

Passive acoustics reveal low-latitude distribution of North Atlantic minke whales

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Supplementary material:

Details on the repertoire of the North Atlantic common minke whale

The North Atlantic common minke whale subspecies has a vocal repertoire mainly consisting of low frequency (< 1 kHz) pulse trains. These pulse trains consist of a repetition of brief pulses (< 0.2 s), with varying interpulse interval (IPI, time in between the start of two consecutive pulses), for all durations ranging from 12 over 40 s (Mellinger et al., 2000; Winn and Perkins, 1976). The changes in IPI over the call duration allow the pulse trains to be categorized as slow-down, constant or speed up. Slow down pulse trains are characterized by a larger IPI towards the end of the call. On the contrary, speed up pulse trains are characterized by a shorter IPI toward the end. The IPI of constant pulse trains does not change throughout the call (Risch, 2022). While pulse trains represent the main calls produced by individuals in the Atlantic subspecies, these minke whales can also produce other sounds such as ratchet-like pulses centered around 850 Hz, grunts between 80 and 140 Hz (Thompson et al., 1979; Winn and Perkins, 1976), frequency downsweeps ranging from 200 to 80 Hz (Edds-Walton, 2000; Perrin et al., 2017) and higher frequency clicks at 5-6 kHz (Beamish and Mitchell, 1973; Risch et al., 2015; Winn and Perkins, 1976).

References

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Details on the thermocline variation

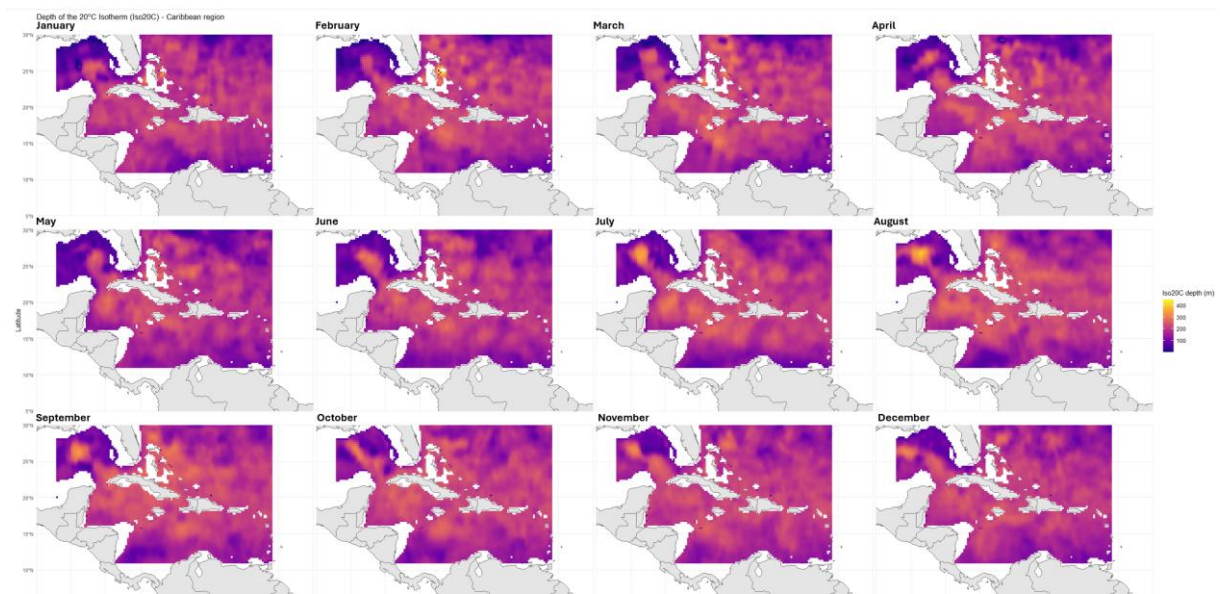


Fig. SP1. 20°C-isobath depth (m) from January to December 2021. Data are from Ocean Heat Content Product Suite (North Atlantic), 0.25° NOAA NESDIS CoastWatch (Dataset ID: noaacwOHCna)

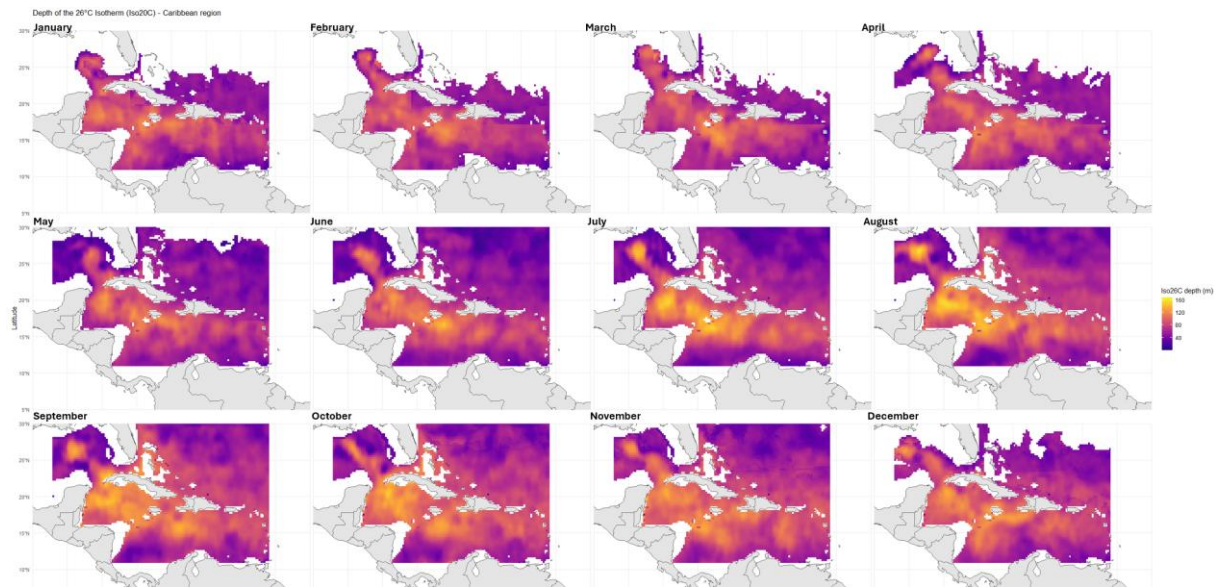


Fig. SP2. 26°C-isobath depth (m) from January to December 2021. Data are from Ocean Heat Content Product Suite (North Atlantic), 0.25° NOAA NESDIS CoastWatch (Dataset ID: noaacwOHCna).

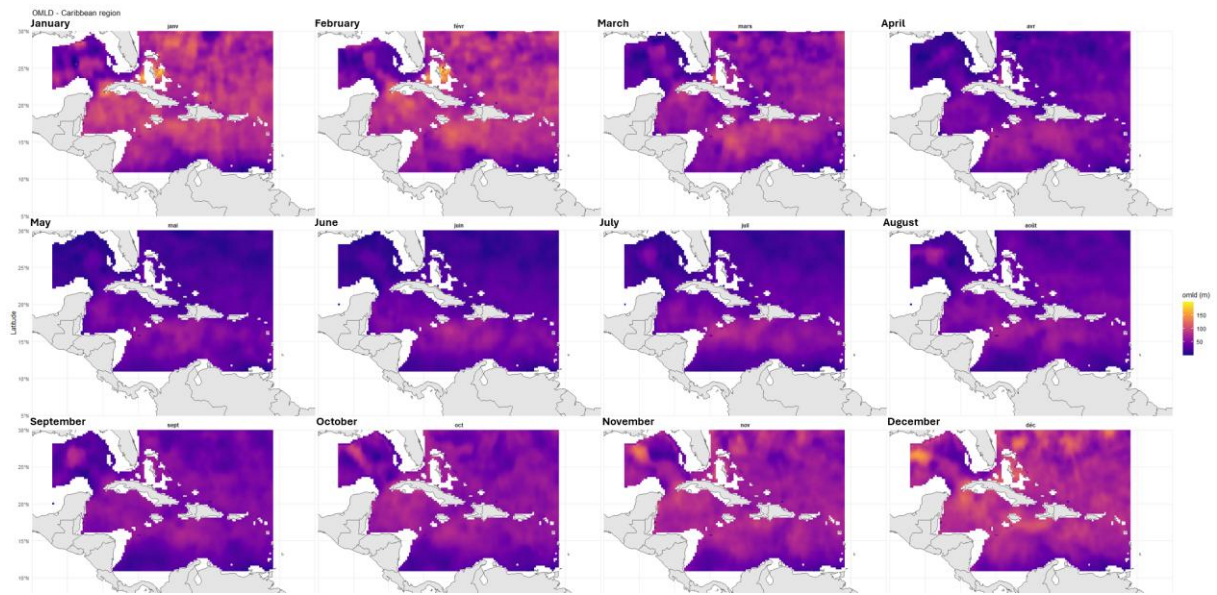


Fig. SP3. Ocean mixed layer thickness (OMLD, in m) from January to December 2021. Data are from Ocean Heat Content Product Suite (North Atlantic), 0.25° NOAA NESDIS CoastWatch (Dataset ID: noaacwOHCna).

Details on the deployment sites

Table SP1 Details of the deployment ID for each region. Lat = latitude (nearest 0.25°). Long = longitude (nearest 0.25°). Depth = water depth when provided; otherwise, it was estimated from the GPS coordinates. Number of instrument days = number of days the recorders were recording underwater. * Depth obtained from online sources (not available in the original metadata).

Region	Deployment ID	Lat (°N)	Long (°E)	Depth (m)	N of instruments days
Belize	2020 NPT Ithaca DogFlea	17.625	272.375	33	139
Belize	2020 NPT Ithaca MaugreCaye	17.625	272.125	*	150
Bermuda	2019c	32.125	294.875	18	30
Bermuda	2019SE	32.125	294.875	4	47
Bermuda	Retrieval2021_data2020	32.125	294.875	4	1
Bermuda	2022 ST500 2021	32.125	294.875	31.3944	21
Bermuda	S1130 2019NW	32.125	294.875	25	31
Curaçao	Dec2023 200ft	12.125	291.125	61	177
Curaçao	Jul2024 200ft	12.125	291.125	61	165
Dominican Republic	S138B_71426_NOAANE10_CHAMP				179
		20.625	290.125	30	
Florida	S034B 2009 1 S01	30.125	279.875	364	24
Florida	S034B 2009 1 S02	30.125	279.875	364	33
Florida	S006B 69040 NOAA 2014 1 S04	30.125	278.875	16	176
Florida	S006B 69040 NOAA 2014 1 N04	30.625	278.875	20	171
Florida	S034B 2009 2 S01	30.125	279.875	393	21
Florida	S034B 2009 2 S02	30.125	279.875	393	22
Florida	S006B 69040 NOAA 2014 2 S04	30.375	278.875	19	176
Florida	S034B 2009 3 S03	30.375	279.875	*	33
Florida	S034B 2009 4 1 S04	30.375	279.875	168	21
Florida	S034B 2009 4 2 S04	30.375	279.875	183	22
Florida	S034B 2009 5 1 S05	30.125	279.875	201	21
Florida	S034B 2009 5 2 S05	30.125	279.875	183	22
Florida	S034B 2009 6 1 S06	30.125	279.875	192	21
Florida	S034B 2009 6 2 S06	30.125	279.875	183	22
Florida	S006B 69040 NOAA 2014 6 S06	30.125	278.875	16	176
Florida	S034B 2009 7 1 S07	30.125	279.625	44	21
Florida	S034B_2009_7_2_S07	30.125	279.625	44	22

Florida	S034B_2009_8_2_S08	30.125	279.625	46	33
Florida	S034B_2009_9_1_S09	30.375	279.625	44	21
Florida	S034B_2009_9_2_S09	30.375	279.625	44	22
Florida	S006B_69040_NOAA_04_South_channel3	30.125	278.875	*	176
Florida	S006B_69040_NOAA_04_South_channel4	30.125	278.875	*	115
Florida	S006B_69040_NOAA_04_South_channel5	30.125	278.875	*	50
Florida	S034B_2009_01_S03_PU024	30.375	279.875	*	24
Florida	S034B_2009_01_S08_PU024	30.125	279.625	*	24
Georgia	S021B_79296_NOAAEC03_03_1	31.125	278.875	15.8	200
Georgia	S021B_79296_NOAAEC03_03_2	30.875	279.125	22.9	200
Georgia	S021B_79296_NOAAEC03_03_3	30.875	279.375	40.3	200
Georgia	S021B_79296_NOAAEC03_03_4	30.875	279.875	40.1	200
Georgia	S021B_79296_NOAAEC03_03_5	30.875	280.125	243	200
Georgia	S021B_79296_NOAAEC03_03_6	30.875	280.375	590	200
GoM	S111B_62378_GoMex01_S01_PU202	27.625	268.375	971	126
GoM	S111B_62378_GoMex01_S02_PU191	27.625	268.625	771	126
GoM	S111B_62378_GoMex01_S04_PU172	27.875	269.625	826	128
GoM	S111B_62378_GoMex01_S05_PU226	27.875	270.125	892	126
GoM	S111B_62378_GoMex01_S16_PU195	27.875	274.125	1152	81
GoM	S111B_62378_GoMex01_S17_PU160	28.375	273.125	1136	83
GoM	S111B_62378_GoMex01_S19_PU218	26.125	275.125	1108	155
GoM	S111B_62378_GoMex01_S20_PU162	25.375	275.375	1081	164
GoM	S111B_62378_GoMex01_S21_PU153	24.875	275.625	1370	170
GoM	S111B_62378_GoMex02_S01_PU048	27.625	268.375	972	166
GoM	S111B_62378_GoMex02_S09_PU186	29.125	271.875	1119	166
GoM	S111B_62378_GoMex02_S10_PU024	29.125	272.375	1195	166
GoM	S111B_62378_GoMex02_S11_PU157	29.125	272.875	803	171
GoM	S111B_62378_GoMex02_S16_PU144	27.875	274.125	1175	161
GoM	S111B_62378_GoMex02_S17_PU038	28.375	273.125	1165	172
GoM	S111B_62378_GoMex02_S18_PU062	28.625	272.625	1309	129
GoM	GoMex03_S01	27.625	268.375	951	146
GoM	GoMex03_S02	27.625	268.625	761	147
GoM	GoMex03_S03	27.875	269.125	679	139
GoM	GoMex03_S04	27.875	269.625	834	147
GoM	S150B_62378_GoMex03_S06_PU135	28.375	270.625	982	146
GoM	S150B_62378_GoMex03_S07_PU130	28.625	271.125	873	147
GoM	S150B_62378_GoMex03_S08_PU219	28.875	271.375	1038	147

GoM	S150B 62378 GoMex03 S09 PU156	29.125	271.875	1083	147
GoM	S150B 62378 GoMex03 S10 PU217	29.125	272.375	1158	147
GoM	S150B 62378 GoMex03 S11 PU148	29.125	272.875	790	147
GoM	S150B 62378 GoMex03S12 PU054	29.625	273.125	249	127
GoM	S150B 62378 GoMex03S13 PU092	29.375	273.625	290	117
GoM	S150B 62378 GoMex03S14 PU220	28.625	274.125	253	128
GoM	S150B 62378 GoMex03S15 PU016	28.375	274.375	230	125
GoM	S150B 62378 GoMex03 S17 PU221	28.375	273.125	1136	147
GoM	GoMex03 020K S19	26.125	275.125	1096	146
GoM	GoMex03 020K S20	25.375	275.375	1055	146
GoM	S150B 62378 GoMex03 S21 PU169	24.875	275.625	1375	146
GoM	S150B 62378 GoMex03 S22 PU201	24.375	276.375	775	146
Guadeloupe	S138B_71426_NOAANE10_CHAMP_TC20161214_E_PU207	16.125	298.875	29.5	169
Guadeloupe	S138B_71426_NOAANE10_CHAMP_TC20161214_W_PU169	16.125	298.125	28	180
Martinique	S138B 71426 NOAANE10 CHAMP FLAC TC20161219	14.875	299.125	59	165
Montserrat	Montserat 8604	16.875	297.875	10	108
Plant Bank	S1105BMU01 S01 RH410	31.875	294.875	1006	178
Plant Bank	S1105BMU02 S01 RH427 D1	31.875	294.875	951	91
Puerto Rico	S137B 2001NOAANMFS S1036S1036 PR01 PR1	18.125	292.625	4	7
Puerto Rico	S137B 2001NOAANMFS S1036S1036 PR01 PR2	18.375	292.375	307.155	13
Quintana Roo	PADI2022PADI 2022 Mujeres	21.625	273.375	13	16
Quintana Roo	S120B S1088 Cozumel AMAR394 2 32000 M36-V35-100	20.375	273.125	11	51
Quintana Roo	PADI2022PADI 2022 Contoy	21.375	273.375	4	16
Quintana Roo	PADI2022PADI 2022 Nizuc	21.125	273.375	5	16
Saba Bank	S124B 65601 NOAANE04	17.625	296.875	30	183
Silver Bank	S120B S1034 NOAASB01 20050122 PU022	20.625	290.125	*	20
Silver Bank	S120B S1034 NOAASB01 20050122 PU082	20.625	290.375	*	23
Aruba	S138B 71426 NOAANE10 CHAMP TC20161209	12.375	290.125	38	188
Bonaire	S138B 71426 NOAANE10 CHAMP TC20161212	12.375	291.625	35	144
Virgin I.	nrs 12 2016-2017	17.875	295.375	39.6	169
Virgin I.	nrs 12 2017-2018	17.875	295.375	39.6	384
Virgin I.	nrs 12 2018-2019	17.875	295.375	39.6	368
Virgin I.	nrs 12 2019 2020	17.875	295.375	39.6	561
Virgin I.	nrs 12 2020-2022	17.875	295.375	39.6	362
Virgin I.	nrs_12_2020-2022	17.875	295.375	39.6	154