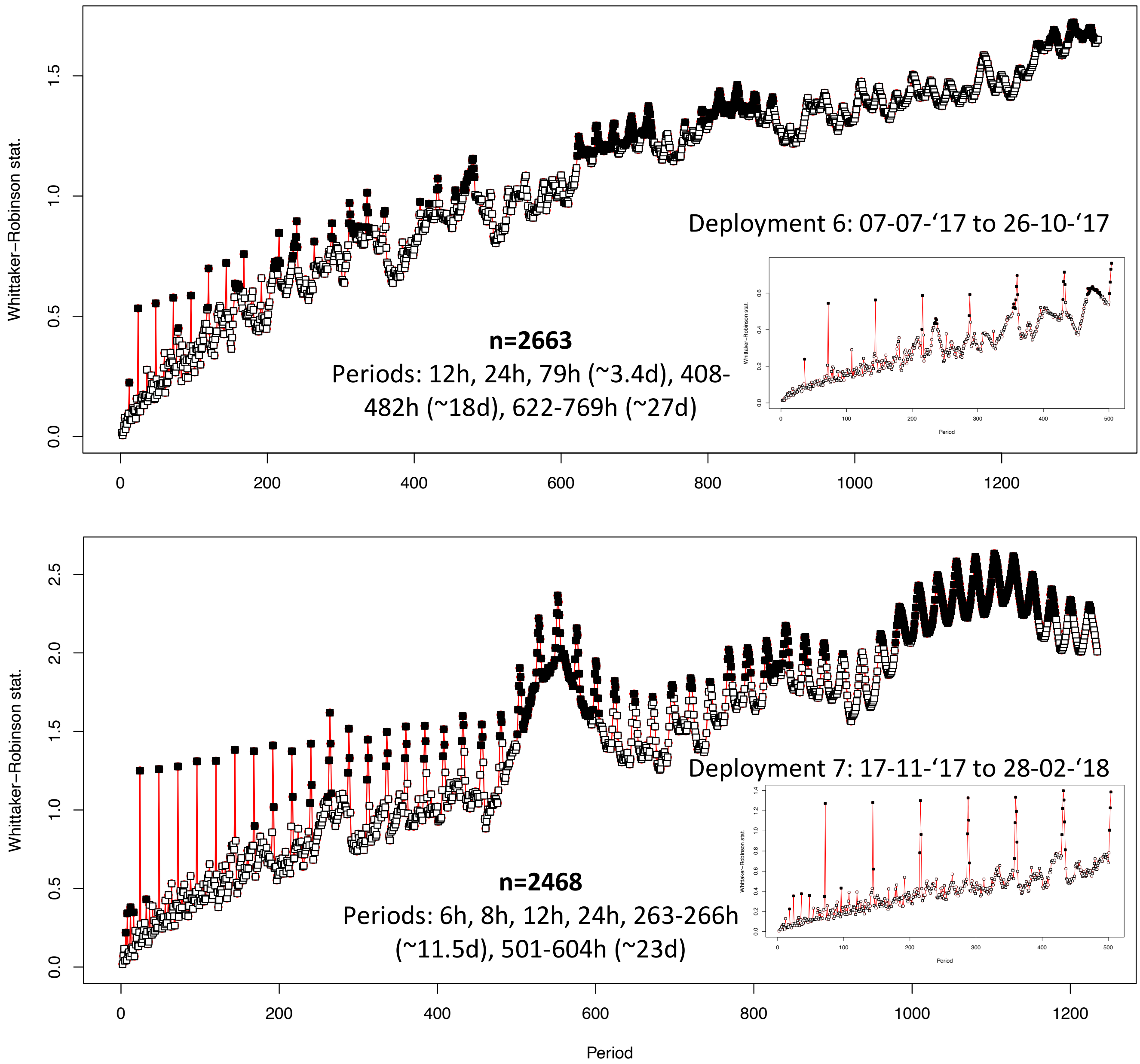
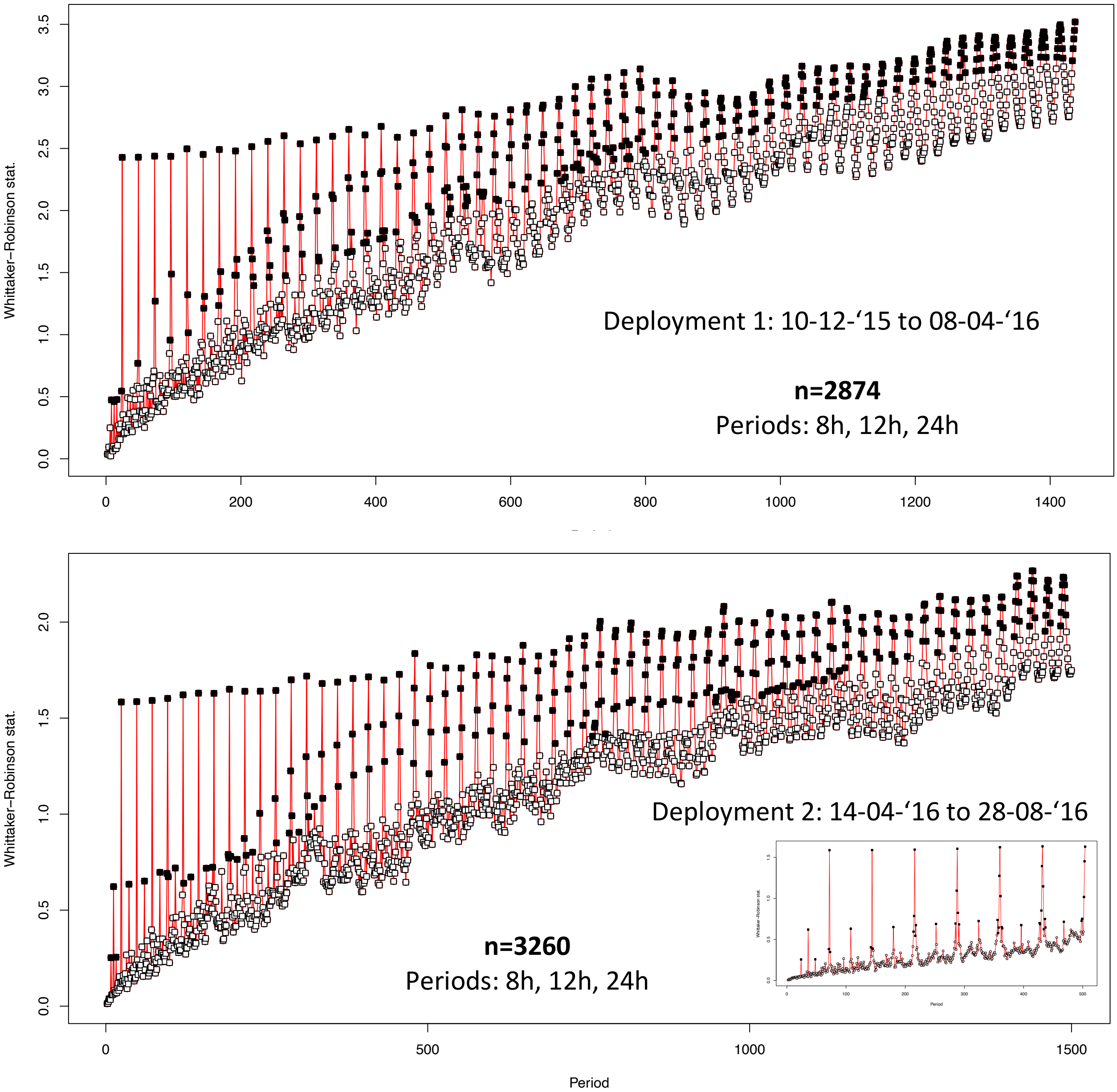
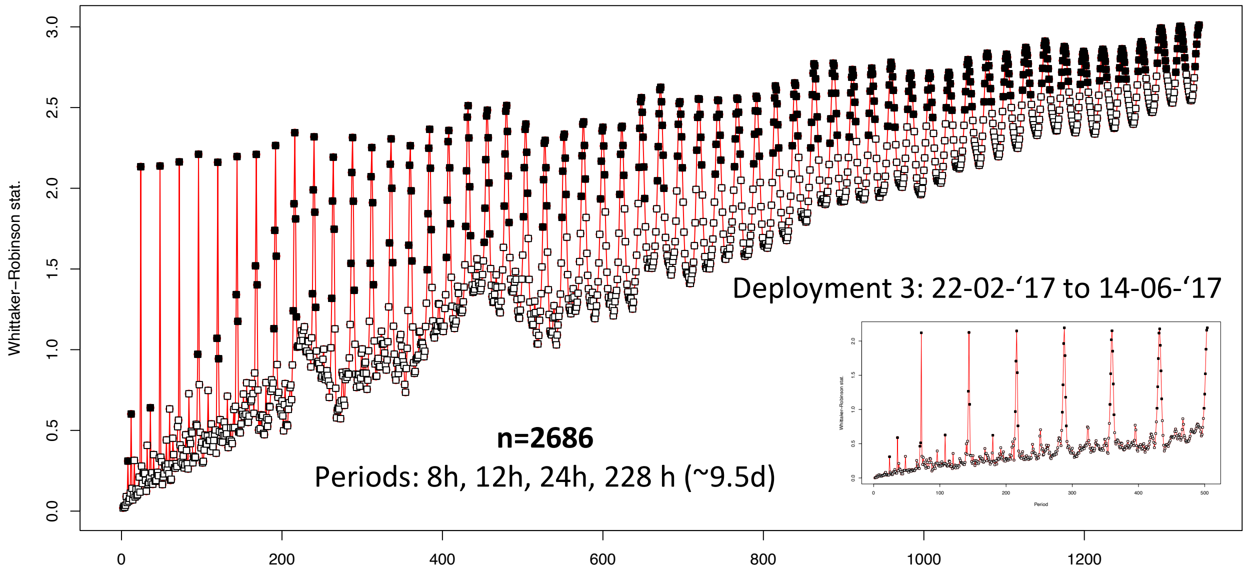
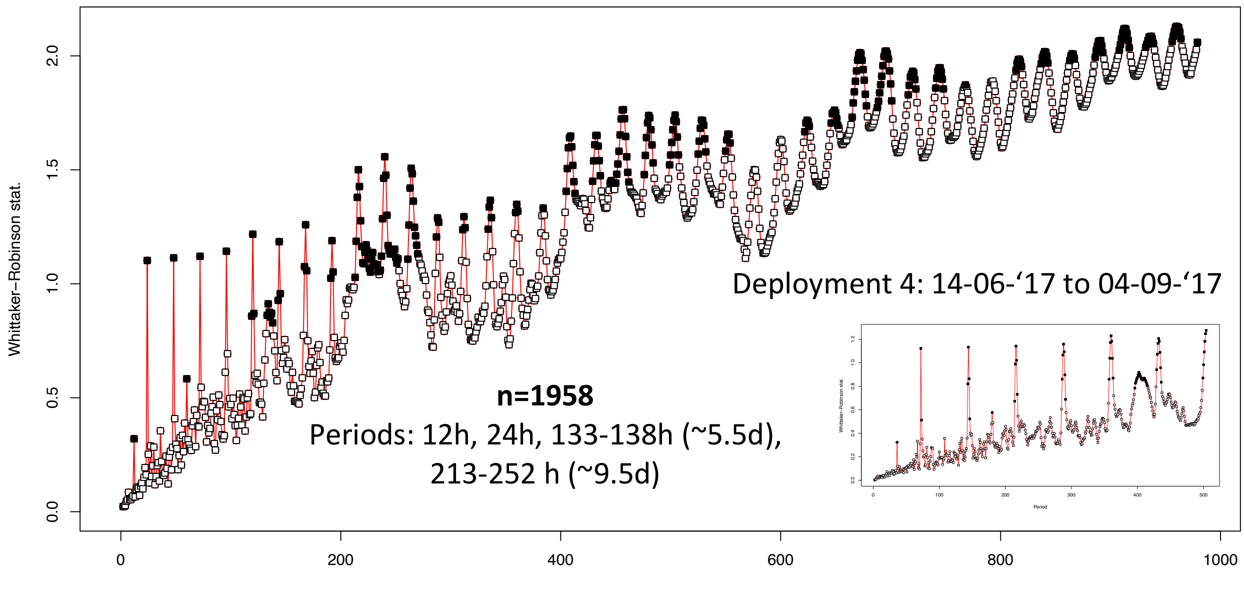

Whittaker−Robinson stat.
Deployment 6: 07-07-'17 to 26-10-'17
n=2663
Periods: 12h, 24h, 79h (~3.4d), 408-482h (~18d), 622-769h (~27d)
Whittaker−Robinson stat.
Deployment 7: 17-11-'17 to 28-02-'18
n=2468
Periods: 6h, 8h, 12h, 24h, 263-266h (~11.5d), 501-604h (~23d)
Period

Figure S5 Whittaker-Robinson periodograms for recorded broadband (30 Hz - 24 kHz) Sound Pressure Levels during deployments at site AB1. "n" indicates the number of hourly samples used to calculate the full periodogram. However, for each site, a maximum of 1500 periods are shown (i.e., 3000 h). Black squares indicate significant (i.e., p<0.05) periods and harmonics. Deployments where the recording duty cycle increased to 5 min every 20 min have inserts with periodograms based on this higher sampling duty. Insert periodograms cover 504 periods (i.e., 7 days).




Whittaker–Robinson stat.
Deployment 3: 22-02-'17 to 14-06-'17
n=2686
Periods: 8h, 12h, 24h, 228 h (~9.5d)


Whittaker–Robinson stat.
Deployment 4: 14-06-'17 to 04-09-'17
n=1958
Periods: 12h, 24h, 133-138h (~5.5d),
213-252 h (~9.5d)

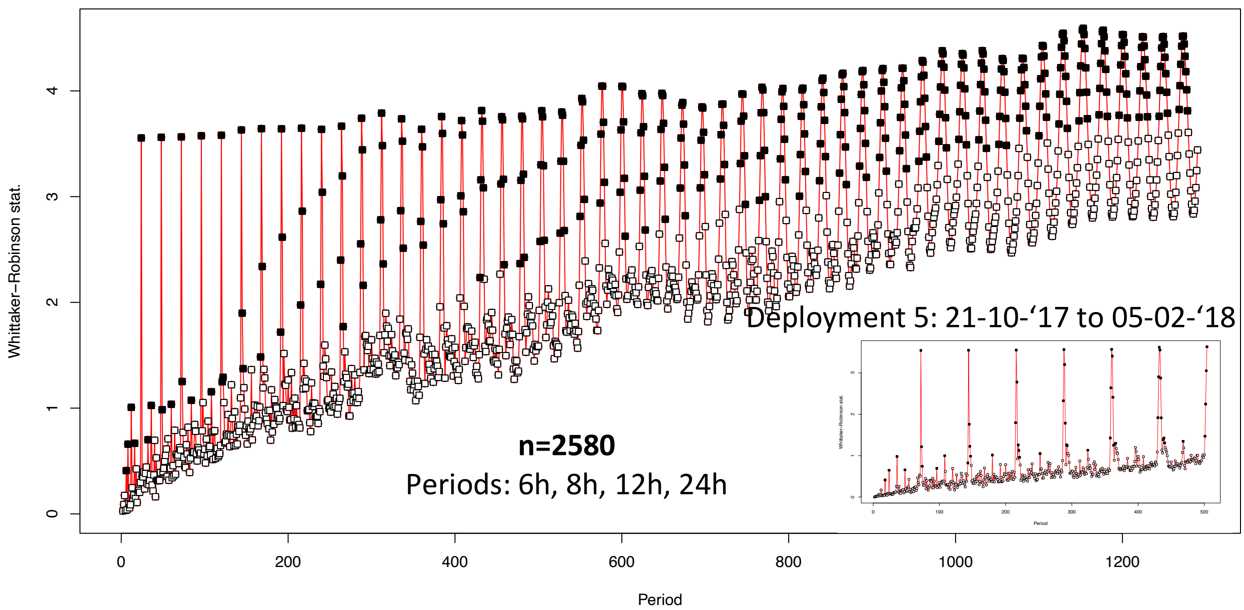
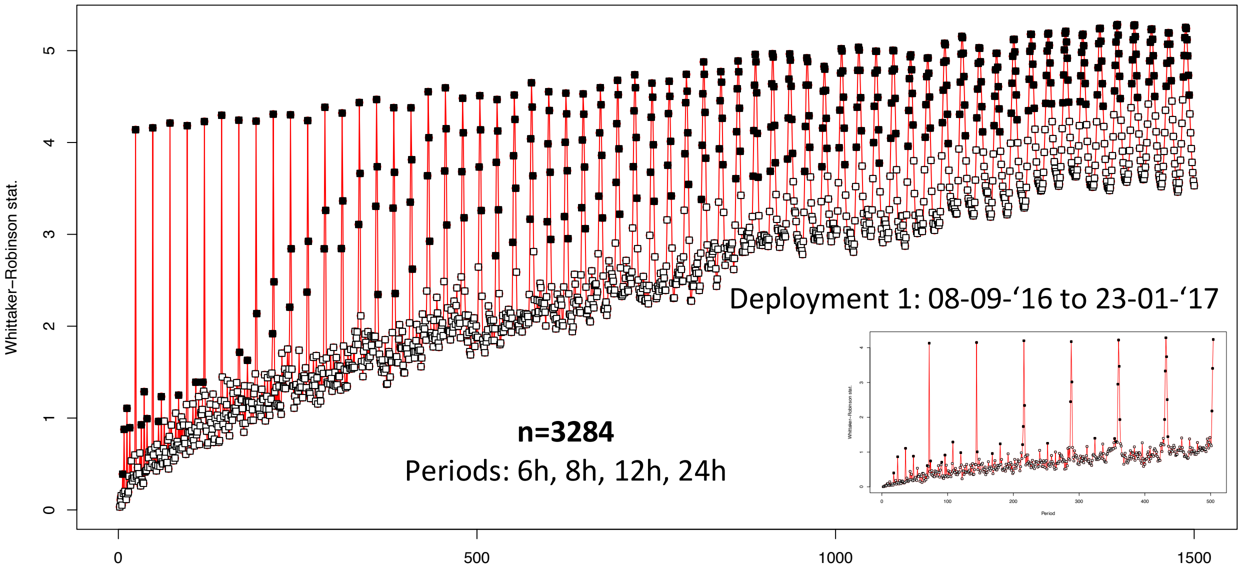
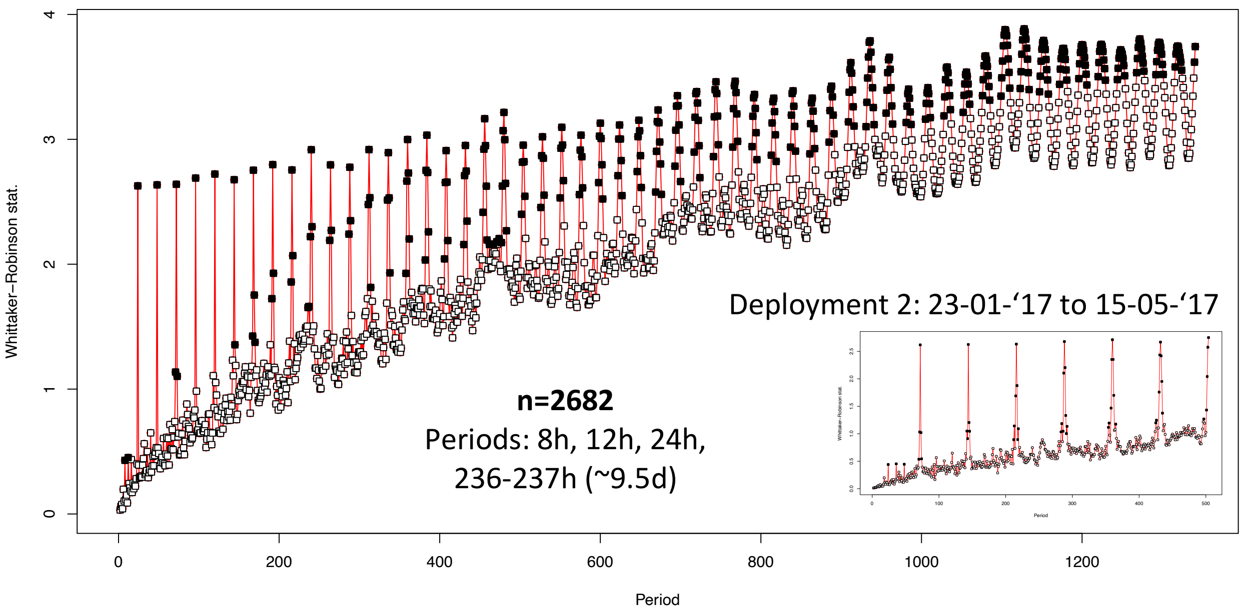
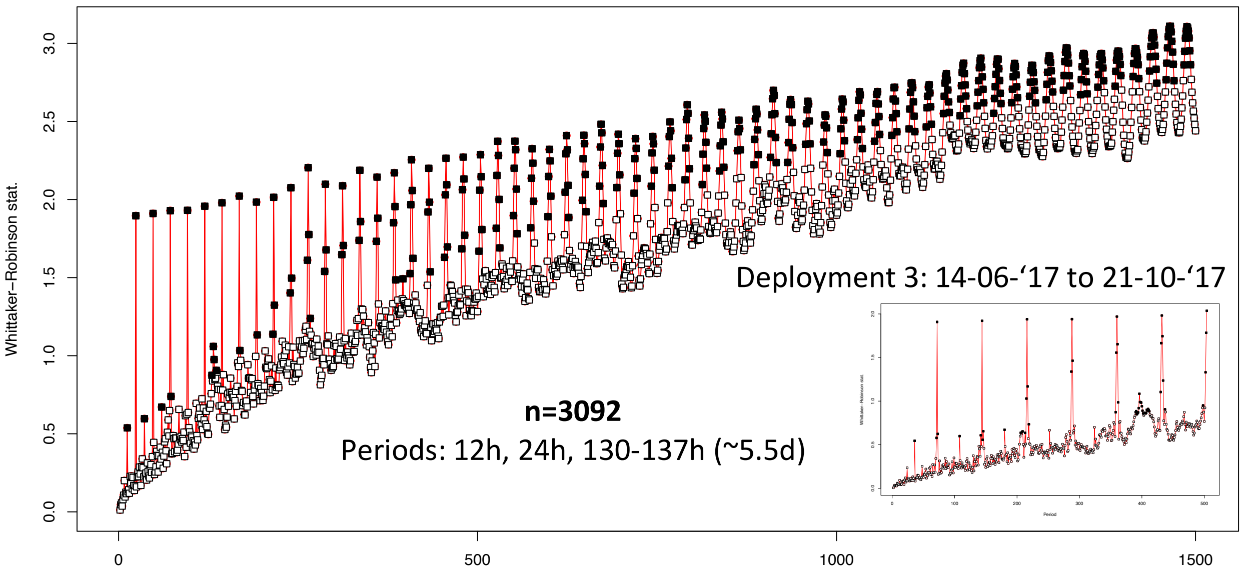

Whittaker–Robinson stat.
Deployment 5: 21-10-'17 to 05-02-'18
n=2580
Periods: 6h, 8h, 12h, 24h
Period

Figure S6 Whittaker-Robinson periodograms for recorded broadband (30 Hz - 24 kHz) Sound Pressure Levels during deployments at site AB2a. "n" indicates the number of hourly samples used to calculate the full periodogram. However, for each site, a maximum of 1500 periods are shown (i.e., 3000 h). Black squares indicate significant (i.e., p<0.05) periods and harmonics. Deployments where the recording duty cycle increased to 5 min every 20 min have inserts with periodograms based on this higher sampling duty. Insert periodograms cover 504 periods (i.e., 7 days).






Whittaker–Robinson stat.
0.0
0.5
1.0
1.5
2.0
2.5
3.0
0
500
1000
1500
Deployment 3: 14-06-‘17 to 21-10-‘17
n=3092
Periods: 12h, 24h, 130-137h (~5.5d)

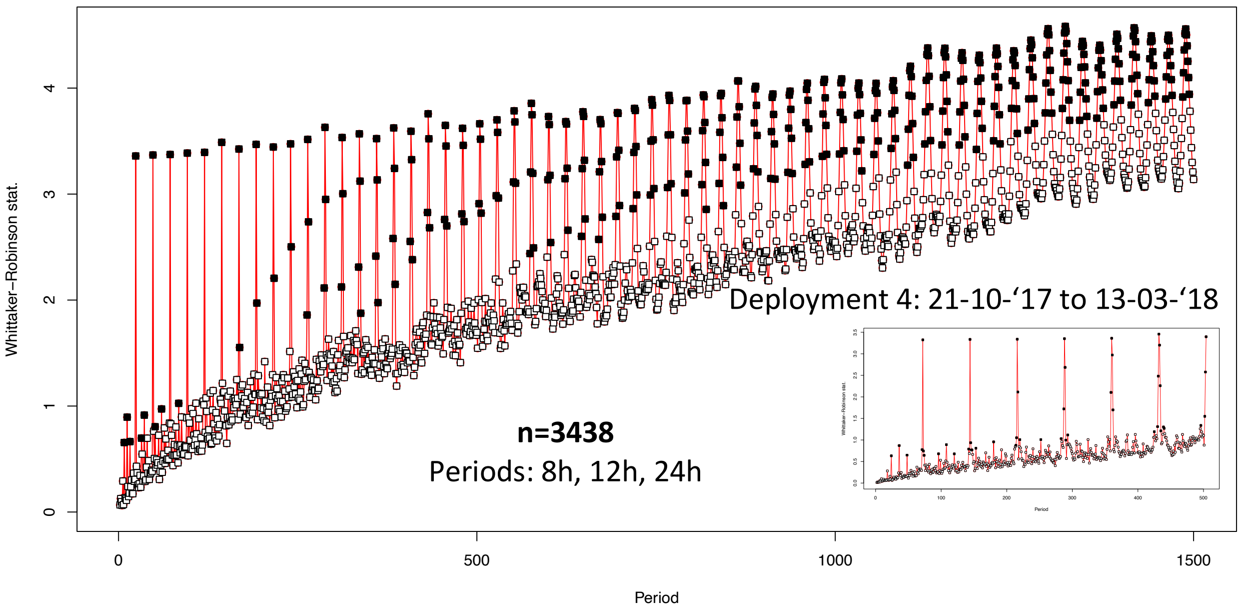
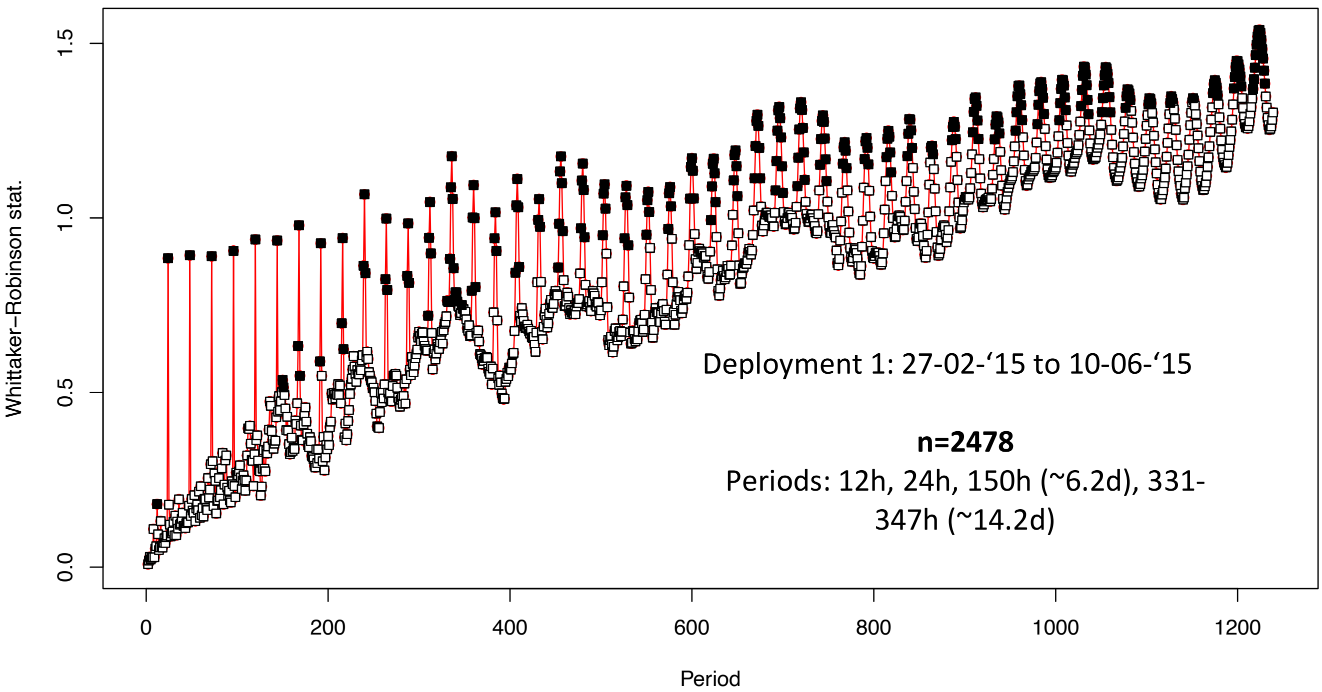
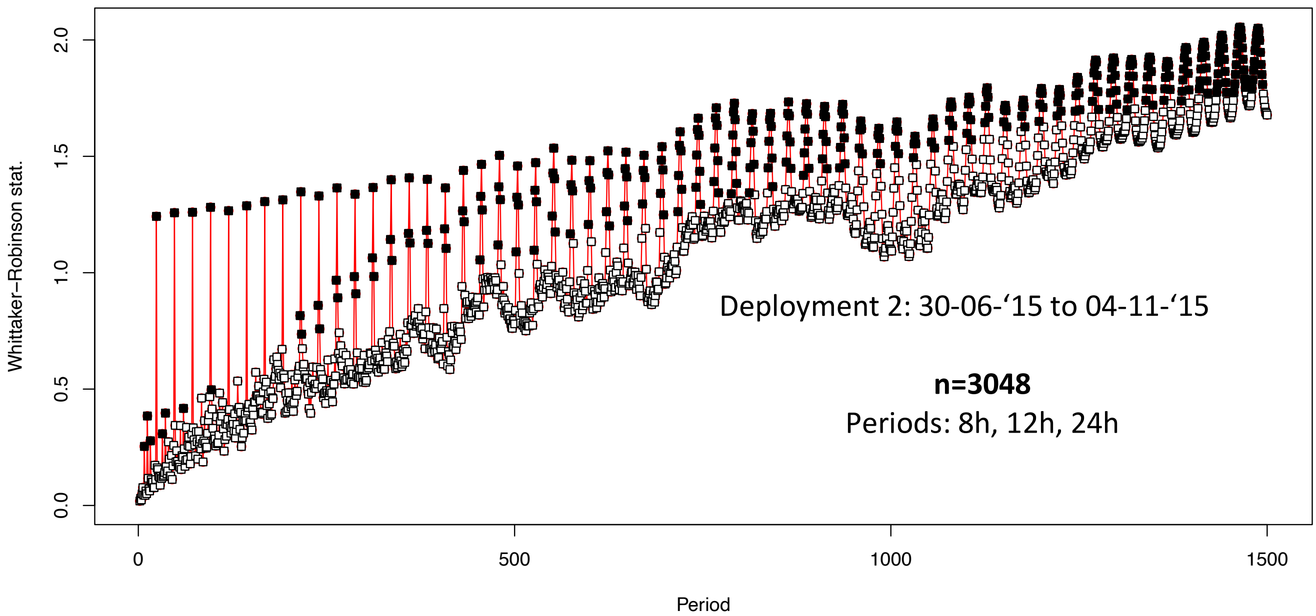

Whittaker–Robinson stat.
0
1
2
3
4
0
500
1000
1500
Period
Deployment 4: 21-10-‘17 to 13-03-‘18
n=3438
Periods: 8h, 12h, 24h

Figure S7 Whittaker-Robinson periodograms for hourly recorded broadband (30 Hz - 24 kHz) Sound Pressure Levels during deployments at site AB2b. "n" indicates the number of hourly samples used to calculate the full periodogram. However, for each site, a maximum of 1500 periods are shown (i.e., 3000 h). Black squares indicate significant (i.e., p<0.05) periods and harmonics.





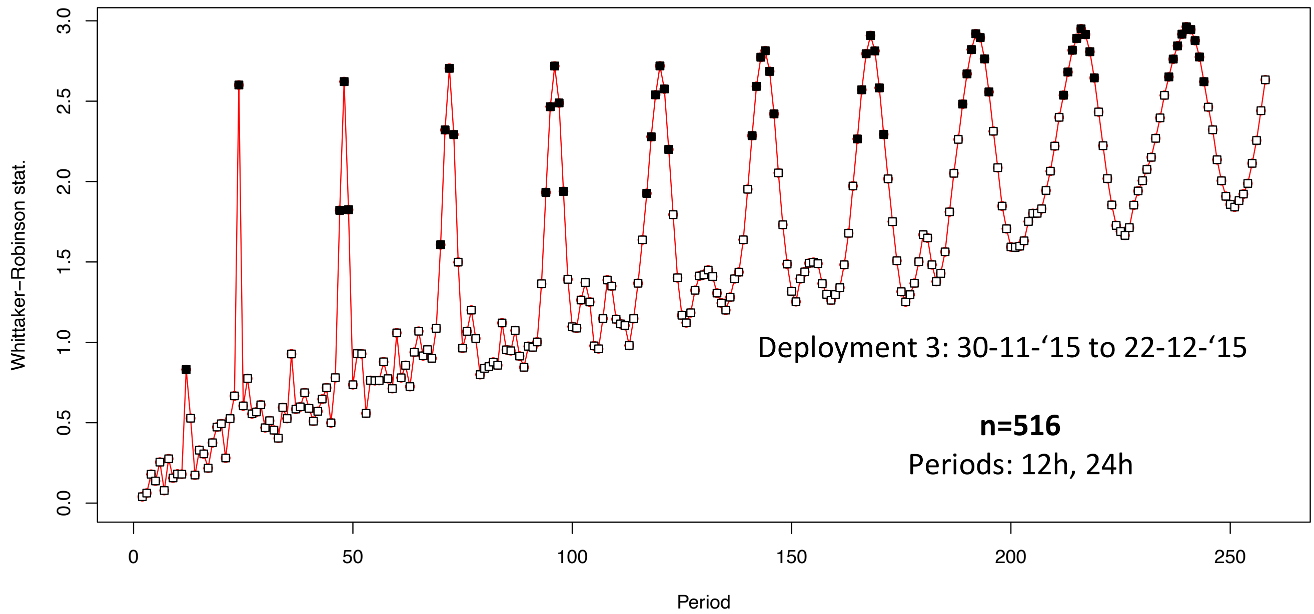
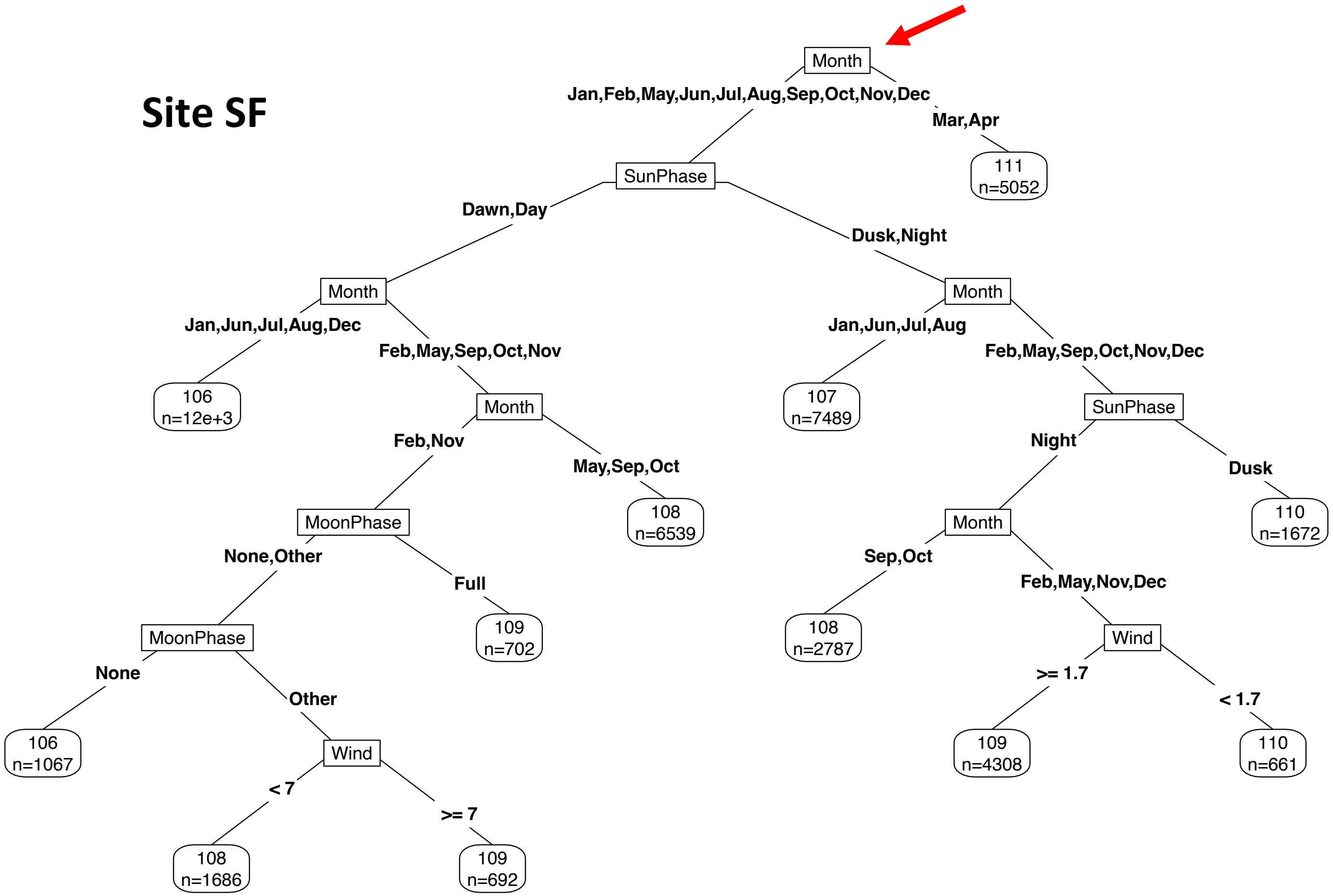
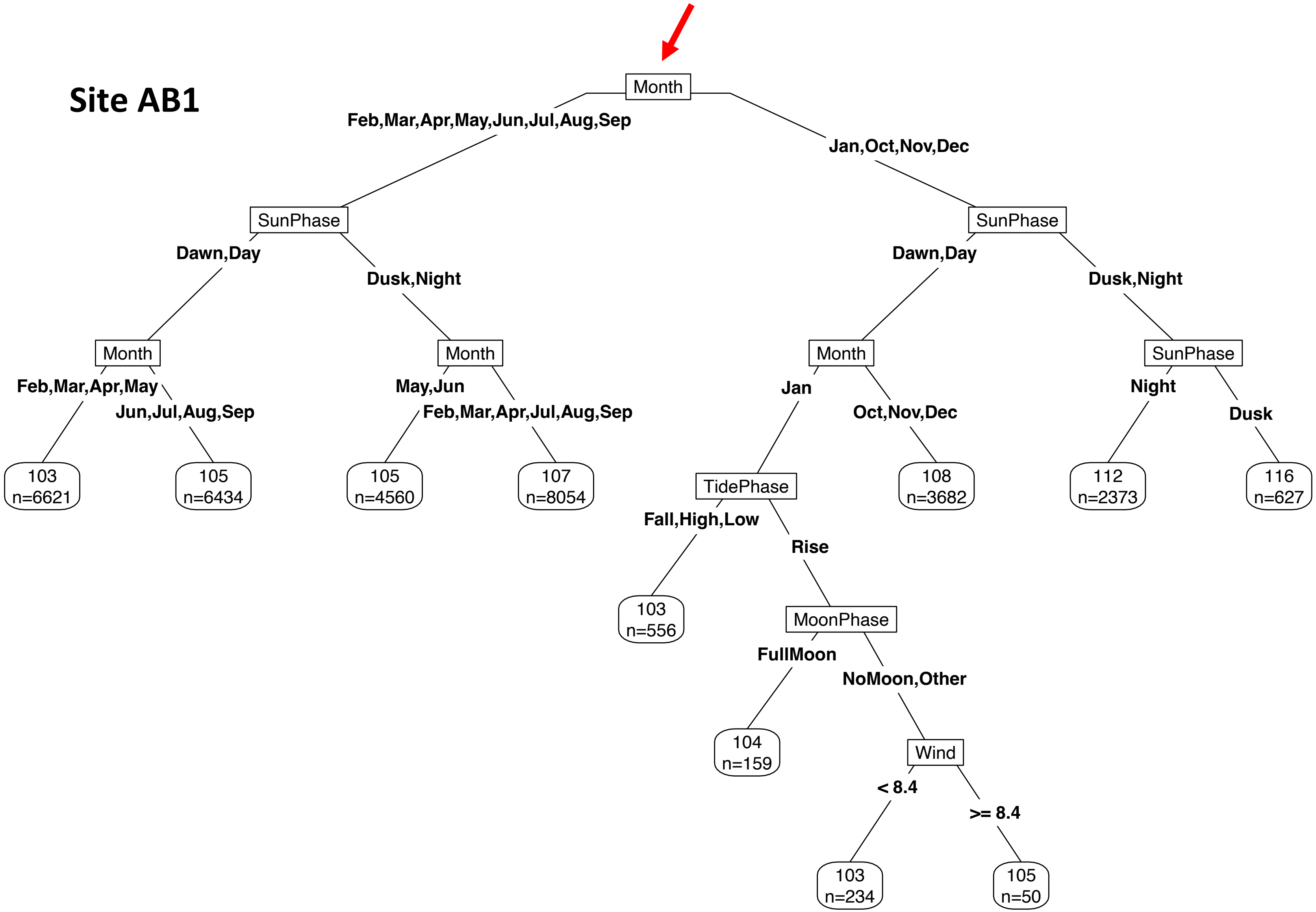

Deployment 3: 30-11-'15 to 22-12-'15
n=516
Periods: 12h, 24h
Whittaker-Robinson stat.
Period
0.0
0.5
1.0
1.5
2.0
2.5
3.0
0
50
100
150
200
250

Figure S8 Regression trees for site SF, AB1, AB2a, and AB2b. Regression trees are based on data from all deployments at one site. Regression trees consist of a root node (i.e., the top box pointed out with a red arrow), internal nodes (i.e., boxes between the root node and leaf nodes), and leaf nodes (i.e., terminal rounded boxes characterised by a predicted broadband Sound Pressure Level and sample size). At each split, the data is divided into smaller data sets based on a predictor variable (named inside the box) that produces maximum homogeneity within the split groups. Predictor variable values that characterise each split are depicted on the split branches.

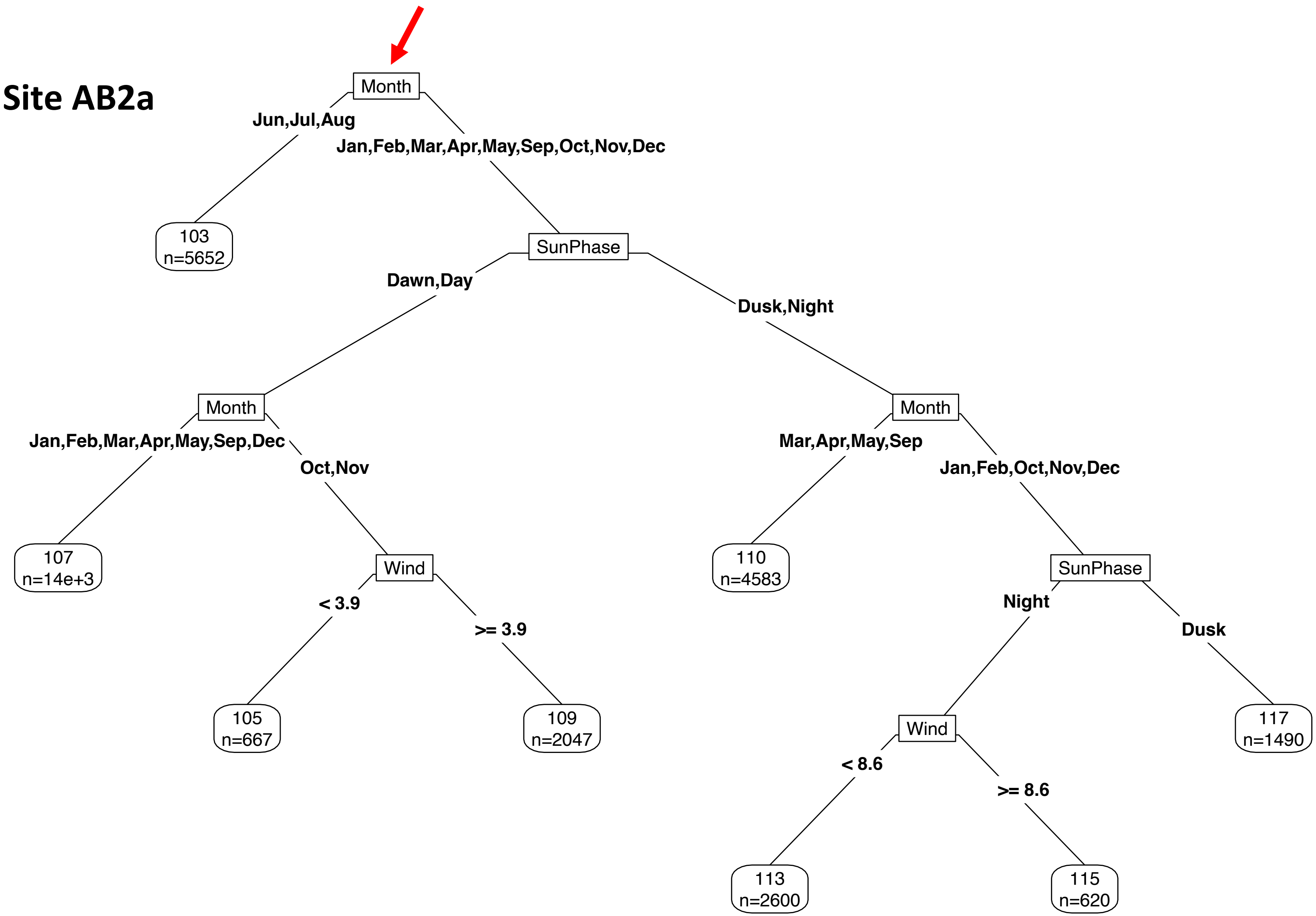


Site AB1



Month
Feb,Mar,Apr,May,Jun,Jul,Aug,Sep
Jan,Oct,Nov,Dec
SunPhase
Dawn,Day
Dusk,Night
SunPhase
Dawn,Day
Dusk,Night
Month
Feb,Mar,Apr,May
Jun,Jul,Aug,Sep
Month
May,Jun
Feb,Mar,Apr,Jul,Aug,Sep
Month
Jan
Oct,Nov,Dec
SunPhase
Night
Dusk
103
n=6621
105
n=6434
105
n=4560
107
n=8054
TidePhase
108
n=3682
112
n=2373
116
n=627
Fall,High,Low
Rise
103
n=556
MoonPhase
FullMoon
NoMoon,Other
104
n=159
Wind
< 8.4
>= 8.4
103
n=234
105
n=50

Site AB2a



Month
Jun,Jul,Aug
Jan,Feb,Mar,Apr,May,Sep,Oct,Nov,Dec
103
n=5652
SunPhase
Dawn,Day
Dusk,Night
Month
Jan,Feb,Mar,Apr,May,Sep,Dec
Oct,Nov
107
n=14e+3
Wind
< 3.9
>= 3.9
105
n=667
109
n=2047
Month
Mar,Apr,May,Sep
Jan,Feb,Oct,Nov,Dec
110
n=4583
SunPhase
Night
Dusk
117
n=1490
Wind
< 8.6
>= 8.6
113
n=2600
115
n=620

Site AB2b

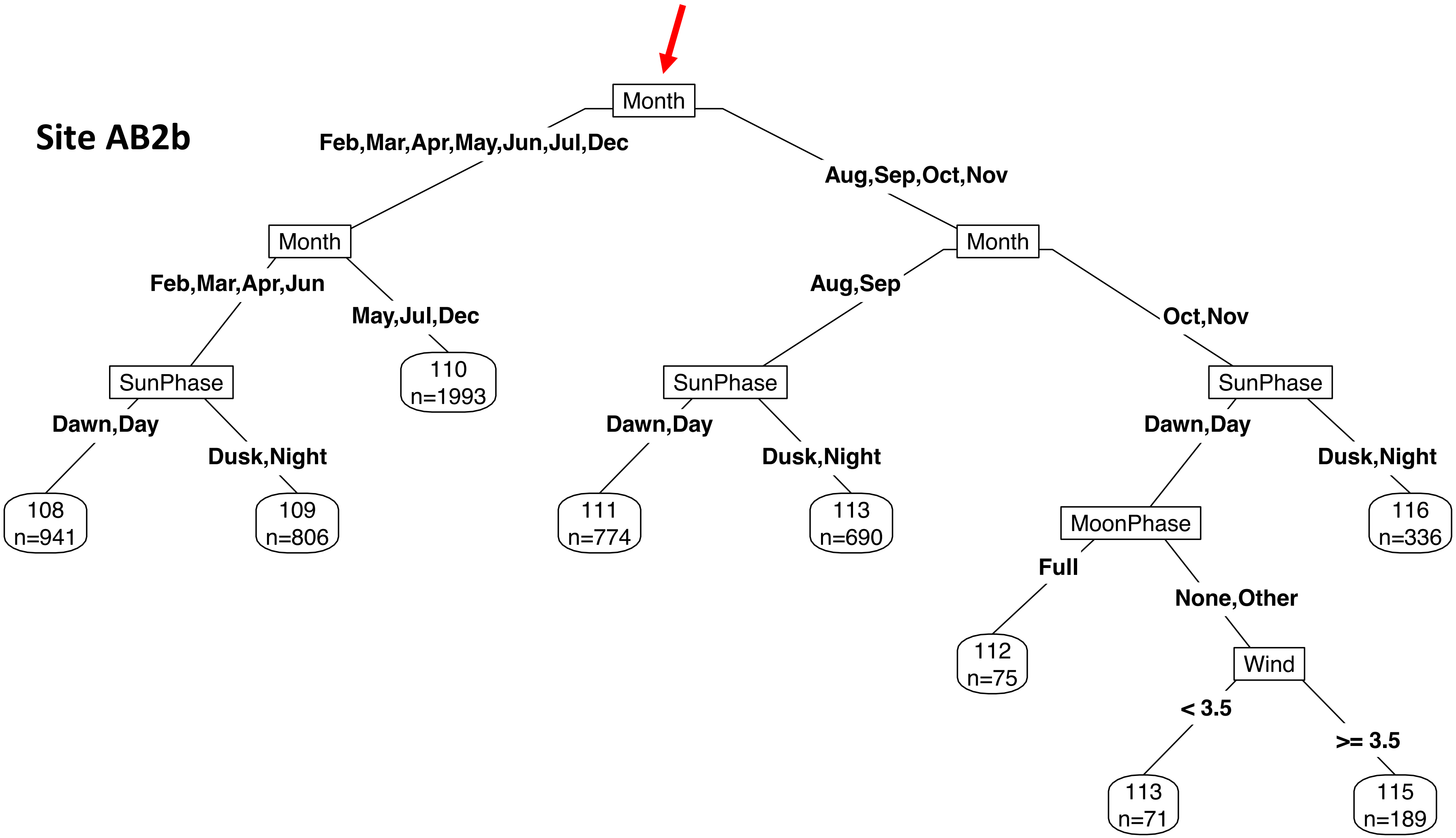

Month
Feb,Mar,Apr,May,Jun,Jul,Dec
Aug,Sep,Oct,Nov
Month
Feb,Mar,Apr,Jun
May,Jul,Dec
Month
Aug,Sep
Oct,Nov
SunPhase
Dawn,Day
Dusk,Night
110
n=1993
SunPhase
Dawn,Day
Dusk,Night
SunPhase
Dawn,Day
Dusk,Night
108
n=941
109
n=806
111
n=774
113
n=690
MoonPhase
Full
None,Other
116
n=336
112
n=75
Wind
< 3.5
>= 3.5
113
n=71
115
n=189

Figure S9 Maps of average received vessel noise (i.e., SPL) in St. Francis Bay and Algoa Bay by vessel class. Note that colour bars differ in range between vessel classes.