

Potential of maritime transport for ocean liming and atmospheric CO₂ removal

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SUPPLEMENTARY MATERIAL

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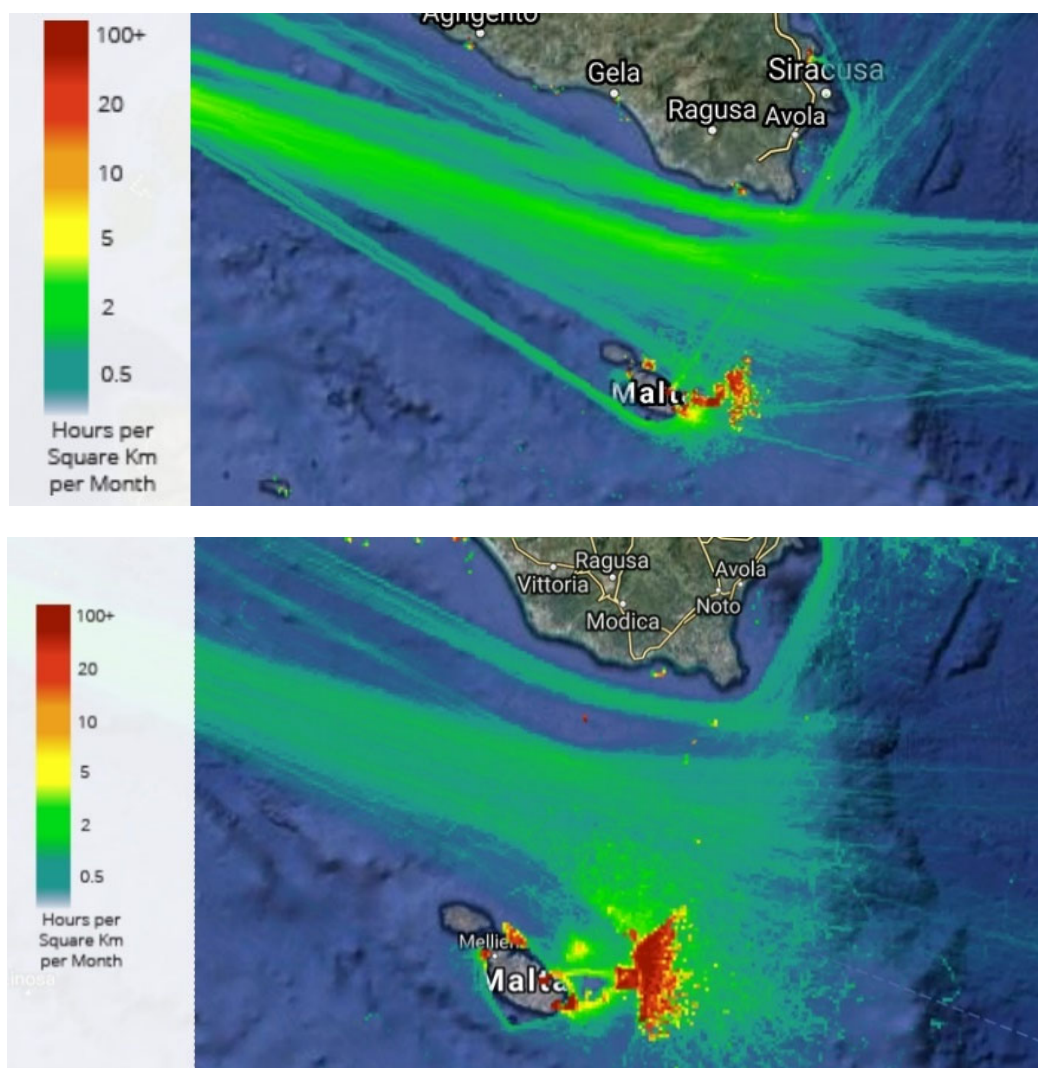


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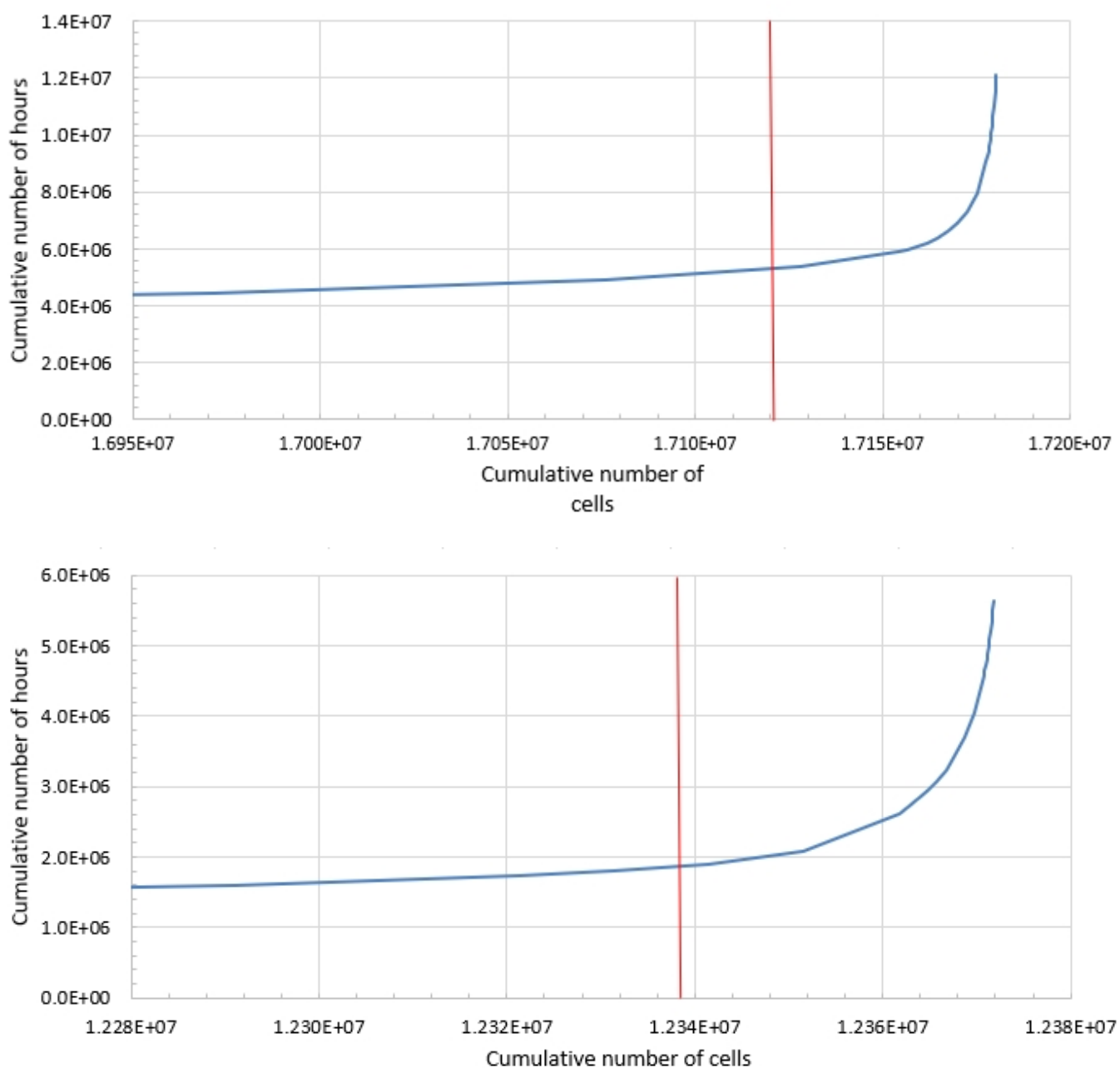


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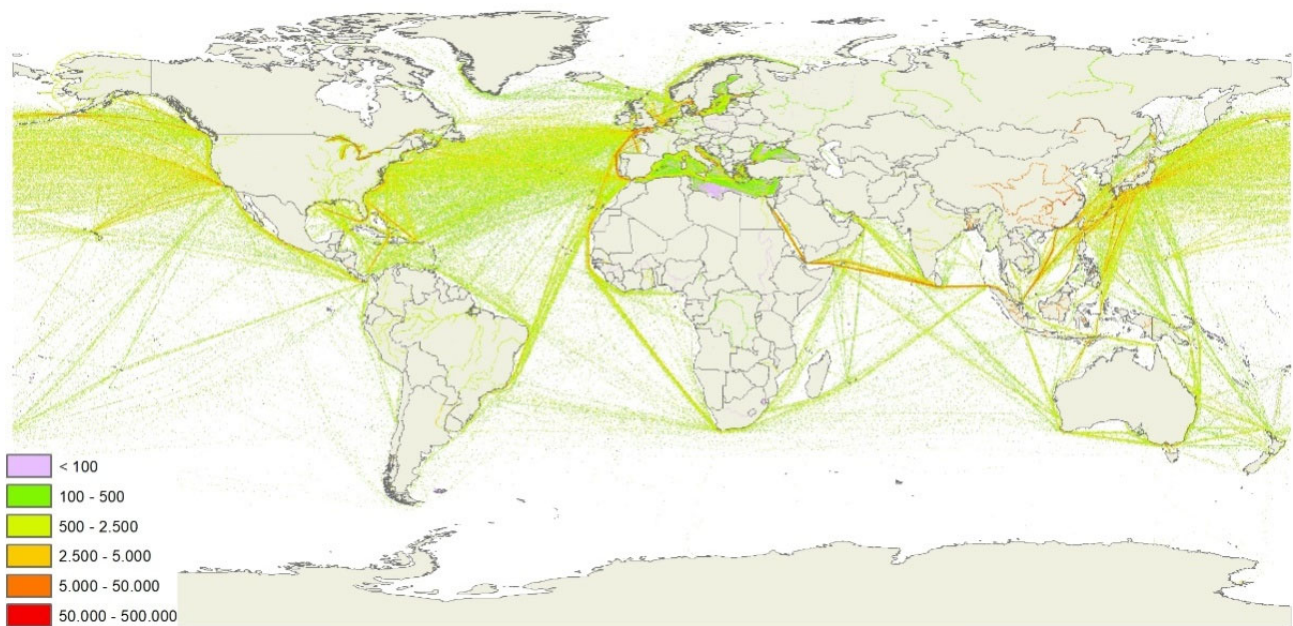


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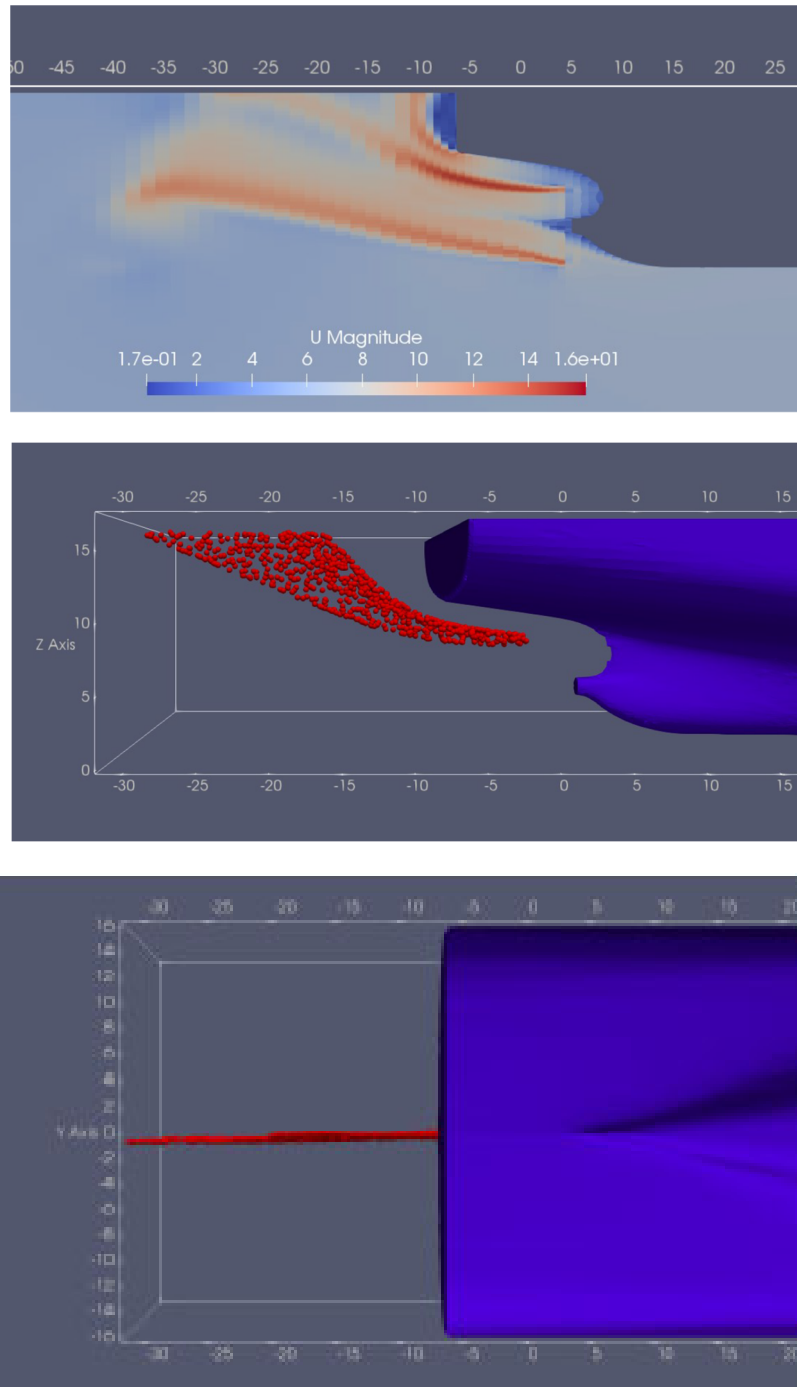


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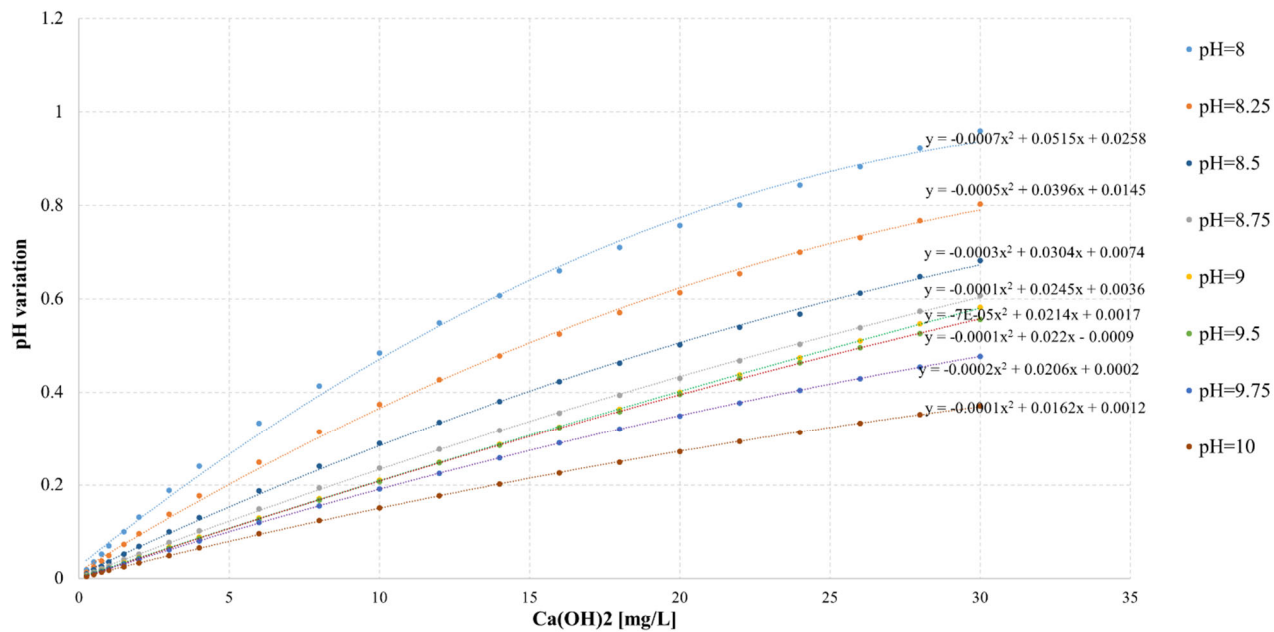


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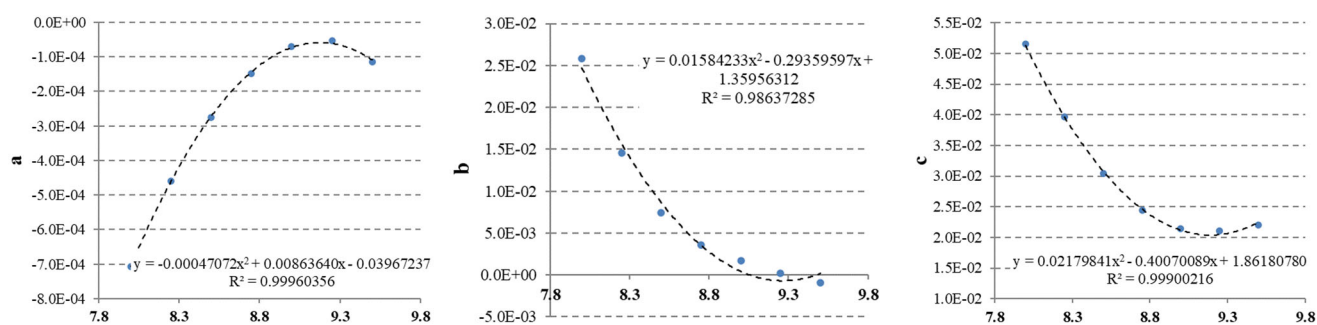


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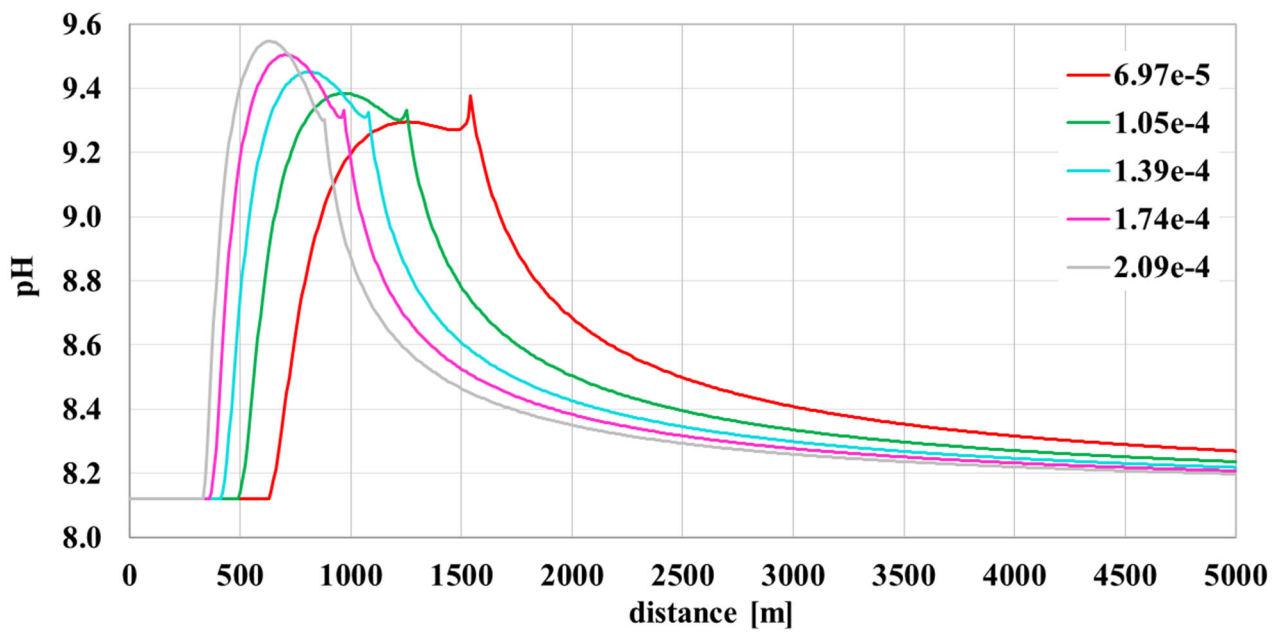


Figure SM.7. pH variation for different values of the diffusion potential and 100 kg/s discharge rate

Table SM.1. Fleet size data provided by IMO (2014)

Ship type	Size category		Total fleet size (IHSF data)	Active ships observed (AIS data)	Average days at sea	Total days of navigation (1)	Average capacity - deadweight	Average installed power	Average speed at sea	Total CO2 emissions	Average emission factor (2)
	value	u.m.			days/year	days/year	dwt	MW	km/h	ktCO2/year	kgCO2/km
Bulk carrier	0-9999	dwt	1,216	670	167	112,002	3,341	1.6	17.4	5,550	118
	10000-34999	dwt	2,317	2,131	168	358,297	27,669	6.6	21.1	24,243	134
	35000-59999	dwt	3,065	2,897	173	502,455	52,222	9.0	21.8	44,116	168
	60000-99999	dwt	2,259	2,145	191	410,083	81,876	10.9	22.1	45,240	208
	100000-199999	dwt	1,246	1,169	202	236,361	176,506	17.3	21.7	36,340	295
200000-+		dwt	294	274	202	55,387	271,391	22.2	22.6	10,815	360
Bulk carrier		dwt	10,397	9,286	181	1,674,585	75,752	10.1	21.4	166,304	193
Container	0-999	TEU	1,126	986	190	187,149	8,634	6.0	22.9	12,966	126
	1000-1999	TEU	1,306	1,275	200	254,434	20,436	12.6	25.8	31,015	197
	2000-2999	TEU	715	689	208	143,385	36,735	22.3	27.8	25,084	263
	3000-4999	TEU	968	923	236	217,798	54,160	36.5	29.7	53,737	346
	5000-7999	TEU	575	552	246	135,521	75,036	54.8	30.1	42,960	439
	8000-11999	TEU	331	325	256	83,206	108,650	67.7	30.1	30,052	500
	12000-14500	TEU	103	98	241	23,652	176,783	83.6	29.9	8,775	517
14500-+		TEU	8	7	251	1,758	158,038	80.7	27.5	806	695
Container			5,132	4,855	218	1,046,903	45,417	29.3	27.4	205,396	299
General cargo	0-4999	dwt	11,620	5,163	161	830,125	1,925	1.1	16.2	23,606	73
	5000-9999	dwt	2,894	2,491	166	414,244	7,339	3.3	18.8	16,949	91
	10000-+	dwt	1,972	1,779	174	310,423	22,472	7.4	22.2	27,601	167
General cargo			16,486	9,433	165	1,554,792	7,470	1.8	18.1	68,156	101
Chemical tanker	0-4999	dwt	1,502	893	159	142,048	2,158	1.4	18.2	5,479	88
	5000-9999	dwt	922	863	169	145,683	7,497	3.3	19.6	7,199	105
	10000-19999	dwt	1,039	1,004	181	182,141	15,278	5.3	21.6	12,318	130
	20000-+	dwt	1,472	1,419	183	259,214	42,605	9.3	22.9	30,027	211
Chemical tanker			4,935	4,179	175	729,085	20,883	5.5	21.0	55,023	150
Liquefied gas tanker	0-49999	cbm	1,104	923	180	166,468	6,676	3.8	22.0	11,271	128
	50000-199999	cbm	463	444	254	112,705	68,463	22.6	27.5	29,283	393
	200000-+	cbm	45	43	277	11,928	121,285	37.4	31.3	5,406	604
Liquefied gas tanker			1,612	1,410	213	291,101	35,294	2.5	24.5	45,960	268
Oil tanker	0-4999	dwt	3,500	1,498	144	216,376	1,985	1.3	16.2	14,991	179
	5000-9999	dwt	664	577	147	84,933	6,777	2.8	16.9	4,630	134
	10000-19999	dwt	190	171	149	25,537	15,129	4.6	17.8	2,121	194
	20000-59999	dwt	659	624	164	102,429	43,763	8.6	21.7	12,627	237
	60000-79999	dwt	391	381	183	69,857	72,901	12.1	22.5	9,950	263
	80000-119999	dwt	917	890	186	165,952	109,259	13.8	21.5	25,769	301
	120000-199999	dwt	473	447	206	92,276	162,348	18.8	21.7	17,230	358
	200000-+	dwt	601	577	233	134,457	313,396	27.7	23.1	36,296	487
Oil tanker			7,395	5,165	178	891,817	96,676	11.3	20.0	123,614	288
Other liquids tankers		0-+	149	39	116	4,530	670	0.6	15.4	1,002	600
Refrigerated bulk		0-1999	1,090	763	173	132,076	5,695	5.0	21.5	17,945	263
Ferry-pax only	0-1999	gt	3,081	1,145	182	208,304	135	1.9	25.7	10,968	86
	2000-+	gt	71	52	215	11,199	1,681	6.6	23.7	1,074	169
Ferry-pax only			3,152	1,197	184	219,503	214	2.1	25.6	12,042	89
Cruise	0-1999	gt	198	75	102	7,658	137	0.9	14.1	1,105	426
	2000-9999	gt	69	53	161	8,510	1,192	4.6	16.0	580	178
	10000-59999	gt	115	108	217	23,440	4,408	19.7	22.2	6,929	555
	60000-99999	gt	87	85	267	22,682	8,425	53.3	25.3	15,415	1121
	100000-+	gt	51	51	261	13,303	11,711	76.1	26.5	10,906	1291
Cruise			520	372	222	75,593	6,104	36.1	22.3	34,935	862
Ferry-RoPax	0-1999	gt	1,669	732	184	134,568	401	1.5	13.5	4,308	99
	2000-+	gt	1,198	1,046	198	207,023	3,221	15.5	22.3	26,753	241
Ferry-RoPax			2,867	1,778	192	341,592	2,110	10.0	18.9	31,061	201
Ro-Ro (Ferry)	0-4999	dwt	1,330	513	146	74,672	1,031	1.5	14.1	15,948	630
	5000-+	dwt	415	396	209	82,756	11,576	12.6	22.9	13,446	296
Ro-Ro (Ferry)			1,745	909	178.9	157,428	6,111	7.3	18.7	29,394	415
Vehicle	0-3999	vehicle	279	261	222	57,892	9,052	9.1	22.9	6,200	195
	4000-+	vehicle	558	515	269	138,518	19,721	14.2	25.0	18,302	220
Vehicle			837	776	255	196,410	16,576	12.7	24.4	24,503	213
Yacht		0-+	1,750	1,110	66	73,316	171	2.8	17.3	3,482	115
Service - tug		0-+	14,641	5,043	100	502,713	119	2.3	10.7	21,301	165
Miscellan.- fishing		0-+	22,130	4,510	164	741,334	181	1.0	12.0	50,959	239
Offshore		0-+	6,480	5,082	106	538,228	1,716	4.7	12.8	27,397	165
Service - other		0-+	3,423	2,816	116	325,911	2,319	3.2	12.6	11,988	121
Miscellan. - other		0-+	3,008	64	117	7,477	59	2.0	11.7	7,425	3542
TOTAL			107,749	58,787		9,504,393				937,886	

(1) calculated from Active ships observed (AIS data) and Average days at sea

(2) calculated from Total CO2 emissions, Average days at sea and Average speed at sea

Table SM.2. Assessment of the average distance of a single vessel trip.

Type of vessels	World seaborne trade in cargo (10 ⁹ ton-miles)	Annual global trade (10 ⁶ tons)	Average distance covered by commodities (km) (4)
Dry bulk carriers	17,729 (1)	5,230 (2)	6,278
Container ships	9,535 (1)	1,976 (3)	8,938

(1) UNCTAD (2018), Fig. 1.4

(2) UNCTAD (2019a), Tab. 1.7

(3) Derived from a containerized trade of 152 MTEU (UNCTAD, 2019a, Tab. 1.10) and a dwt/TEU ratio of 13

(4) A conversion factor 1.852 km/nautical miles has been applied

Table SM.3. Route lengths and the number of intermediate stops of container ships (Marinetraffic, 2019).

Routes Container ship	Route distance (km)	Ship/Company	Tonnage (DWT)	Number of intermediate stops
Shanghai- Los Angeles	10,554	Manulani/Matson	38,261	3
Qingdao-Savannah	18,677	Cosco Fortune/Cosco	140,637	6
Xingang-Oakland	8,663	Cosco Denmark/Cosco	156,694	4
New York-Halifax(CA)	1,098	YM Express/Yang Ming Transport Corp.	57,320	6
Busan(KR)-Vung Tau(TH)	3,607	Hyundai Busan/Sealand(Maersk)	34,567	4
Qingdao-Hong Kong	930	Navios Destiny/Oocl	50,554	6
Singapore-Ningbo(Cina)	3,843	Agios Dimitrios/Technomar Shipping - Athens, Greece	85,701	3
Busan(KR)-Trieste	16,336	Hangzhou/Maersk	178,257	6
La Spezia-Salerno	628	Vento di Zefiro/Maersk	22,033	5
Singapore-Santos(BR)	16,609	Lavras/Maersk	106,043	7
Ningbo-Lagos	15,123	Kota Lekas/Pacific International Lines	57,712	6
Luanda(Angola)-Paranagua(BR)	6,767	Carlotta Star	40,017	3
Port Klang(MY)-Durban(ZSA)	8,648	Jpo Taurus/Schiffahrtsgesellschaft Oltmann mbH & Co.	52,300	1
Yantian(CN)-Melbourne	9,161	Johannes Maersk	35,097	5
Ambarli-New York	9,230	Safmarine Benguela	43,096	2

Table SM.4. Maritime cargo and tanker traffic density data in the Mediterranean Sea: original EMODnet data and with vessels density threshold at 10 hours/month/km²

Month	Cargo			Tanker		
	n. cells	original data	with threshold	n. cells	original data	with threshold
		10 ⁻³ hours /months			10 ⁻³ hours /months	
1	1,113,017	892	384	737,671	406	175
2	1,245,221	858	386	813,888	397	177
3	1,446,773	1,008	482	982,294	448	213
4	1,478,972	991	478	1,262,696	450	214
5	1,626,735	1,113	563	1,162,110	500	246
6	1,693,359	1,196	612	1,271,272	544	271
7	1,696,542	1,215	617	1,269,036	555	279
8	1,647,116	1,125	582	1,230,871	528	267
9	1,517,770	1,016	498	1,086,481	462	220
10	1,373,133	952	474	953,499	464	212
11	1,183,238	863	413	822,167	436	191
12	1,158,444	904	407	779,794	441	195
Total	17,180,320	12,135	5,898	12,371,779	5,630	2,661

Table SM.5. Comparison between maritime traffic density (hours/year) in original data, after both limitation of vessel density to 10 hours/month/km² and removal of cells < 5km to the coastline.

	Original data	Threshold < 10 h/month	Threshold < 10 h/month and distance > 5km
Cargo	12,134,931	5,897,513	5,155,684
Tanker	5,629,859	2,660,947	2,297,837
Total	22,449,043	10,733,265	9,073,162

Table SM.6. Seawater composition (Lyman and Fleming, 1940)

Salt	g salt/ kg water
Cl	18.9799
Br	0.0646
SO ₄	2.6486
HCO ₃	0.1390
F	0.0013
Ca	0.4001
Mg	1.2720
K	0.3800
Sr	0.0133
Na	10.5561
H ₃ BO ₃	0.0260
Total	34.4816

Table SM.7. Assessment of discharge capacity and time for three type of vessels.

		Cargo	Tankers	Cruise
Average tonnage	dwt	43,499	62,584	6,104
% dead weight cargo capacity (DWCC)	%	85%	85%	85%
% DWCC usable for Ca(OH) ₂	%	15%	15%	5%
% Tonnage used for transporting Ca(OH) ₂	%	13%	13%	4%
Ca(OH) ₂ load on board	t	5,546	7,979	259
Navigation in the Mediterranean Sea	hours/y	5.16	2.30	1.62
Ca(OH) ₂ discharge rate	kg/s	10	10	1
Total Ca(OH) ₂ discharge	Mt/y	186	83	6
Total discharge time - single load	hours	154	222	72.1
Average speed	km/h	21.7	20.5	21.6
Total discharge distance - single load	km	3,339	4,536	1,555
Average emission factor (1)	gCO ₂ /km	185	226	862
CO ₂ emission during discharge - single load	t CO ₂	103	180	224

(1) Average CO₂ emission factor are calculated from Table SM1 with a wheighetd average on total days of navigation

Table SM.8. Comparison between seawater discharge flow rate and seawater flow rate for engine refrigeration for a 75.000 dwt bulk carrier.

Parameter	u.m.	value	
Ca(OH) ₂ solubility in seawater	g/l	1.73	a
Dilution compared to saturation	%	2%	b
Ca(OH) ₂ concentration at discharge	g/l	86.5	c=a/b
Seawater volume / Ca(OH) ₂ weight ratio	m ³ /t	11.6	d=1/c·10 ³
Ca(OH) ₂ discharge rate	kg/s	10	e
Seawater discharge flow rate	m ³ /h	416	f=d·e·3,6
Bulk carrier size	dwt	75000	g
Installed engine	MW	10	h
Main engines flow rate	m ³ /h/kW	0.06	i
% engine load during discharge	%	90%	l
Seawater flow rate for engine cooling	m ³ /h	540	m=h·i·l·10 ³

Table SM.9. Concentration and dilution

Distance (m)	Discharge: 10 kg/s		Discharge: 100 kg/s	
	Concentration	Dilution	Concentration	Dilution
0	86.000	1.0	86.000	1.000
1	86.000	1.0	86.000	1.000
2	58.050	1.5	86.000	1.000
3	38.700	2.2	86.000	1.000
4	29.025	3.0	86.000	1.000
5	23.220	3.7	73.960	1.163
6	19.350	4.4	61.633	1.395
7	16.586	5.2	52.829	1.628
8	14.513	5.9	46.225	1.860
9	12.900	6.7	41.089	2.093
10	11.610	7.4	36.980	2.326
11	10.555	8.1	33.618	2.558
12	9.675	8.9	30.817	2.791
13	8.931	9.6	28.446	3.023
14	8.293	10.4	26.414	3.256
15	7.740	11.1	24.653	3.488
16	7.256	11.9	23.113	3.721
17	6.829	12.6	21.753	3.953
18	6.450	13.3	20.544	4.186
19	6.111	14.1	19.463	4.419
20	5.805	14.8	18.490	4.651
21	5.529	15.6	17.610	4.884
22	5.277	16.3	16.809	5.116
23	5.048	17.0	16.078	5.349
24	4.838	17.8	15.408	5.581
25	4.644	18.5	14.792	5.814
26	4.465	19.3	14.223	6.047
27	4.300	20.0	13.696	6.279
28	4.146	20.7	13.207	6.512
29	4.003	21.5	12.752	6.744
30	3.870	22.2	12.327	6.977
31	3.745	23.0	11.929	7.209
32	3.628	23.7	11.556	7.442
33	3.518	24.4	11.206	7.674
34	3.415	25.2	10.876	7.907
35	3.317	25.9	10.566	8.140
36	3.225	26.7	10.272	8.372
37	3.138	27.4	9.995	8.605
38	3.055	28.1	9.732	8.837
39	2.977	28.9	9.482	9.070
40	2.903	29.6	9.245	9.302
41	2.832	30.4	9.020	9.535
42	2.764	31.1	8.805	9.767
43	2.700	31.9	8.600	10.000
44	2.639	32.6	8.405	10.233
45	2.580	33.3	8.218	10.465
46	2.524	34.1	8.039	10.698
47	2.470	34.8	7.868	10.930
48	2.419	35.6	7.704	11.163
49	2.369	36.3	7.547	11.395
50	2.322	37.0	7.396	11.628
51	2.276	37.8	7.251	11.860
52	2.233	38.5	7.112	12.093
53	2.191	39.3	6.977	12.326
54	2.150	40.0	6.848	12.558
55	2.111	40.7	6.724	12.791
56	2.073	41.5	6.604	13.023
57	2.037	42.2	6.488	13.256
58	2.002	43.0	6.376	13.488
59	1.968	43.7	6.268	13.721
60	1.935	44.4	6.163	13.953
61	1.903	45.2	6.062	14.186
62	1.873	45.9	5.965	14.419

63	1.843	46.7	5.870	14.651
64	1.814	47.4	5.778	14.884
65	1.786	48.1	5.689	15.116
66	1.759	48.9	5.603	15.349
67	1.733	49.6	5.519	15.581
68	1.707	50.4	5.438	15.814
69	1.683	51.1	5.359	16.047
70	1.659	51.9	5.283	16.279
71	1.635	52.6	5.208	16.512
72	1.613	53.3	5.136	16.744
73	1.590	54.1	5.066	16.977
74	1.569	54.8	4.997	17.209
75	1.548	55.6	4.931	17.442
76	1.528	56.3	4.866	17.674
77	1.508	57.0	4.803	17.907
78	1.488	57.8	4.741	18.140
79	1.470	58.5	4.681	18.372
80	1.451	59.3	4.623	18.605
81	1.433	60.0	4.565	18.837
82	1.416	60.7	4.510	19.070
83	1.399	61.5	4.455	19.302
84	1.382	62.2	4.402	19.535
85	1.366	63.0	4.351	19.767
86	1.350	63.7	4.300	20.000
87	1.334	64.4	4.251	20.233
88	1.319	65.2	4.202	20.465
89	1.304	65.9	4.155	20.698
90	1.290	66.7	4.109	20.930
91	1.276	67.4	4.064	21.163
92	1.262	68.1	4.020	21.395
93	1.248	68.9	3.976	21.628
94	1.235	69.6	3.934	21.860
95	1.222	70.4	3.893	22.093
96	1.209	71.1	3.852	22.326
97	1.197	71.9	3.812	22.558
98	1.185	72.6	3.773	22.791
99	1.173	73.3	3.735	23.023
100	1.161	74.1	3.698	23.256
101	1.150	74.8	3.661	23.488
102	1.138	75.6	3.625	23.721
103	1.127	76.3	3.590	23.953
104	1.116	77.0	3.556	24.186
105	1.106	77.8	3.522	24.419
106	1.095	78.5	3.489	24.651
107	1.085	79.3	3.456	24.884
108	1.075	80.0	3.424	25.116
109	1.065	80.7	3.393	25.349
110	1.055	81.5	3.362	25.581
111	1.046	82.2	3.332	25.814
112	1.037	83.0	3.302	26.047
113	1.027	83.7	3.273	26.279
114	1.018	84.4	3.244	26.512
115	1.010	85.2	3.216	26.744
116	1.001	85.9	3.188	26.977
117	0.992	86.7	3.161	27.209
118	0.984	87.4	3.134	27.442
119	0.976	88.1	3.108	27.674
120	0.968	88.9	3.082	27.907
121	0.960	89.6	3.056	28.140
122	0.952	90.4	3.031	28.372
123	0.944	91.1	3.007	28.605
124	0.936	91.9	2.982	28.837
125	0.929	92.6	2.958	29.070
126	0.921	93.3	2.935	29.302
127	0.914	94.1	2.912	29.535
128	0.907	94.8	2.889	29.767
129	0.900	95.6	2.867	30.000
130	0.893	96.3	2.845	30.233

131	0.886	97.0	2.823	30.465
132	0.880	97.8	2.802	30.698
133	0.873	98.5	2.780	30.930
134	0.866	99.3	2.760	31.163
135	0.860	100.0	2.739	31.395
136	0.854	100.7	2.719	31.628
137	0.847	101.5	2.699	31.860
138	0.841	102.2	2.680	32.093
139	0.835	103.0	2.660	32.326
140	0.829	103.7	2.641	32.558
141	0.823	104.4	2.623	32.791
142	0.818	105.2	2.604	33.023
143	0.812	105.9	2.586	33.256
144	0.806	106.7	2.568	33.488
145	0.801	107.4	2.550	33.721
146	0.795	108.1	2.533	33.953
147	0.790	108.9	2.516	34.186
148	0.784	109.6	2.499	34.419
149	0.779	110.4	2.482	34.651
150	0.774	111.1	2.465	34.884
151	0.769	111.9	2.449	35.116
152	0.764	112.6	2.433	35.349
153	0.759	113.3	2.417	35.581
154	0.754	114.1	2.401	35.814
155	0.749	114.8	2.386	36.047
156	0.744	115.6	2.371	36.279
157	0.739	116.3	2.355	36.512
158	0.735	117.0	2.341	36.744
159	0.730	117.8	2.326	36.977
160	0.726	118.5	2.311	37.209
161	0.721	119.3	2.297	37.442
162	0.717	120.0	2.283	37.674
163	0.712	120.7	2.269	37.907
164	0.708	121.5	2.255	38.140
165	0.704	122.2	2.241	38.372
166	0.699	123.0	2.228	38.605
167	0.695	123.7	2.214	38.837
168	0.691	124.4	2.201	39.070
169	0.687	125.2	2.188	39.302
170	0.683	125.9	2.175	39.535
171	0.679	126.7	2.163	39.767
172	0.675	127.4	2.150	40.000
173	0.671	128.1	2.138	40.233
174	0.667	128.9	2.125	40.465
175	0.663	129.6	2.113	40.698
176	0.660	130.4	2.101	40.930
177	0.656	131.1	2.089	41.163
178	0.652	131.9	2.078	41.395
179	0.649	132.6	2.066	41.628
180	0.645	133.3	2.054	41.860
181	0.641	134.1	2.043	42.093
182	0.638	134.8	2.032	42.326
183	0.634	135.6	2.021	42.558
184	0.631	136.3	2.010	42.791
185	0.628	137.0	1.999	43.023
186	0.624	137.8	1.988	43.256
187	0.621	138.5	1.978	43.488
188	0.618	139.3	1.967	43.721
189	0.614	140.0	1.957	43.953
190	0.611	140.7	1.946	44.186
191	0.608	141.5	1.936	44.419
192	0.605	142.2	1.926	44.651
193	0.602	143.0	1.916	44.884
194	0.598	143.7	1.906	45.116
195	0.595	144.4	1.896	45.349
196	0.592	145.2	1.887	45.581
197	0.589	145.9	1.877	45.814
198	0.586	146.7	1.868	46.047

199	0.583	147.4	1.858	46.279
200	0.581	148.1	1.849	46.512
201	0.578	148.9	1.840	46.744
202	0.575	149.6	1.831	46.977
203	0.572	150.4	1.822	47.209
204	0.569	151.1	1.813	47.442
205	0.566	151.9	1.804	47.674
206	0.564	152.6	1.795	47.907
207	0.561	153.3	1.786	48.140
208	0.558	154.1	1.778	48.372
209	0.556	154.8	1.769	48.605
210	0.553	155.6	1.761	48.837
211	0.550	156.3	1.753	49.070
212	0.548	157.0	1.744	49.302
213	0.545	157.8	1.736	49.535
214	0.543	158.5	1.728	49.767
215	0.540	159.3	1.720	50.000
216	0.538	160.0	1.712	50.233
217	0.535	160.7	1.704	50.465
218	0.533	161.5	1.696	50.698
219	0.530	162.2	1.689	50.930
220	0.528	163.0	1.681	51.163
221	0.525	163.7	1.673	51.395
222	0.523	164.4	1.666	51.628
223	0.521	165.2	1.658	51.860
224	0.518	165.9	1.651	52.093
225	0.516	166.7	1.644	52.326

Table SM.10. pH variation for different values of the diffusion potential and two discharge rates

pH (discharge rate: 10 kg/s)						pH (discharge rate: 100 kg/s)					
Distance (m)	$2.09 \cdot 10^{-4}$	$1.74 \cdot 10^{-4}$	$1.39 \cdot 10^{-4}$	$1.05 \cdot 10^{-4}$	$6.97 \cdot 10^{-5}$	Distance (m)	$2.09 \cdot 10^{-4}$	$1.74 \cdot 10^{-4}$	$1.39 \cdot 10^{-4}$	$1.05 \cdot 10^{-4}$	$6.97 \cdot 10^{-5}$
0	8.12	8.12	8.12	8.12	8.12	0	8.12	8.12	8.12	8.12	8.12
10	8.12	8.12	8.12	8.12	8.12	10	8.12	8.12	8.12	8.12	8.12
20	8.12	8.12	8.12	8.12	8.12	20	8.12	8.12	8.12	8.12	8.12
30	8.12	8.12	8.12	8.12	8.12	30	8.12	8.12	8.12	8.12	8.12
40	8.12	8.12	8.12	8.12	8.12	40	8.12	8.12	8.12	8.12	8.12
50	8.12	8.12	8.12	8.12	8.12	50	8.12	8.12	8.12	8.12	8.12
60	8.12	8.12	8.12	8.12	8.12	60	8.12	8.12	8.12	8.12	8.12
70	8.12	8.12	8.12	8.12	8.12	70	8.12	8.12	8.12	8.12	8.12
80	8.12	8.12	8.12	8.12	8.12	80	8.12	8.12	8.12	8.12	8.12
90	8.12	8.12	8.12	8.12	8.12	90	8.12	8.12	8.12	8.12	8.12
100	8.12	8.12	8.12	8.12	8.12	100	8.12	8.12	8.12	8.12	8.12
110	8.12	8.12	8.12	8.12	8.12	110	8.12	8.12	8.12	8.12	8.12
120	8.12	8.12	8.12	8.12	8.12	120	8.12	8.12	8.12	8.12	8.12
130	8.12	8.12	8.12	8.12	8.12	130	8.12	8.12	8.12	8.12	8.12
140	8.12	8.12	8.12	8.12	8.12	140	8.12	8.12	8.12	8.12	8.12
150	8.12	8.12	8.12	8.12	8.12	150	8.12	8.12	8.12	8.12	8.12
160	8.12	8.12	8.12	8.12	8.12	160	8.12	8.12	8.12	8.12	8.12
170	8.12	8.12	8.12	8.12	8.12	170	8.12	8.12	8.12	8.12	8.12
180	8.12	8.12	8.12	8.12	8.12	180	8.12	8.12	8.12	8.12	8.12
190	8.12	8.12	8.12	8.12	8.12	190	8.12	8.12	8.12	8.12	8.12
200	8.12	8.12	8.12	8.12	8.12	200	8.12	8.12	8.12	8.12	8.12
210	8.15	8.12	8.12	8.12	8.12	210	8.12	8.12	8.12	8.12	8.12
220	8.24	8.12	8.12	8.12	8.12	220	8.12	8.12	8.12	8.12	8.12
230	8.37	8.14	8.12	8.12	8.12	230	8.12	8.12	8.12	8.12	8.12
240	8.51	8.20	8.12	8.12	8.12	240	8.12	8.12	8.12	8.12	8.12
250	8.64	8.29	8.12	8.12	8.12	250	8.12	8.12	8.12	8.12	8.12
260	8.75	8.41	8.12	8.12	8.12	260	8.12	8.12	8.12	8.12	8.12
270	8.84	8.53	8.16	8.12	8.12	270	8.12	8.12	8.12	8.12	8.12
280	8.92	8.63	8.23	8.12	8.12	280	8.12	8.12	8.12	8.12	8.12
290	8.98	8.73	8.32	8.12	8.12	290	8.12	8.12	8.12	8.12	8.12
300	9.03	8.81	8.42	8.12	8.12	300	8.12	8.12	8.12	8.12	8.12
310	9.07	8.88	8.51	8.14	8.12	310	8.12	8.12	8.12	8.12	8.12
320	9.11	8.93	8.60	8.17	8.12	320	8.12	8.12	8.12	8.12	8.12
330	9.14	8.98	8.68	8.23	8.12	330	8.12	8.12	8.12	8.12	8.12
340	9.16	9.02	8.75	8.29	8.12	340	8.17	8.12	8.12	8.12	8.12
350	9.18	9.06	8.82	8.37	8.12	350	8.28	8.12	8.12	8.12	8.12
360	9.19	9.09	8.87	8.44	8.12	360	8.41	8.12	8.12	8.12	8.12
370	9.21	9.11	8.92	8.51	8.12	370	8.54	8.14	8.12	8.12	8.12
380	9.22	9.13	8.96	8.58	8.12	380	8.67	8.20	8.12	8.12	8.12
390	9.22	9.15	8.99	8.64	8.12	390	8.78	8.28	8.12	8.12	8.12
400	9.23	9.16	9.02	8.70	8.14	400	8.89	8.39	8.12	8.12	8.12
410	9.23	9.18	9.05	8.75	8.18	410	8.98	8.50	8.12	8.12	8.12
420	9.23	9.18	9.07	8.80	8.22	420	9.05	8.61	8.14	8.12	8.12
430	9.23	9.19	9.09	8.84	8.27	430	9.12	8.71	8.18	8.12	8.12
440	9.23	9.20	9.11	8.88	8.32	440	9.18	8.80	8.24	8.12	8.12
450	9.23	9.20	9.12	8.91	8.37	450	9.23	8.89	8.32	8.12	8.12
460	9.22	9.20	9.13	8.94	8.43	460	9.28	8.96	8.41	8.12	8.12
470	9.22	9.21	9.14	8.97	8.48	470	9.31	9.03	8.50	8.12	8.12
480	9.22	9.21	9.15	8.99	8.53	480	9.35	9.09	8.59	8.12	8.12
490	9.24	9.21	9.16	9.01	8.57	490	9.38	9.14	8.67	8.12	8.12

500	9.14	9.21	9.16	9.03	8.62	500	9.41	9.18	8.75	8.14	8.12
510	9.07	9.21	9.17	9.04	8.66	510	9.43	9.23	8.82	8.18	8.12
520	9.01	9.21	9.17	9.06	8.70	520	9.45	9.26	8.89	8.22	8.12
530	8.96	9.21	9.17	9.07	8.73	530	9.47	9.29	8.95	8.28	8.12
540	8.91	9.24	9.18	9.08	8.76	540	9.48	9.32	9.00	8.35	8.12
550	8.87	9.15	9.18	9.09	8.79	550	9.50	9.35	9.05	8.42	8.12
560	8.84	9.08	9.18	9.10	8.82	560	9.51	9.37	9.09	8.49	8.12
570	8.81	9.02	9.18	9.11	8.84	570	9.52	9.39	9.13	8.56	8.12
580	8.78	8.97	9.19	9.11	8.87	580	9.53	9.41	9.17	8.62	8.12
590	8.75	8.93	9.19	9.12	8.89	590	9.53	9.43	9.20	8.69	8.12
600	8.73	8.89	9.21	9.12	8.91	600	9.54	9.44	9.23	8.75	8.12
610	8.71	8.86	9.24	9.13	8.93	610	9.54	9.45	9.26	8.80	8.12
620	8.69	8.83	9.16	9.13	8.94	620	9.55	9.46	9.28	8.85	8.12
630	8.67	8.80	9.10	9.14	8.96	630	9.55	9.47	9.30	8.90	8.12
640	8.65	8.78	9.04	9.14	8.97	640	9.55	9.48	9.32	8.94	8.14
650	8.64	8.75	9.00	9.14	8.98	650	9.55	9.49	9.34	8.98	8.18
660	8.62	8.73	8.96	9.15	8.99	660	9.54	9.49	9.35	9.02	8.21
670	8.61	8.71	8.92	9.15	9.00	670	9.54	9.50	9.37	9.05	8.26
680	8.60	8.69	8.89	9.16	9.01	680	9.53	9.50	9.38	9.08	8.30
690	8.58	8.68	8.86	9.18	9.02	690	9.53	9.50	9.39	9.11	8.35
700	8.57	8.66	8.83	9.21	9.03	700	9.52	9.50	9.40	9.14	8.40
710	8.56	8.65	8.81	9.15	9.04	710	9.51	9.50	9.41	9.16	8.45
720	8.55	8.63	8.78	9.09	9.04	720	9.50	9.50	9.42	9.18	8.50
730	8.54	8.62	8.76	9.04	9.05	730	9.49	9.50	9.43	9.20	8.55
740	8.53	8.61	8.74	9.00	9.06	740	9.48	9.50	9.43	9.22	8.59
750	8.52	8.60	8.73	8.97	9.06	750	9.47	9.50	9.44	9.24	8.64
760	8.51	8.58	8.71	8.93	9.07	760	9.46	9.49	9.44	9.25	8.68
770	8.50	8.57	8.69	8.90	9.07	770	9.44	9.49	9.45	9.27	8.72
780	8.50	8.56	8.68	8.88	9.08	780	9.43	9.48	9.45	9.28	8.76
790	8.49	8.55	8.66	8.85	9.08	790	9.42	9.47	9.45	9.29	8.79
800	8.48	8.54	8.65	8.83	9.09	800	9.40	9.47	9.45	9.31	8.83
810	8.48	8.54	8.64	8.81	9.09	810	9.38	9.46	9.45	9.32	8.86
820	8.47	8.53	8.63	8.79	9.10	820	9.37	9.45	9.45	9.33	8.89
830	8.46	8.52	8.61	8.77	9.11	830	9.35	9.44	9.45	9.33	8.92
840	8.46	8.51	8.60	8.75	9.12	840	9.34	9.43	9.45	9.34	8.94
850	8.45	8.50	8.59	8.73	9.14	850	9.32	9.42	9.45	9.35	8.97
860	8.44	8.50	8.58	8.72	9.18	860	9.31	9.41	9.44	9.35	8.99
870	8.44	8.49	8.57	8.70	9.13	870	9.30	9.40	9.44	9.36	9.01
880	8.43	8.48	8.56	8.69	9.09	880	9.30	9.38	9.44	9.37	9.03
890	8.43	8.48	8.56	8.68	9.05	890	9.24	9.37	9.43	9.37	9.05
900	8.42	8.47	8.55	8.66	9.02	900	9.18	9.36	9.43	9.37	9.07
910	8.42	8.47	8.54	8.65	8.98	910	9.14	9.35	9.42	9.38	9.09
920	8.41	8.46	8.53	8.64	8.96	920	9.09	9.33	9.41	9.38	9.10
930	8.41	8.45	8.52	8.63	8.93	930	9.06	9.32	9.41	9.38	9.12
940	8.41	8.45	8.52	8.62	8.90	940	9.02	9.31	9.40	9.38	9.13
950	8.40	8.44	8.51	8.61	8.88	950	8.99	9.31	9.39	9.38	9.14
960	8.40	8.44	8.50	8.60	8.86	960	8.96	9.31	9.38	9.38	9.16
970	8.39	8.43	8.50	8.59	8.84	970	8.94	9.33	9.38	9.38	9.17
980	8.39	8.43	8.49	8.58	8.82	980	8.91	9.27	9.37	9.38	9.18
990	8.39	8.42	8.49	8.58	8.81	990	8.89	9.22	9.36	9.38	9.19
1000	8.38	8.42	8.48	8.57	8.79	1000	8.87	9.17	9.35	9.38	9.20
1010	8.38	8.42	8.47	8.56	8.77	1010	8.85	9.13	9.34	9.38	9.21
1020	8.37	8.41	8.47	8.55	8.76	1020	8.83	9.09	9.33	9.38	9.22
1030	8.37	8.41	8.46	8.55	8.74	1030	8.82	9.06	9.33	9.38	9.22
1040	8.37	8.40	8.46	8.54	8.73	1040	8.80	9.02	9.32	9.37	9.23
1050	8.36	8.40	8.45	8.53	8.72	1050	8.78	9.00	9.31	9.37	9.24
1060	8.36	8.40	8.45	8.53	8.71	1060	8.77	8.97	9.31	9.37	9.24
1070	8.36	8.39	8.45	8.52	8.70	1070	8.76	8.95	9.31	9.36	9.25
1080	8.36	8.39	8.44	8.51	8.68	1080	8.74	8.92	9.32	9.36	9.25
1090	8.35	8.39	8.44	8.51	8.67	1090	8.73	8.90	9.27	9.36	9.26

1100	8.35	8.38	8.43	8.50	8.66	1100	8.72	8.88	9.22	9.35	9.26
1110	8.35	8.38	8.43	8.50	8.65	1110	8.71	8.87	9.18	9.35	9.27
1120	8.34	8.38	8.42	8.49	8.64	1120	8.70	8.85	9.14	9.34	9.27
1130	8.34	8.37	8.42	8.49	8.64	1130	8.68	8.83	9.10	9.34	9.28
1140	8.34	8.37	8.42	8.48	8.63	1140	8.67	8.82	9.07	9.33	9.28
1150	8.34	8.37	8.41	8.48	8.62	1150	8.67	8.80	9.04	9.33	9.28
1160	8.33	8.36	8.41	8.47	8.61	1160	8.66	8.79	9.02	9.32	9.28
1170	8.33	8.36	8.41	8.47	8.60	1170	8.65	8.77	8.99	9.32	9.29
1180	8.33	8.36	8.40	8.46	8.60	1180	8.64	8.76	8.97	9.31	9.29
1190	8.33	8.36	8.40	8.46	8.59	1190	8.63	8.75	8.95	9.31	9.29
1200	8.33	8.35	8.40	8.45	8.58	1200	8.62	8.74	8.93	9.30	9.29
1210	8.32	8.35	8.39	8.45	8.58	1210	8.61	8.73	8.91	9.30	9.29
1220	8.32	8.35	8.39	8.45	8.57	1220	8.61	8.72	8.89	9.30	9.29
1230	8.32	8.35	8.39	8.44	8.56	1230	8.60	8.71	8.87	9.30	9.29
1240	8.32	8.34	8.38	8.44	8.56	1240	8.59	8.70	8.86	9.31	9.30
1250	8.32	8.34	8.38	8.43	8.55	1250	8.59	8.69	8.84	9.33	9.30
1260	8.31	8.34	8.38	8.43	8.54	1260	8.58	8.68	8.83	9.28	9.30
1270	8.31	8.34	8.37	8.43	8.54	1270	8.57	8.67	8.81	9.24	9.30
1280	8.31	8.33	8.37	8.42	8.53	1280	8.57	8.66	8.80	9.20	9.29
1290	8.31	8.33	8.37	8.42	8.53	1290	8.56	8.65	8.79	9.16	9.29
1300	8.31	8.33	8.37	8.42	8.52	1300	8.55	8.64	8.78	9.13	9.29
1310	8.30	8.33	8.36	8.41	8.52	1310	8.55	8.64	8.76	9.10	9.29
1320	8.30	8.33	8.36	8.41	8.51	1320	8.54	8.63	8.75	9.07	9.29
1330	8.30	8.32	8.36	8.41	8.51	1330	8.54	8.62	8.74	9.05	9.29
1340	8.30	8.32	8.36	8.40	8.50	1340	8.53	8.61	8.73	9.03	9.29
1350	8.30	8.32	8.35	8.40	8.50	1350	8.53	8.61	8.72	9.00	9.29
1360	8.30	8.32	8.35	8.40	8.49	1360	8.52	8.60	8.71	8.98	9.29
1370	8.29	8.32	8.35	8.40	8.49	1370	8.52	8.59	8.70	8.96	9.28
1380	8.29	8.31	8.35	8.39	8.49	1380	8.51	8.59	8.69	8.94	9.28
1390	8.29	8.31	8.35	8.39	8.48	1390	8.51	8.58	8.69	8.93	9.28
1400	8.29	8.31	8.34	8.39	8.48	1400	8.50	8.58	8.68	8.91	9.28
1410	8.29	8.31	8.34	8.38	8.47	1410	8.50	8.57	8.67	8.89	9.28
1420	8.29	8.31	8.34	8.38	8.47	1420	8.50	8.57	8.66	8.88	9.28
1430	8.29	8.31	8.34	8.38	8.47	1430	8.49	8.56	8.65	8.87	9.27
1440	8.28	8.30	8.34	8.38	8.46	1440	8.49	8.55	8.65	8.85	9.27
1450	8.28	8.30	8.33	8.37	8.46	1450	8.48	8.55	8.64	8.84	9.27
1460	8.28	8.30	8.33	8.37	8.46	1460	8.48	8.54	8.63	8.83	9.27
1470	8.28	8.30	8.33	8.37	8.45	1470	8.48	8.54	8.63	8.81	9.27
1480	8.28	8.30	8.33	8.37	8.45	1480	8.47	8.53	8.62	8.80	9.27
1490	8.28	8.30	8.33	8.37	8.45	1490	8.47	8.53	8.61	8.79	9.27
1500	8.28	8.30	8.32	8.36	8.44	1500	8.47	8.53	8.61	8.78	9.28
1510	8.27	8.29	8.32	8.36	8.44	1510	8.46	8.52	8.60	8.77	9.28
1520	8.27	8.29	8.32	8.36	8.44	1520	8.46	8.52	8.60	8.76	9.29
1530	8.27	8.29	8.32	8.36	8.43	1530	8.45	8.51	8.59	8.75	9.31
1540	8.27	8.29	8.32	8.35	8.43	1540	8.45	8.51	8.59	8.74	9.38
1550	8.27	8.29	8.32	8.35	8.43	1550	8.45	8.50	8.58	8.73	9.33
1560	8.27	8.29	8.31	8.35	8.42	1560	8.45	8.50	8.57	8.73	9.29
1570	8.27	8.29	8.31	8.35	8.42	1570	8.44	8.50	8.57	8.72	9.25
1580	8.27	8.28	8.31	8.35	8.42	1580	8.44	8.49	8.56	8.71	9.22
1590	8.27	8.28	8.31	8.35	8.42	1590	8.44	8.49	8.56	8.70	9.19
1600	8.26	8.28	8.31	8.34	8.41	1600	8.43	8.49	8.56	8.69	9.16
1610	8.26	8.28	8.31	8.34	8.41	1610	8.43	8.48	8.55	8.69	9.14
1620	8.26	8.28	8.31	8.34	8.41	1620	8.43	8.48	8.55	8.68	9.11
1630	8.26	8.28	8.30	8.34	8.41	1630	8.42	8.48	8.54	8.67	9.09
1640	8.26	8.28	8.30	8.34	8.40	1640	8.42	8.47	8.54	8.67	9.07
1650	8.26	8.28	8.30	8.33	8.40	1650	8.42	8.47	8.53	8.66	9.05
1660	8.26	8.28	8.30	8.33	8.40	1660	8.42	8.47	8.53	8.65	9.03
1670	8.26	8.27	8.30	8.33	8.40	1670	8.41	8.46	8.52	8.65	9.01
1680	8.26	8.27	8.30	8.33	8.39	1680	8.41	8.46	8.52	8.64	8.99
1690	8.26	8.27	8.30	8.33	8.39	1690	8.41	8.46	8.52	8.63	8.98

1700	8.25	8.27	8.29	8.33	8.39
1710	8.25	8.27	8.29	8.32	8.39
1720	8.25	8.27	8.29	8.32	8.38
1730	8.25	8.27	8.29	8.32	8.38
1740	8.25	8.27	8.29	8.32	8.38
1750	8.25	8.27	8.29	8.32	8.38
1760	8.25	8.26	8.29	8.32	8.38
1770	8.25	8.26	8.29	8.32	8.37
1780	8.25	8.26	8.29	8.31	8.37
1790	8.25	8.26	8.28	8.31	8.37
1800	8.25	8.26	8.28	8.31	8.37
1810	8.24	8.26	8.28	8.31	8.37
1820	8.24	8.26	8.28	8.31	8.37
1830	8.24	8.26	8.28	8.31	8.36
1840	8.24	8.26	8.28	8.31	8.36
1850	8.24	8.26	8.28	8.31	8.36
1860	8.24	8.26	8.28	8.30	8.36
1870	8.24	8.25	8.28	8.30	8.36
1880	8.24	8.25	8.27	8.30	8.35
1890	8.24	8.25	8.27	8.30	8.35
1900	8.24	8.25	8.27	8.30	8.35
1910	8.24	8.25	8.27	8.30	8.35
1920	8.24	8.25	8.27	8.30	8.35
1930	8.24	8.25	8.27	8.30	8.35
1940	8.24	8.25	8.27	8.29	8.35
1950	8.23	8.25	8.27	8.29	8.34
1960	8.23	8.25	8.27	8.29	8.34
1970	8.23	8.25	8.27	8.29	8.34
1980	8.23	8.25	8.27	8.29	8.34
1990	8.23	8.25	8.26	8.29	8.34
2000	8.23	8.24	8.26	8.29	8.34

1700	8.41	8.45	8.51	8.63	8.96
1710	8.40	8.45	8.51	8.62	8.95
1720	8.40	8.45	8.51	8.62	8.93
1730	8.40	8.44	8.50	8.61	8.92
1740	8.40	8.44	8.50	8.61	8.91
1750	8.40	8.44	8.50	8.60	8.89
1760	8.39	8.44	8.49	8.60	8.88
1770	8.39	8.43	8.49	8.59	8.87
1780	8.39	8.43	8.49	8.59	8.86
1790	8.39	8.43	8.48	8.58	8.85
1800	8.39	8.43	8.48	8.58	8.84
1810	8.38	8.42	8.48	8.57	8.83
1820	8.38	8.42	8.47	8.57	8.82
1830	8.38	8.42	8.47	8.57	8.81
1840	8.38	8.42	8.47	8.56	8.80
1850	8.38	8.41	8.46	8.56	8.79
1860	8.37	8.41	8.46	8.55	8.78
1870	8.37	8.41	8.46	8.55	8.77
1880	8.37	8.41	8.46	8.54	8.77
1890	8.37	8.41	8.45	8.54	8.76
1900	8.37	8.40	8.45	8.54	8.75
1910	8.36	8.40	8.45	8.53	8.74
1920	8.36	8.40	8.45	8.53	8.74
1930	8.36	8.40	8.44	8.53	8.73
1940	8.36	8.40	8.44	8.52	8.72
1950	8.36	8.39	8.44	8.52	8.72
1960	8.36	8.39	8.44	8.52	8.71
1970	8.35	8.39	8.43	8.51	8.70
1980	8.35	8.39	8.43	8.51	8.70
1990	8.35	8.39	8.43	8.51	8.69
2000	8.35	8.38	8.43	8.50	8.68
2010	8.35	8.38	8.42	8.50	8.68
2020	8.35	8.38	8.42	8.50	8.67
2030	8.35	8.38	8.42	8.49	8.67
2040	8.34	8.38	8.42	8.49	8.66
2050	8.34	8.38	8.42	8.49	8.66
2060	8.34	8.37	8.41	8.49	8.65
2070	8.34	8.37	8.41	8.48	8.65
2080	8.34	8.37	8.41	8.48	8.64
2090	8.34	8.37	8.41	8.48	8.64
2100	8.34	8.37	8.41	8.48	8.63
2110	8.33	8.37	8.40	8.47	8.63
2120	8.33	8.36	8.40	8.47	8.62
2130	8.33	8.36	8.40	8.47	8.62
2140	8.33	8.36	8.40	8.47	8.61
2150	8.33	8.36	8.40	8.46	8.61
2160	8.33	8.36	8.39	8.46	8.61
2170	8.33	8.36	8.39	8.46	8.60
2180	8.33	8.35	8.39	8.46	8.60
2190	8.32	8.35	8.39	8.45	8.59
2200	8.32	8.35	8.39	8.45	8.59
2210	8.32	8.35	8.39	8.45	8.59
2220	8.32	8.35	8.38	8.45	8.58
2230	8.32	8.35	8.38	8.44	8.58
2240	8.32	8.35	8.38	8.44	8.58
2250	8.32	8.35	8.38	8.44	8.57
2260	8.32	8.34	8.38	8.44	8.57
2270	8.32	8.34	8.38	8.44	8.56
2280	8.31	8.34	8.38	8.43	8.56
2290	8.31	8.34	8.37	8.43	8.56

2300	8.31	8.34	8.37	8.43	8.55
2310	8.31	8.34	8.37	8.43	8.55
2320	8.31	8.34	8.37	8.43	8.55
2330	8.31	8.34	8.37	8.42	8.55
2340	8.31	8.33	8.37	8.42	8.54
2350	8.31	8.33	8.36	8.42	8.54
2360	8.31	8.33	8.36	8.42	8.54
2370	8.31	8.33	8.36	8.42	8.53
2380	8.30	8.33	8.36	8.41	8.53
2390	8.30	8.33	8.36	8.41	8.53
2400	8.30	8.33	8.36	8.41	8.52
2410	8.30	8.33	8.36	8.41	8.52
2420	8.30	8.32	8.36	8.41	8.52
2430	8.30	8.32	8.35	8.41	8.52
2440	8.30	8.32	8.35	8.40	8.51
2450	8.30	8.32	8.35	8.40	8.51
2460	8.30	8.32	8.35	8.40	8.51
2470	8.30	8.32	8.35	8.40	8.51
2480	8.29	8.32	8.35	8.40	8.50
2490	8.29	8.32	8.35	8.40	8.50
2500	8.29	8.32	8.35	8.40	8.50
2510	8.29	8.32	8.34	8.39	8.50
2520	8.29	8.31	8.34	8.39	8.49
2530	8.29	8.31	8.34	8.39	8.49
2540	8.29	8.31	8.34	8.39	8.49
2550	8.29	8.31	8.34	8.39	8.49
2560	8.29	8.31	8.34	8.39	8.48
2570	8.29	8.31	8.34	8.38	8.48
2580	8.29	8.31	8.34	8.38	8.48
2590	8.29	8.31	8.34	8.38	8.48
2600	8.29	8.31	8.33	8.38	8.48
2610	8.28	8.31	8.33	8.38	8.47
2620	8.28	8.31	8.33	8.38	8.47
2630	8.28	8.30	8.33	8.38	8.47
2640	8.28	8.30	8.33	8.38	8.47
2650	8.28	8.30	8.33	8.37	8.47
2660	8.28	8.30	8.33	8.37	8.46
2670	8.28	8.30	8.33	8.37	8.46
2680	8.28	8.30	8.33	8.37	8.46
2690	8.28	8.30	8.33	8.37	8.46
2700	8.28	8.30	8.32	8.37	8.46
2710	8.28	8.30	8.32	8.37	8.45
2720	8.28	8.30	8.32	8.37	8.45
2730	8.28	8.30	8.32	8.36	8.45
2740	8.27	8.30	8.32	8.36	8.45
2750	8.27	8.29	8.32	8.36	8.45
2760	8.27	8.29	8.32	8.36	8.45
2770	8.27	8.29	8.32	8.36	8.44
2780	8.27	8.29	8.32	8.36	8.44
2790	8.27	8.29	8.32	8.36	8.44
2800	8.27	8.29	8.31	8.36	8.44
2810	8.27	8.29	8.31	8.35	8.44
2820	8.27	8.29	8.31	8.35	8.43
2830	8.27	8.29	8.31	8.35	8.43
2840	8.27	8.29	8.31	8.35	8.43
2850	8.27	8.29	8.31	8.35	8.43
2860	8.27	8.29	8.31	8.35	8.43
2870	8.27	8.29	8.31	8.35	8.43
2880	8.27	8.29	8.31	8.35	8.43
2890	8.27	8.28	8.31	8.35	8.42

2900	8.26	8.28	8.31	8.35	8.42
2910	8.26	8.28	8.31	8.34	8.42
2920	8.26	8.28	8.30	8.34	8.42
2930	8.26	8.28	8.30	8.34	8.42
2940	8.26	8.28	8.30	8.34	8.42
2950	8.26	8.28	8.30	8.34	8.42
2960	8.26	8.28	8.30	8.34	8.41
2970	8.26	8.28	8.30	8.34	8.41
2980	8.26	8.28	8.30	8.34	8.41
2990	8.26	8.28	8.30	8.34	8.41
3000	8.26	8.28	8.30	8.34	8.41
3010	8.26	8.28	8.30	8.33	8.41
3020	8.26	8.28	8.30	8.33	8.41
3030	8.26	8.28	8.30	8.33	8.40
3040	8.26	8.27	8.30	8.33	8.40
3050	8.26	8.27	8.30	8.33	8.40
3060	8.26	8.27	8.29	8.33	8.40
3070	8.26	8.27	8.29	8.33	8.40
3080	8.25	8.27	8.29	8.33	8.40
3090	8.25	8.27	8.29	8.33	8.40
3100	8.25	8.27	8.29	8.33	8.40
3110	8.25	8.27	8.29	8.33	8.39
3120	8.25	8.27	8.29	8.32	8.39
3130	8.25	8.27	8.29	8.32	8.39
3140	8.25	8.27	8.29	8.32	8.39
3150	8.25	8.27	8.29	8.32	8.39
3160	8.25	8.27	8.29	8.32	8.39
3170	8.25	8.27	8.29	8.32	8.39
3180	8.25	8.27	8.29	8.32	8.39
3190	8.25	8.27	8.29	8.32	8.38
3200	8.25	8.27	8.29	8.32	8.38
3210	8.25	8.26	8.28	8.32	8.38
3220	8.25	8.26	8.28	8.32	8.38
3230	8.25	8.26	8.28	8.32	8.38
3240	8.25	8.26	8.28	8.32	8.38
3250	8.25	8.26	8.28	8.31	8.38
3260	8.25	8.26	8.28	8.31	8.38
3270	8.25	8.26	8.28	8.31	8.38
3280	8.25	8.26	8.28	8.31	8.37
3290	8.24	8.26	8.28	8.31	8.37
3300	8.24	8.26	8.28	8.31	8.37
3310	8.24	8.26	8.28	8.31	8.37
3320	8.24	8.26	8.28	8.31	8.37
3330	8.24	8.26	8.28	8.31	8.37
3340	8.24	8.26	8.28	8.31	8.37
3350	8.24	8.26	8.28	8.31	8.37
3360	8.24	8.26	8.28	8.31	8.37
3370	8.24	8.26	8.28	8.31	8.37
3380	8.24	8.26	8.27	8.31	8.36
3390	8.24	8.26	8.27	8.30	8.36
3400	8.24	8.26	8.27	8.30	8.36
3410	8.24	8.25	8.27	8.30	8.36
3420	8.24	8.25	8.27	8.30	8.36
3430	8.24	8.25	8.27	8.30	8.36
3440	8.24	8.25	8.27	8.30	8.36
3450	8.24	8.25	8.27	8.30	8.36
3460	8.24	8.25	8.27	8.30	8.36
3470	8.24	8.25	8.27	8.30	8.36
3480	8.24	8.25	8.27	8.30	8.36
3490	8.24	8.25	8.27	8.30	8.35

3500	8.24	8.25	8.27	8.30	8.35
3510	8.24	8.25	8.27	8.30	8.35
3520	8.24	8.25	8.27	8.30	8.35
3530	8.24	8.25	8.27	8.30	8.35
3540	8.23	8.25	8.27	8.29	8.35
3550	8.23	8.25	8.27	8.29	8.35
3560	8.23	8.25	8.27	8.29	8.35
3570	8.23	8.25	8.26	8.29	8.35
3580	8.23	8.25	8.26	8.29	8.35
3590	8.23	8.25	8.26	8.29	8.35
3600	8.23	8.25	8.26	8.29	8.34
3610	8.23	8.25	8.26	8.29	8.34
3620	8.23	8.25	8.26	8.29	8.34
3630	8.23	8.25	8.26	8.29	8.34
3640	8.23	8.25	8.26	8.29	8.34
3650	8.23	8.24	8.26	8.29	8.34
3660	8.23	8.24	8.26	8.29	8.34
3670	8.23	8.24	8.26	8.29	8.34
3680	8.23	8.24	8.26	8.29	8.34
3690	8.23	8.24	8.26	8.29	8.34
3700	8.23	8.24	8.26	8.29	8.34
3710	8.23	8.24	8.26	8.29	8.34
3720	8.23	8.24	8.26	8.28	8.34
3730	8.23	8.24	8.26	8.28	8.33
3740	8.23	8.24	8.26	8.28	8.33
3750	8.23	8.24	8.26	8.28	8.33
3760	8.23	8.24	8.26	8.28	8.33
3770	8.23	8.24	8.26	8.28	8.33
3780	8.23	8.24	8.26	8.28	8.33
3790	8.23	8.24	8.26	8.28	8.33
3800	8.23	8.24	8.25	8.28	8.33
3810	8.23	8.24	8.25	8.28	8.33
3820	8.23	8.24	8.25	8.28	8.33
3830	8.22	8.24	8.25	8.28	8.33
3840	8.22	8.24	8.25	8.28	8.33
3850	8.22	8.24	8.25	8.28	8.33
3860	8.22	8.24	8.25	8.28	8.33
3870	8.22	8.24	8.25	8.28	8.32
3880	8.22	8.24	8.25	8.28	8.32
3890	8.22	8.24	8.25	8.28	8.32
3900	8.22	8.24	8.25	8.28	8.32
3910	8.22	8.24	8.25	8.27	8.32
3920	8.22	8.23	8.25	8.27	8.32
3930	8.22	8.23	8.25	8.27	8.32
3940	8.22	8.23	8.25	8.27	8.32
3950	8.22	8.23	8.25	8.27	8.32
3960	8.22	8.23	8.25	8.27	8.32
3970	8.22	8.23	8.25	8.27	8.32
3980	8.22	8.23	8.25	8.27	8.32
3990	8.22	8.23	8.25	8.27	8.32
4000	8.22	8.23	8.25	8.27	8.32