

## SUMMETH – Sustainable Marine Methanol

### Deliverable D2.1

### Market Report



**Date:** 2018-04-12

**Authors:** T. Rydbergh, B. Berneblad

**Document Status:** Final Report

**Document Number:** D2.1

#### PROJECT PARTNERS



#### CO-FUNDED BY



Supported by the MARTEC II Network

## ABSTRACT

This report describes the Market Study part of the SUMMETH project. The summary of vessels having a total installed main engine power per ship in the range of 250 KW to 1200 KW, and that have moved more than 150 hours during 1 March 2016 to 31 August 2016 is shown in the table below.

SimpleShipType	Number of vessels	Sum of fuel used (ton/6 months)	fuel kg/vessel/day
Unknown	422	5,534	71.9
AntiPollution	3	23	41.6
Cargo	1086	60,030	302.9
Diving	22	247	61.4
Dredger	81	2,380	161.0
Fishing	1875	21,561	63.0
HSC	64	1,120	95.9
LawEnforcement	77	1,046	74.4
Military	15	199	72.7
NonCombat	2	26	70.6
OtherType	603	8,207	74.6
Pass	775	11,293	79.8
Pilot	150	3,211	117.3
Pleasure	184	901	26.8
PortTender	25	430	94.1
Rescue	57	496	47.7
Sailing	351	2,795	43.6
Tanker	243	9,410	212.2
Tug	121	2,170	98.3
WIG	11	153	76.0
Total	6,167	131,229	116.6 Average

## SUMMETH PROJECT SUMMARY

SUMMETH, the **Sustainable Marine Methanol** project, is focused on developing clean methanol engine and fuel solutions for smaller ships. The project is advancing the development of methanol engines, fuel system installations, and distribution systems to facilitate the uptake of sustainable methanol as a fuel for coastal and inland waterway vessels through:

- developing, testing and evaluating different methanol combustion concepts for the smaller engine segment
- identifying the total greenhouse gas and emissions reduction potential of sustainable methanol through market investigations
- producing a case design for converting a road ferry to methanol operation
- assessing the requirements for transport and distribution of sustainable methanol.

The SUMMETH project consortium consists of SSPA Sweden, ScandiNAOS, Lund University, VTT Technical Research Centre of Finland, Scania AB, Marine Benchmark, Swedish Transport Administration Road Ferries, and the Swedish Maritime Technology Forum.

## ACKNOWLEDGEMENTS

---

The SUMMETH project is supported by the MARTEC II network and co-funded by the Swedish Maritime Administration, Region Västra Götaland, the Methanol Institute and Oiltanking Finland Oy.

**Document Data**

Document Title:	D2.1 Market Report
WP and/or Task:	WP2
Responsible Author:	<b>T. Rydbergh</b>
Co-author:	<b>B. Berneblad</b>
Date and Version:	20180412, Final Includes addition of partner and funding agencies logos to the cover page, and minor editorial changes
Previous Versions:	20171206, Final Draft 20170228 Market Study Interim Report



## TABLE OF CONTENTS

---

Abstract .....	ii
SUMMETH Project Summary.....	ii
Acknowledgements .....	iii
Table of Contents .....	v
1 Introduction.....	1
2 Method.....	1
2.1 Identified vessels and allocation of engine power to non IMO vessels .....	2
3 Results .....	5
3.1 6167 vessels with ME 250 kW - 1200 kW, moving > 150h in 6 months.....	5
3.2 2085 vessels with ME 250 kW - 450 kW, moving > 150h in 6 months.....	6
3.3 1128 vessels with ME 450 kW - 600 kW, moving > 150h in 6 months.....	7
3.4 1657 vessels with ME 600 kW - 900 kW, moving > 150h in 6 months.....	8
3.5 1297 vessels with ME 900 kW - 1200 kW, moving > 150h in 6 months.....	9
3.6 Top 100 vessels consuming the most fuel during Mar-Aug 2016 .....	10
Appendix I – Top 25 vessels – Engine size 250 - 450 kW.....	11
Appendix II – Top 25 vessels – Engine size 450 - 600 kW.....	37
Appendix III – Top 25 vessels – Engine size 600 - 900 kW.....	63
Appendix IV – Top 25 vessels – Engine size 900 - 1200 kW .....	89
Appendix V – Additional top 8 Ferries – Engine size 450 - 1200 kW .....	115

# 1 INTRODUCTION

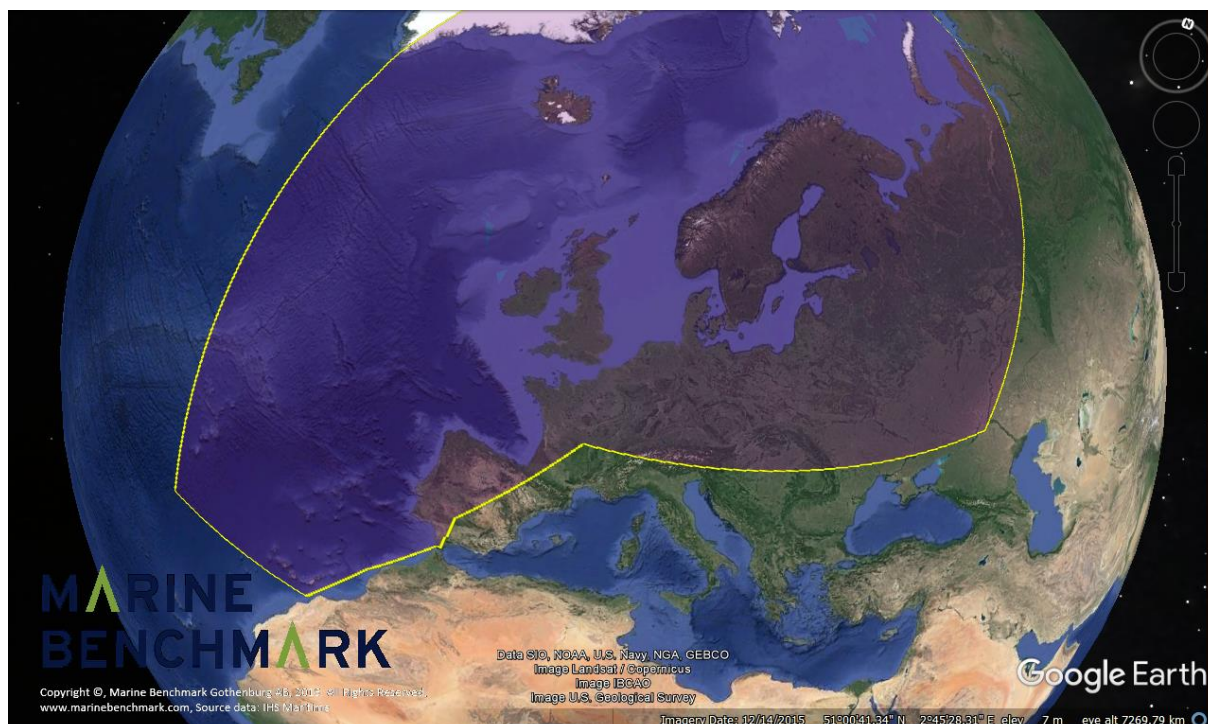
---

This report describes the market analysis work carried out for the SUMMETH project to find the market size for marine engines used for propulsion in the power range 250 kW to 1200 kW. The ship operational profile (time at different speeds and kW load) for all identified vessels with propulsion engines in this range was captured to enable a calculation of running cost and environmental impact (in terms of fuel use) as a comparison between conventional fuel and methanol as fuel. The top 100 vessels with the best economy of investment for conversion to a methanol engine and to run on methanol as a fuel were identified. The power range has been divided into four segments: 250-450 kW, 450-600 kW, 600-900 kW and 900-1200 kW. The vessels having the best economy of investment were identified as those vessels having the highest fuel consumption per installed power and can also be noted to have the highest engine utilisation. The top 25 vessels with the highest engine utilisation for each of the four engine segments were documented as a result of this market study, together with the total fuel consumption of engines in this range that can be replaced by methanol as fuel.

## 2 METHOD

---

This market study used 2 billion AIS records sampled every 10 minutes globally for the time span of 6 months (1 Mar to 31 Aug 2016). The ID of in total 370 000 vessels has been captured. The AIS records contain a lot of data that needs to be disqualified and sorted away from the analysis, using a process we call “washing”. About 10% of all received AIS records are deleted. The process of washing AIS records requires that all records are sorted in time order by vessel ID number and thereafter a number of algorithms wash the AIS data. The AIS records identified within the north-west Europe area in the figure below were selected for the further analysis. We have identified 50 800 vessels to be analysed further in this study. Out of these 50 800 vessels there are 14 200 vessels with an IMO number and engine data from the IMO register, but there are also 36 600 vessels without engine data.



## 2.1 IDENTIFIED VESSELS AND ALLOCATION OF ENGINE POWER TO NON IMO VESSELS

The identified vessels are shown in the table below as count of vessels in the ship types and vessel lengths captured from AIS. The ship type in the table below comes from the decoded ship type code in the AIS message. Also note that the top row with 14 759 vessels are missing a ship type and these are treated as “other type”, but some of these have an IMO number and then we have the ship type from the IMO number database together with engine size and service speed.

		A_0 - 19 m	B_20 - 39 m	C_40 - 59 m	D_60 - 79 m	E_80 - 99 m	F_100 - 119 m	G_120 - 139 m	H_140 - 159 m	I_160 - 179 m	J_180 - 199 m	K_200 - 219 m	L_220 - 239 m	M_240 - 259 m	N_260 - 279 m	O_280 - 299 m	P_300 - 319 m	Q_320 - 339 m	R_340 - 359 m	S_360 - 379 m	T_380 - 399 m	U_400 - 419 m	V_420 - 439 m	W_440 - 459 m	X_460 - 479 m	Z_500 + m	Grand Total	
Row Labels																												
Unknown	13,472	513	330	111	82	98	59	24	13	10	20	8	6	4	2	1		2				1	2				1	14,759
AntiPollution	2	12	9	10	4	1																						38
Cargo	144	105	520	590	991	2,331	1,189	725	521	545	1,160	386	564	62	120	297	90	57	3	139	52	13			1		1	10,606
Diving	9	35	26	3	4	3	8	2	2																			92
Dredger	22	101	169	120	74	60	24	15	8	2	1																	596
Fishing	248	1,363	1,414	271	146	24	17	9	2																			3,494
HSC	20	166	183	23		9	6	1		1																		409
LawEnforcement	19	74	101	39	16	10	1																					260
MedicalTransport		1	1		1	1																						4
Military	38	26	64	53	20	17	12	21	9	8	5	1																274
NonCombat	1	1	2																									4
OtherType	130	487	603	214	217	345	187	94	36	19	16	7	8	2	1	3	1	2				1				1	1	2,375
Pass	78	315	1,012	265	114	101	133	168	43	74	76	53	11	8	7	18	5	4	2	1								2,488
Pilot	34	227	63	7	3	3																						337
Pleasure	347	2,892	500	50	20	10	6		2																		4	3,831
PortTender	23	76	21	2	1																							123
Rescue	54	405	81	75	20	7	2																					644
Sailing	358	4,233	252	59	8	2	5																	1			2	4,920
Tanker	29	14	105	95	137	615	789	324	270	201	674	21	181	281	136	42	15	68	8									4,005
Tug	51	314	956	52	49	50	5	6		1	1																1	1,486
WIG	9	8	9	5	11	36	23	2		1	5			1														111
Grand Total	15,088	11,368	6,421	2,044	1,918	3,723	2,466	1,391	906	862	1,958	476	770	358	266	361	111	133	13	140	54	15	1	1	1	1	11	50,856

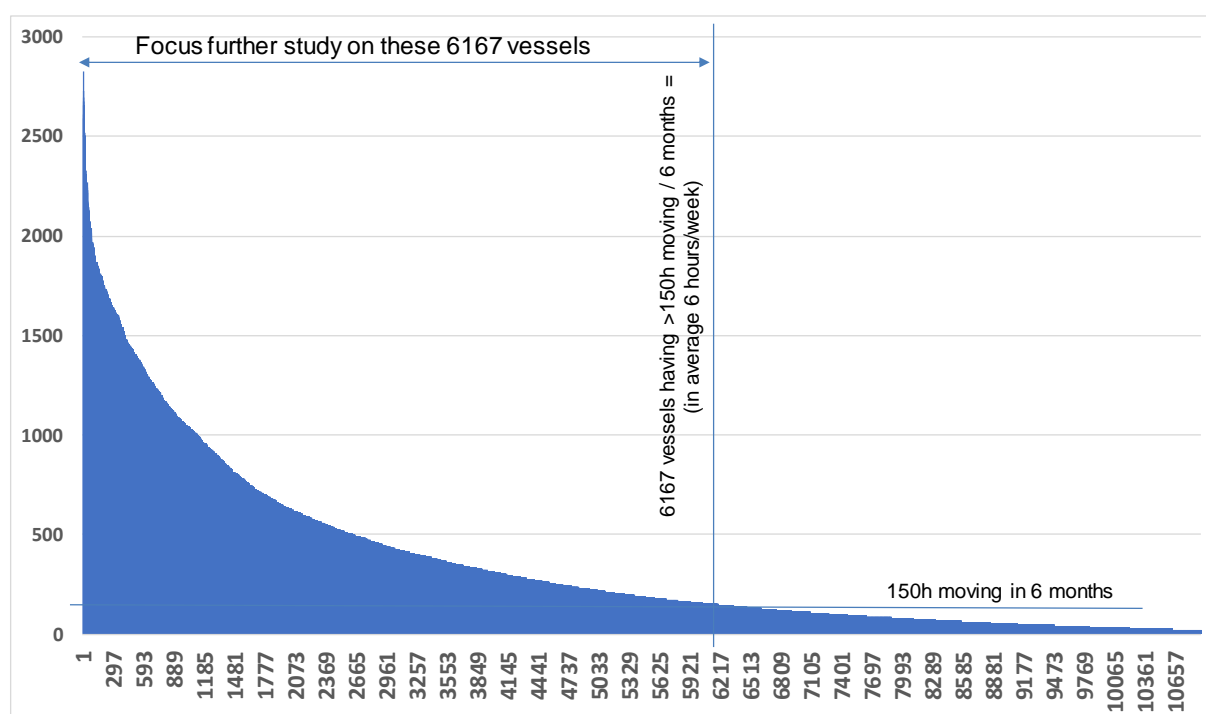
There are only about 14 200 vessels identified with IMO number where engine and service speed are known. The remaining 36 600 vessels are missing engine data and service speed that is essential for this market study.

The method to allocate engine size and service speed for all these vessels has been to use engine and speed data from the known 14 200 vessels divided into ship type / vessel dimension groups and make a model for engine size and service speed to populate the speed and engine size for the unknown 36 600 vessels. A 97% percentile for the speed of all running hours during March 2016 to August 2016 has

been calculated on a vessel individual basis. This has given ship individual values of maximum speeds during the selected time. This 97% percentile speed has been used as a maximum speed where every vessel has been allocated an engine power based on known vessels in the same ship type / vessel dimension group. The vessels with a main engine for propulsion in the wanted size range 250 kW – 1200 kW could thereafter be identified and these 10 916 vessels are shown in the table below.

		Vessel length groups								
SimpleShipType	no length	A_0 - 19 m	B_20 - 39 m	C_40 - 59 m	D_60 - 79 m	E_80 - 99 m	F_100 - 119 m	G_120 - 139 m	H_140 - 159 m	
Unknown	48	470	261	63	11	4	2			859
AntiPollution		7	1	3	1					12
Cargo	10	98	496	451	165	240	29		1	1,490
Diving	1	23	12	1						37
Dredger	2	63	27	31	16	6	1			146
Fishing	61	1,074	1,212	102						2,449
HSC	1	97	21	4						123
LawEnforcement		71	49	10						130
Military		23	21							44
NonCombat		1	2							3
OtherType	15	416	522	128	18	9	2	1		1,111
Pass	7	296	937	142	14	4		1		1,401
Pilot		198	35	3						236
Pleasure	1	663	162	14	2	2	1			845
PortTender	1	65	11	1						78
Rescue	2	325	20	4	1					352
Sailing	2	797	138	42	8	2	2			991
Tanker	1	13	92	76	37	55	35			309
Tug	6	187	84			1				278
WIG	1	8	8	3	2					22
	159	4,895	4,111	1,078	275	323	72	2	1	10,916

Some of the 10 916 vessels have very few running hours - the following graph shows the running hours for all vessels. For further study in this project all vessels having a running time of 150 hours or more were selected. These are in total 6 167 vessels.



The selected 6167 vessels with the main engine within the power range 250 kW - 1200 kW and that have moved more than 150 hours in 6 months are shown in the following table.

Vessel length groups

SimpleShipType	no length	A_0 - 19 m	B_20 - 39 m	C_40 - 59 m	D_60 - 79 m	E_80 - 99 m	F_100 - 119 m	G_120 - 139 m	H_140 - 159 m	
Unknown	31	179	158	42	7	4	1			422
AntiPollution		2	1							3
Cargo	8	50	289	350	134	232	22		1	1,086
Diving		12	9	1						22
Dredger	2	17	18	23	14	6	1			81
Fishing	48	788	958	81						1,875
HSC	1	53	10							64
LawEnforcement		31	38	8						77
Military		6	9							15
NonCombat		1	1							2
OtherType	14	176	310	79	14	7	2	1		603
Pass	4	117	552	90	8	3		1		775
Pilot		123	24	3						150
Pleasure		132	48	4						184
PortTender	1	19	4	1						25
Rescue		49	5	2	1					57
Sailing		212	93	34	8	2	2			351
Tanker	1	8	59	61	29	51	34			243
Tug	3	72	46							121
WIG	1	2	6	1	1					11
	114	2,049	2,638	780	216	305	62	2	1	6,167

## 3 RESULTS

### 3.1 6167 VESSELS WITH ME 250 kW - 1200 kW, MOVING > 150H IN 6 MONTHS

Number of vessels

Vessel length groups									
SimpleShipType	no length	A_0 - 19 m	B_20 - 39 m	C_40 - 59 m	D_60 - 79 m	E_80 - 99 m	F_100 - 119 m	G_120 - 139 m	H_140 - 159 m
Unknown	31	179	158	42	7	4	1		
AntiPollution		2	1						
Cargo	8	50	289	350	134	232	22		1
Diving		12	9	1					
Dredger	2	17	18	23	14	6	1		
Fishing	48	788	958	81					
HSC	1	53	10						
LawEnforcement		31	38	8					
Military		6	9						
NonCombat		1	1						
OtherType	14	176	310	79	14	7	2	1	
Pass	4	117	552	90	8	3		1	
Pilot		123	24	3					
Pleasure		132	48	4					
PortTender	1	19	4	1					
Rescue		49	5	2	1				
Sailing		212	93	34	8	2	2		
Tanker	1	8	59	61	29	51	34		
Tug	3	72	46						
WIG	1	2	6	1	1				
	114	2,049	2,638	780	216	305	62	2	1

422  
3  
1,086  
22  
81  
1,875  
64  
77  
15  
2  
603  
775  
150  
184  
25  
57  
351  
243  
121  
11  
6,167

Fuel consumption (ton)

Vessel length groups									
SimpleShipType	no length	A_0 - 19 m	B_20 - 39 m	C_40 - 59 m	D_60 - 79 m	E_80 - 99 m	F_100 - 119 m	G_120 - 139 m	H_140 - 159 m
Unknown	349	1,332	2,129	978	193	523	30	0	0
AntiPollution	0	20	3	0	0	0	0	0	0
Cargo	248	735	3,846	8,660	11,131	32,641	2,739	0	30
Diving	0	122	103	22	0	0	0	0	0
Dredger	18	219	305	514	766	454	104	0	0
Fishing	604	6,782	12,746	1,429	0	0	0	0	0
HSC	13	908	199	0	0	0	0	0	0
LawEnforcement	0	396	506	144	0	0	0	0	0
Military	0	68	131	0	0	0	0	0	0
NonCombat	0	17	9	0	0	0	0	0	0
OtherType	168	1,806	4,138	1,322	370	354	27	21	0
Pass	67	1,156	8,134	1,576	146	163	0	51	0
Pilot	0	2,524	615	71	0	0	0	0	0
Pleasure	0	582	298	21	0	0	0	0	0
PortTender	5	315	86	23	0	0	0	0	0
Rescue	0	361	77	41	18	0	0	0	0
Sailing	0	1,208	806	477	121	39	145	0	0
Tanker	13	89	707	2,167	2,592	2,470	1,372	0	0
Tug	68	932	1,170	0	0	0	0	0	0
WIG	15	24	92	5	17	0	0	0	0
	1,568	19,594	36,100	17,451	15,353	36,643	4,417	73	30

5,534  
23  
60,030  
247  
2,380  
21,561  
1,120  
1,046  
199  
26  
8,207  
11,293  
3,211  
901  
430  
496  
2,795  
9,410  
2,170  
153  
131,229

The fuel consumption has been calculated based on operation hours at each vessel's speed distribution divided in half knot intervals with a reference to a maximum service speed and installed propulsion power for each vessel.

### 3.2 2085 VESSELS WITH ME 250 kW - 450 kW, MOVING > 150H IN 6 MONTHS

Number of vessels

Vessel length groups						
SimpleShipType	no length	A_0 - 19 m	B_20 - 39 m	C_40 - 59 m	D_60 - 79 m	E_80 - 99 m
Unknown	12	96	25	3	1	
Cargo	3	17	7	18	12	17
Diving			2			
Dredger			5	8	1	
Fishing	22	742	445	3		
HSC		7				
LawEnforcement		1	5	1		
NonCombat		1				
OtherType	7	65	31	9		
Pass	1	34	33	3	2	
Pilot				1		
Pleasure		104	31	2		
PortTender		2		1		
Rescue		13				
Sailing		176	78	18	2	1
Tanker		2	4	6	2	
Tug			2			
WIG	1					
	46	1,260	668	73	20	18

Fuel consumption (ton)

Vessel length groups						
SimpleShipType	no length	A_0 - 19 m	B_20 - 39 m	C_40 - 59 m	D_60 - 79 m	E_80 - 99 m
Unknown	90	466	145	52	3	0
Cargo	90	181	80	339	687	1,123
Diving	0	0	14	0	0	0
Dredger	0	0	29	135	42	0
Fishing	186	6,184	4,356	21	0	0
HSC	0	83	0	0	0	0
LawEnforcement	0	4	34	1	0	0
NonCombat	0	17	0	0	0	0
OtherType	66	421	297	88	0	0
Pass	1	329	131	15	5	0
Pilot	0	0	0	9	0	0
Pleasure	0	353	152	4	0	0
PortTender	0	52	0	23	0	0
Rescue	0	56	0	0	0	0
Sailing	0	840	682	176	26	12
Tanker	0	13	26	99	6	0
Tug	0	0	9	0	0	0
WIG	15	0	0	0	0	0
	447	8,997	5,956	962	769	1,135

### 3.3 1128 VESSELS WITH ME 450 kW - 600 kW, MOVING > 150H IN 6 MONTHS

Number of vessels

Vessel length groups								
SimpleShipType	no length	A_0 - 19 m	B_20 - 39 m	C_40 - 59 m	D_60 - 79 m	E_80 - 99 m	F_100 - 119 m	
Unknown	11	60	30	3				104
AntiPollution			1					1
Cargo	2	27	27	18	29	14	2	119
Diving			3					3
Dredger	2	1	6	8	3			20
Fishing	14	33	284	14				345
HSC		6						6
LawEnforcement		8	8	1				17
Military			2					2
OtherType	3	86	74	7	1		1	172
Pass		75	143	7				225
Pilot		7	1					8
Pleasure		14	6	2				22
PortTender	1	1	1					3
Rescue		8						8
Sailing		19	10	8	2			39
Tanker		5	5	6	4	1	1	22
Tug		6	3					9
WIG		1	2					3
	33	357	606	74	39	15	4	1,128

Fuel consumption (ton)

Vessel length groups								
SimpleShipType	no length	A_0 - 19 m	B_20 - 39 m	C_40 - 59 m	D_60 - 79 m	E_80 - 99 m	F_100 - 119 m	
Unknown	161	614	364	48	0	0	0	1,187
AntiPollution	0	0	3	0	0	0	0	3
Cargo	63	437	277	581	2,029	1,302	65	4,753
Diving	0	0	16	0	0	0	0	16
Dredger	18	3	57	150	106	0	0	333
Fishing	187	383	4,148	130	0	0	0	4,849
HSC	0	48	0	0	0	0	0	48
LawEnforcement	0	38	94	9	0	0	0	140
Military	0	0	18	0	0	0	0	18
OtherType	48	1,002	936	82	13	0	12	2,093
Pass	0	742	2,344	55	0	0	0	3,141
Pilot	0	75	0	0	0	0	0	76
Pleasure	0	59	45	18	0	0	0	121
PortTender	5	14	14	0	0	0	0	34
Rescue	0	56	0	0	0	0	0	56
Sailing	0	151	78	142	42	0	0	413
Tanker	0	62	48	245	116	10	30	510
Tug	0	49	23	0	0	0	0	72
WIG	0	7	29	0	0	0	0	36
	482	3,741	8,494	1,459	2,306	1,311	106	17,900



### 3.4 1657 VESSELS WITH ME 600 kW - 900 kW, MOVING > 150H IN 6 MONTHS

Number of vessels

Vessel length groups									
SimpleShipType	no length	A_0 - 19 m	B_20 - 39 m	C_40 - 59 m	D_60 - 79 m	E_80 - 99 m	F_100 - 119 m	G_120 - 139 m	H_140 - 159 m
Unknown	5	12	90	9	1	1			
AntiPollution		1							
Cargo	2	4	229	63	33	55			1
Diving		5	4	1					
Dredger		7	4	5	5	4	1		
Fishing	9	9	172	31					
HSC		15	2						
LawEnforcement		8	1	5					
Military		4							
NonCombat			1						
OtherType	3	16	169	24	2	4			
Pass	2	6	308	23				1	
Pilot		72	6						
Pleasure		7	8						
PortTender		7	1						
Rescue		17		2					
Sailing		6	2	6	4		1		
Tanker		1	48	13	14	24	2		
Tug	1	35	18						
WIG			4	1					
	22	232	1,067	183	59	88	4	1	1

Fuel consumption (ton)

Vessel length groups									
SimpleShipType	no length	A_0 - 19 m	B_20 - 39 m	C_40 - 59 m	D_60 - 79 m	E_80 - 99 m	F_100 - 119 m	G_120 - 139 m	H_140 - 159 m
Unknown	74	131	1,378	157	11	122		0	0
AntiPollution	0	5	0	0	0	0	0	0	0
Cargo	35	102	2,980	1,500	3,973	6,021	0	0	30
Diving	0	37	73	22	0	0	0	0	0
Dredger	0	85	103	185	221	341	104	0	0
Fishing	185	127	3,015	577	0	0	0	0	0
HSC	0	180	43	0	0	0	0	0	0
LawEnforcement	0	65	12	114	0	0	0	0	0
Military	0	29	0	0	0	0	0	0	0
NonCombat	0	0	9	0	0	0	0	0	0
OtherType	41	213	2,234	317	25	58	0	0	0
Pass	43	51	4,160	429	0	0	0	51	0
Pilot	0	1,448	145	0	0	0	0	0	0
Pleasure	0	52	80	0	0	0	0	0	0
PortTender	0	107	7	0	0	0	0	0	0
Rescue	0	138	0	41	0	0	0	0	0
Sailing	0	53	13	122	53	0	34	0	0
Tanker	0	14	618	419	1,165	637	62	0	0
Tug	42	366	387	0	0	0	0	0	0
WIG	0	0	63	5	0	0	0	0	0
	420	3,205	15,320	3,886	5,448	7,179	200	51	30

### 3.5 1297 VESSELS WITH ME 900 kW - 1200 kW, MOVING > 150H IN 6 MONTHS

Number of vessels

Vessel length groups								
SimpleShipType	no length	A_0 - 19 m	B_20 - 39 m	C_40 - 59 m	D_60 - 79 m	E_80 - 99 m	F_100 - 119 m	G_120 - 139 m
Unknown	3	11	13	27	5	3	1	
AntiPollution		1						
Cargo	1	2	26	251	60	146	20	
Diving		7						
Dredger		9	3	2	5	2		
Fishing	3	4	57	33				
HSC	1	25	8					
LawEnforcement		14	24	1				
Military		2	7					
OtherType	1	9	36	39	11	3	1	1
Pass	1	2	68	57	6	3		
Pilot		44	17	2				
Pleasure		7	3					
PortTender		9	2					
Rescue		11	5		1			
Sailing		11	3	2		1	1	
Tanker	1		2	36	9	26	31	
Tug	2	31	23					
WIG		1			1			
	13	200	297	450	98	184	54	1

63  
1  
506  
7  
21  
97  
34  
39  
9  
101  
137  
63  
10  
11  
17  
18  
105  
56  
2  
1,297

Fuel consumption (ton)

Vessel length groups								
SimpleShipType	no length	A_0 - 19 m	B_20 - 39 m	C_40 - 59 m	D_60 - 79 m	E_80 - 99 m	F_100 - 119 m	G_120 - 139 m
Unknown	24	120	241	723	179	400	30	0
AntiPollution	0	15	0	0	0	0	0	0
Cargo	60	15	510	6,240	4,442	24,195	2,674	0
Diving	0	85	0	0	0	0	0	0
Dredger	0	130	116	44	396	113	0	0
Fishing	46	88	1,226	701	0	0	0	0
HSC	13	597	156	0	0	0	0	0
LawEnforcement	0	289	367	20	0	0	0	0
Military	0	39	113	0	0	0	0	0
OtherType	13	170	672	835	333	296	15	21
Pass	23	34	1,499	1,077	141	163	0	0
Pilot	0	1,001	471	62	0	0	0	0
Pleasure	0	118	21	0	0	0	0	0
PortTender	0	142	65	0	0	0	0	0
Rescue	0	111	77	0	18	0	0	0
Sailing	0	164	32	37	0	27	111	0
Tanker	13	0	14	1,405	1,304	1,823	1,281	0
Tug	26	517	751	0	0	0	0	0
WIG	0	17	0	0	17	0	0	0
	219	3,652	6,329	11,144	6,829	27,018	4,110	21

1,717  
15  
38,137  
85  
800  
2,061  
766  
675  
151  
2,356  
2,937  
1,533  
140  
207  
206  
371  
5,840  
1,294  
34  
59,324

### 3.6 TOP 100 VESSELS CONSUMING THE MOST FUEL DURING MAR-AUG 2016

The top 100 vessels with the highest engine utilisation and fuel consumption were identified and the vessels' tracks for the selected 6-month period are visualised in the picture from our Google Earth model below.

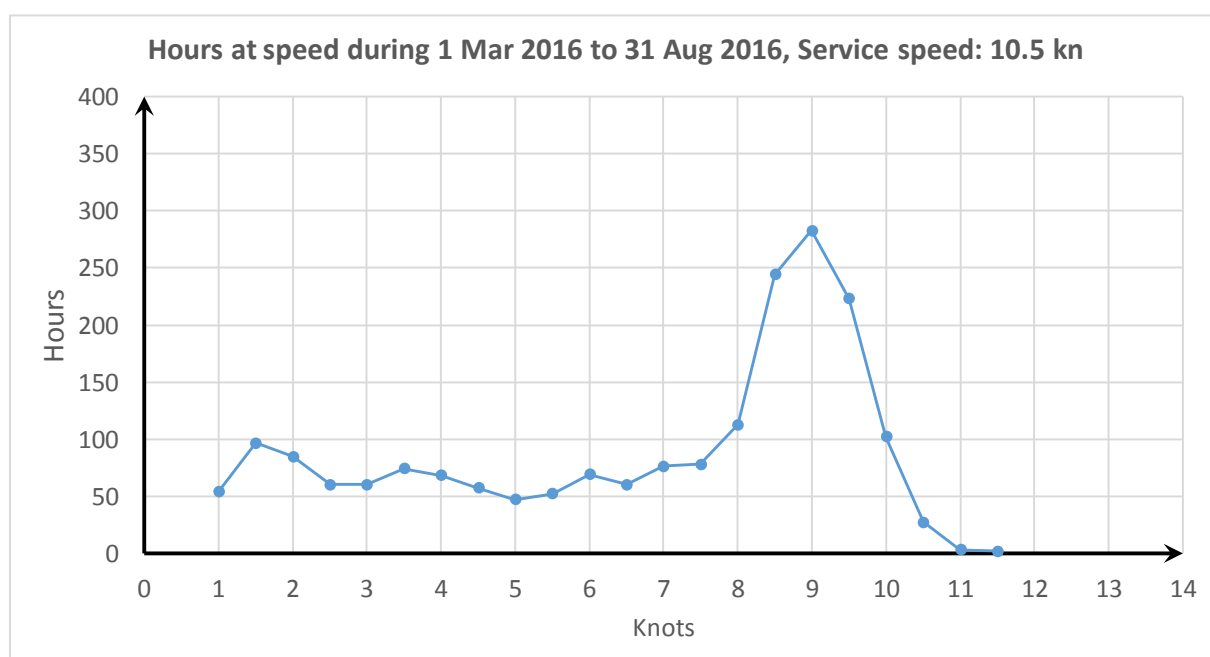
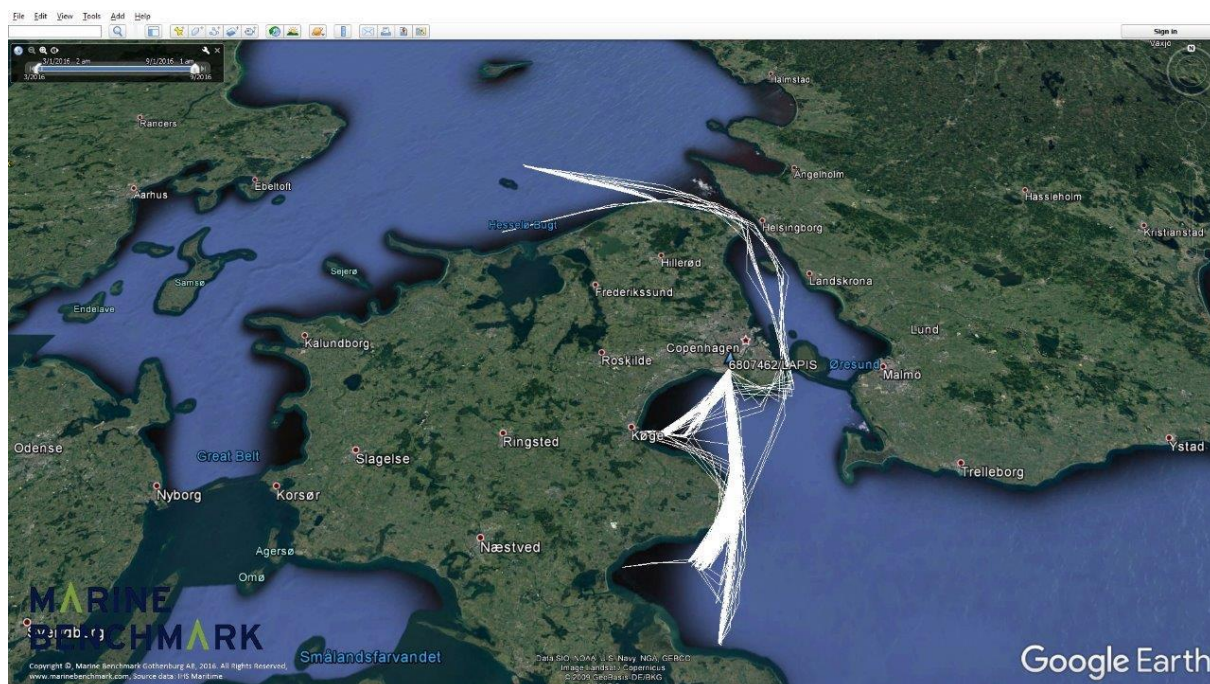


The details of each of these top 100 vessels (and in addition also the 8 top passenger vessels) are found in the Appendices I to V.

## APPENDIX I – TOP 25 VESSELS – ENGINE SIZE 250 - 450 kW

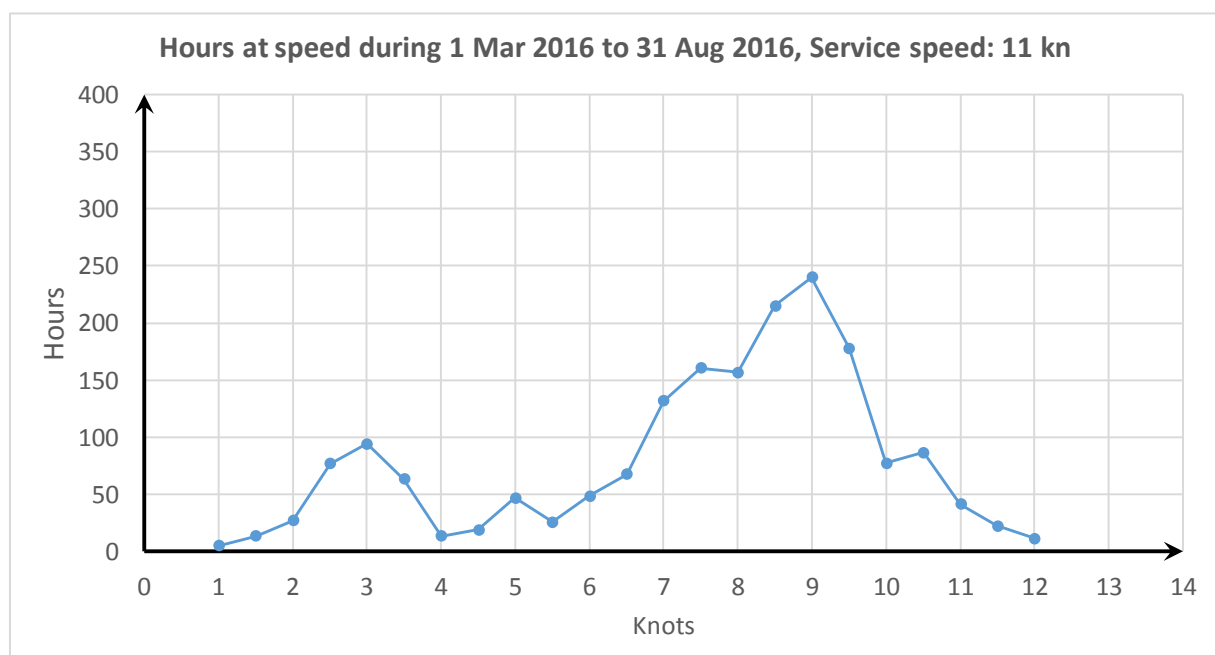
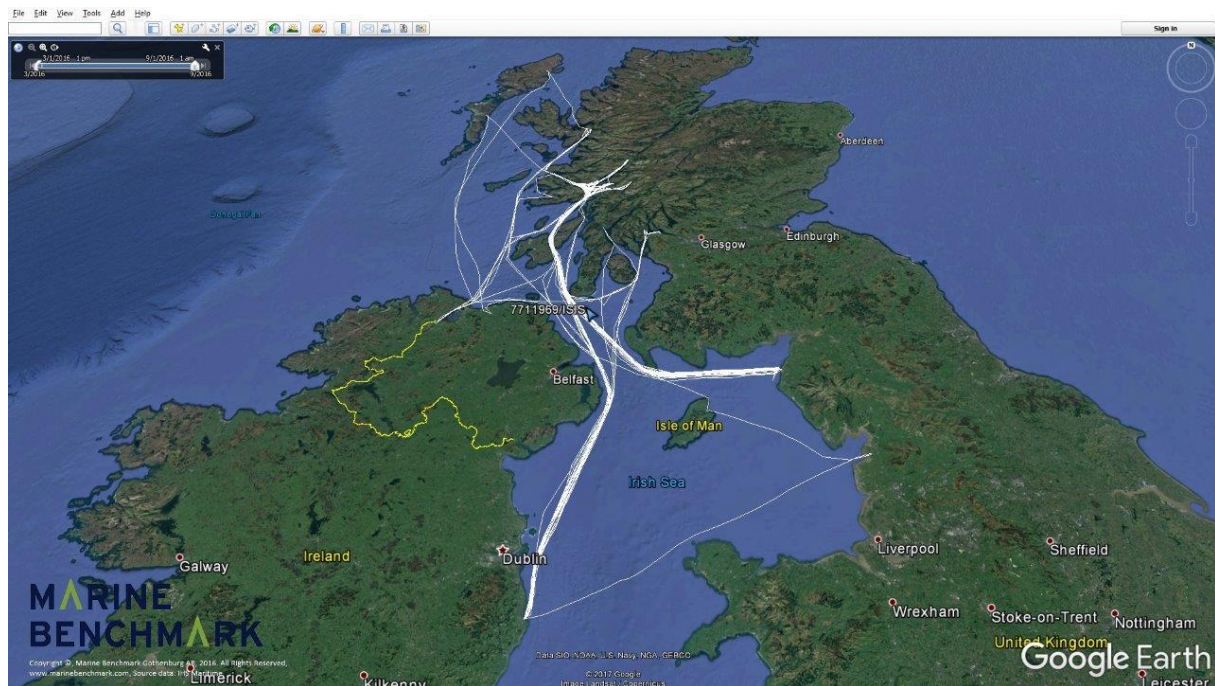
IMO	Current name	Vessel type	Fuel / day (kg)	Service speed	Propulsion power (kW)	Vessel beneficial owner	Vessel technical manager	Vessel operator
6807462	LAPIS	Service	377	10.5	375	NCC Roads	Ncc Roads	NCC Roads
7711969	ISIS	Dry Cargo	349	11.0	349	Great Glen Shipping Co Ltd	Great Glen Shipping Co Ltd	Great Glen Shipping Co Ltd
7726897	BURHOU I	Dry Cargo	253	11.0	349	Great Glen Shipping Co Ltd	Great Glen Shipping Co Ltd	Great Glen Shipping Co Ltd
8100636	FRI STAR	Dry Cargo	401	10.8	441	Kopervik Shipping AS	Kopervik Ship Mgmt Poland	Wagle Chartering AS
8104565	AMANDA	Dry Cargo	367	10.5	441	Boye HC	Dano Sp Z Oo	Boye HC
8124474	HAV SAND	Dry Cargo	317	10.5	324	Frakt & Sandsoelan Sp/F	Frakt & Sandsoelan Sp/F	Frakt & Sandsoelan Sp/F
8124503	SIRIUS	Tanker	337	10.5	441	Bröring Beteiligungs mbH	Bot Broering Oil Trans GmbH	BOT Broering Oil Trans GmbH
8128884	ICELANDICA HAV	Dry Cargo	356	10.8	441	HAV Ship Management NorRus AS	Hav Ship Management Norrus As	HAV Ship Management NorRus AS
8209717	PEAK AMSTERDAM	Dry Cargo	344	10.6	441	HAV Ship Management NorRus AS	Kopervik Ship Mgmt Poland	Peak Project Carriers AS
8215728	PEAK ABERDEEN	Dry Cargo	340	10.8	441	HAV Ship Management NorRus AS	Kopervik Ship Mgmt Poland	Peak Project Carriers AS
8303173	CEG COSMOS	Dry Cargo	518	9.8	441	Fehn Ship Management	Fehn Ship Management	Fehn Ship Management
8321656	REBECCA ROUSING	Dry Cargo	352	10.5	441	Maritim Supply ApS	Maritim Supply Aps	Maritim Supply ApS
8324672	GERMANICA HAV	Dry Cargo	329	10.5	441	HAV Ship Management NorRus AS	Hav Ship Management Norrus As	HAV Ship Management NorRus AS
8324684	PEIKKO	Dry Cargo	451	10.8	441	Afalita Shipping JSC	Afalita Shipping Jsc	Interscan Schiffahrtsges mbH
8401535	DANICA HAV	Dry Cargo	427	10.8	441	HAV Ship Management NorRus AS	Hav Ship Management Norrus As	HAV Ship Management NorRus AS
8402577	HELGA	Dry Cargo	503	10.0	441	Helga Shipping Ltd-ABB	Sirius Shipman Co Ltd Co	Antares Shipping Agency Ltd
8402589	HELT	Dry Cargo	401	10.0	441	Vista Shipping Agency	Vista Shipping Agency	Vista Shipping Agency
8407228	DARWIN	Dry Cargo	413	10.0	441	Darwin Schiffahrts UG	Loge Shipmanagement GmbH & Co	LoGe Shipmanagement GmbH & Co
8412417	SNOWLARK	Dry Cargo	345	10.0	441	Vista Shipping Agency	Vista Shipping Agency	Vista Shipping Agency
8415653	DANUBIA	Dry Cargo	484	10.8	441	Samuelsens Rederi	M Hannestad As	M Hannestad AS
8415665	PLUTO	Dry Cargo	335	10.6	441	SeaG8 Ltd	Faversham Ships Ltd	Faversham Ships Ltd
8420086	OSA	Dry Cargo	300	10.5	441	Baltramp Shipping Sp z oo	Baltramp Ship Sp Z Oo Sp K	Baltramp Shipping Sp z oo
8422022	CELTICA HAV	Dry Cargo	424	10.5	441	HAV Ship Management NorRus AS	Hav Ship Management Norrus As	HAV Ship Management NorRus AS
8505939	NATHALIE	Dry Cargo	414	10.0	441	Kyriakopoulos K&D	Powdermill Navigation Inc	Powdermill Navigation Inc
8513314	SUNTIS	Dry Cargo	576	10.5	441	Warnecke Schifffahrt GbR	Warnecke Schifffahrt Gbr	Warnecke Schifffahrt GbR

6807462-LAPIS, 377 kg fuel/day, 857 dwt, 375 kW, Alpha / 406-24VO  
 Service vessel, Owner: NCC Roads

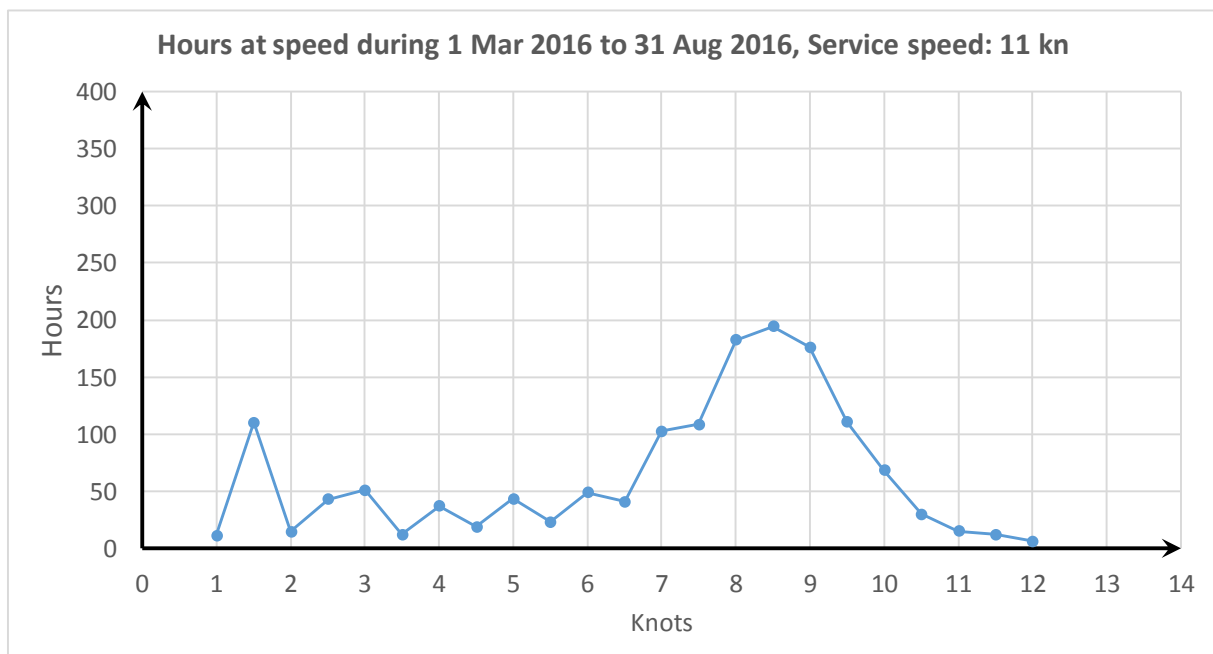
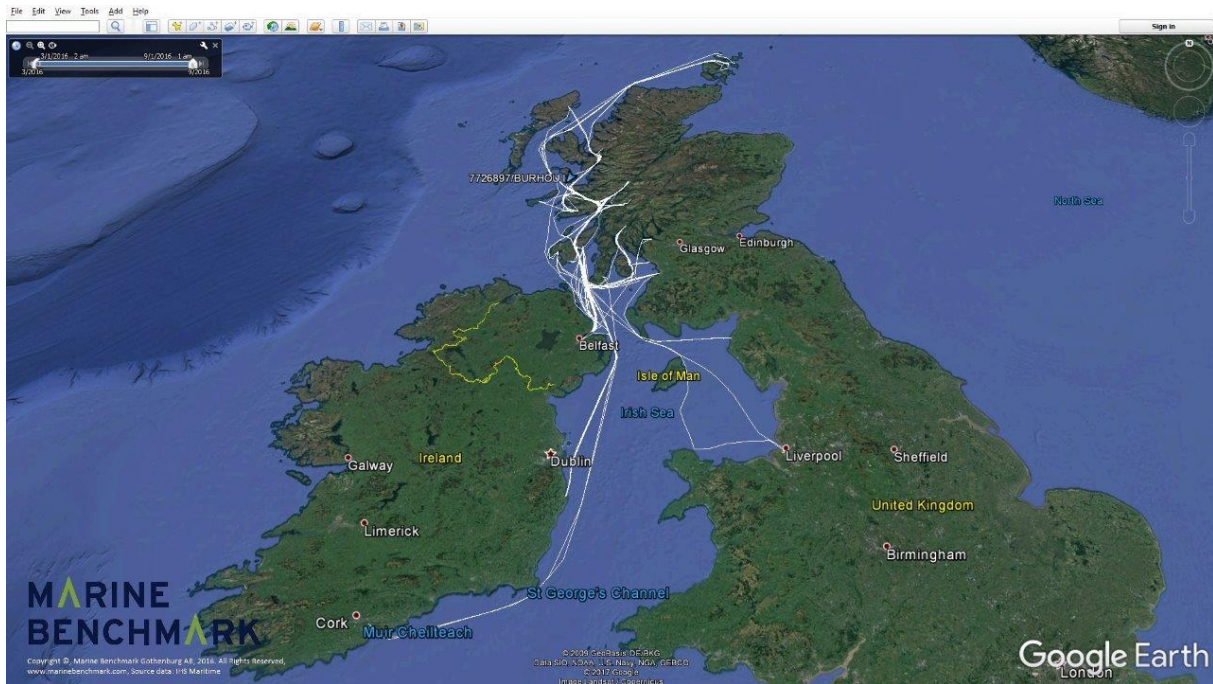




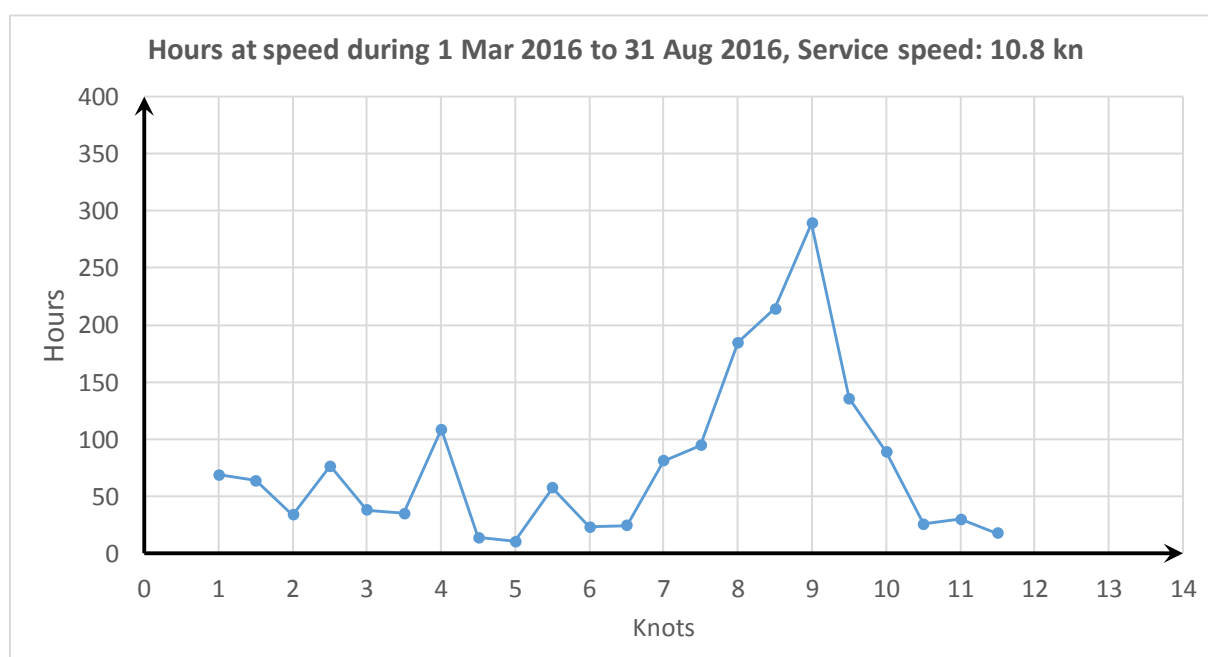
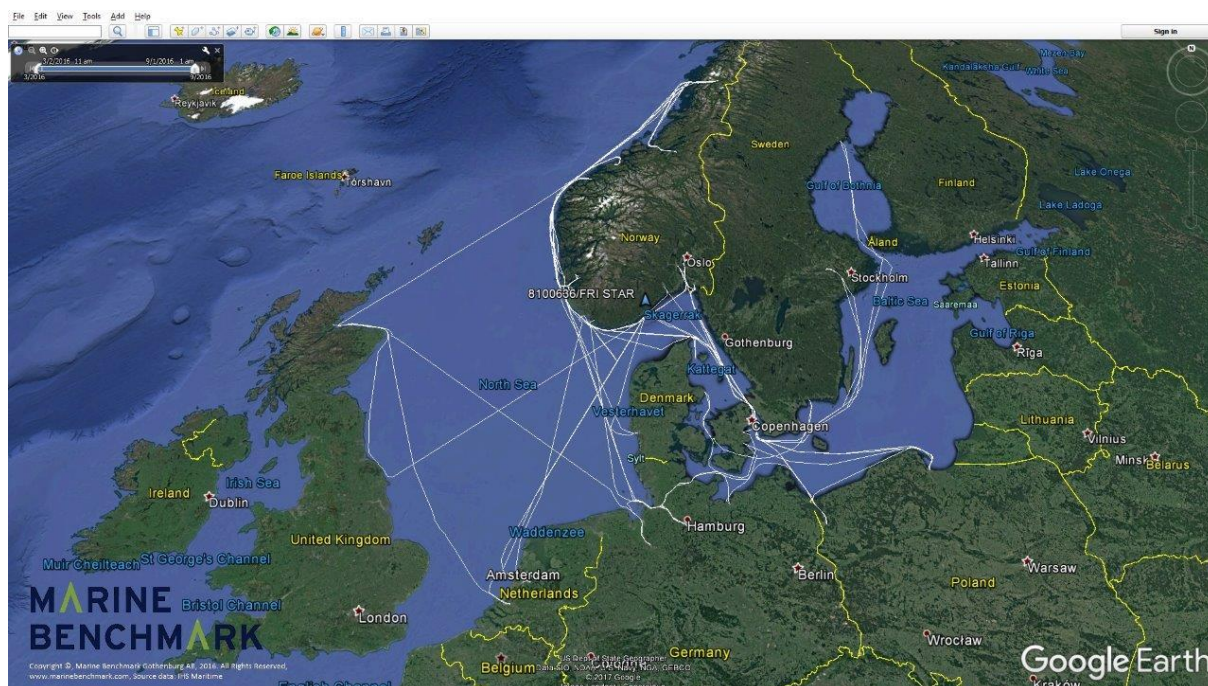
7711969-ISIS, 349 kg fuel/day, 953 dwt, 349 kW, Blackstone / ESL6MK2  
 Dry Cargo vessel, Owner: Great Glen Shipping Co Ltd



7726897-BURHOU I, 253 kg fuel/day, 953 dwt, 349 kW, Blackstone / ESL6MK2  
 Dry Cargo vessel, Owner: Great Glen Shipping Co Ltd

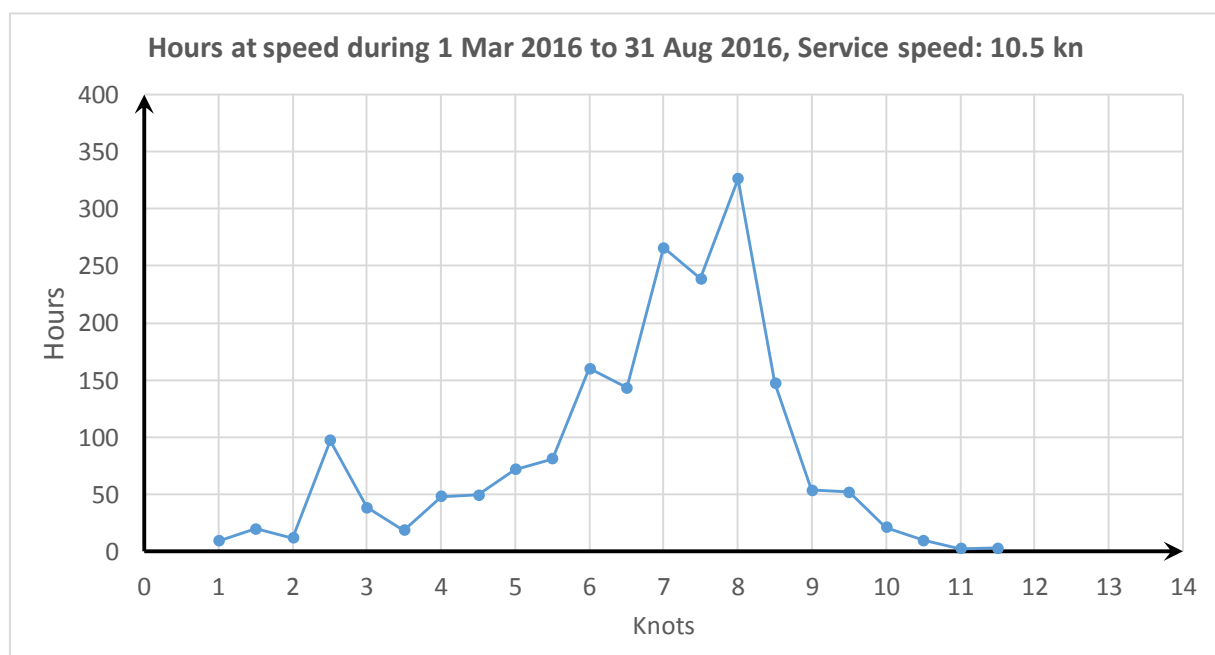
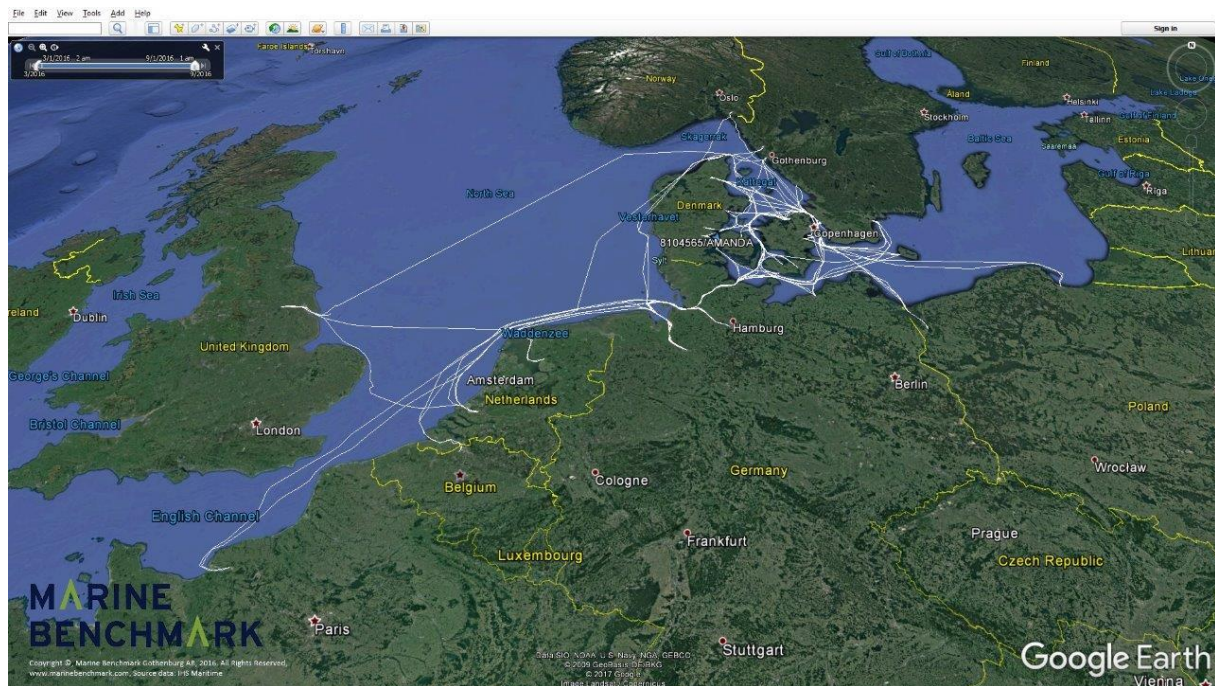


8100636-FRI STAR, 401 kg fuel/day, 1773 dwt, 441 kW, Deutz / SBA8M528  
 Dry Cargo vessel, Owner: Kopervik Shipping AS

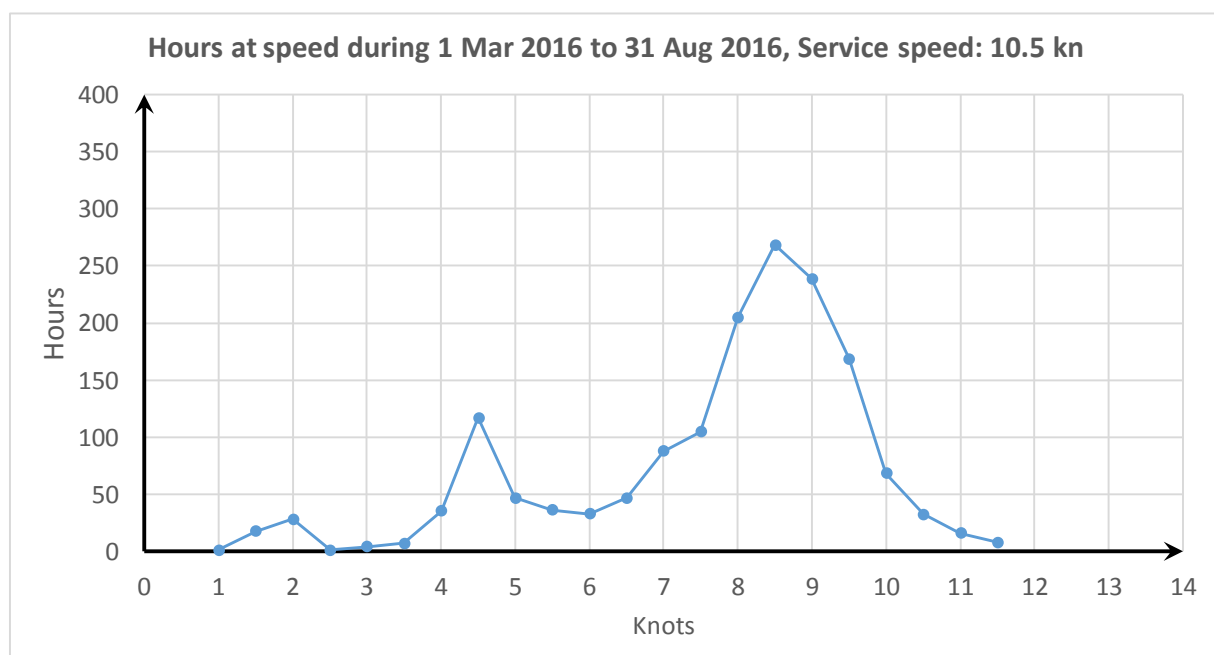
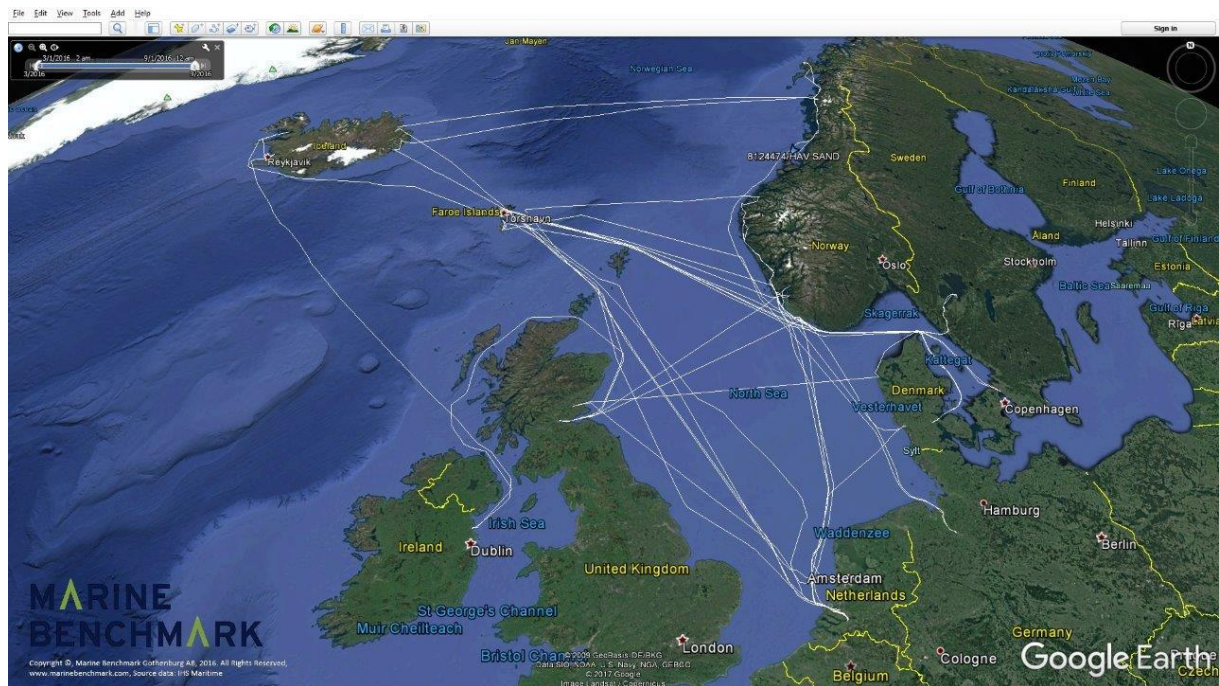




8104565-AMANDA, 367 kg fuel/day, 1795 dwt, 441 kW, Deutz / SBA8M528  
 Dry Cargo vessel, Owner: Boye HC

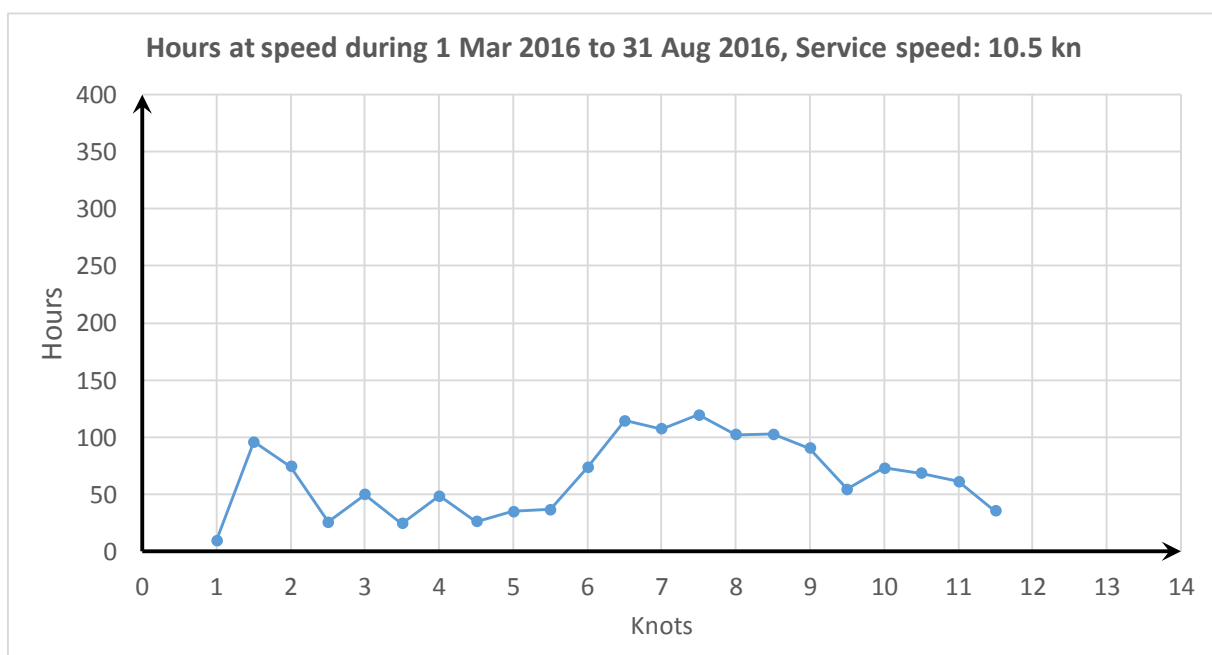
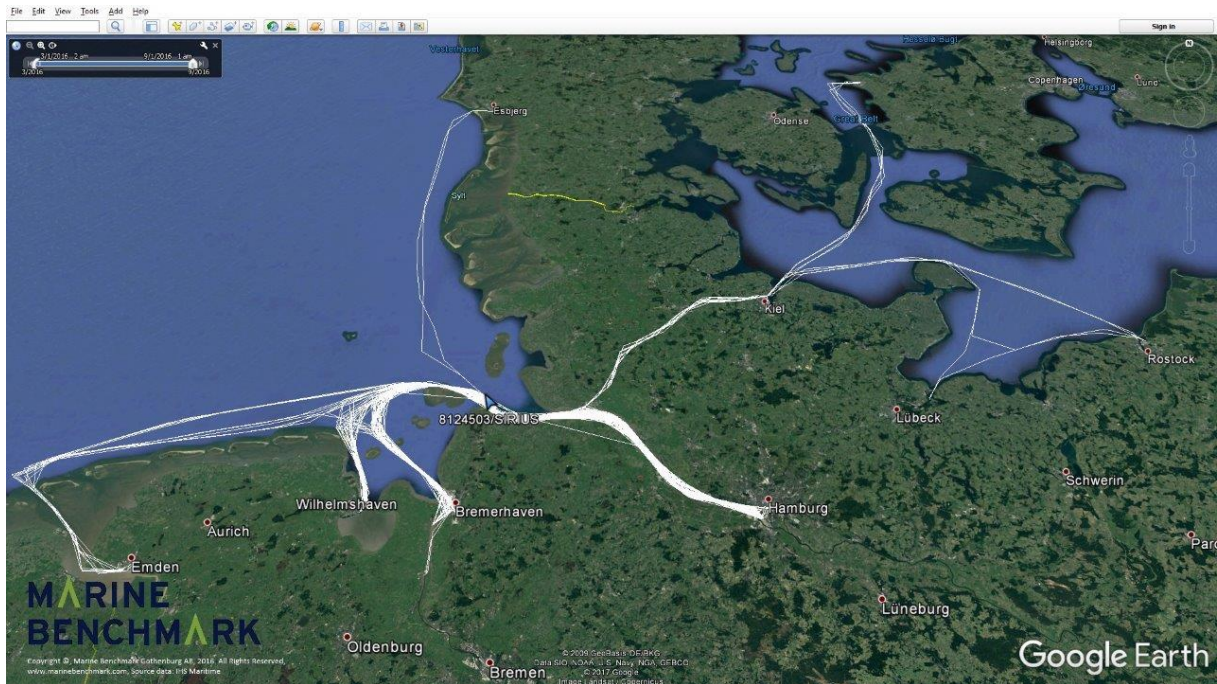


8124474-HAV SAND, 317 kg fuel/day, 1737 dwt, 324 kW, Deutz / SBV6M628  
 Dry Cargo vessel, Owner: Frakt & Sandsoelan Sp/F

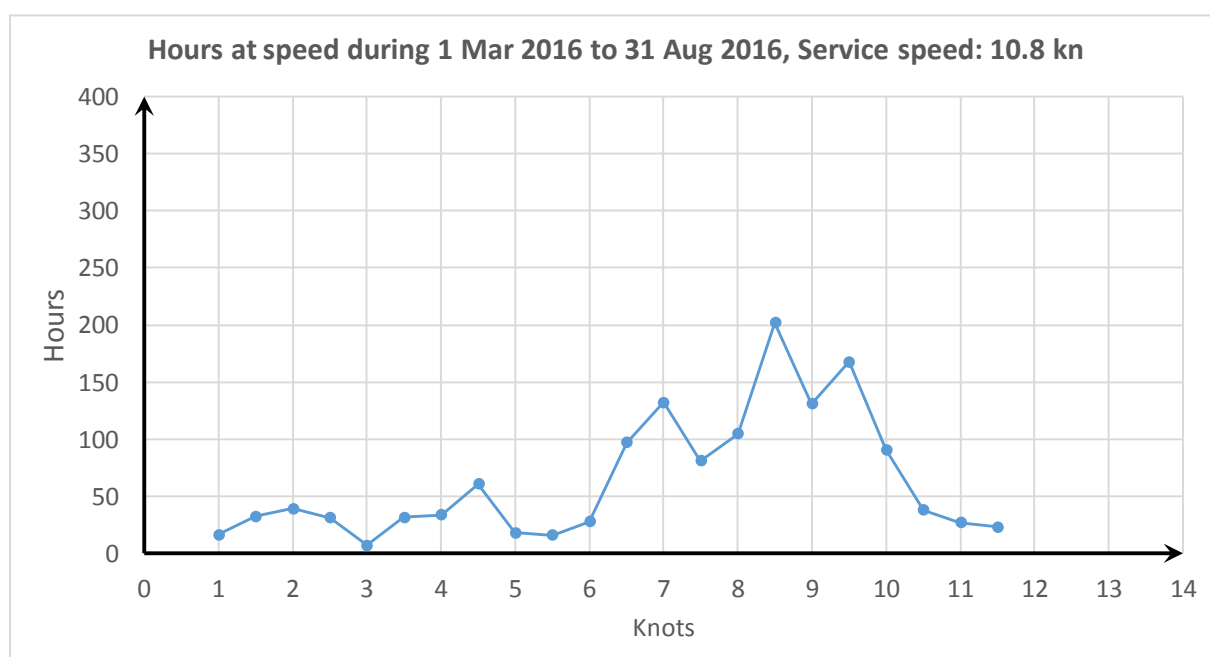
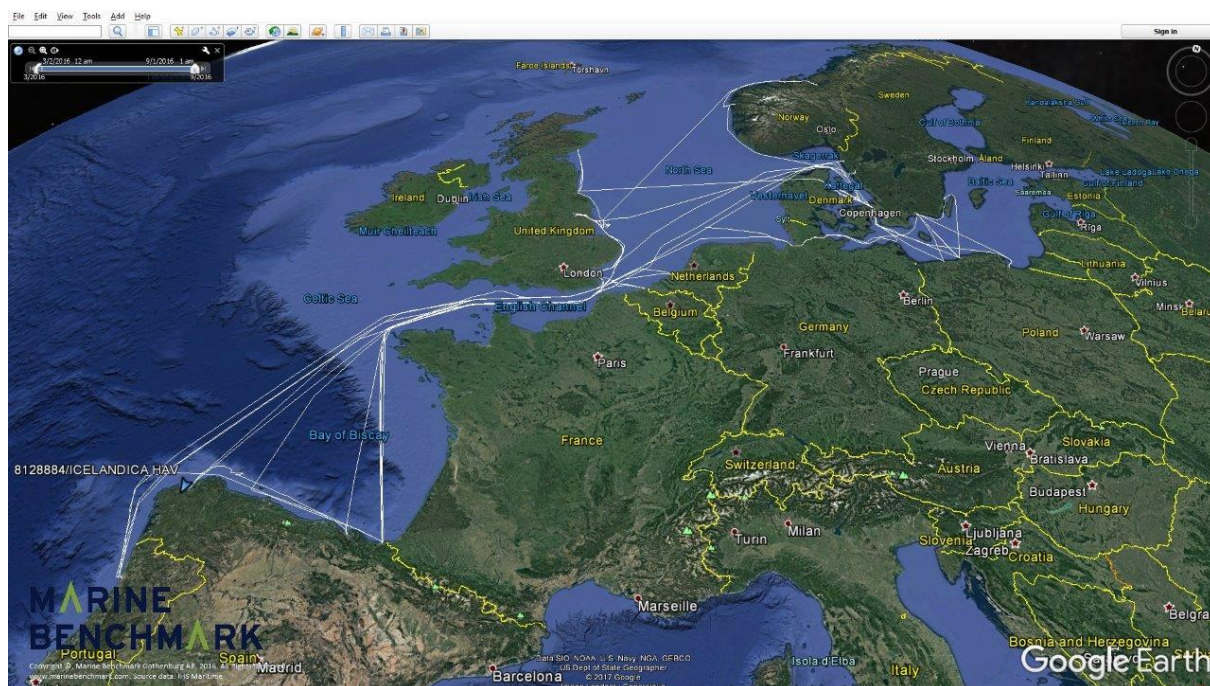




8124503-SIRIUS, 337 kg fuel/day, 801 dwt, 441 kW, Callesen / 6-427-FOT  
 Tanker vessel, Owner: Broring Beteiligungs mbH

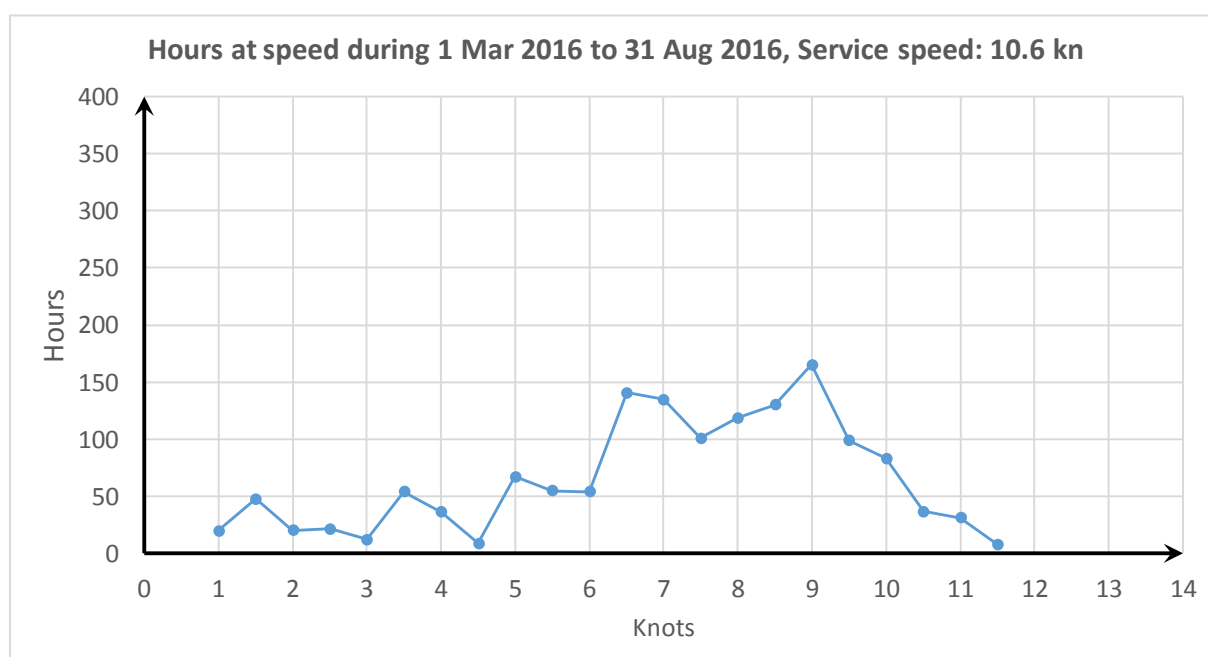
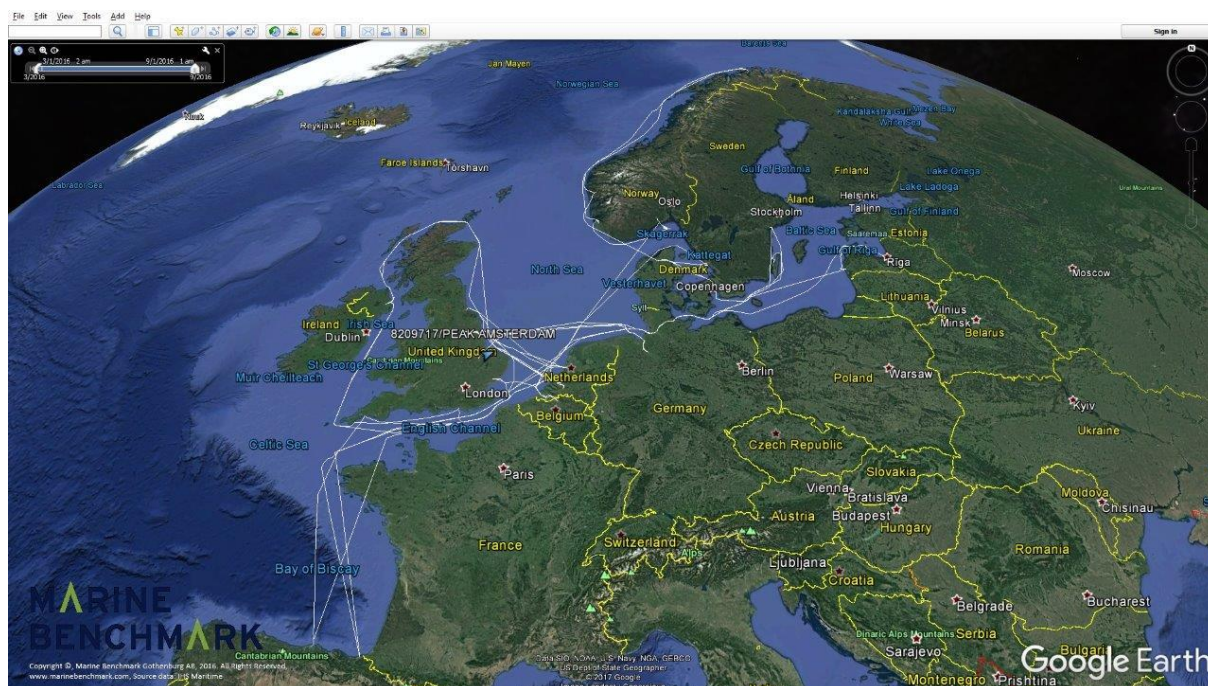


8128884-ICELANDICA HAV, 356 kg fuel/day, 2325 dwt, 441 kW, Deutz / SBA8M528  
 Dry Cargo vessel, Owner: HAV Ship Management NorRus AS

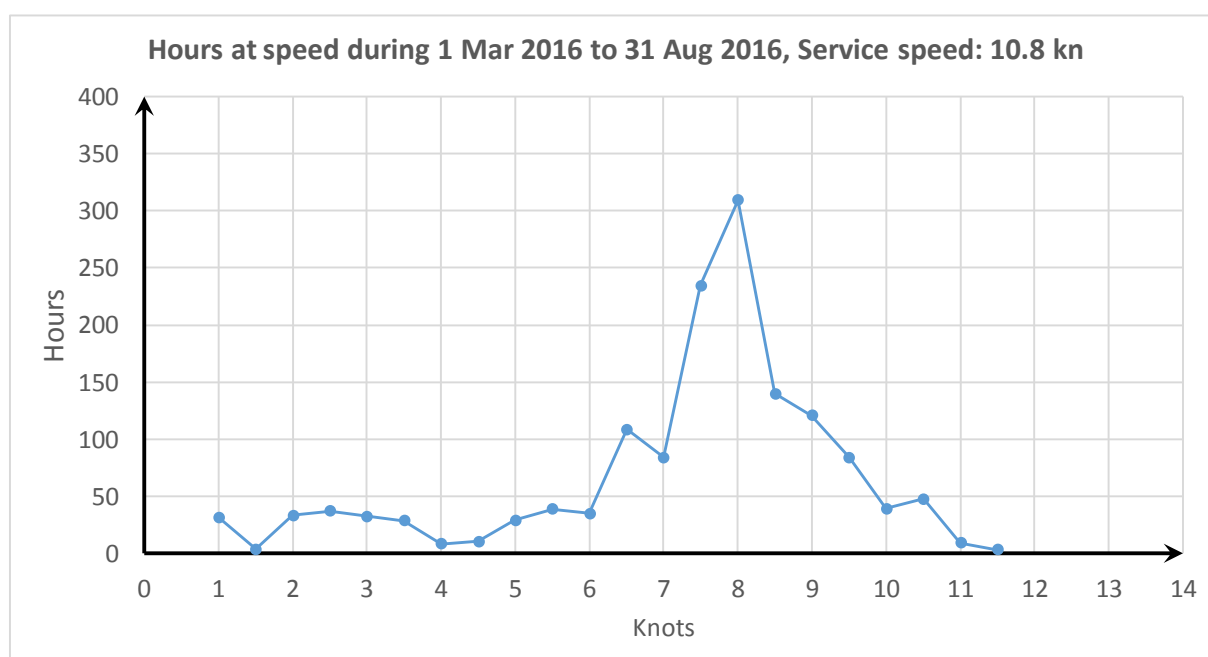
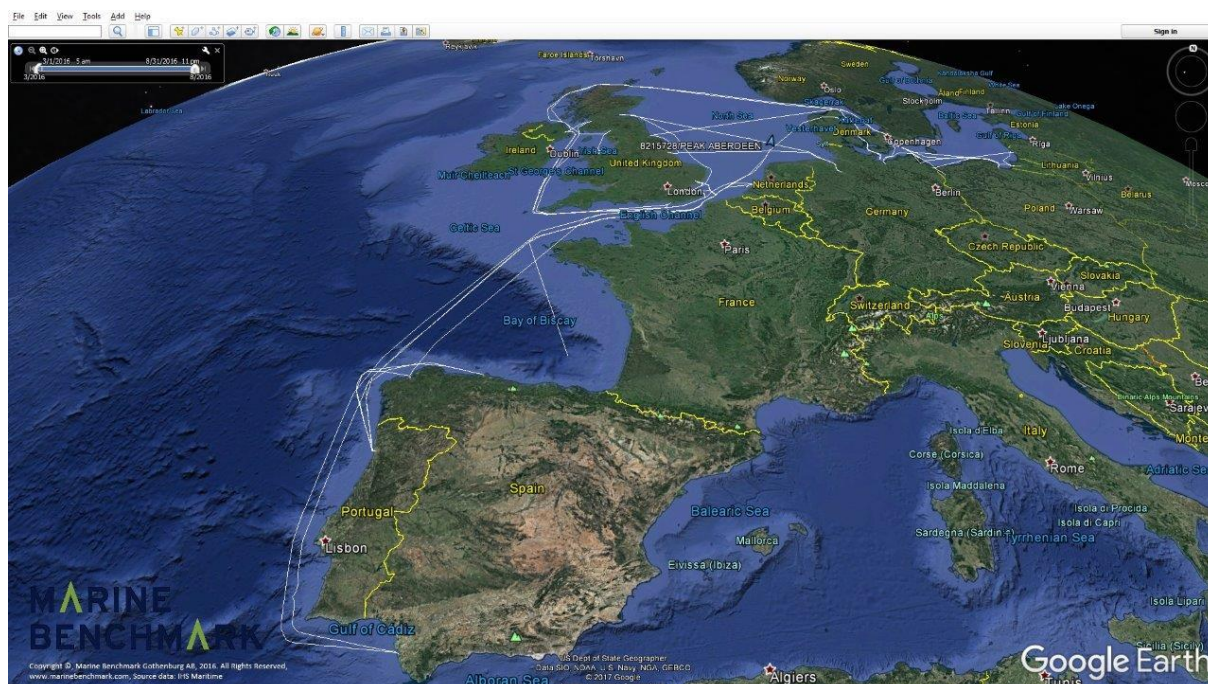




8209717-PEAK AMSTERDAM, 344 kg fuel/day, 2299 dwt, 441 kW, Deutz / SBA8M528  
 Dry Cargo vessel, Owner: HAV Ship Management NorRus AS

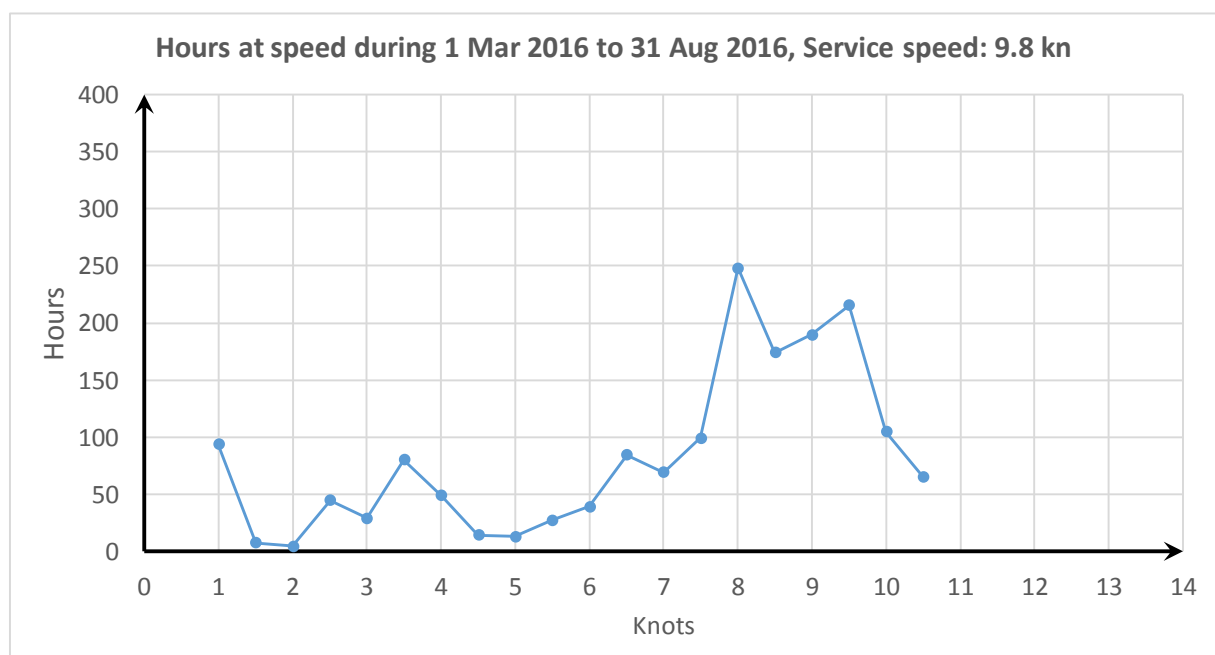
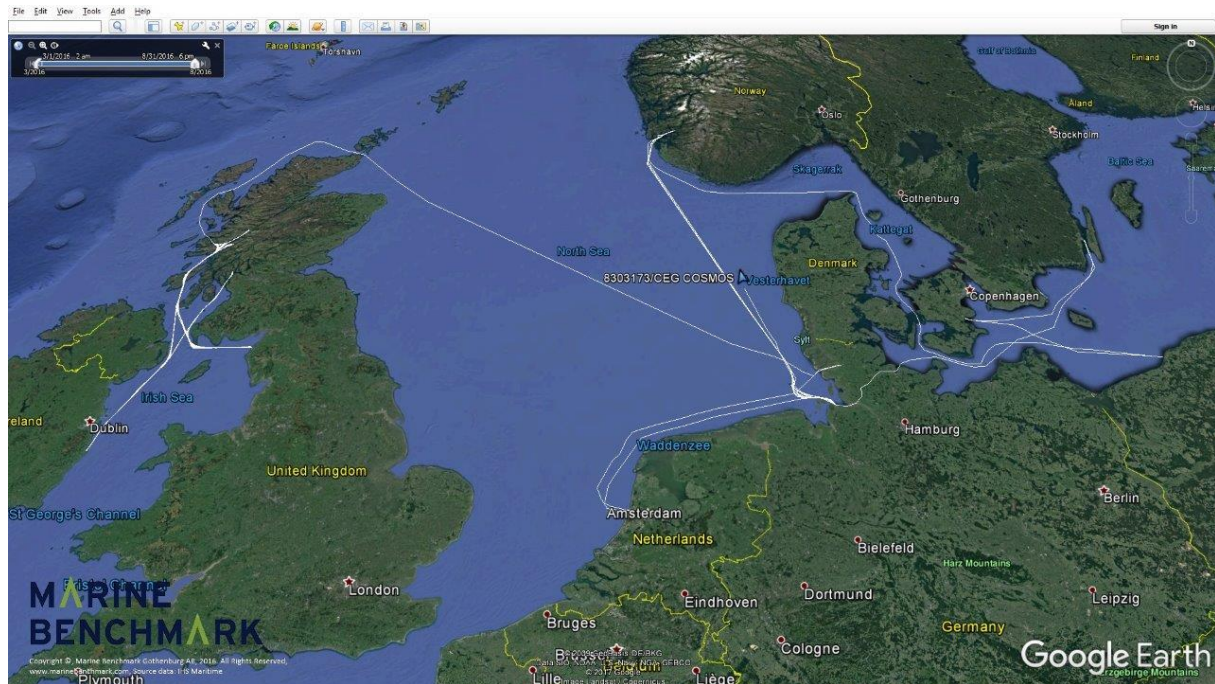


8215728-PEAK ABERDEEN, 340 kg fuel/day, 2305 dwt, 441 kW, Deutz / SBA8M528  
 Dry Cargo vessel, Owner: HAV Ship Management NorRus AS

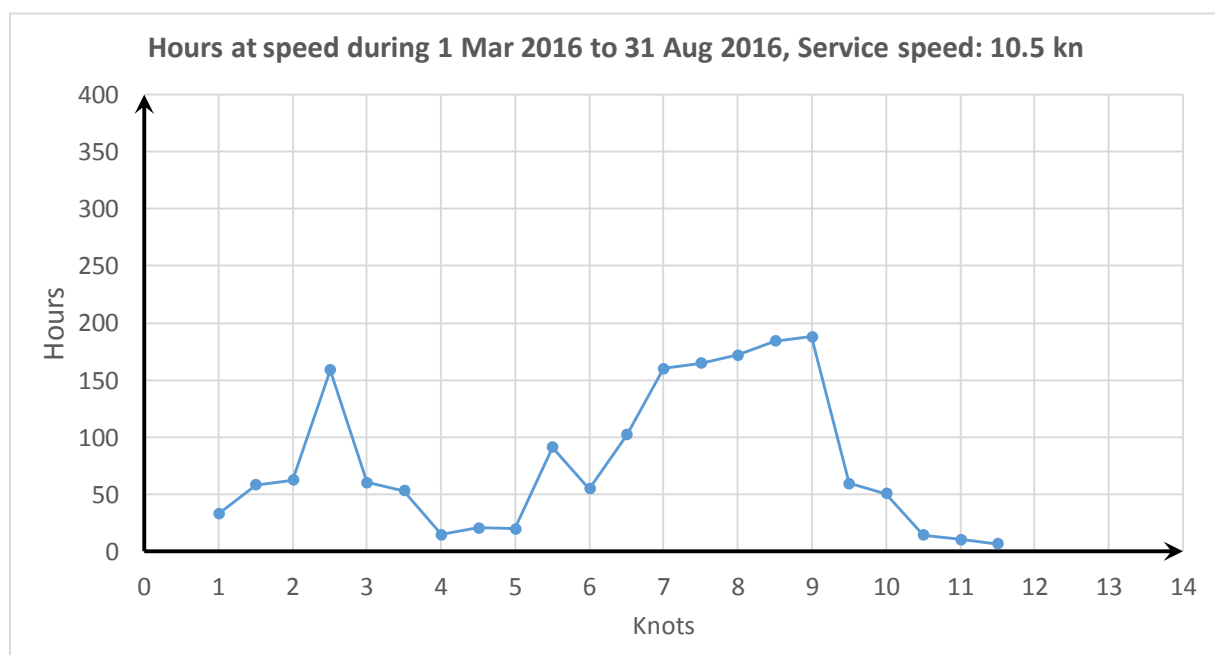
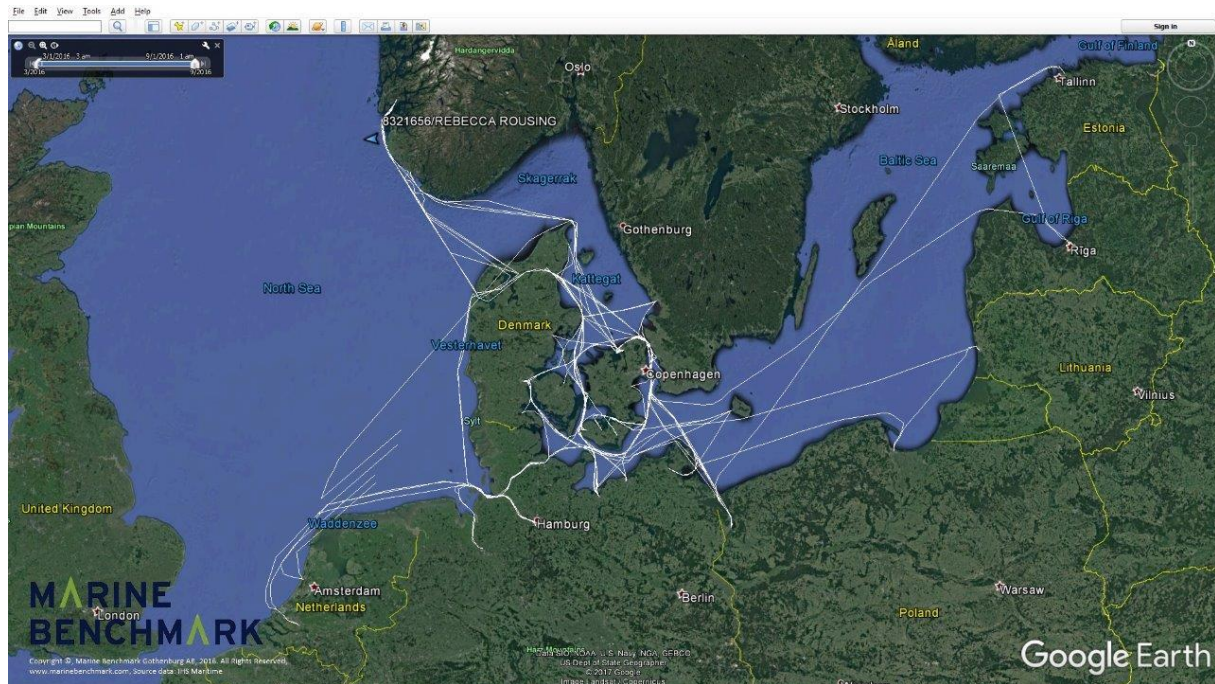




8303173-CEG COSMOS, 518 kg fuel/day, 1102 dwt, 441 kW, Callesen / 6-427-FOT  
 Dry Cargo vessel, Owner: Fehn Ship Management

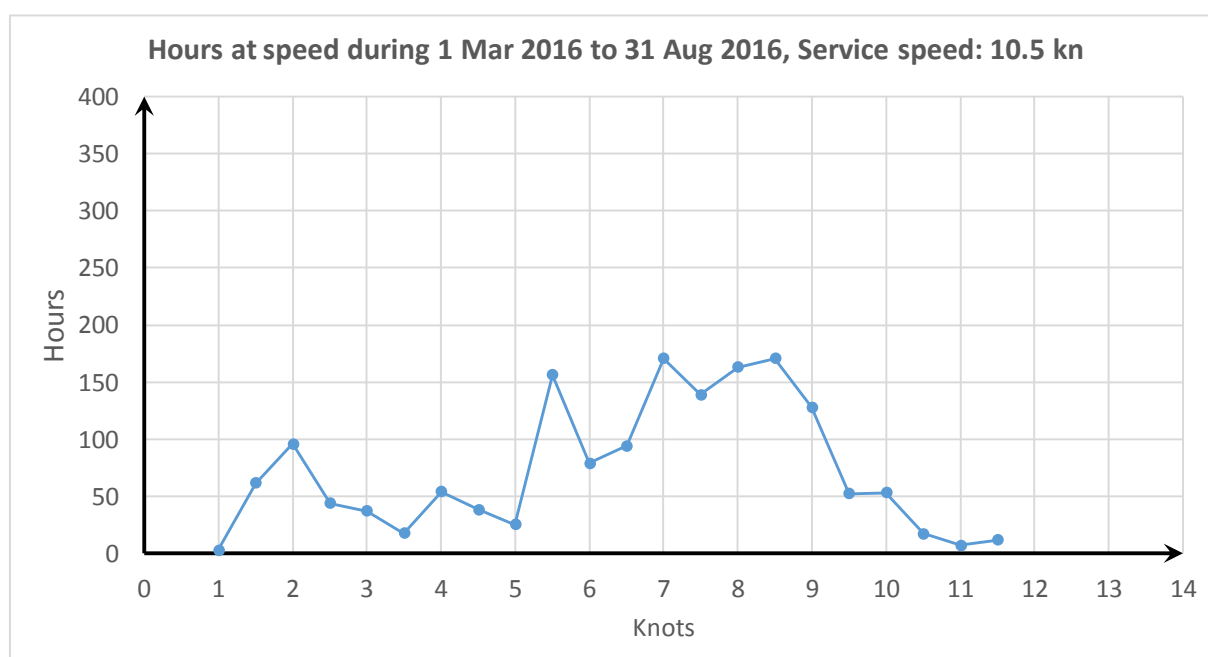
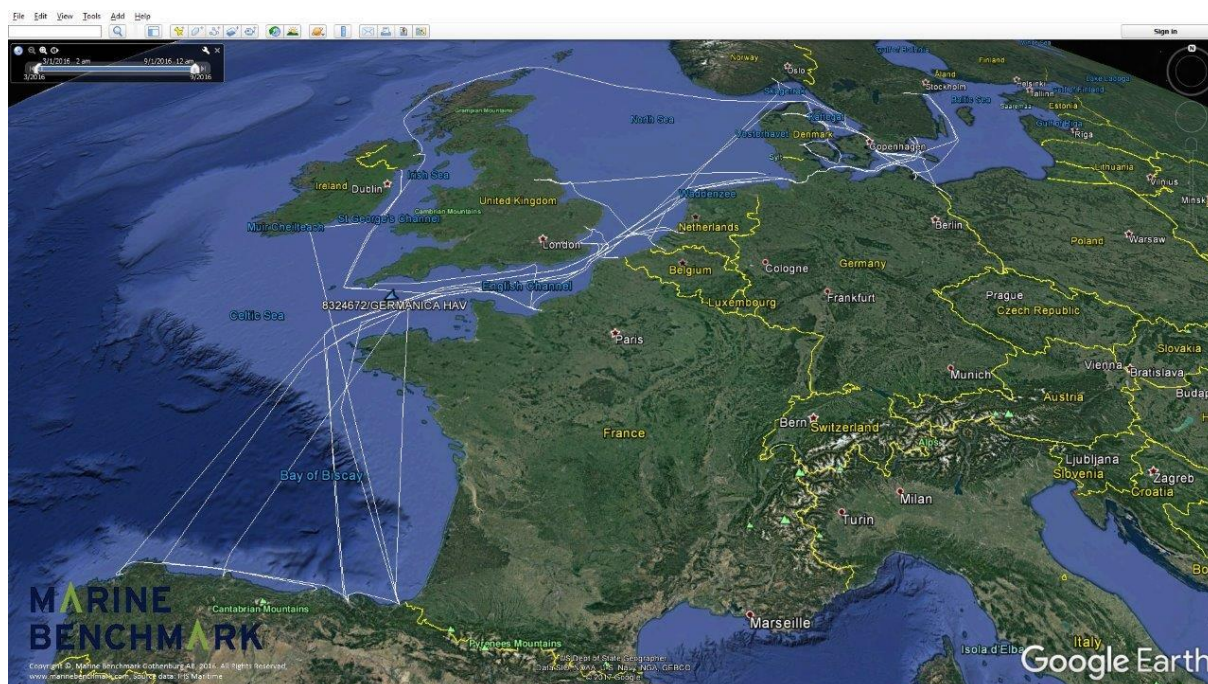


8321656-REBECCA ROUSING, 352 kg fuel/day, 1768 dwt, 441 kW, Deutz / SBA8M528  
 Dry Cargo vessel, Owner: Maritim Supply ApS

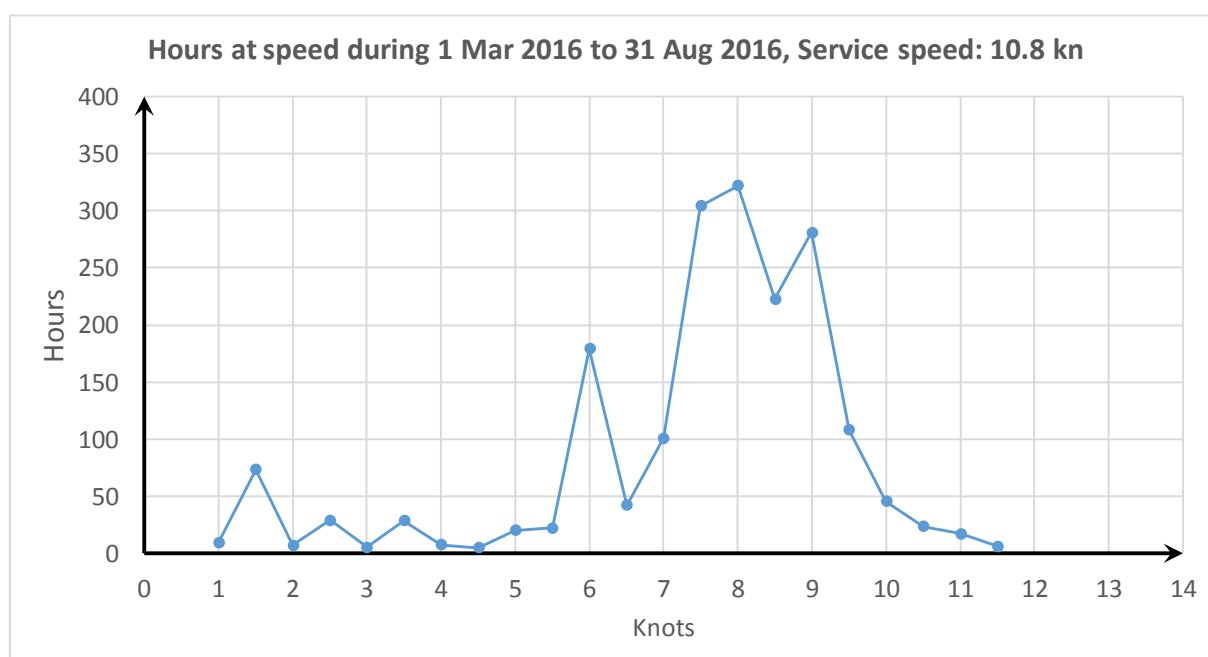
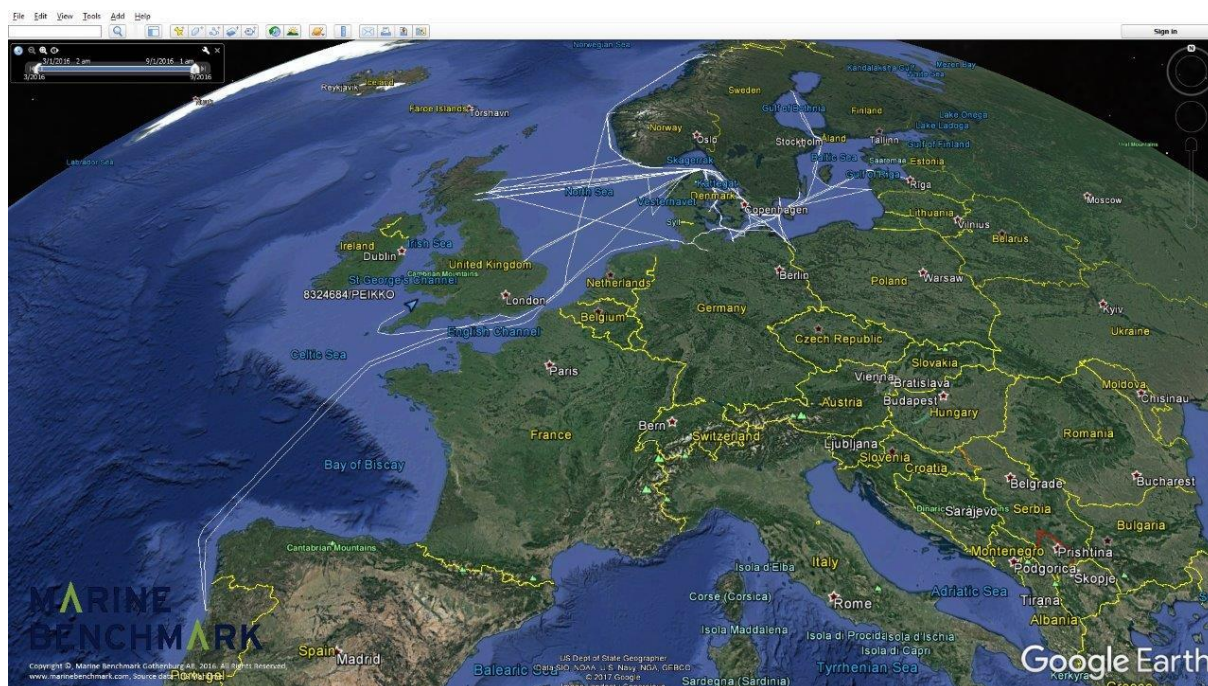




8324672-GERMANICA HAV, 329 kg fuel/day, 2295 dwt, 441 kW, MWM / TBD440-6K  
 Dry Cargo vessel, Owner: HAV Ship Management NorRus AS

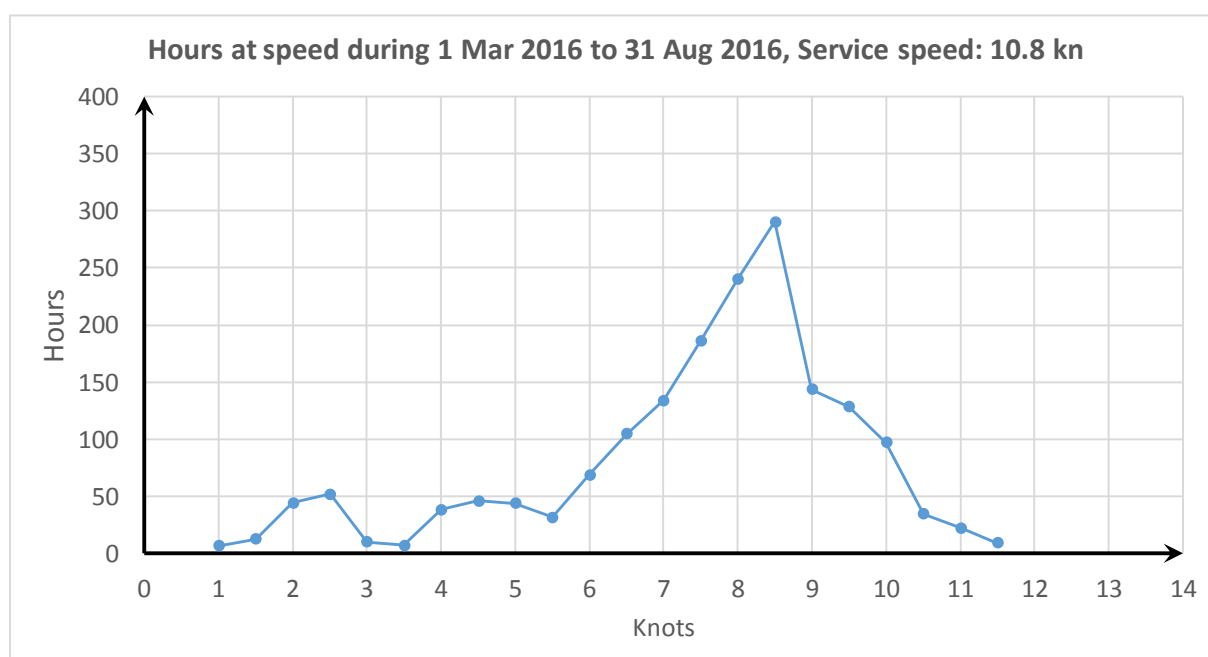
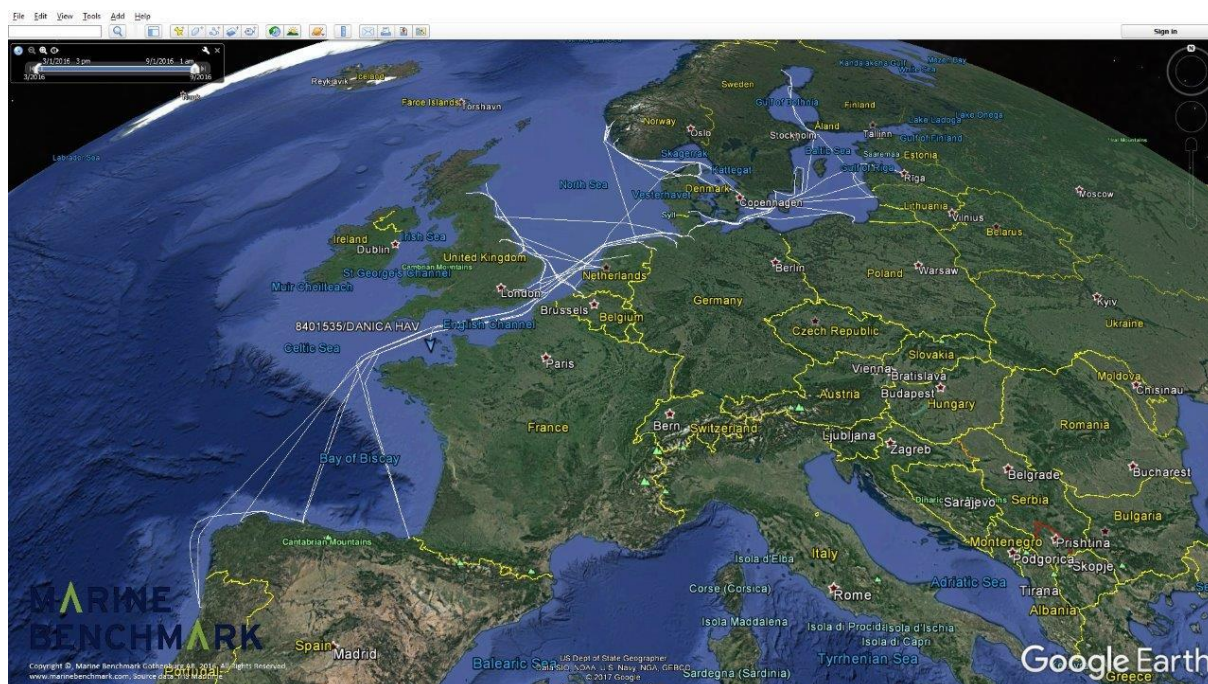


8324684-PEIKKO, 451 kg fuel/day, 1723 dwt, 441 kW, Deutz / SBA8M528  
 Dry Cargo vessel, Owner: Afalita Shipping JSC

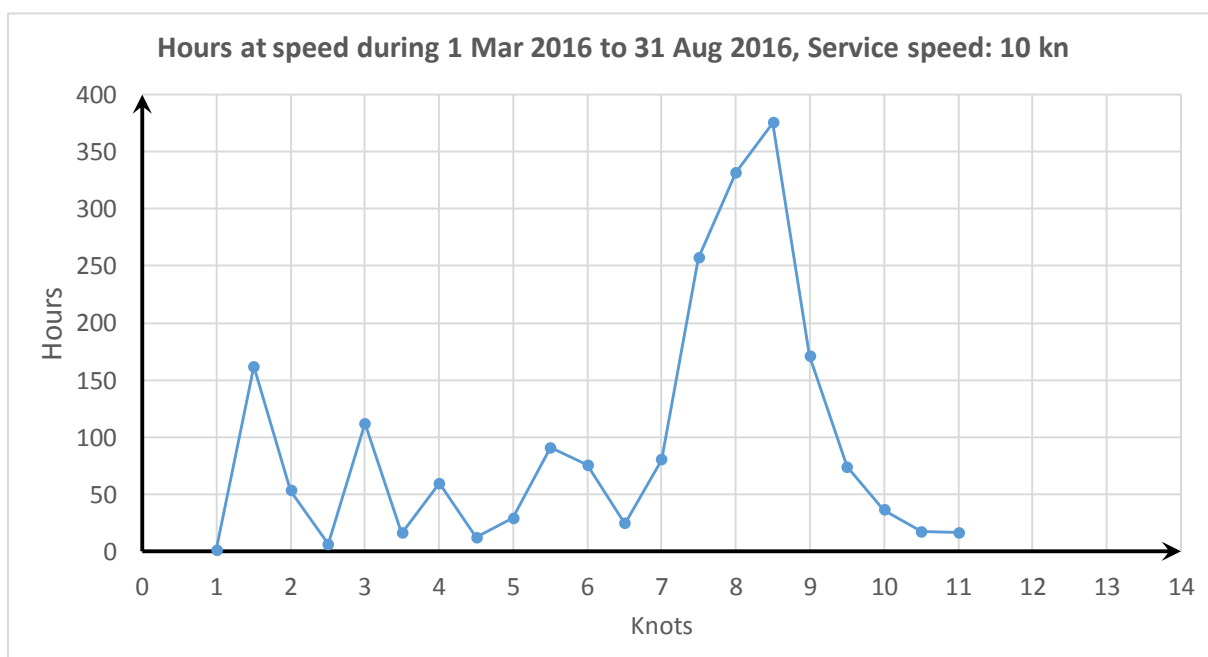
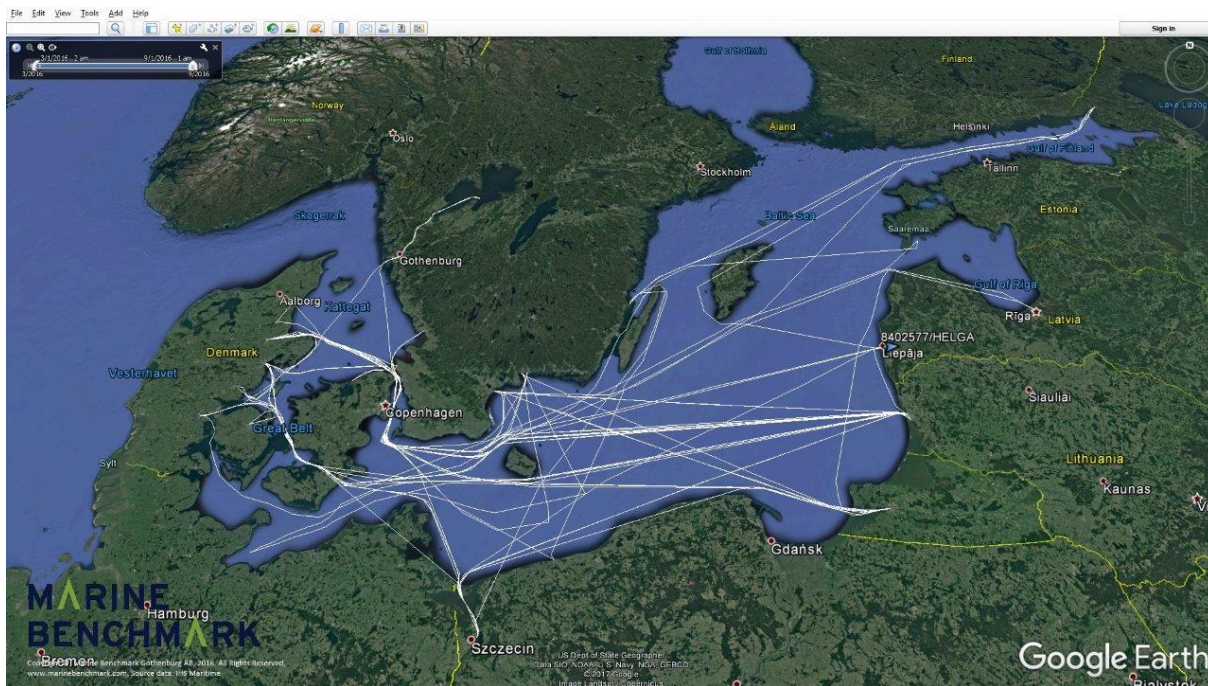




8401535-DANICA HAV, 427 kg fuel/day, 1720 dwt, 441 kW, Deutz / SBA8M528  
 Dry Cargo vessel, Owner: HAV Ship Management NorRus AS

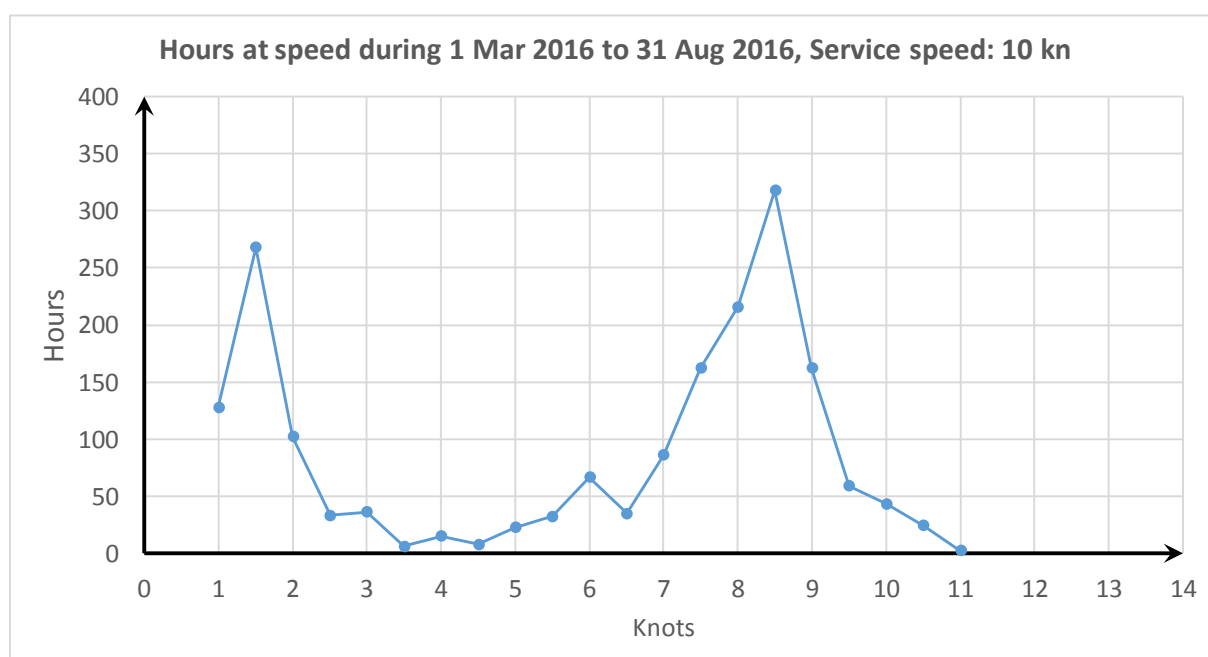
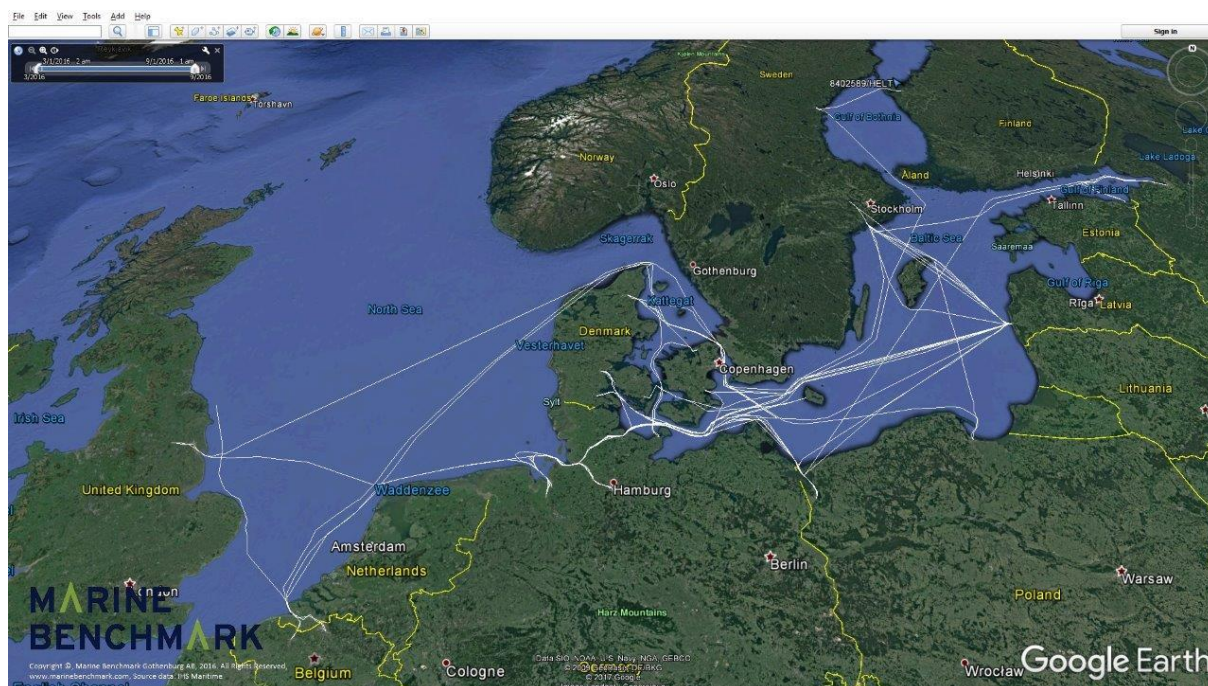


8402577-HELGA, 503 kg fuel/day, 2086 dwt, 441 kW, Deutz / SBV6M628  
Dry Cargo vessel, Owner: Helga Shipping Ltd-ABB

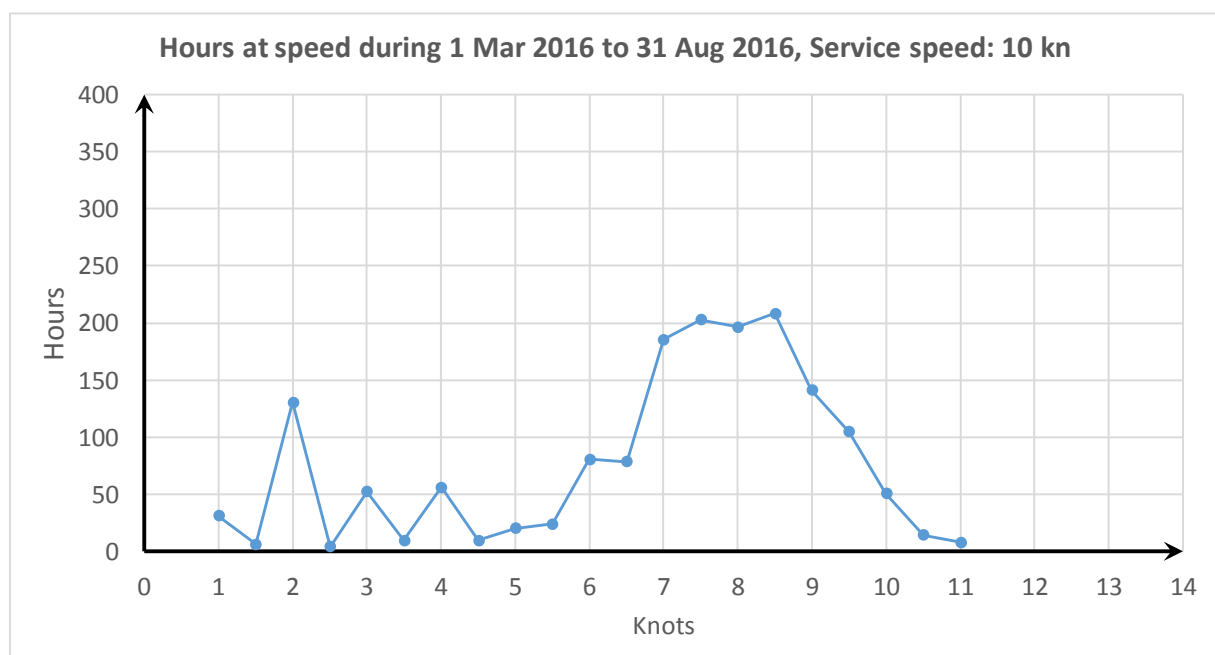
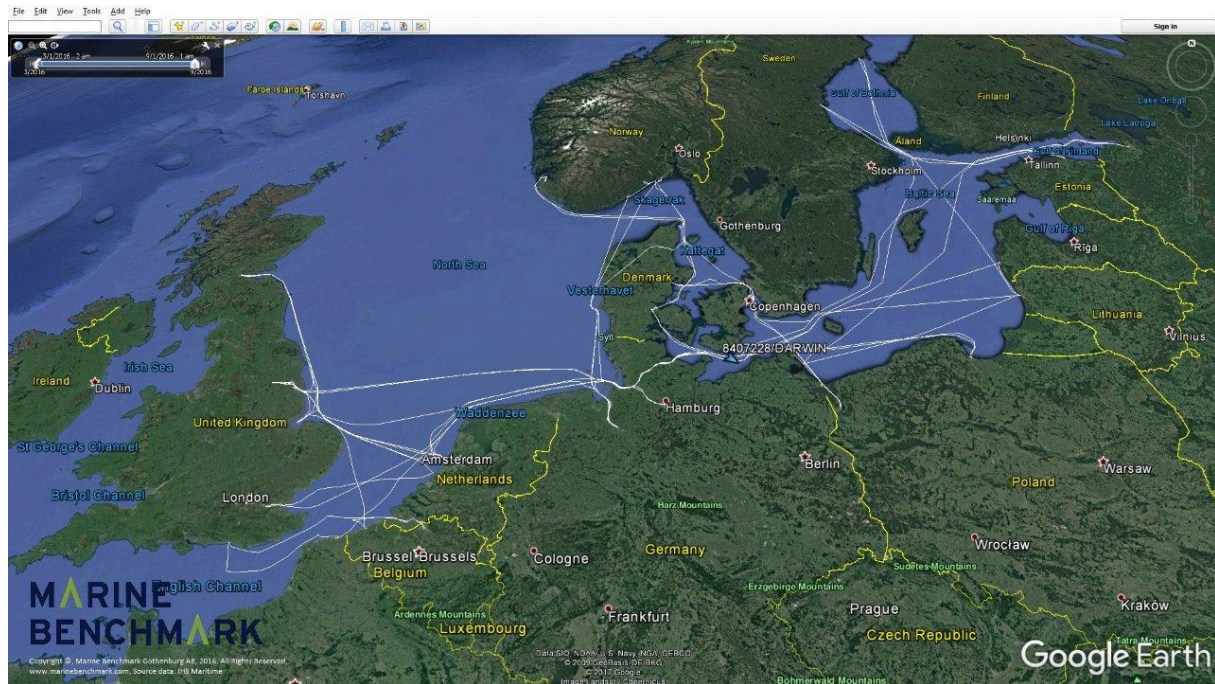




8402589-HELT, 401 kg fuel/day, 2086 dwt, 441 kW, Deutz / SBV6M628  
 Dry Cargo vessel, Owner: Vista Shipping Agency

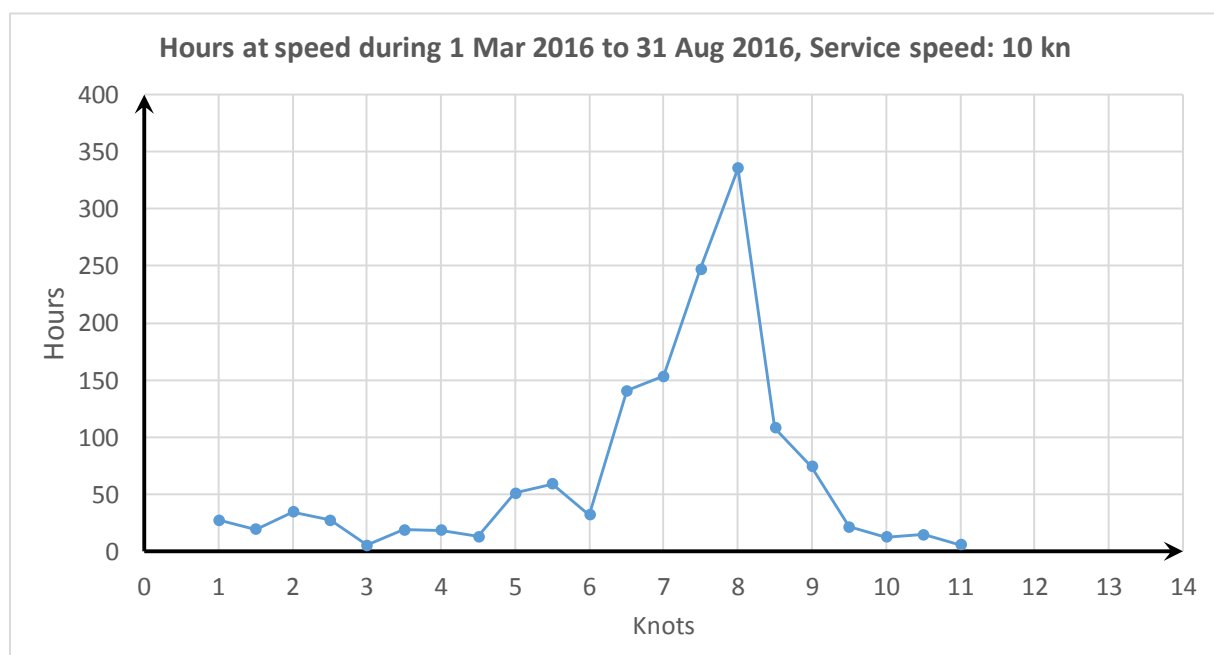
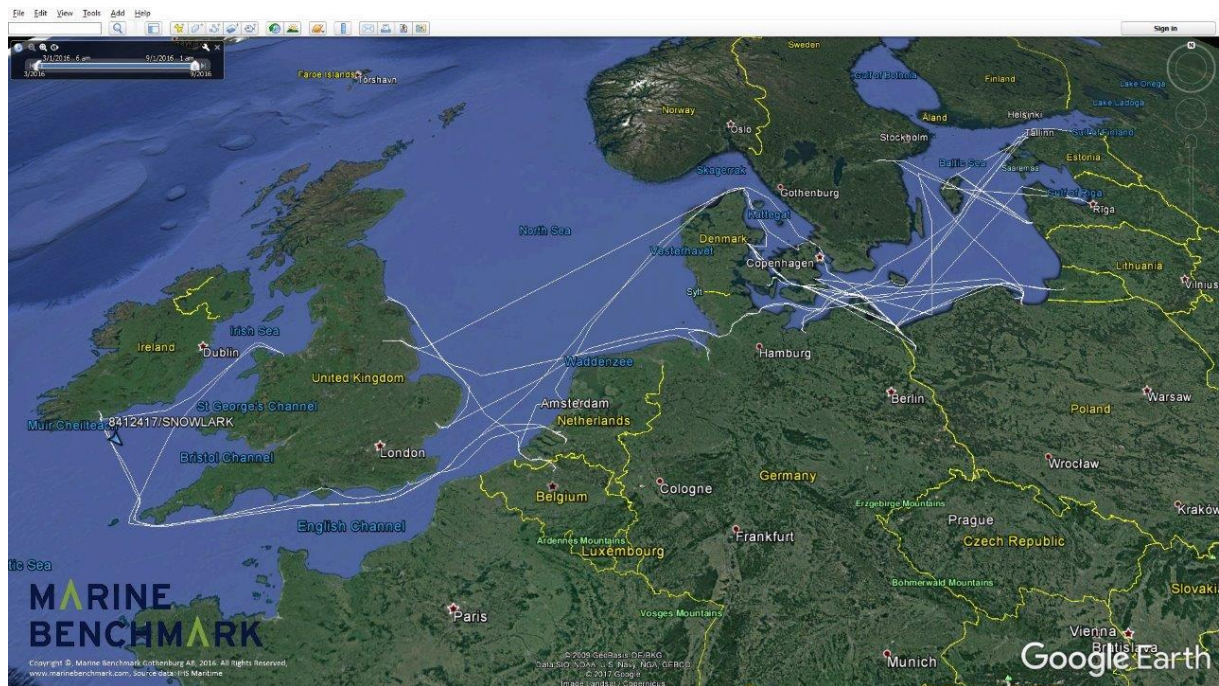


8407228-DARWIN, 413 kg fuel/day, 1537 dwt, 441 kW, MAN / 7L20/27  
 Dry Cargo vessel, Owner: Darwin Schiffahrts UG

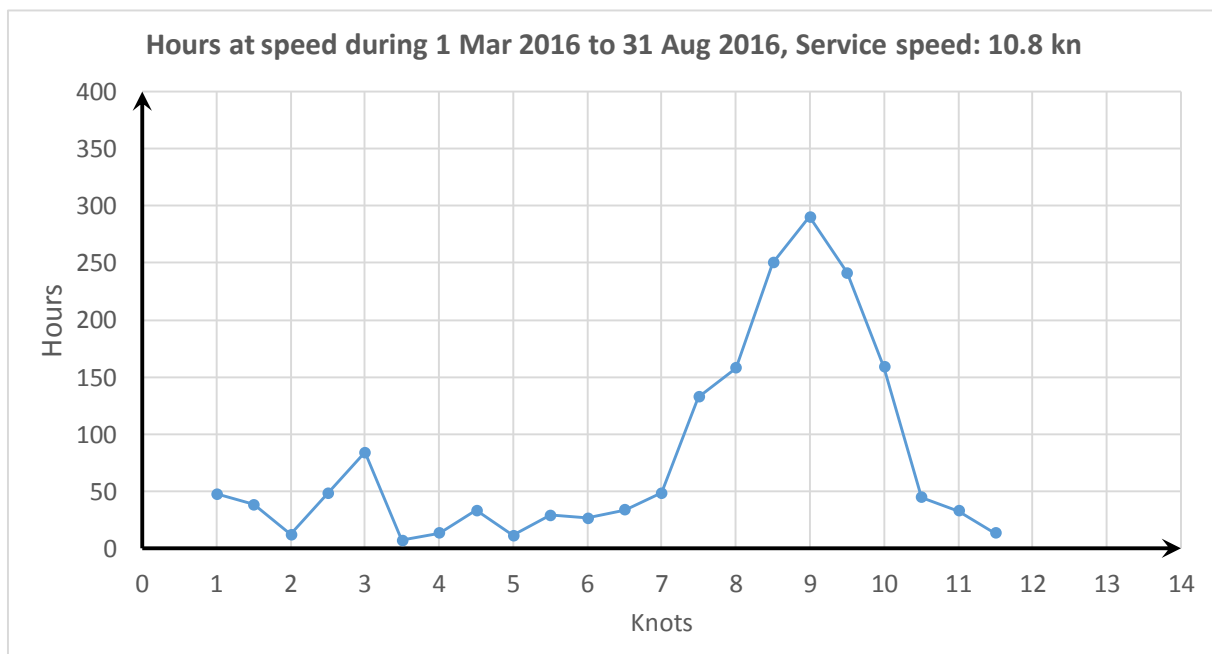
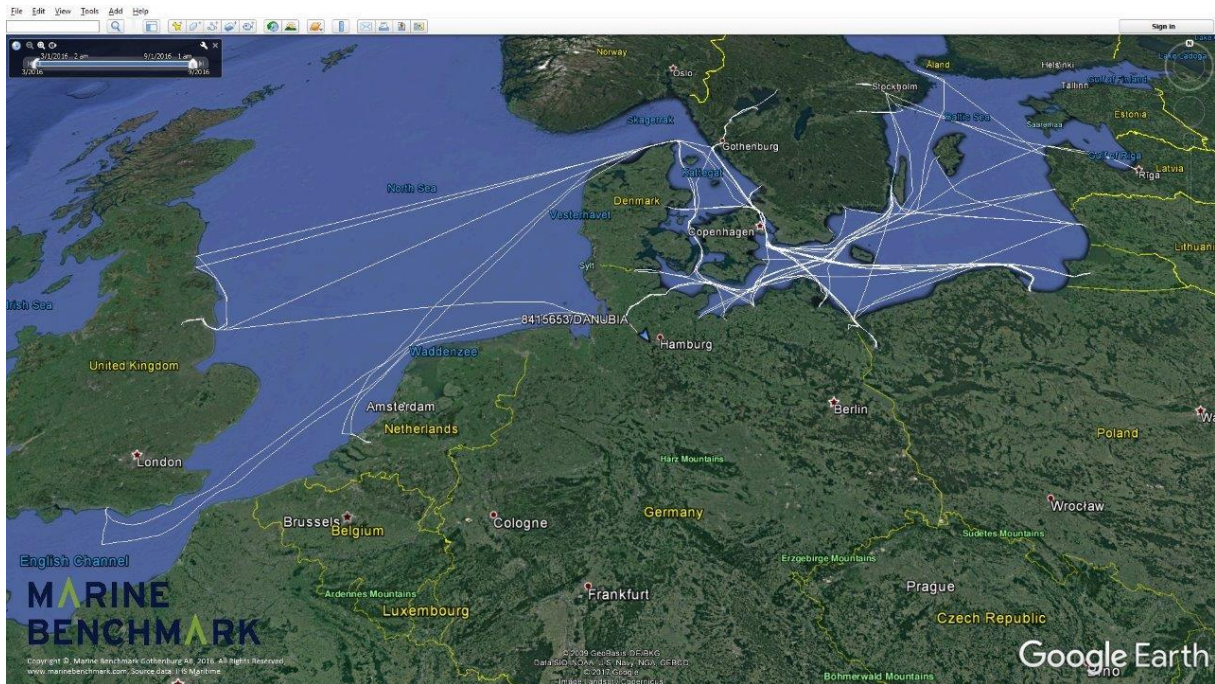




8412417-SNOWLARK, 345 kg fuel/day, 1555 dwt, 441 kW, Deutz / SBA6M528  
 Dry Cargo vessel, Owner: Vista Shipping Agency

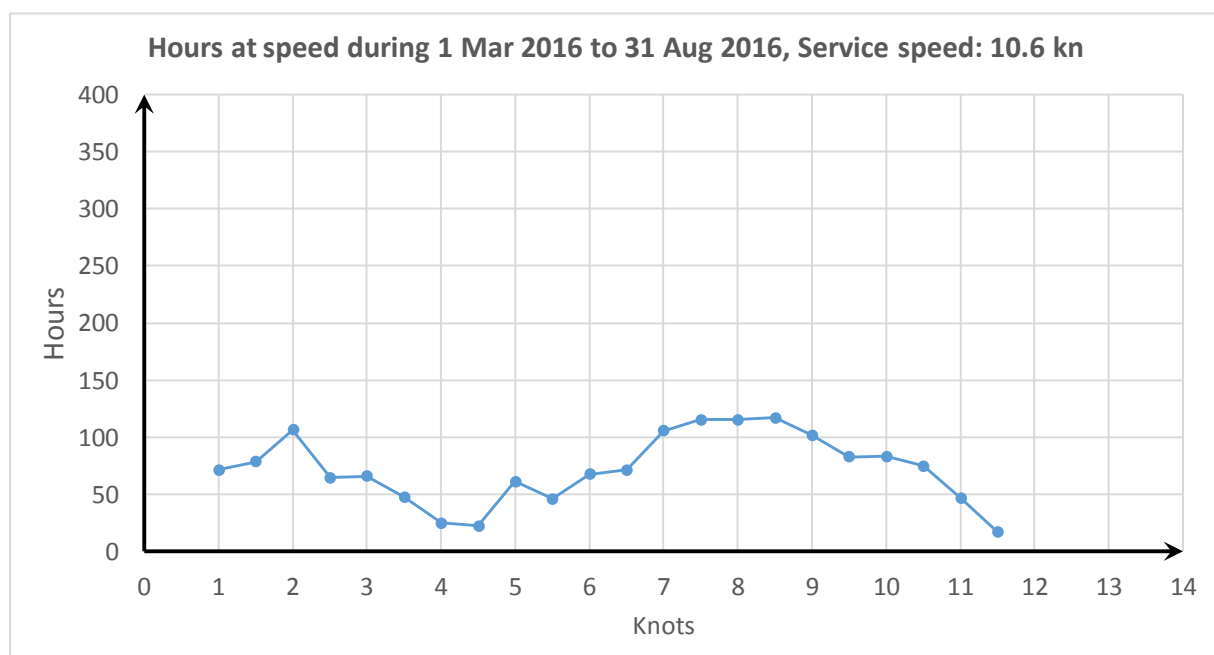
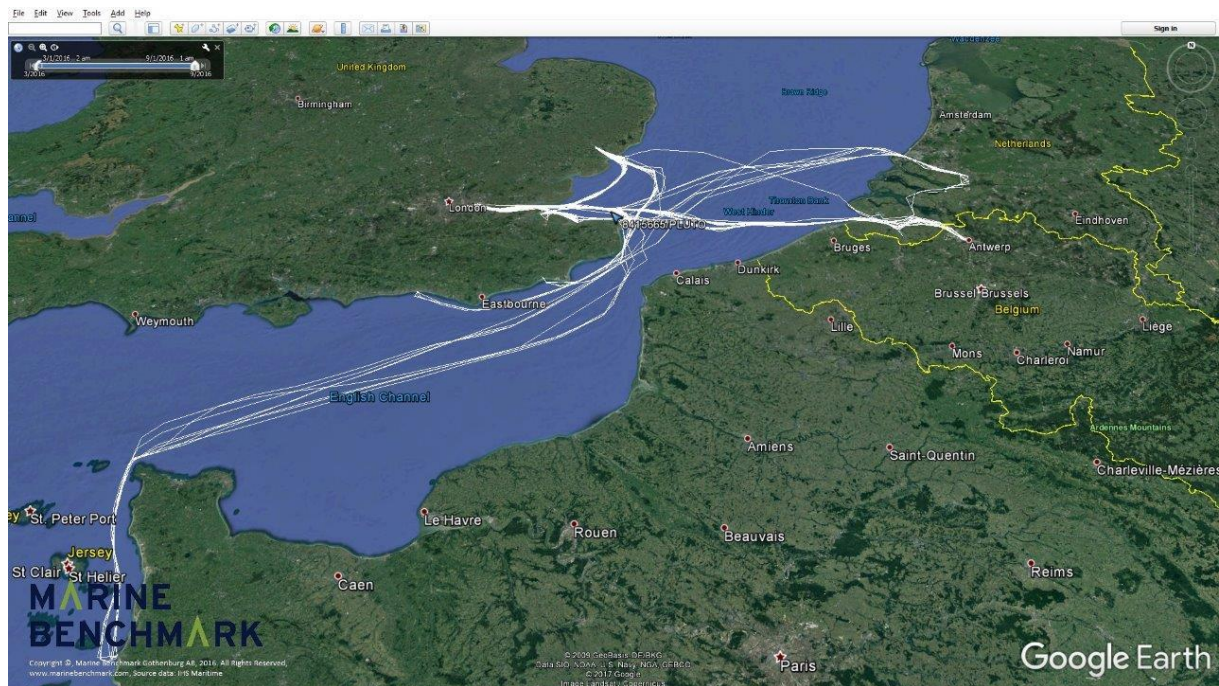


8415653-DANUBIA, 484 kg fuel/day, 2550 dwt, 441 kW, Deutz / SBV6M628  
 Dry Cargo vessel, Owner: Samuelsens Rederi

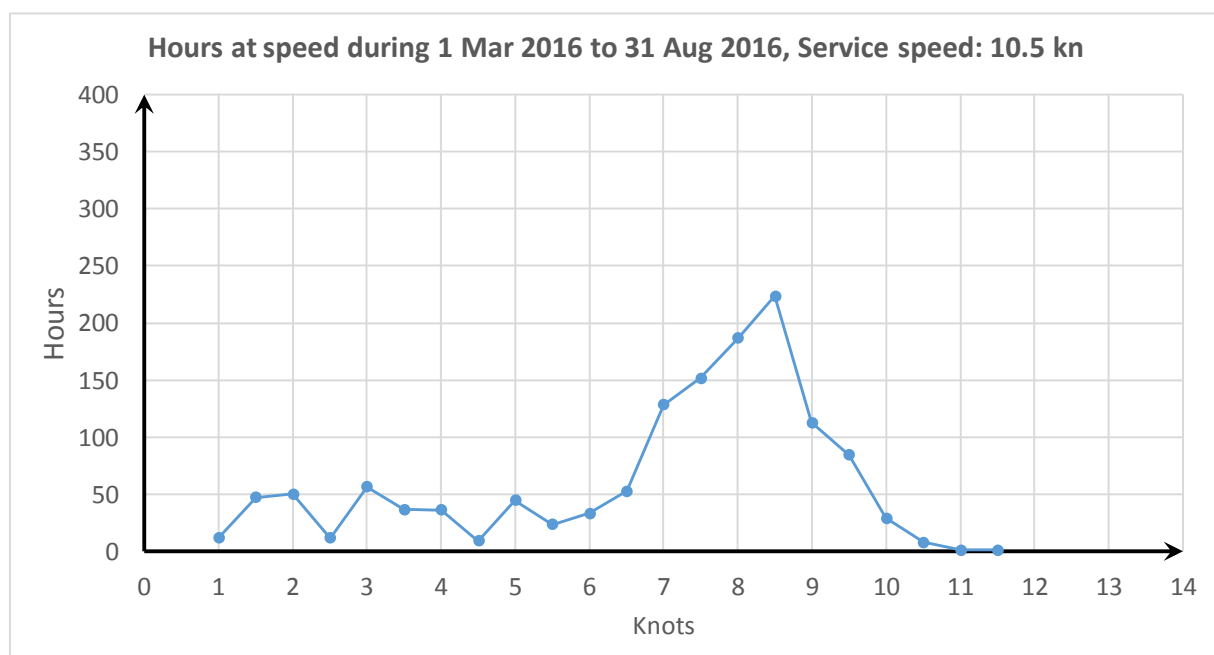
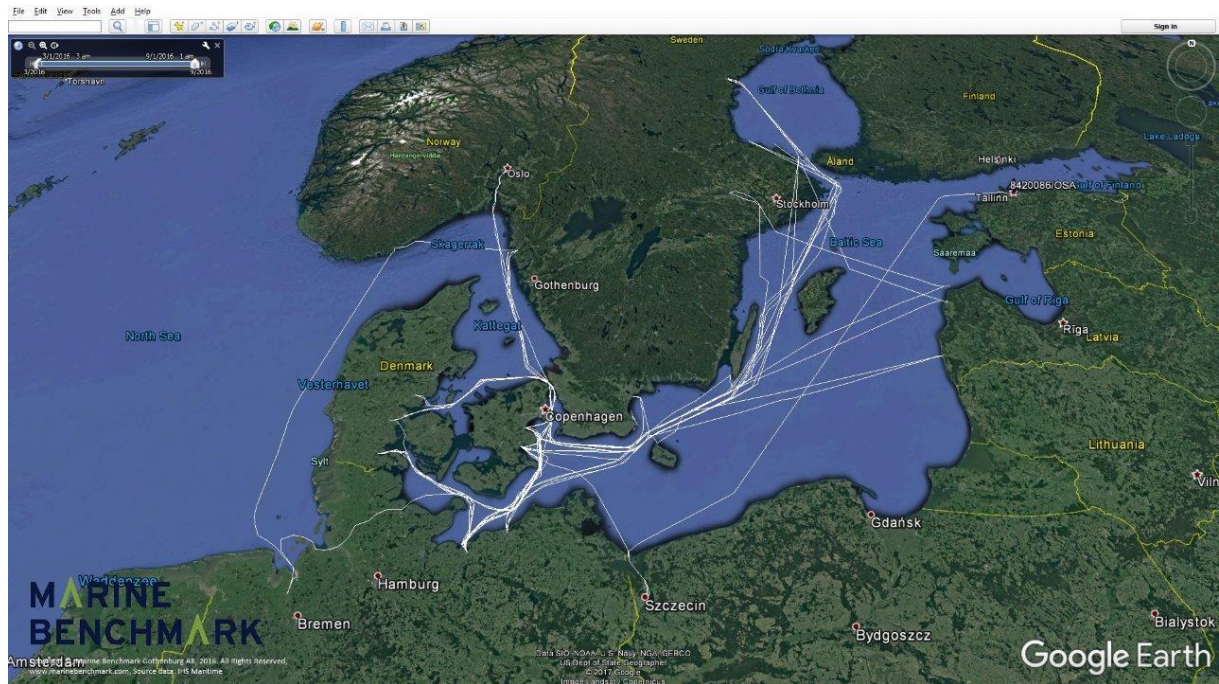




8415665-PLUTO, 335 kg fuel/day, 2324 dwt, 441 kW, MWM / TBD440-6K  
 Dry Cargo vessel, Owner: SeaG8 Ltd

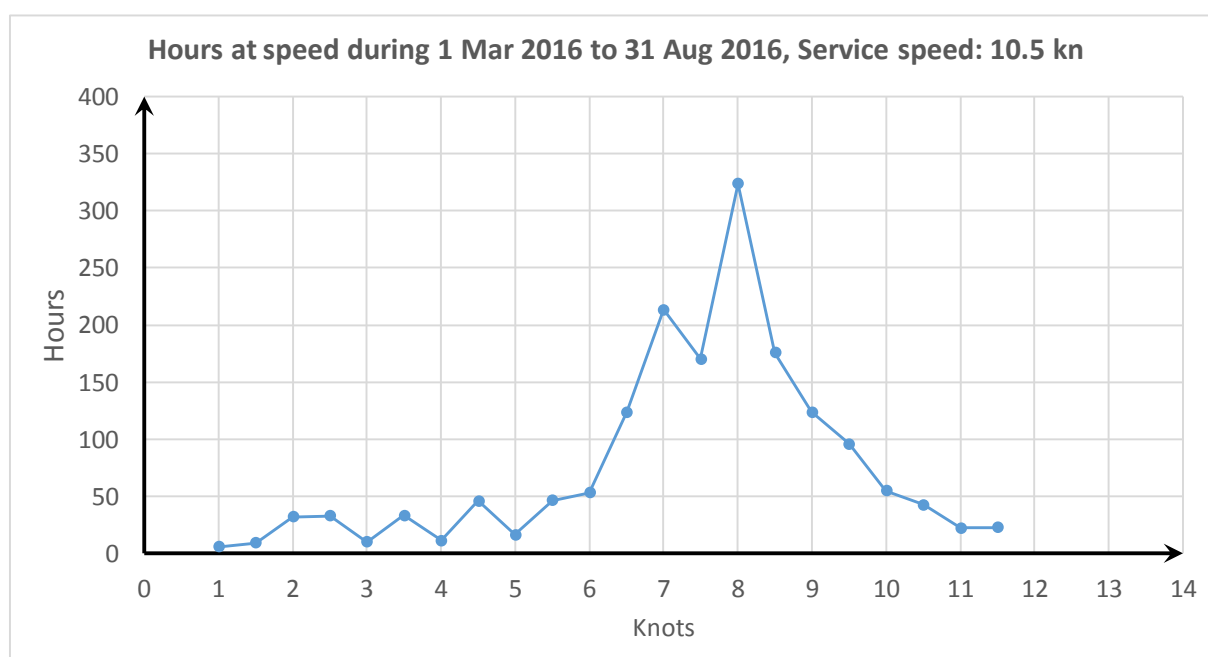
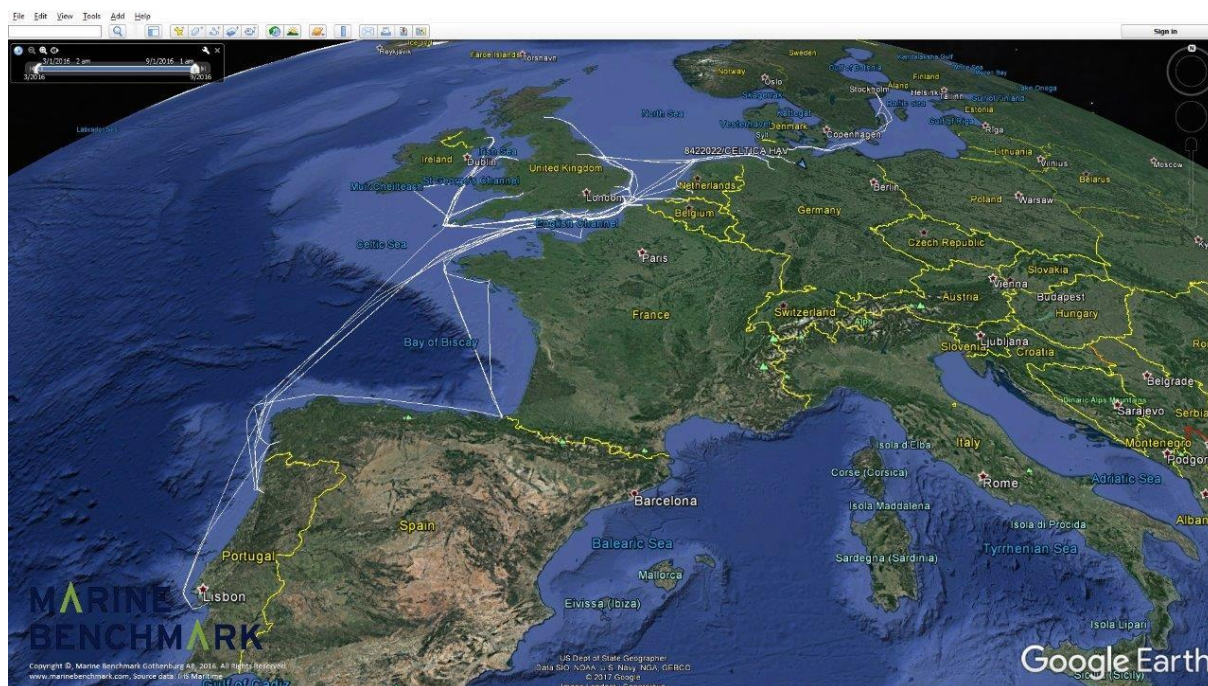


8420086-OSA, 300 kg fuel/day, 2507 dwt, 441 kW, Deutz / SBV6M628  
 Dry Cargo vessel, Owner: Baltramp Shipping Sp z oo

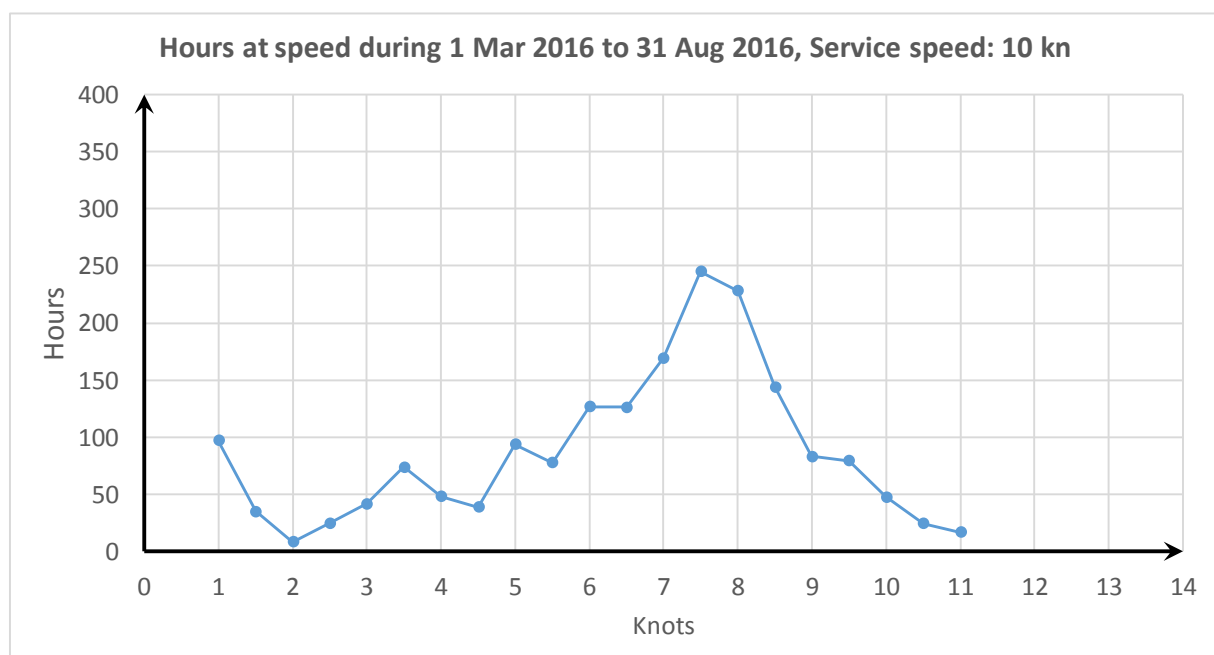
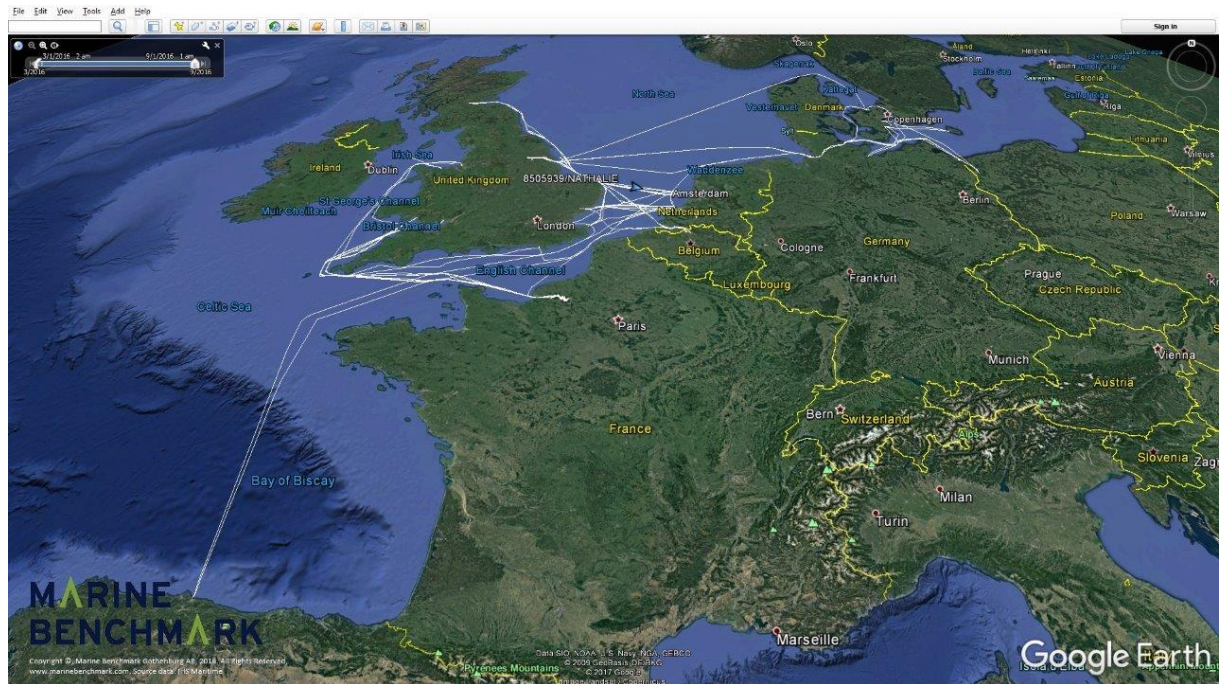




8422022-CELTICA HAV, 424 kg fuel/day, 1720 dwt, 441 kW, Deutz / SBA8M528  
 Dry Cargo vessel, Owner: HAV Ship Management NorRus AS

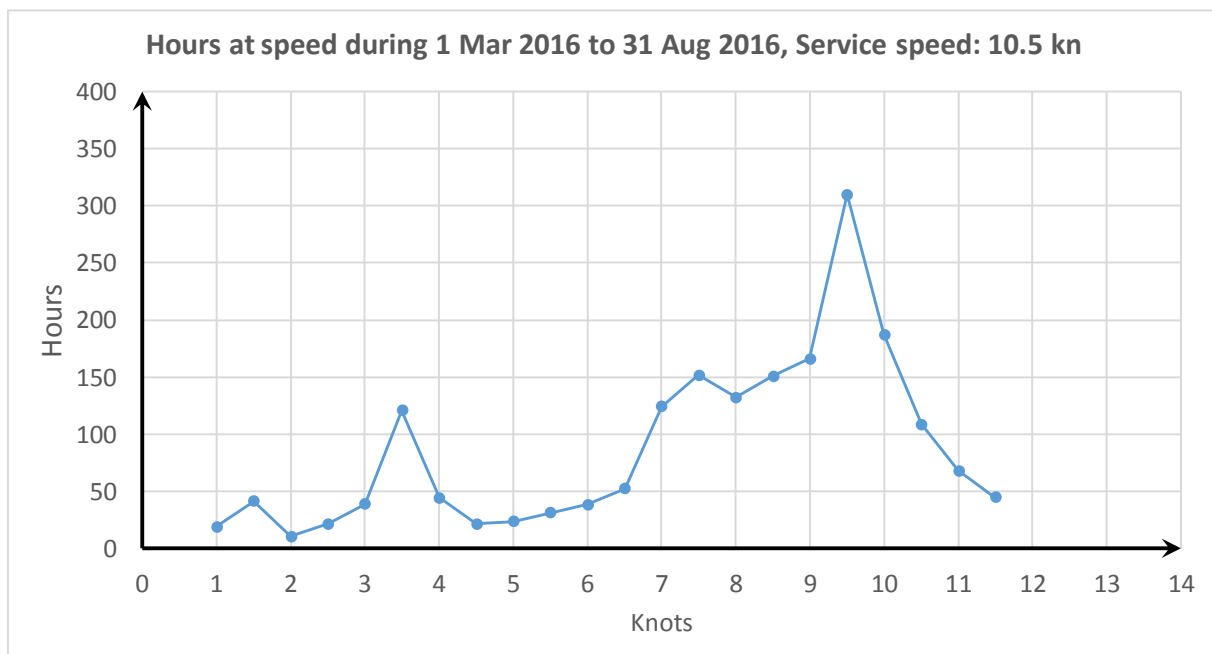
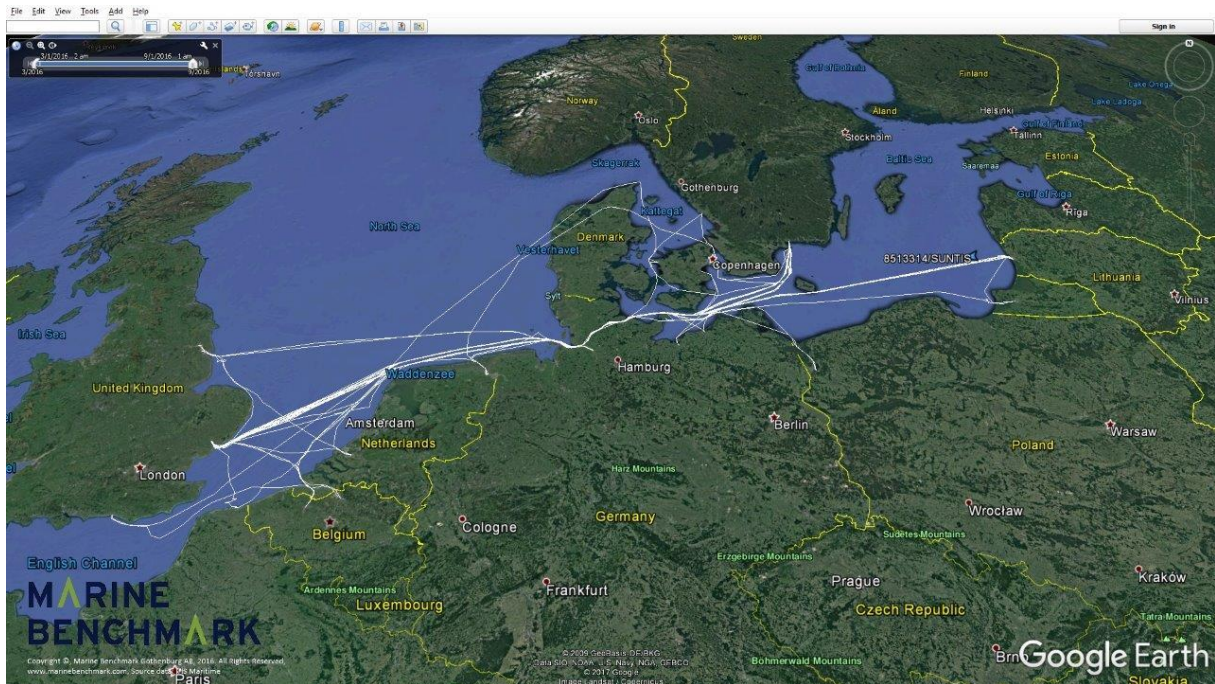


8505939-NATHALIE, 414 kg fuel/day, 1529 dwt, 441 kW, MAN / 7L20/27  
 Dry Cargo vessel, Owner: Kyriakopoulos K&D





8513314-SUNTIS, 576 kg fuel/day, 1815 dwt, 441 kW, MWM / TBD440-6K  
 Dry Cargo vessel, Owner: Warnecke Schifffahrt GbR

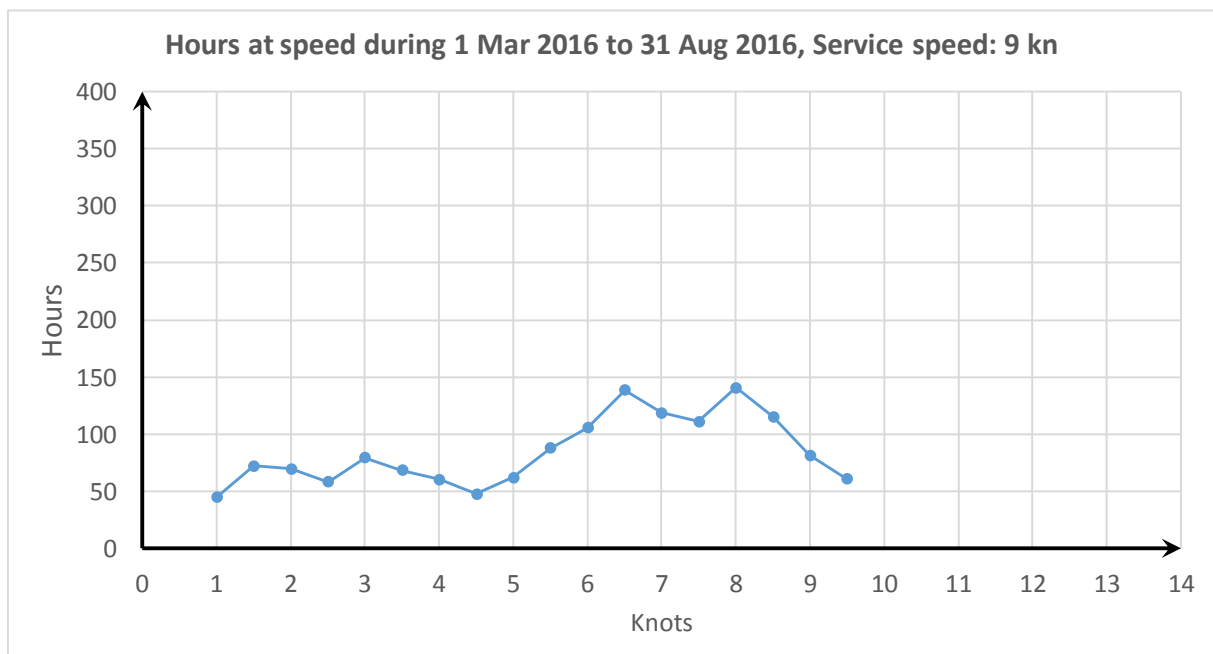
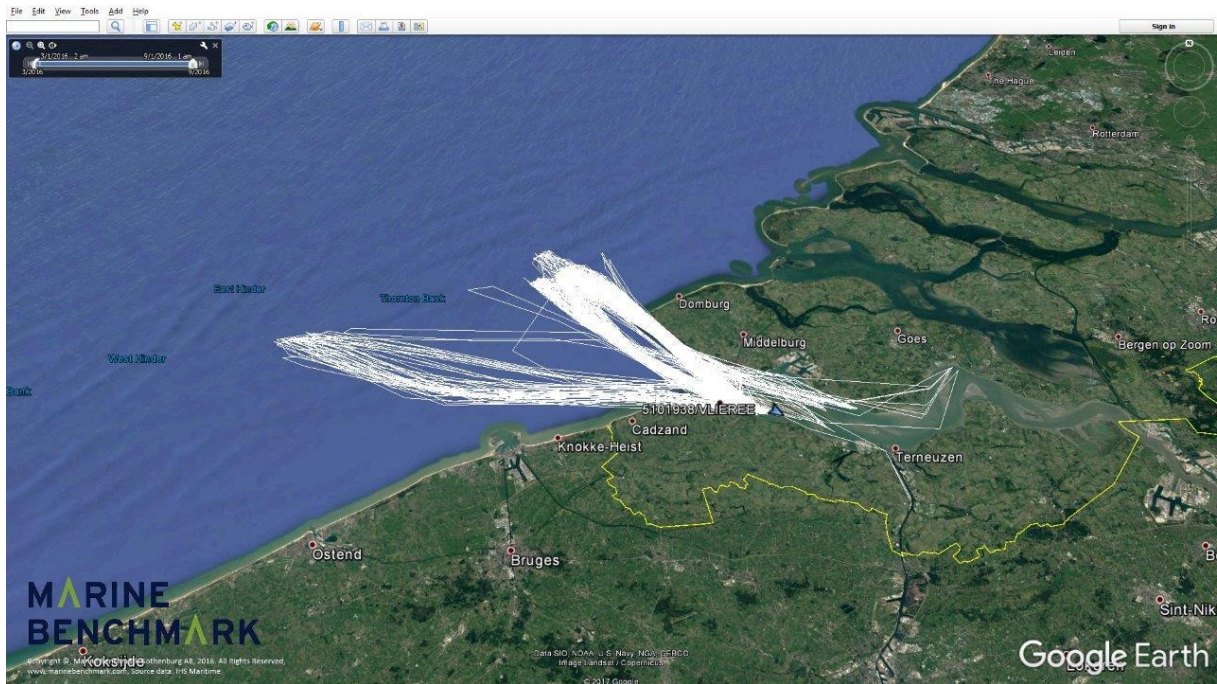


## APPENDIX II – TOP 25 VESSELS – ENGINE SIZE 450 - 600 kW

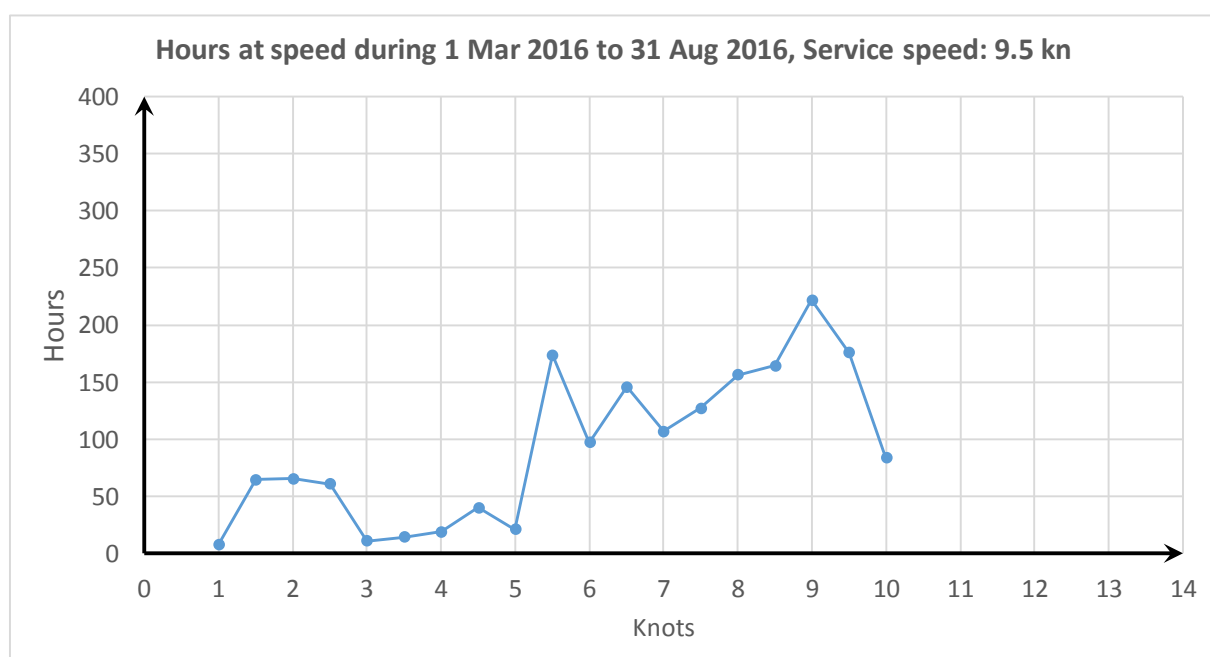
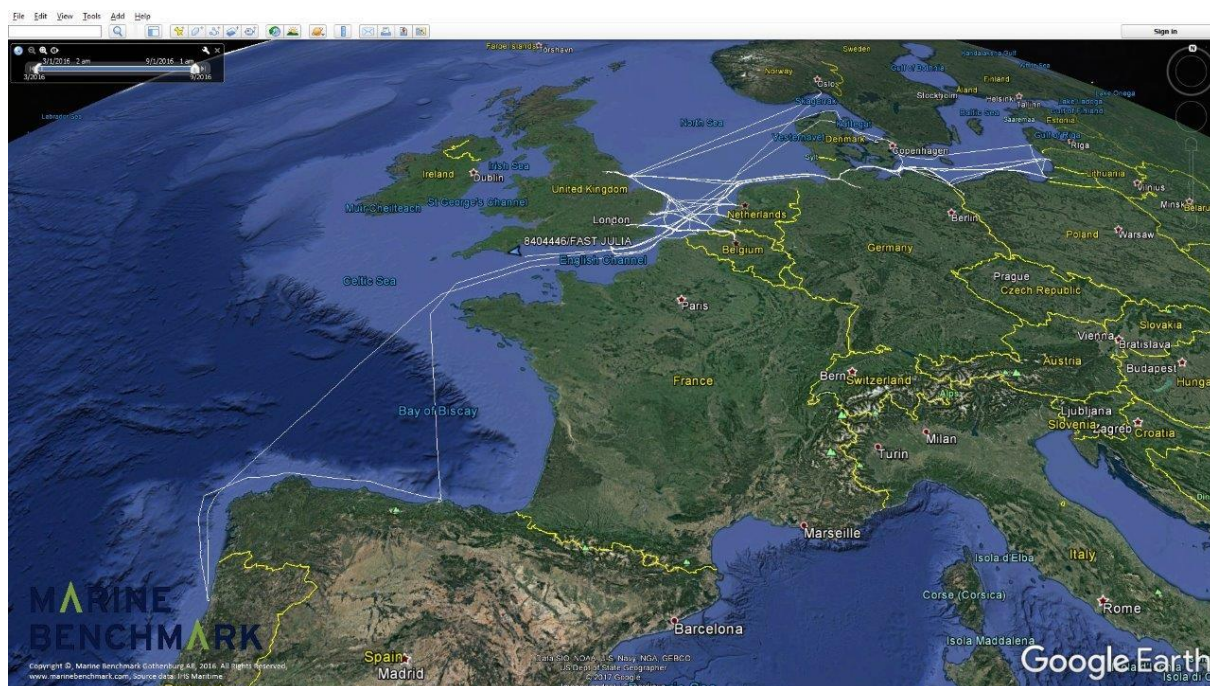
IMO	Current name	Vessel type	Fuel / day (kg)	Service speed	Propulsion power (kW)	Vessel beneficial owner	Vessel technical manager	Vessel operator
5101938	VLIJREE	Service	411	9.0	514	Zand & Grinhandel Outwerkerk	Zand & Grinhandel Outwerkerk	Zand & Grinhandel Outwerkerk
8404446	FAST JULIA	Dry Cargo	676	9.5	581	Fast Lines Belgium NV	Fast Baltic Sp Z Oo	Fast Lines Belgium NV
8410316	VESTBRIS	Dry Cargo	512	11.0	600	Berge Rederi AS	Maritime Management As	Berge Rederi AS
8502145	CHRISTINE	Dry Cargo	484	10.0	570	Christine Maritime SA	Sky Mare Navigation Co	Sky Mare Navigation Co
8504272	ARUNDO	Dry Cargo	918	11.0	598	Venus Shipping ApS	Venus Shipping Aps	Norbroker Shipping & Trading
8504947	ILKA	Dry Cargo	565	10.0	587	ATR Landhandel GmbH & Co KG	Atr Landhandel GmbH & Co Kg	ATR Landhandel GmbH & Co KG
8505915	SCANLARK	Dry Cargo	483	11.0	598	Vista Shipping Agency	Vista Shipping Agency	Vista Shipping Agency
8506440	BRITANNICA HAV	Dry Cargo	593	10.5	598	HAV Ship Management NorRus AS	Hav Ship Management Norrus As	HAV Ship Management NorRus AS
8511885	RUBYN	Dry Cargo	558	9.5	551	Baltnautic Shipping Ltd	Sirius Shipman Co Ltd Co	Antares Shipping Agency Ltd
8516263	FRIFJORD	Dry Cargo	478	10.0	587	Kopervik Shipping AS	Kopervik Ship Mgmt Poland	Wagle Chartering AS
8517542	HEIDE	Tanker	545	10.5	506	Glusing R	Glusing Transport GmbH	Cuxhavener Mineraloel GmbH
8609931	BONITA	Dry Cargo	754	10.0	570	A&A Trading Ltd	Arfa Management Sia	Arfa Management SIA
8611013	LENE D	Dry Cargo	589	10.0	598	Drabert Schifffahrtsges mbH	Drabert Schifffahrtsges MbH	Lubecker Schifffahrts
8611958	SULE VIKING	Dry Cargo	590	11.0	598	Nye Sulevaer AS	Maritime Management As	Nye Sulevaer AS
8616087	PERSEUS	Dry Cargo	576	11.0	600	Baltnautic Shipping Ltd	Baltnautic Shipping Ltd	Baltnautic Shipping Ltd
8709767	DAN FIGHTER	Dry Cargo	542	10.5	570	Venus Shipping ApS	Venus Shipping Aps	Norbroker Shipping & Trading
8801060	EMIUE	Dry Cargo	604	10.5	578	Rederi Ab Nathalie	Rederi Ab Nathalie	Rederi Ab Nathalie
8801072	LIVA GRETA	Dry Cargo	462	8.0	576	Liepaja Trading & Shipping	Aquarius Shipmanagement Co	Aquarius Shipmanagement Co
8813051	RIVER TRADER	Dry Cargo	415	9.0	535	River Trader Marine SA	Sky Mare Navigation Co	Sky Mare Navigation Co
8814196	NEWTON	Dry Cargo	553	10.2	600	Newton Schifffahrts UG	Loge Shipmanagement GmbH & Co	LoGe Shipmanagement GmbH & Co
8905115	MAIKE	Dry Cargo	513	10.0	600	ATR Landhandel GmbH & Co KG	Atr Landhandel GmbH & Co Kg	ATR Landhandel GmbH & Co KG
8906224	NATHALIE	Dry Cargo	576	11.0	578	Rederi Ab Nathalie	Rederi Ab Nathalie	Rederi Ab Nathalie
8913485	WILSON MAIN	Dry Cargo	678	10.5	600	Wilson ASA	Wilson Ship Management As	Wilson EuroCarriers AS
8919221	ANDRINA F.	Dry Cargo	814	10.0	600	Fischer U	Fischer U	Fischer U
9280110	CLAUDIA	Tanker	537	10.0	528	BMT Bunker und Mineraloeltrans	Glusing Transport GmbH	BMT Bunker und Mineraloeltrans



5101938-VLIEREE, 411 kg fuel/day, 1500 dwt, 514 kW, MaK / MAU423A  
 Service vessel, Owner: Zand & Grinhandel Outwerkerk

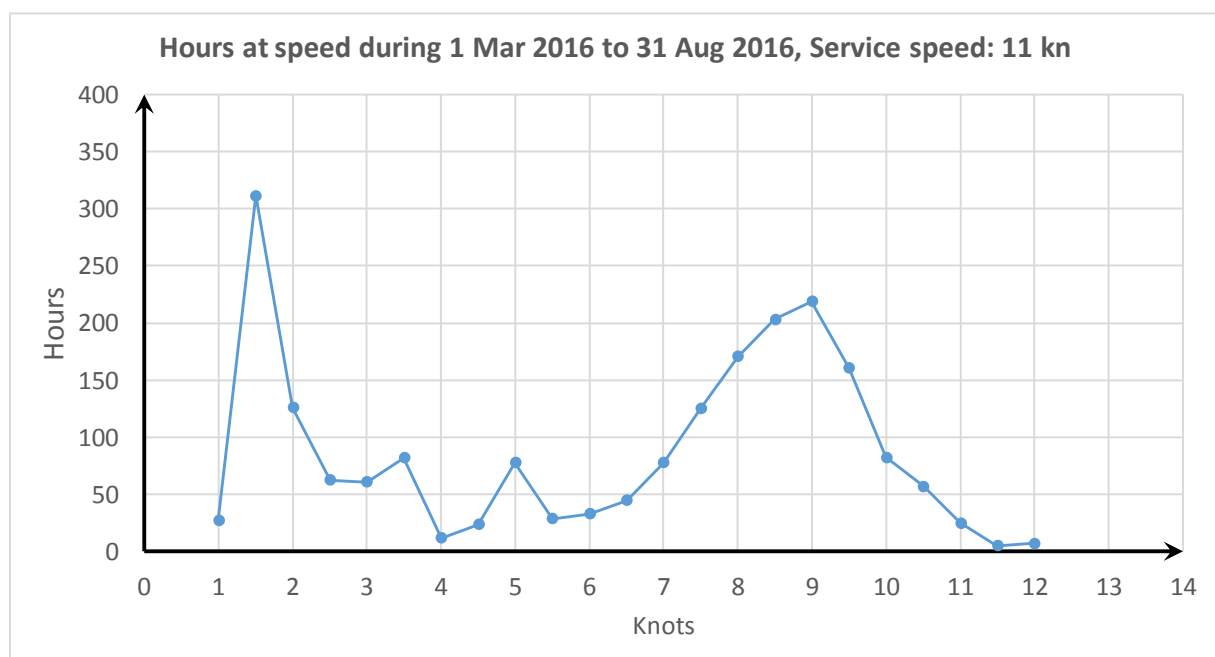
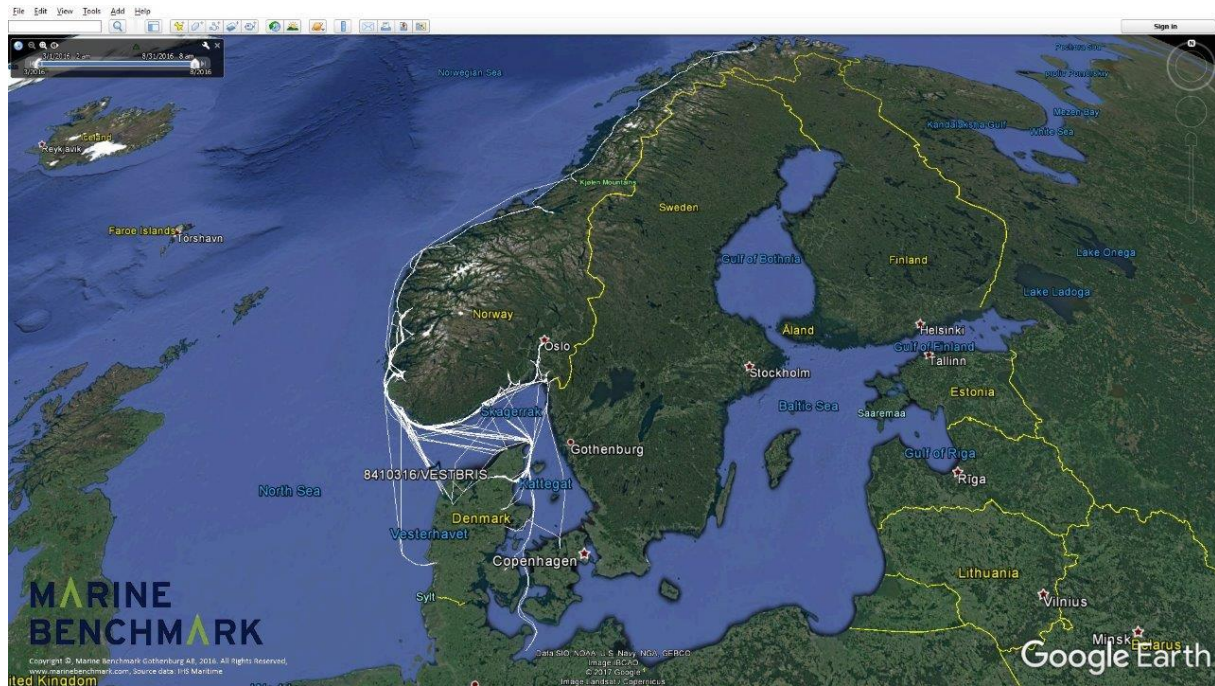


8404446-FAST JULIA, 676 kg fuel/day, 2284 dwt, 581 kW, Deutz / SBV6M628  
Dry Cargo vessel, Owner: Fast Lines Belgium NV

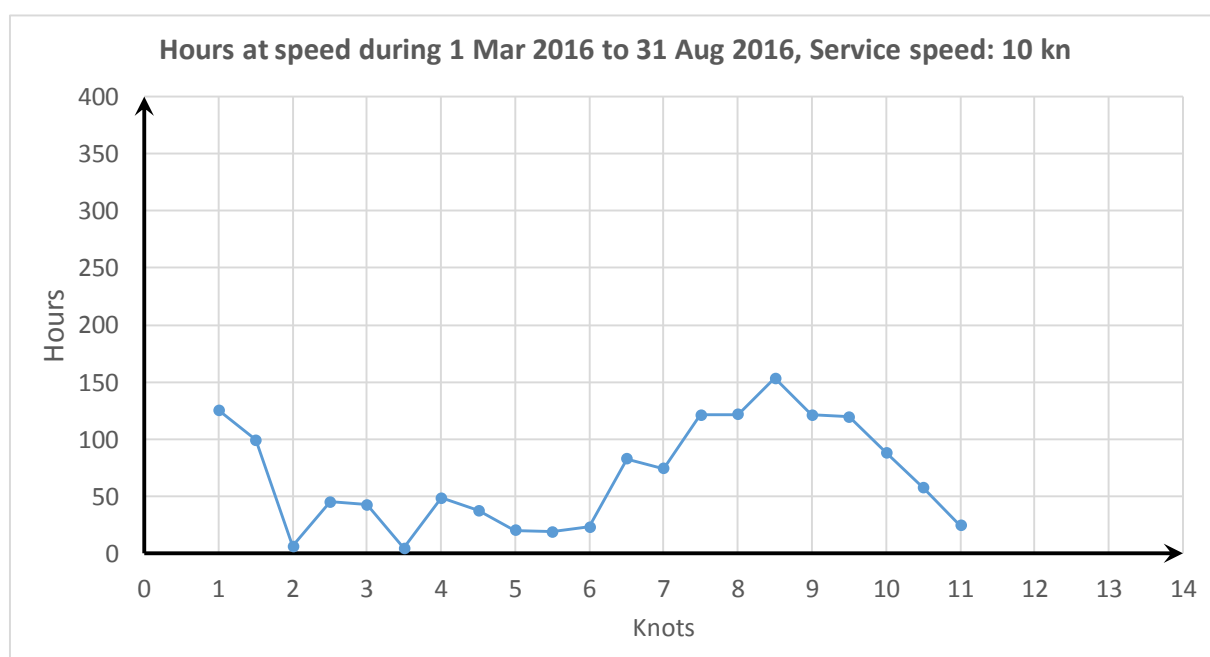
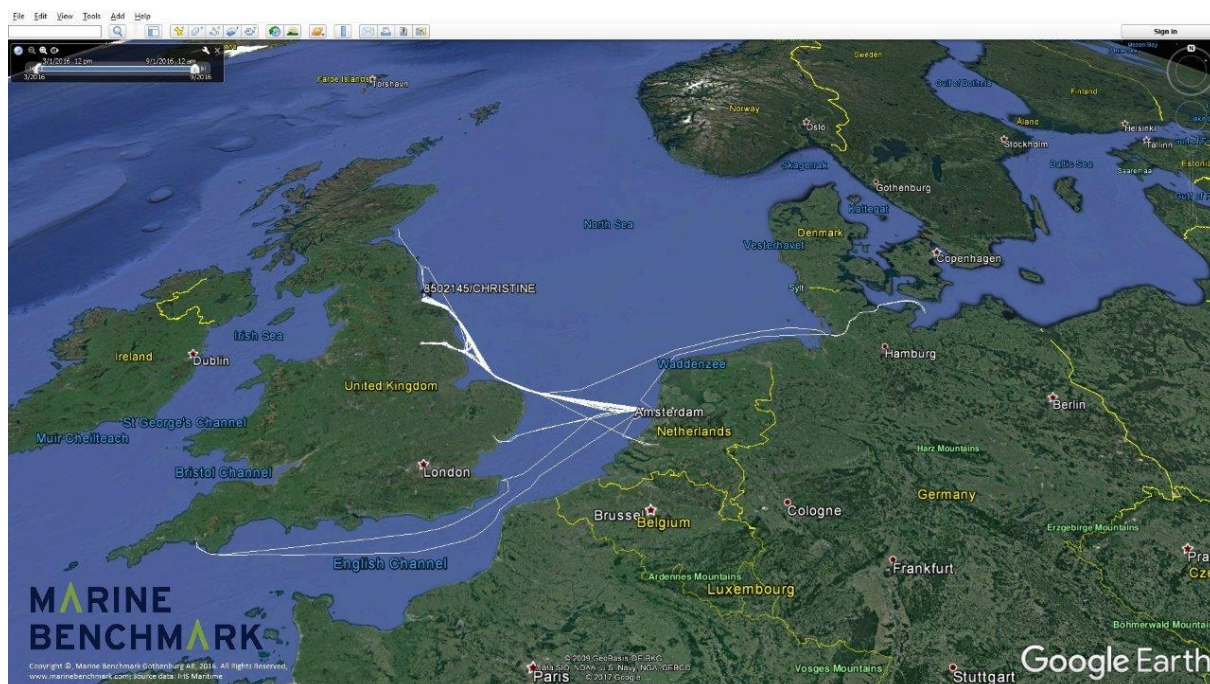




8410316-VESTBRIS, 512 kg fuel/day, 1770 dwt, 600 kW, MaK / 6M452AK  
 Dry Cargo vessel, Owner: Berge Rederi AS

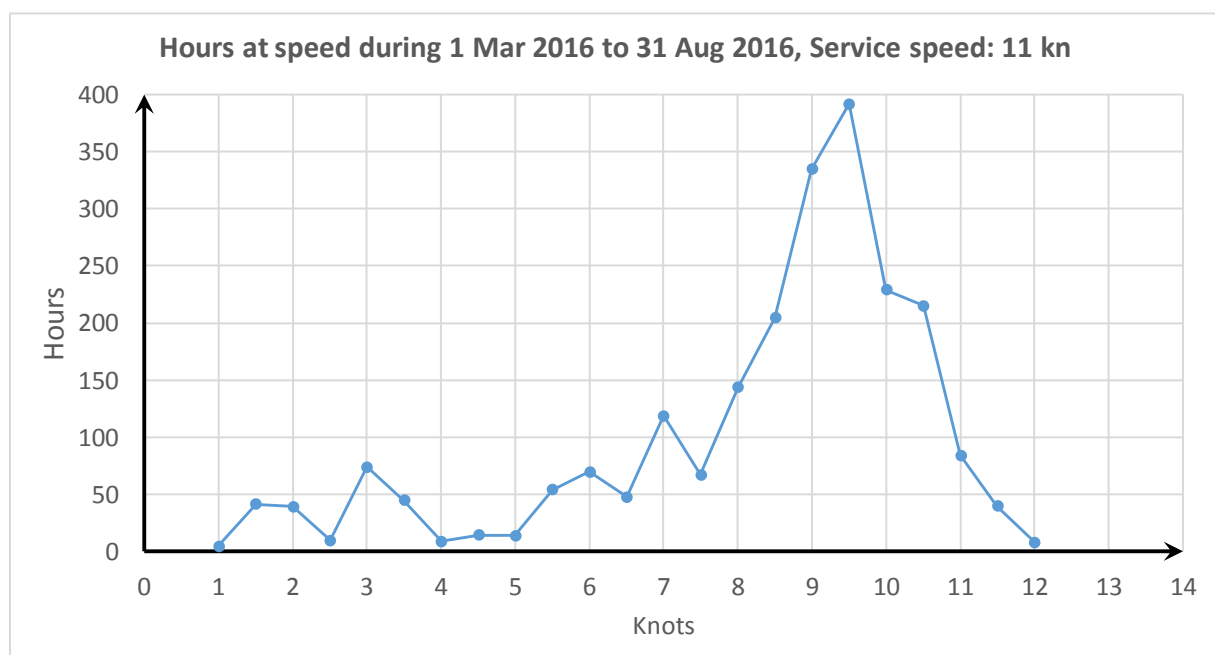
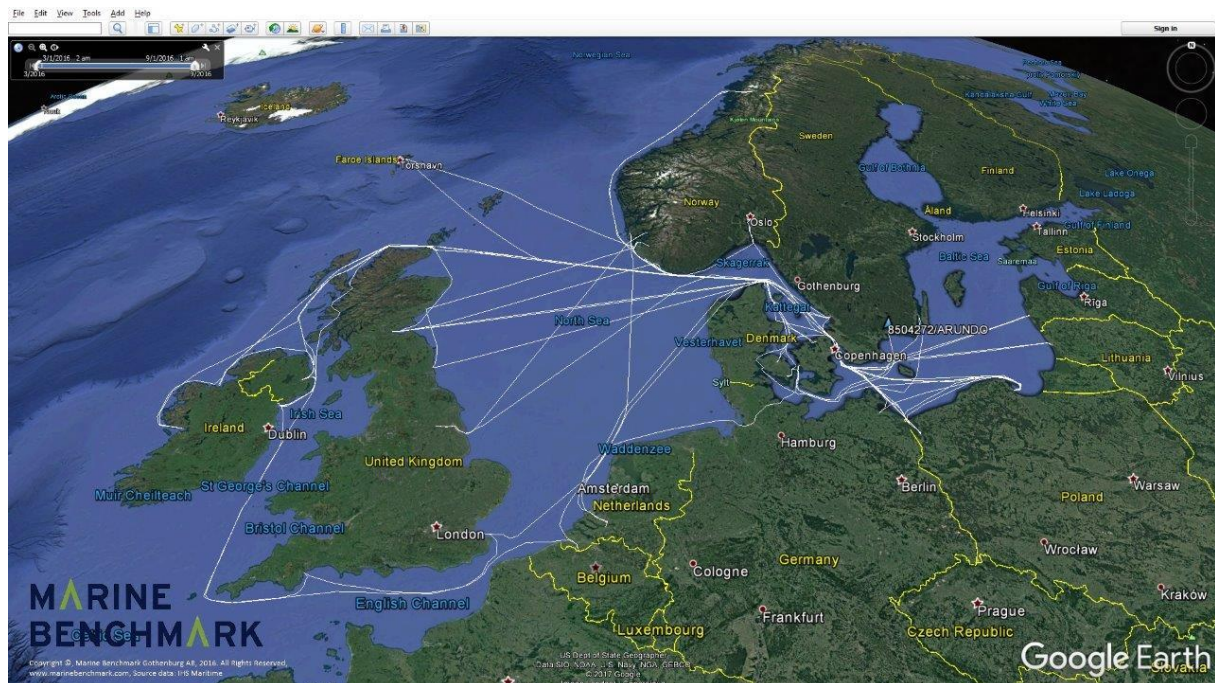


8502145-CHRISTINE, 484 kg fuel/day, 1281 dwt, 570 kW, Caterpillar / 3508TA  
 Dry Cargo vessel, Owner: Christine Maritime SA

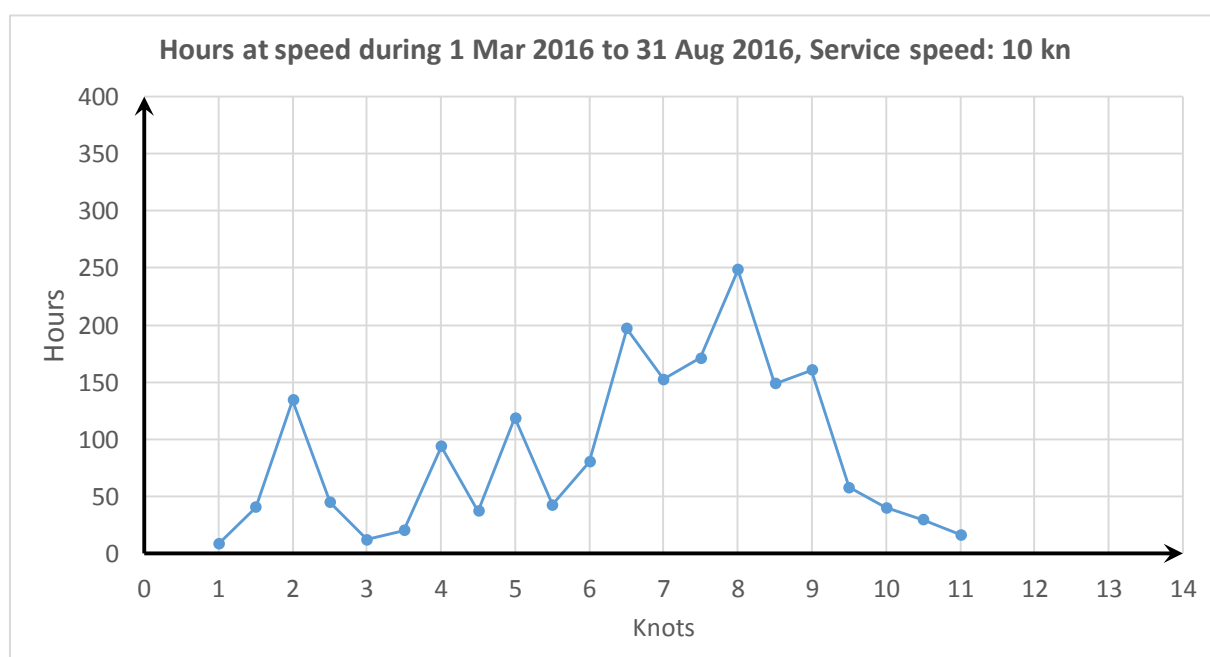
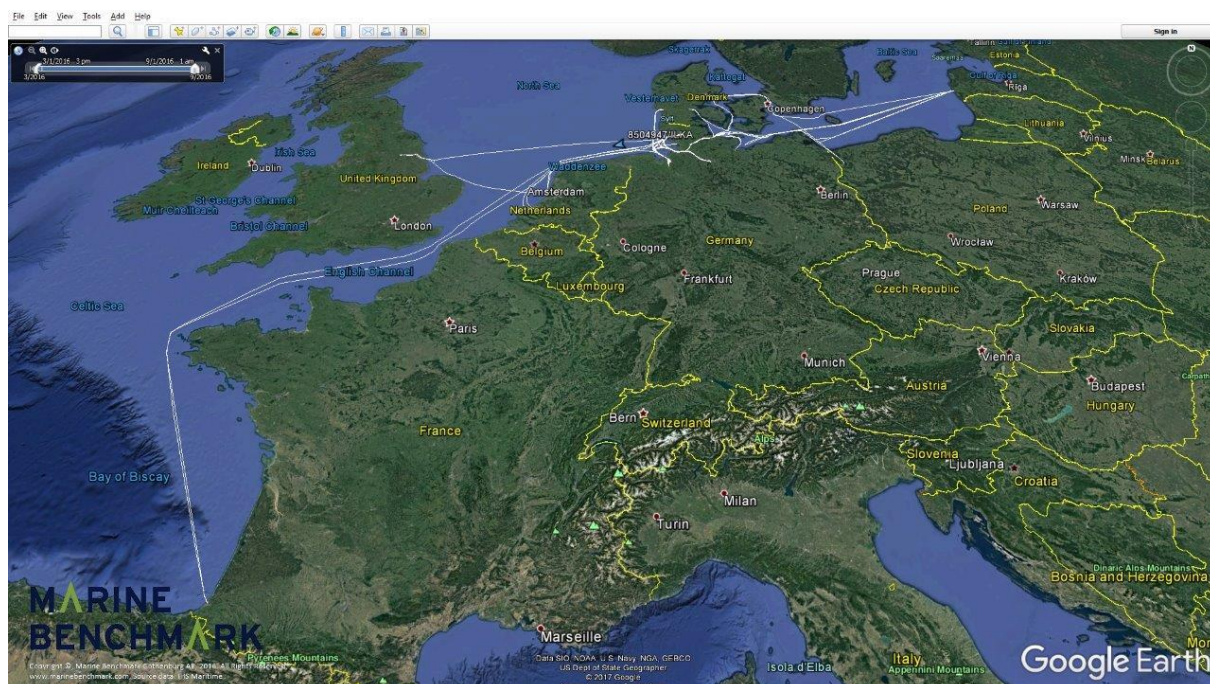




8504272-ARUNDO, 918 kg fuel/day, 2892 dwt, 598 kW, Deutz / SBV6M628  
 Dry Cargo vessel, Owner: Venus Shipping ApS

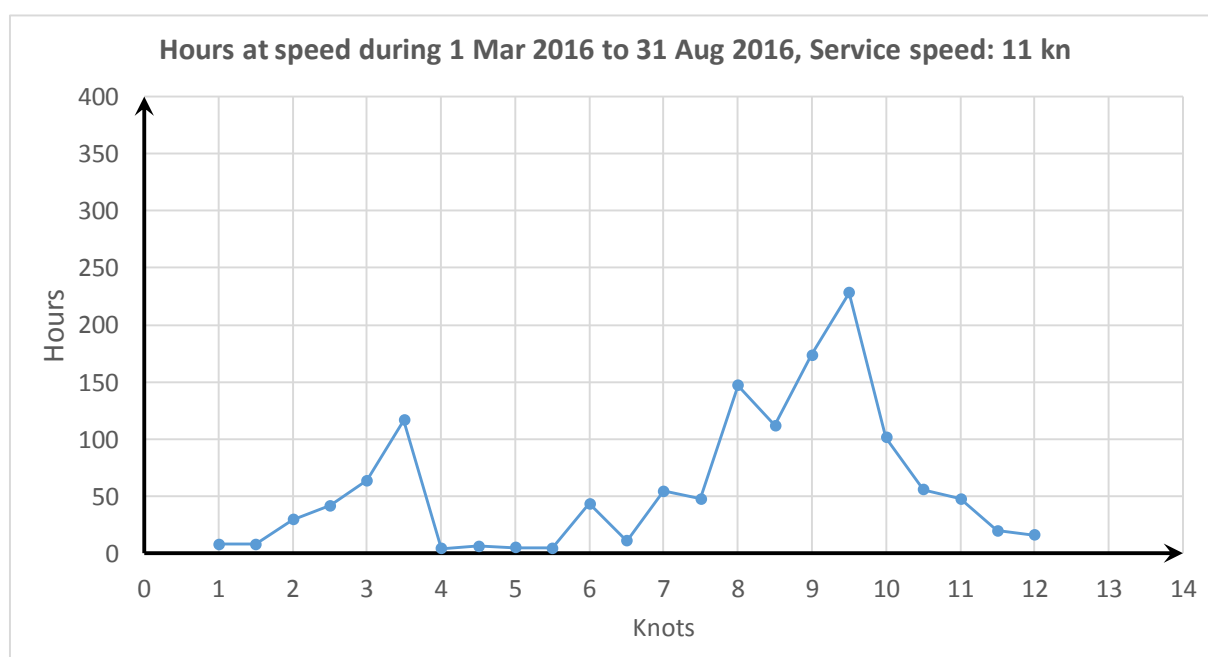
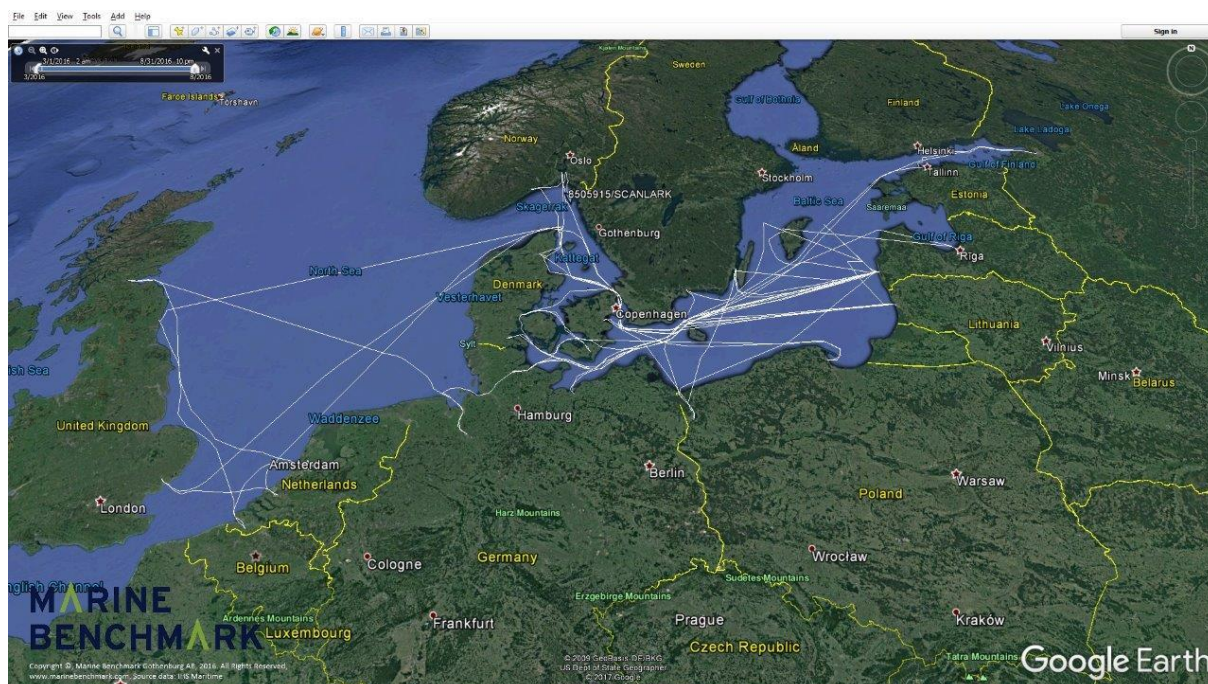


8504947-ILKA, 565 kg fuel/day, 1300 dwt, 587 kW, Callesen / 6-427-FOTK  
 Dry Cargo vessel, Owner: ATR Landhandel GmbH & Co KG



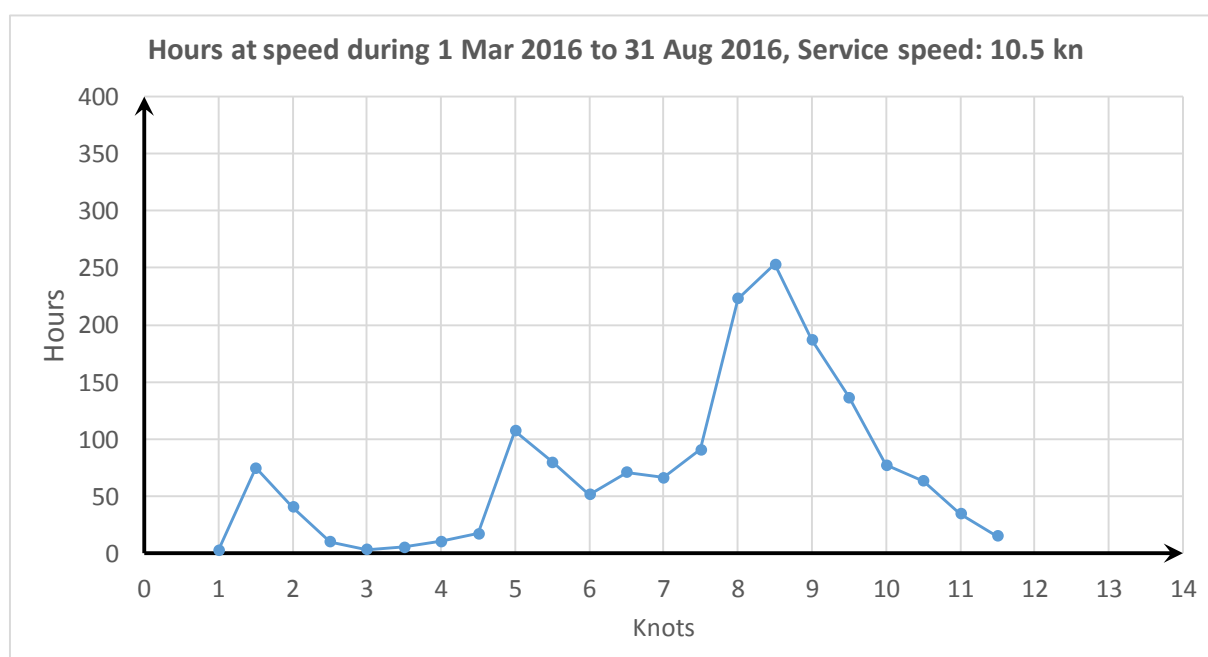
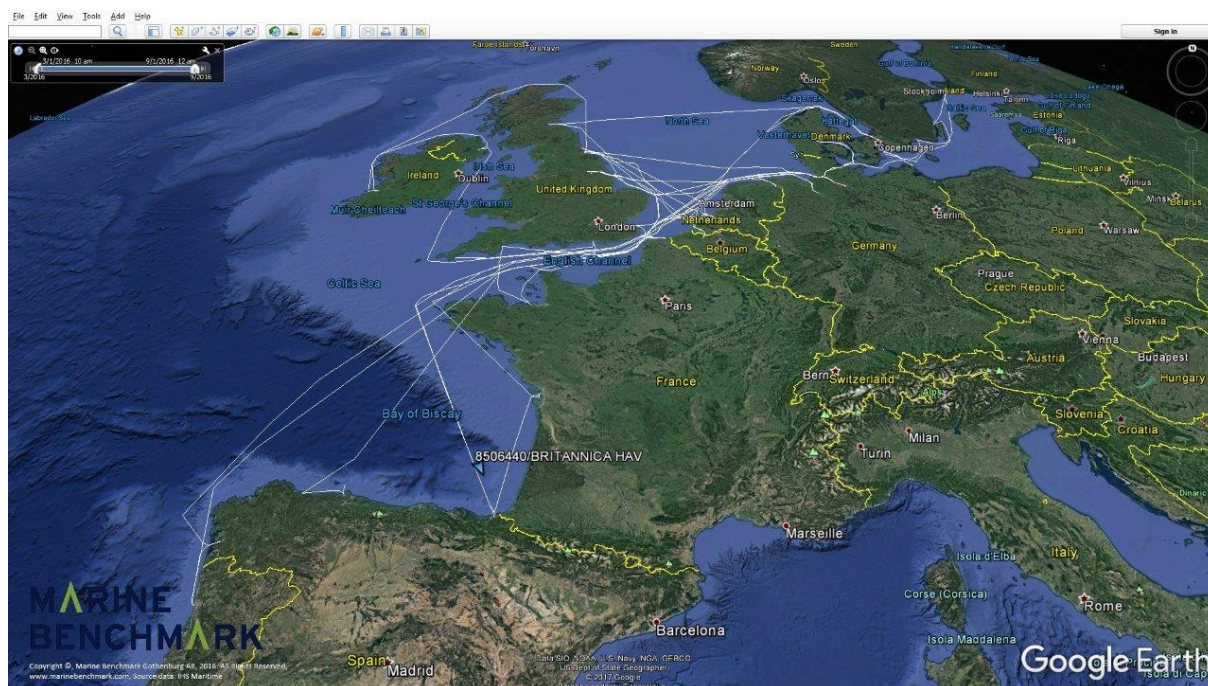


8505915-SCANLARK, 483 kg fuel/day, 1520 dwt, 598 kW, MaK / 6M332AK  
 Dry Cargo vessel, Owner: Vista Shipping Agency

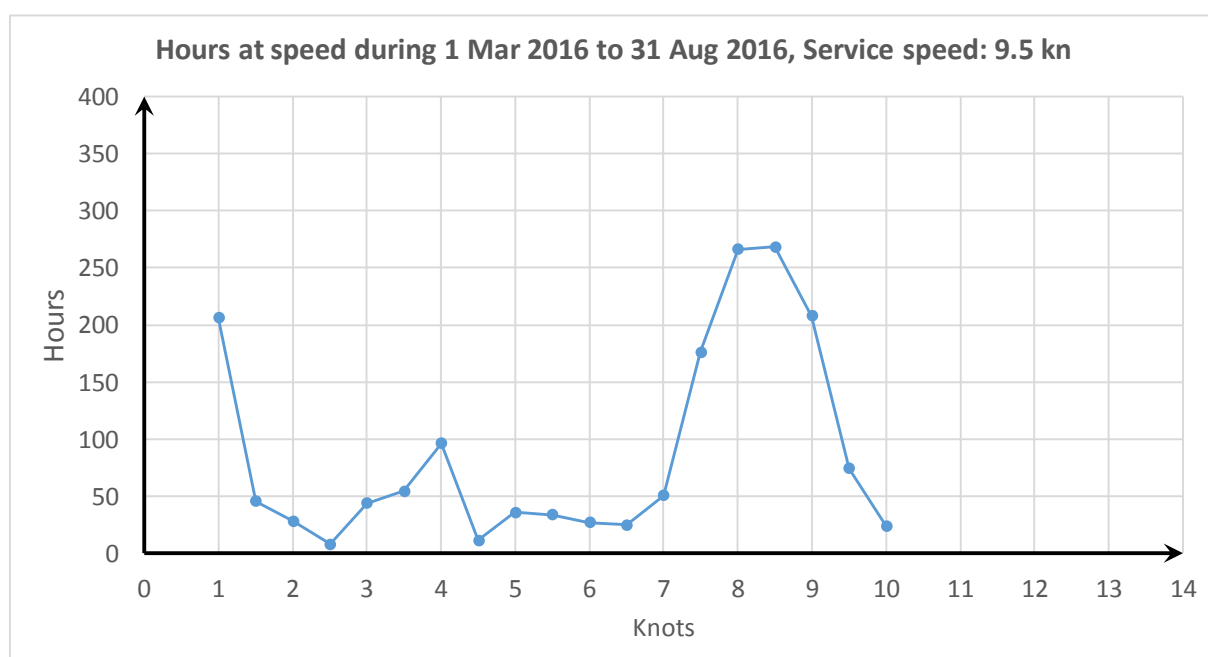
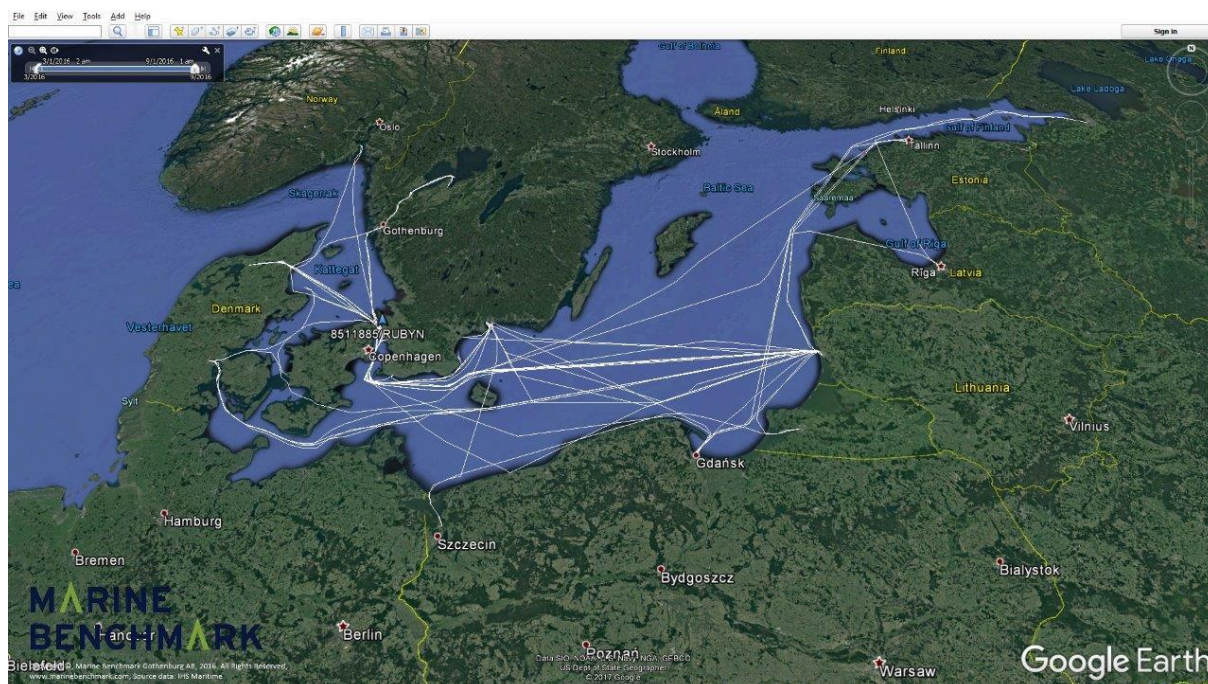




8506440-BRITANNICA HAV, 593 kg fuel/day, 2289 dwt, 598 kW, Deutz / SBA8M528  
 Dry Cargo vessel, Owner: HAV Ship Management NorRus AS

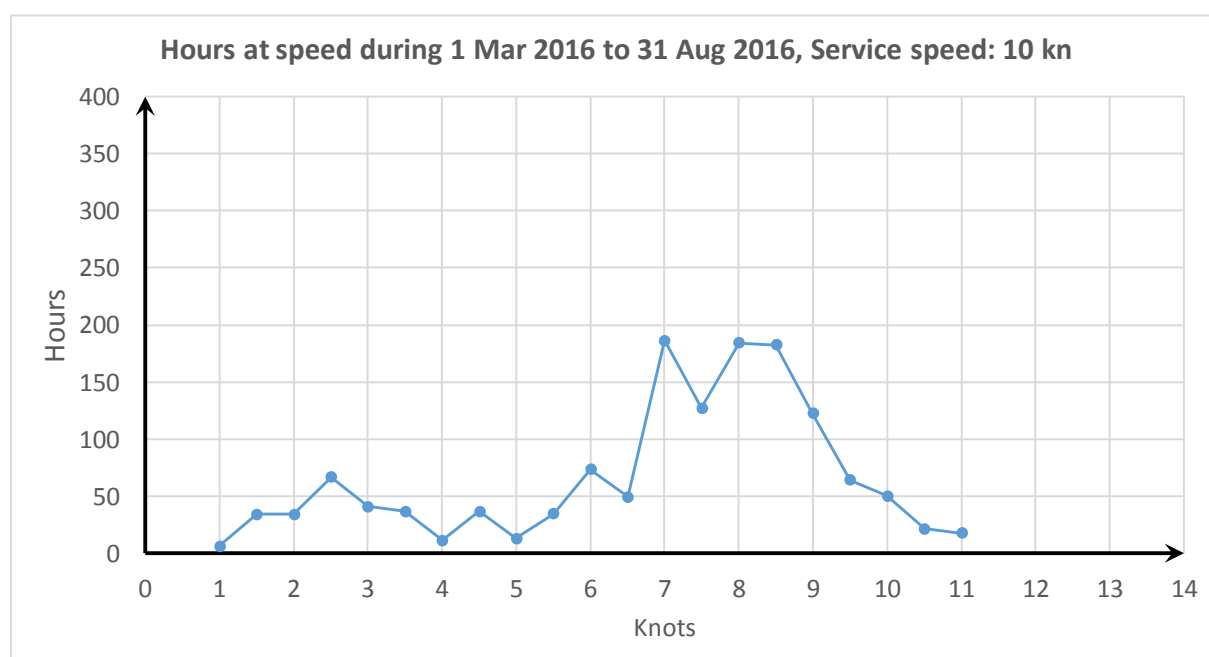
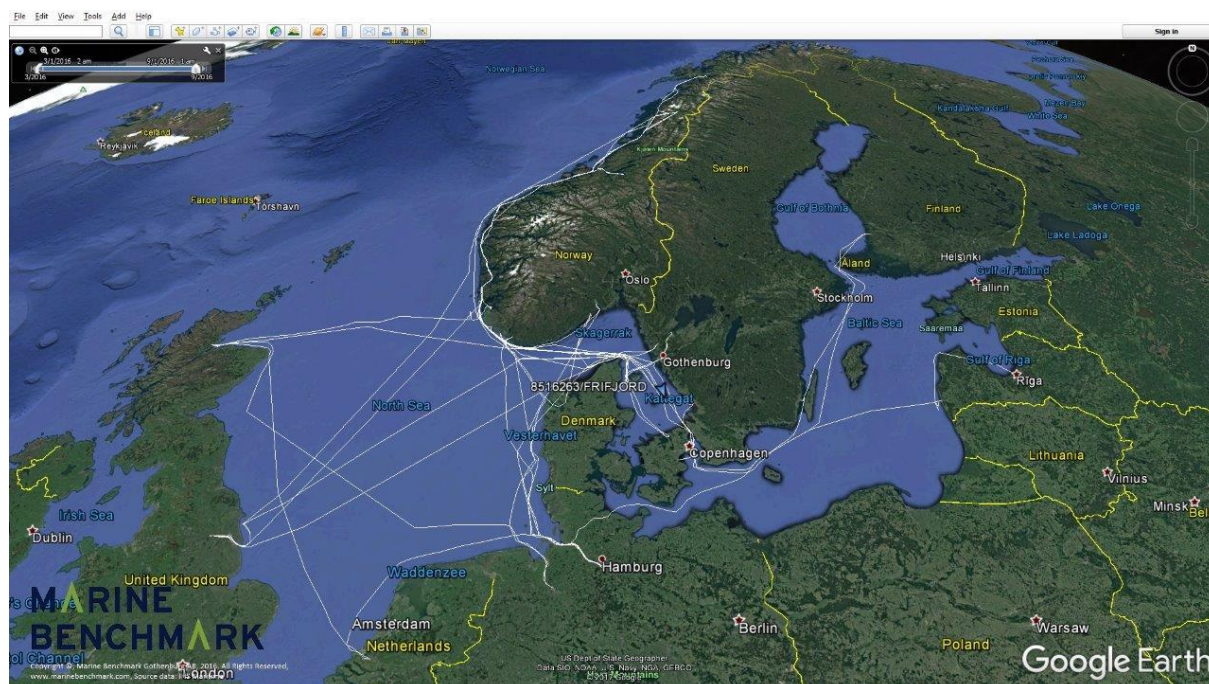


8511885-RUBYN, 558 kg fuel/day, 2450 dwt, 551 kW, Kromhout / 6F/SW240  
 Dry Cargo vessel, Owner: Baltnautic Shipping Ltd



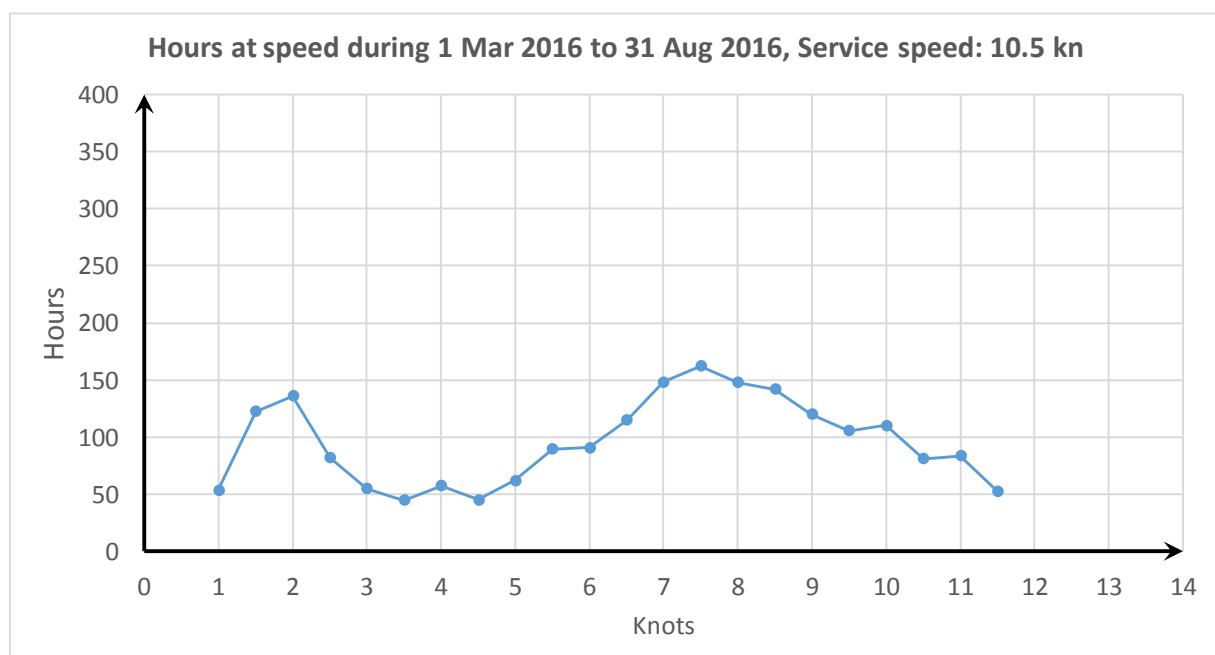
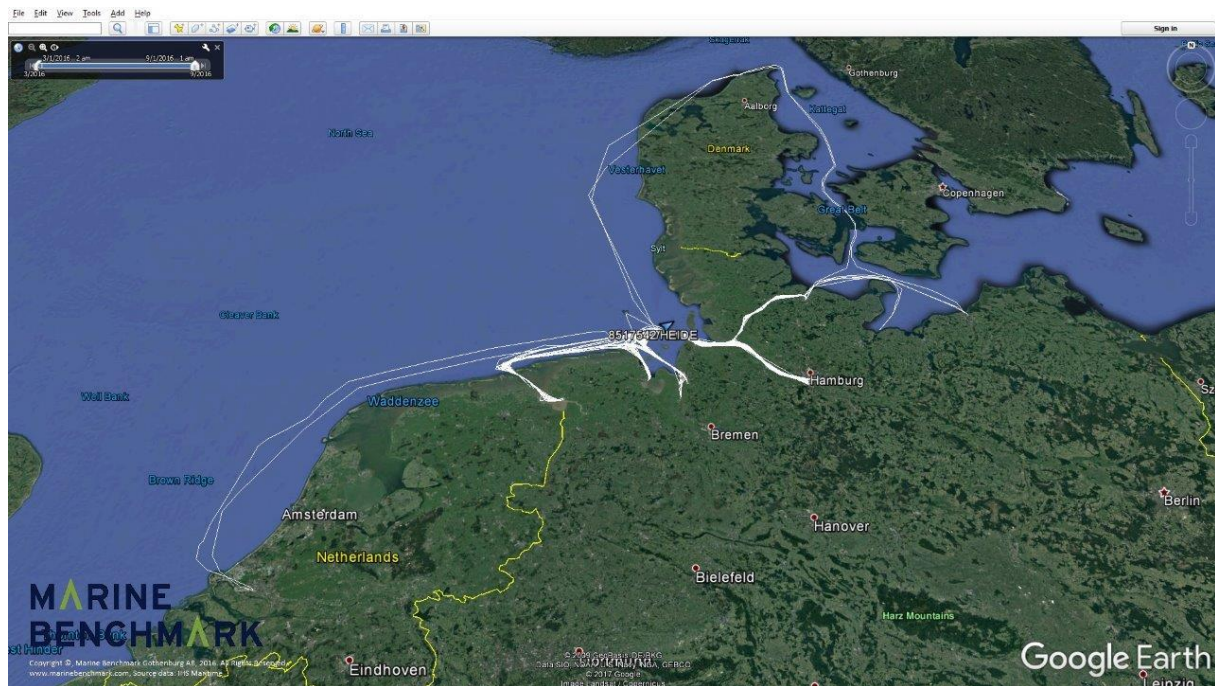


8516263-FRIFJORD, 478 kg fuel/day, 1318 dwt, 587 kW, MWM / TBD440-6  
Dry Cargo vessel, Owner: Kopervik Shipping AS

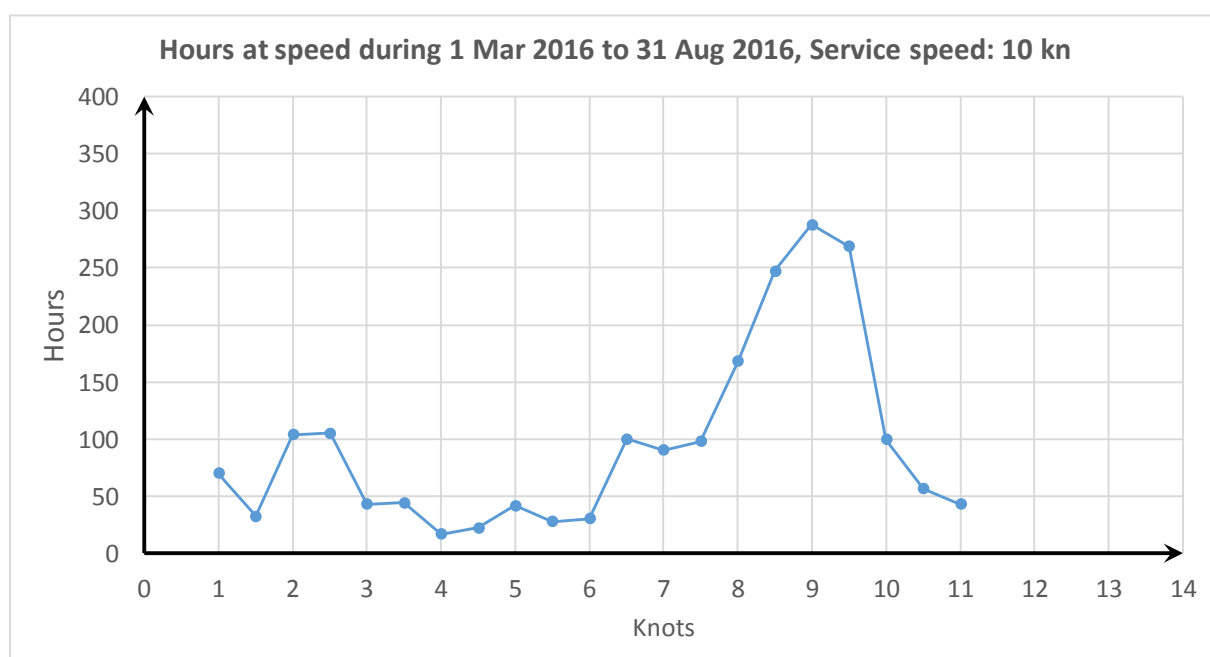
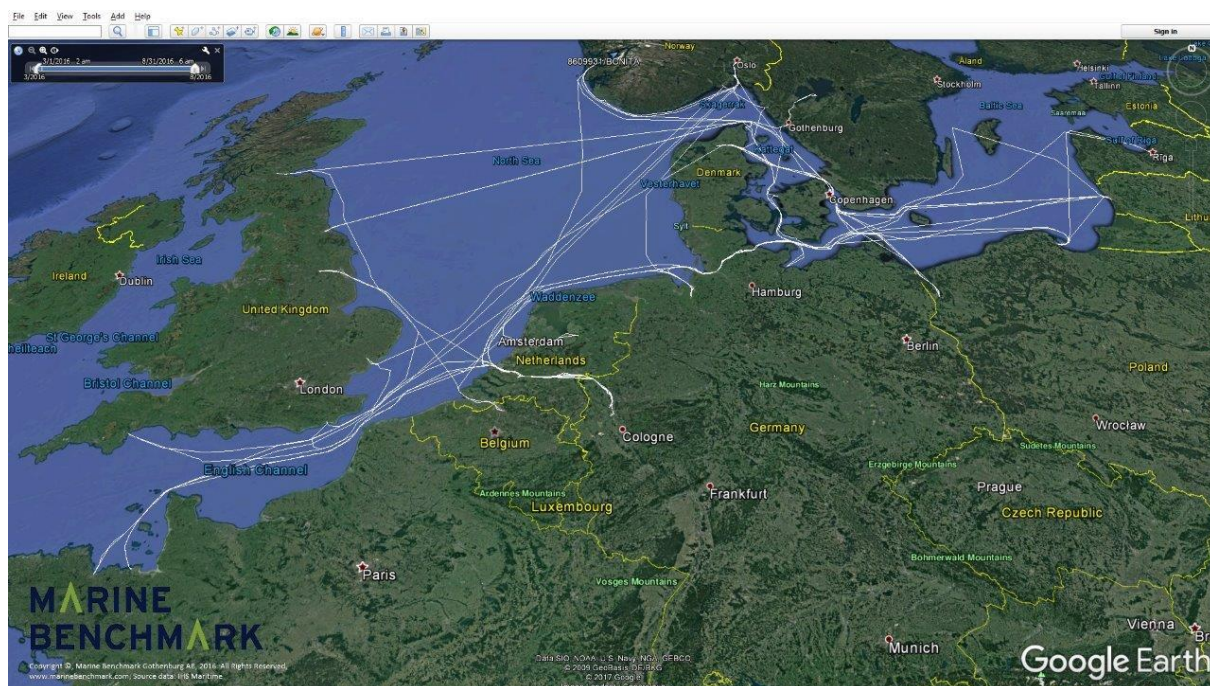




8517542-HEIDE, 545 kg fuel/day, 801 dwt, 506 kW, Callesen / 6-427-FOT  
 Tanker vessel, Owner: Glusing R

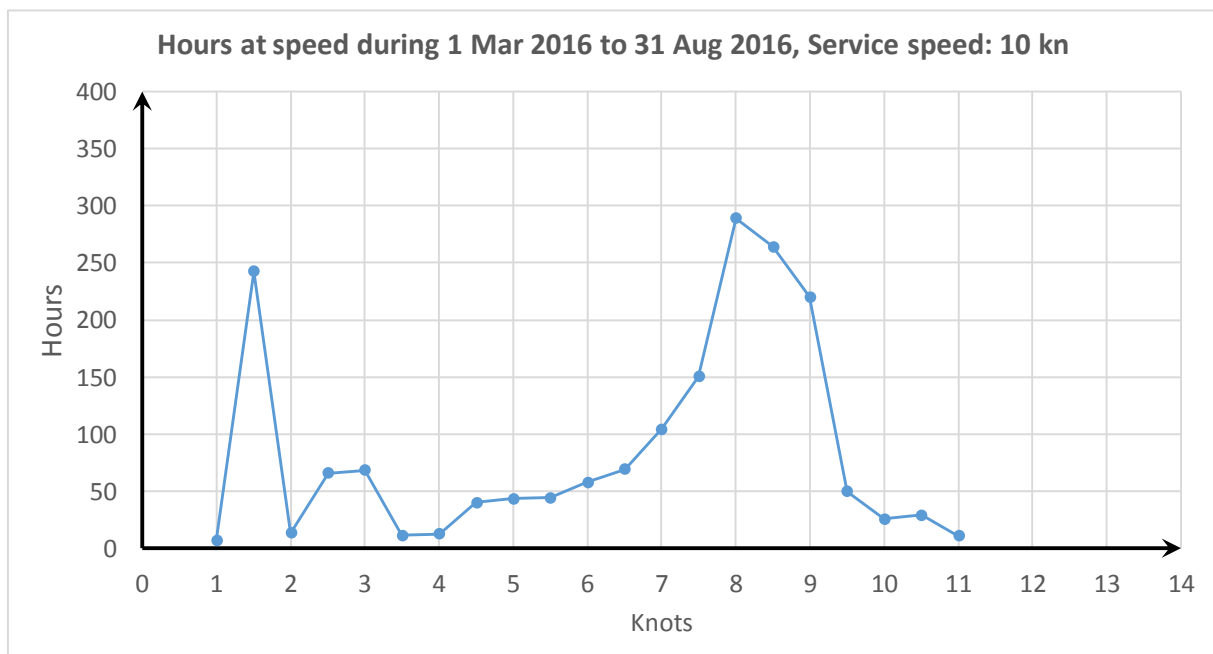
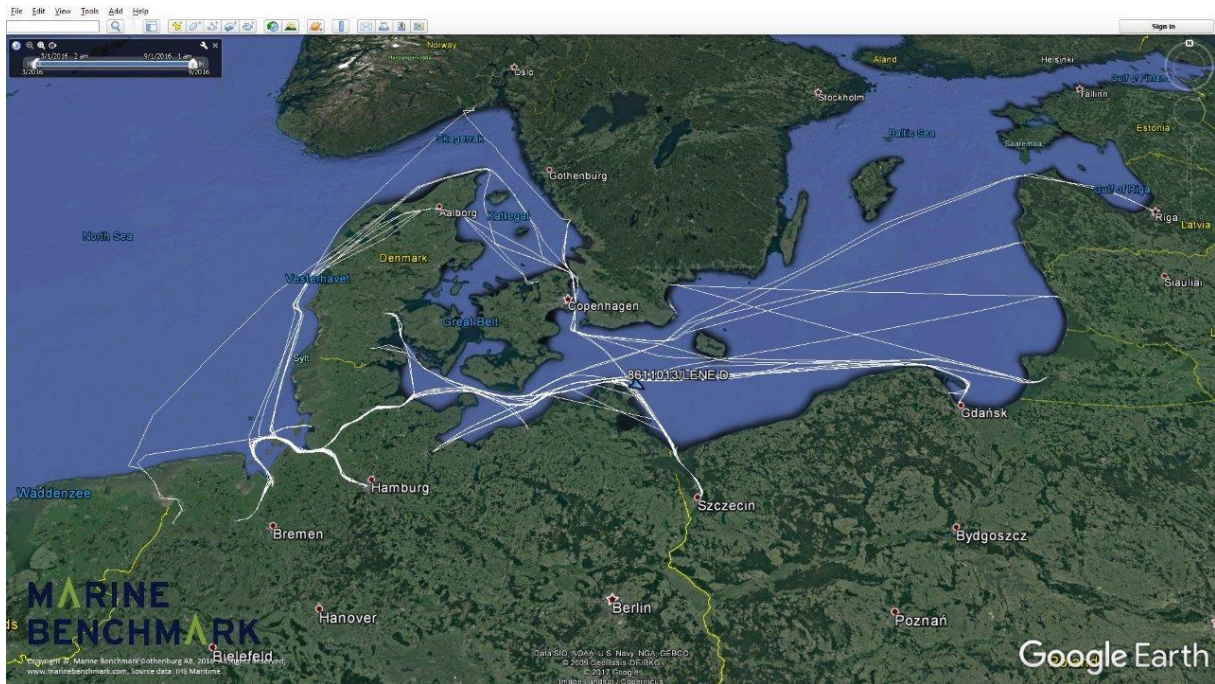


8609931-BONITA, 754 kg fuel/day, 1469 dwt, 570 kW, Caterpillar / 3508TA  
 Dry Cargo vessel, Owner: A&A Trading Ltd



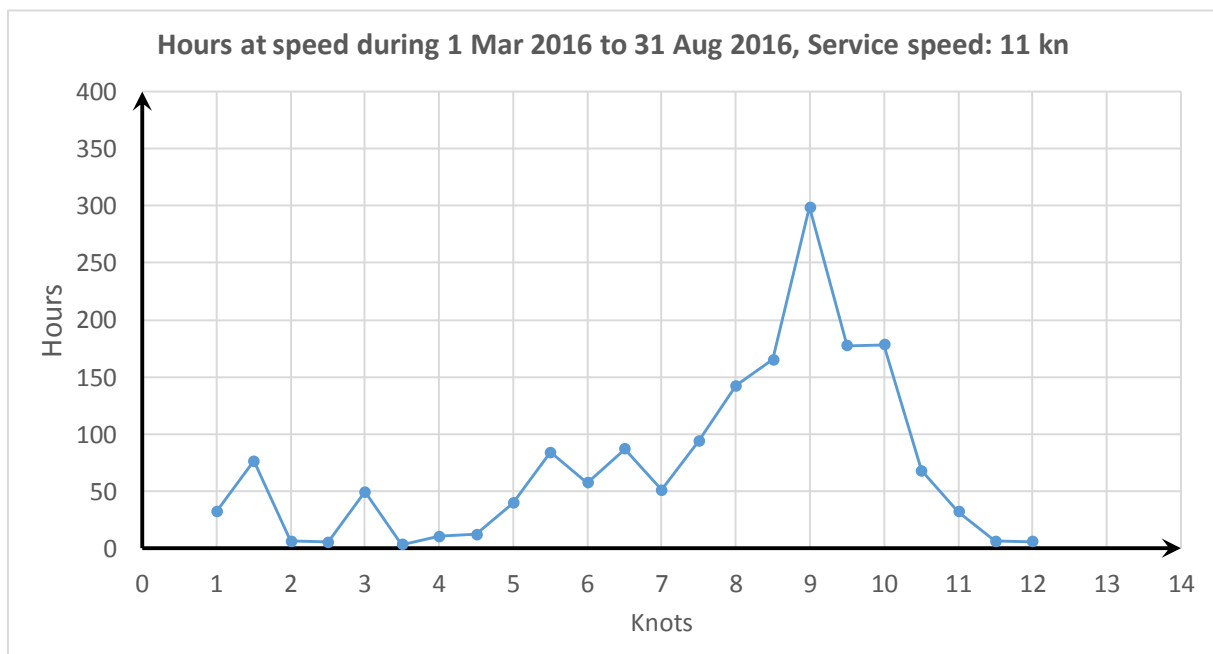
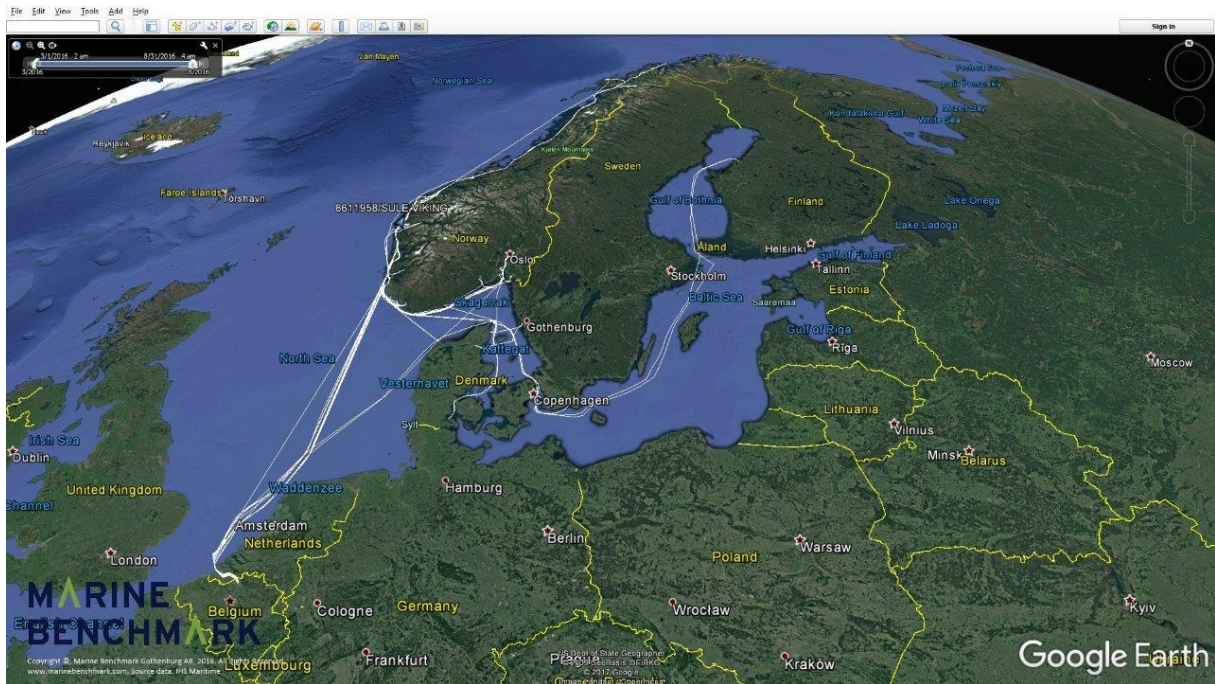


8611013-LENE D, 589 kg fuel/day, 1900 dwt, 598 kW, MAN / 8L20/27  
 Dry Cargo vessel, Owner: Drabert Schiffahrtsges mbH

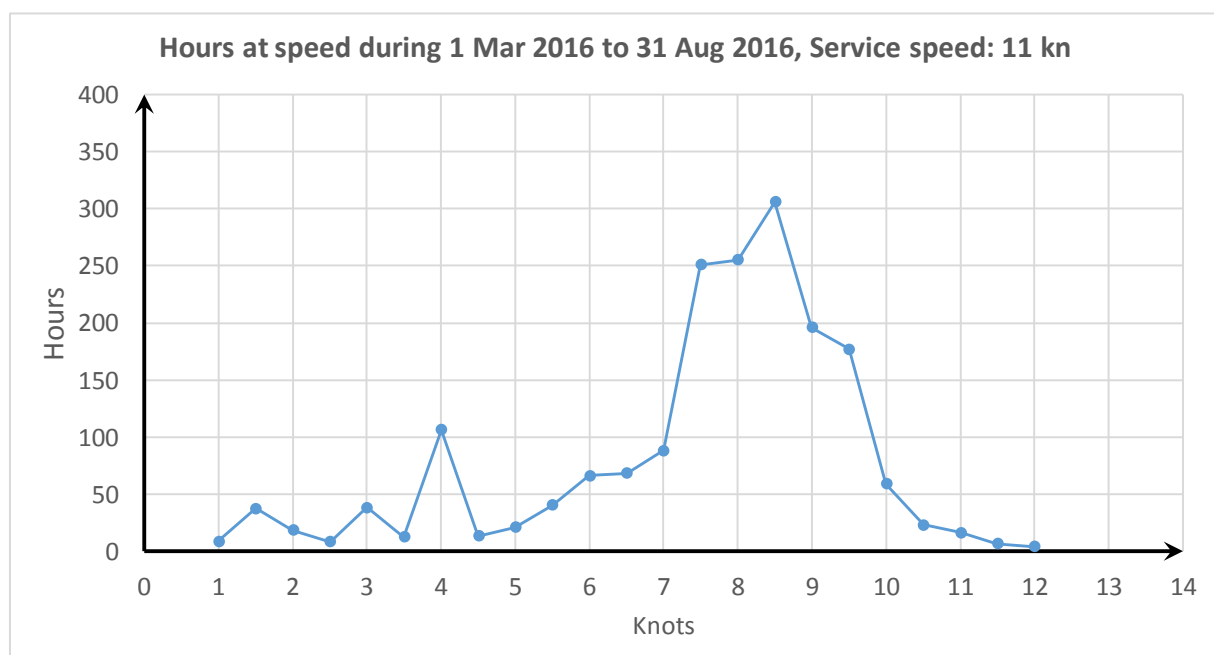
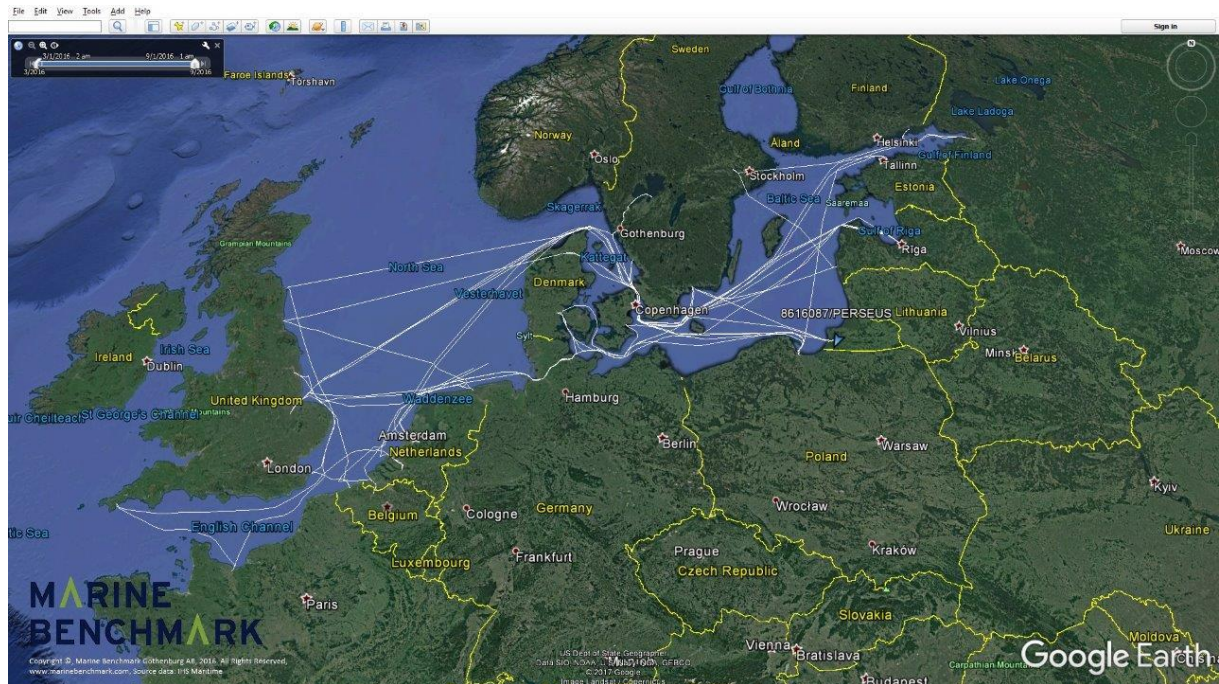




8611958-SULE VIKING, 590 kg fuel/day, 2262 dwt, 598 kW, Deutz / SBV6M628  
 Dry Cargo vessel, Owner: Nye Sulevaer AS

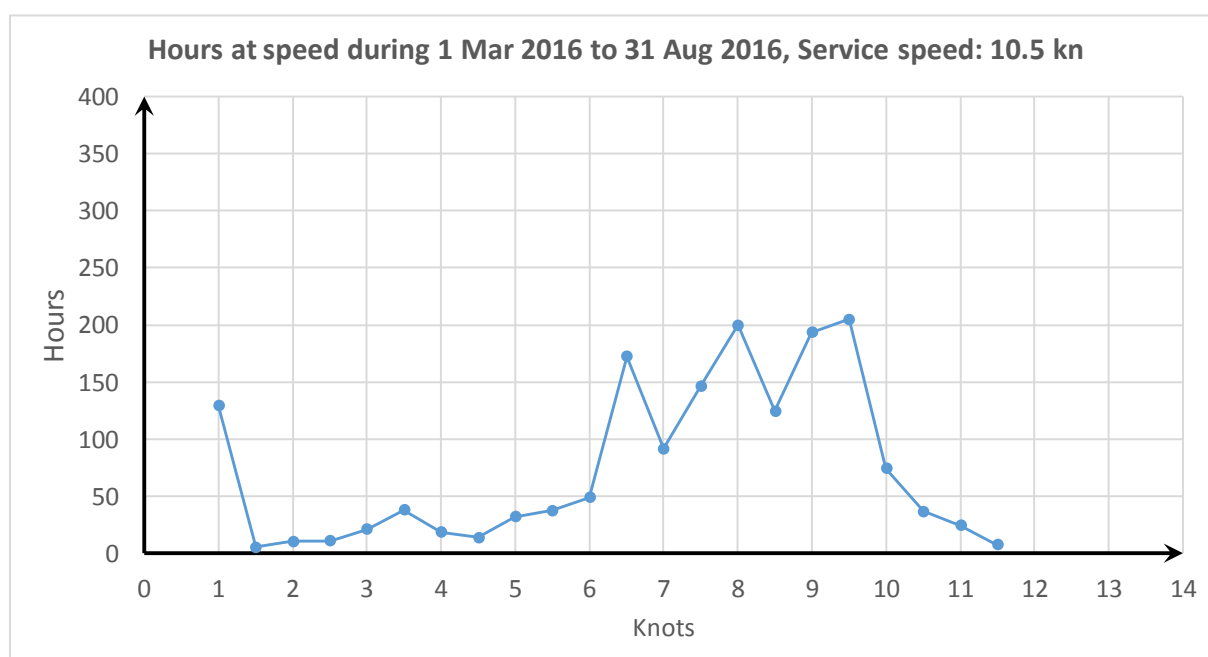
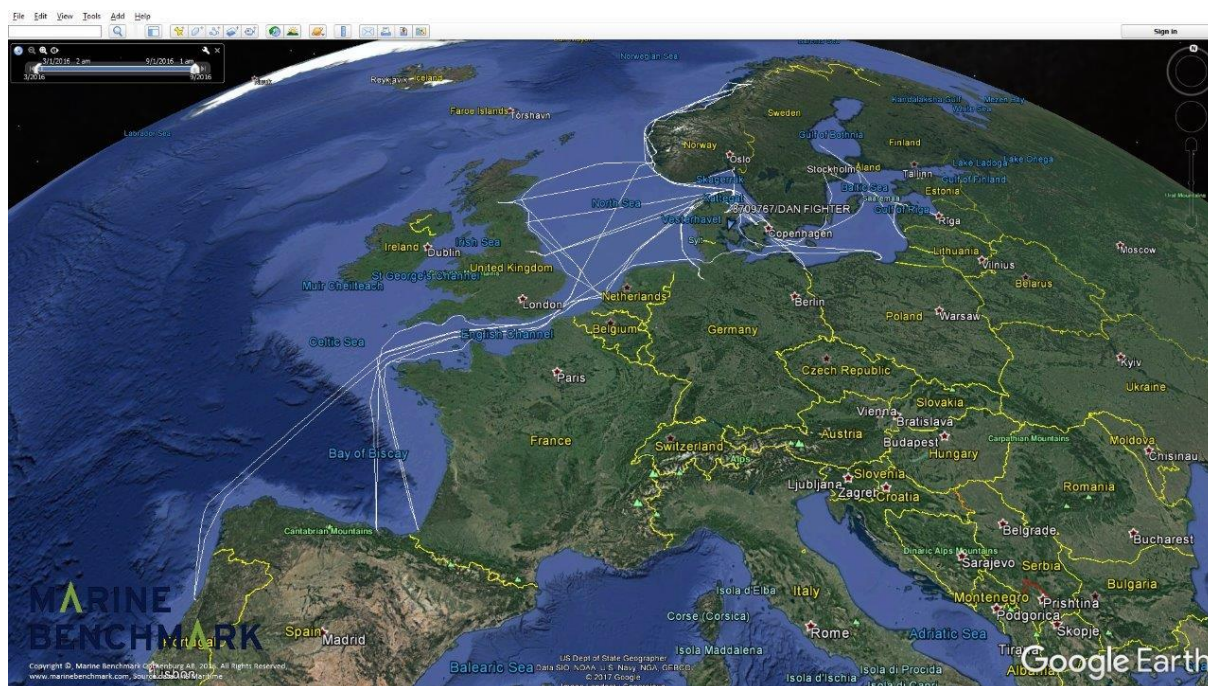


8616087-PERSEUS, 576 kg fuel/day, 1827 dwt, 600 kW, Caterpillar / 3512TA  
 Dry Cargo vessel, Owner: Baltnautic Shipping Ltd



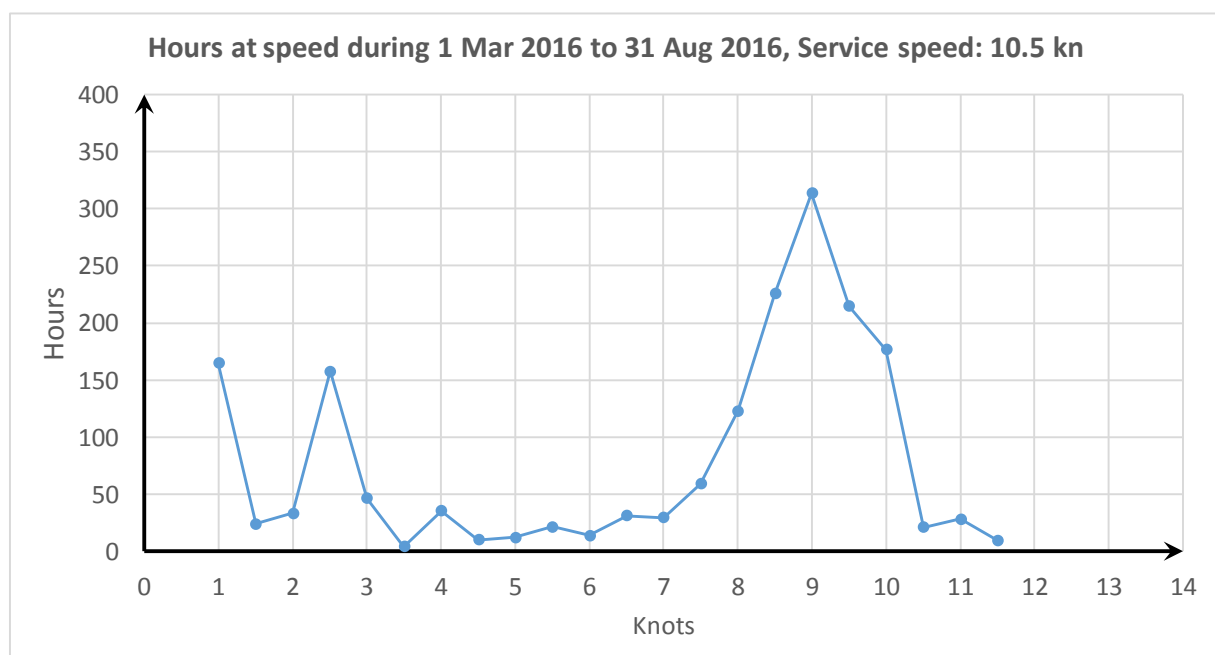
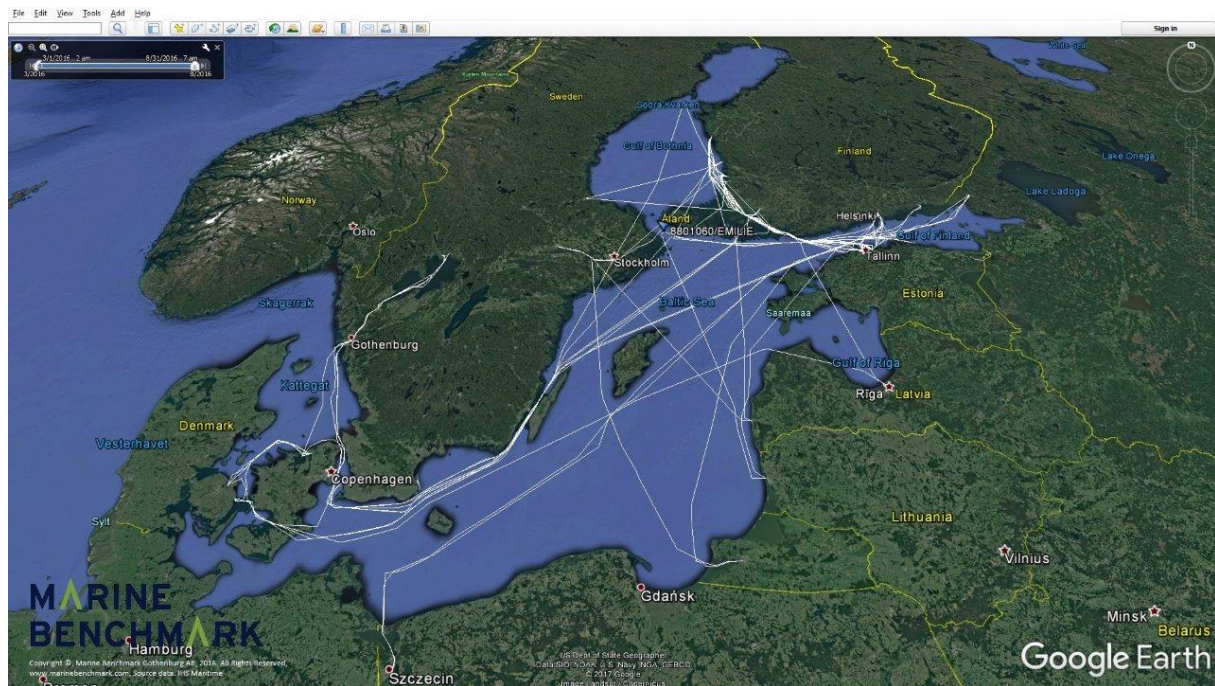


8709767-DAN FIGHTER, 542 kg fuel/day, 1260 dwt, 570 kW, Caterpillar / 3508TA  
 Dry Cargo vessel, Owner: Venus Shipping ApS

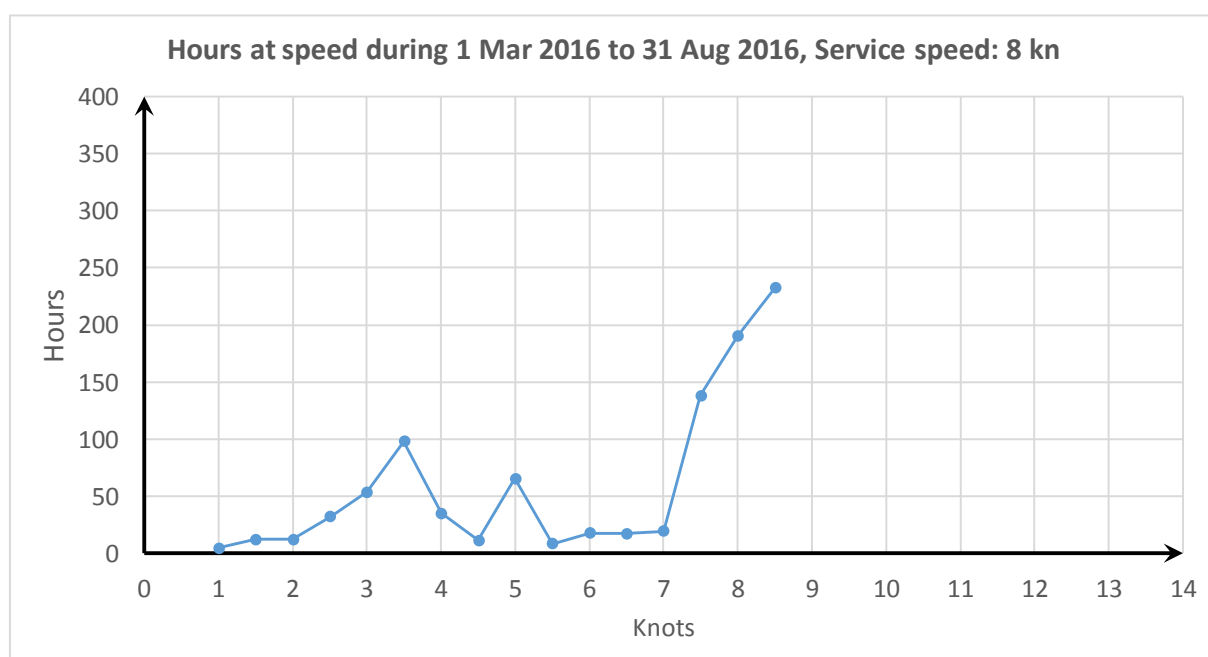
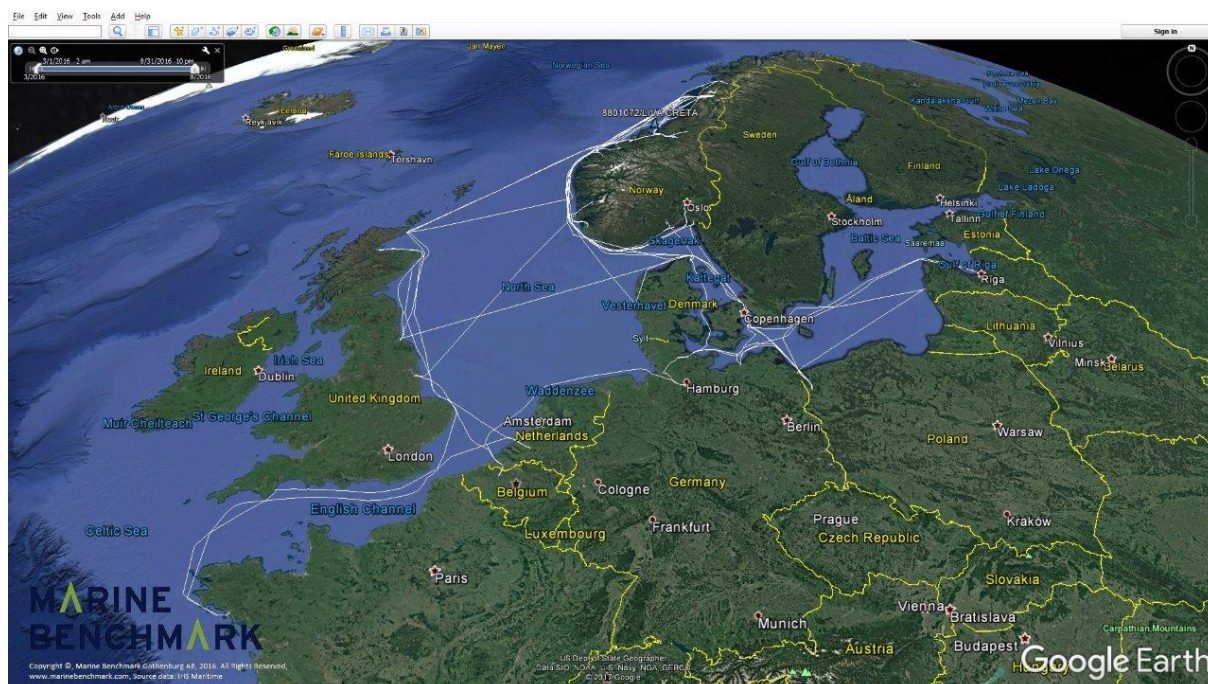




8801060-EMILIE, 604 kg fuel/day, 1276 dwt, 578 kW, Caterpillar / 3508TA  
 Dry Cargo vessel, Owner: Rederi Ab Nathalie

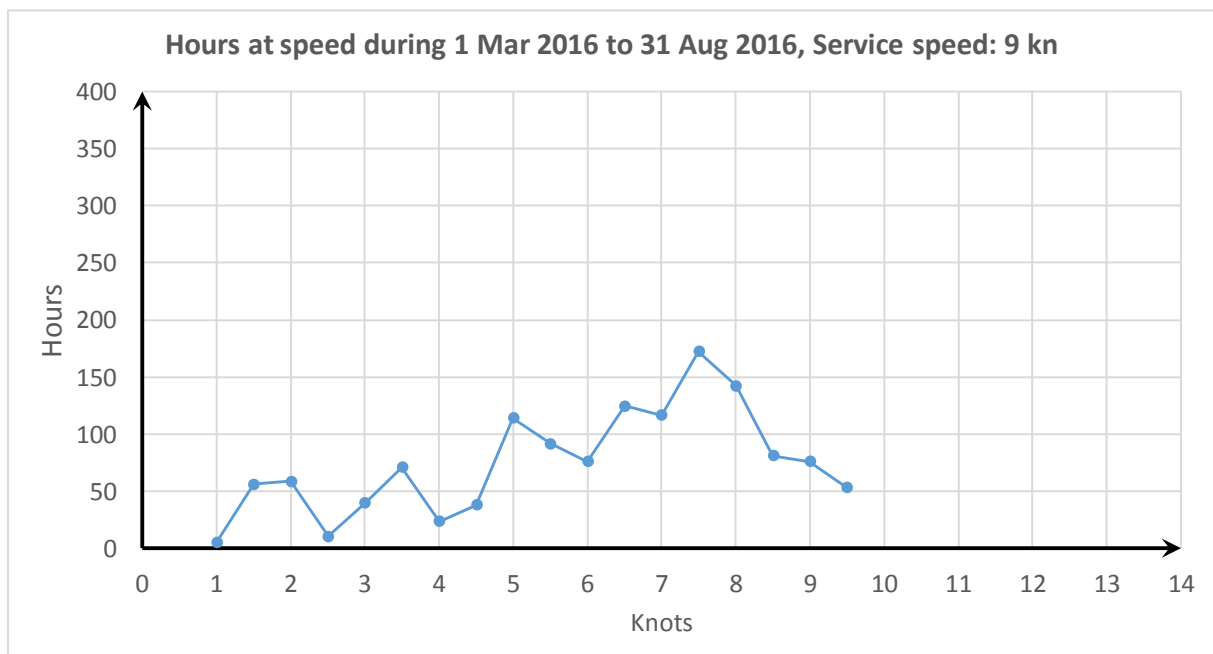
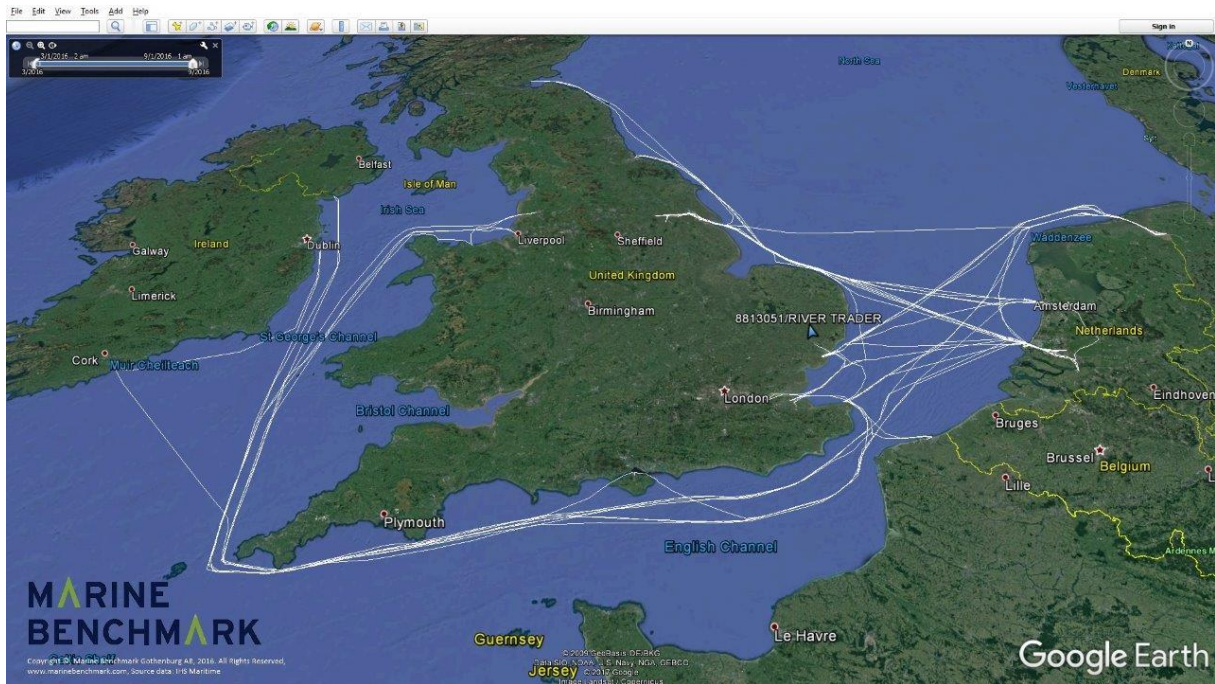


8801072-LIVA GRETA, 462 kg fuel/day, 1280 dwt, 576 kW, Caterpillar / 3508TA  
 Dry Cargo vessel, Owner: Liepaja Trading & Shipping



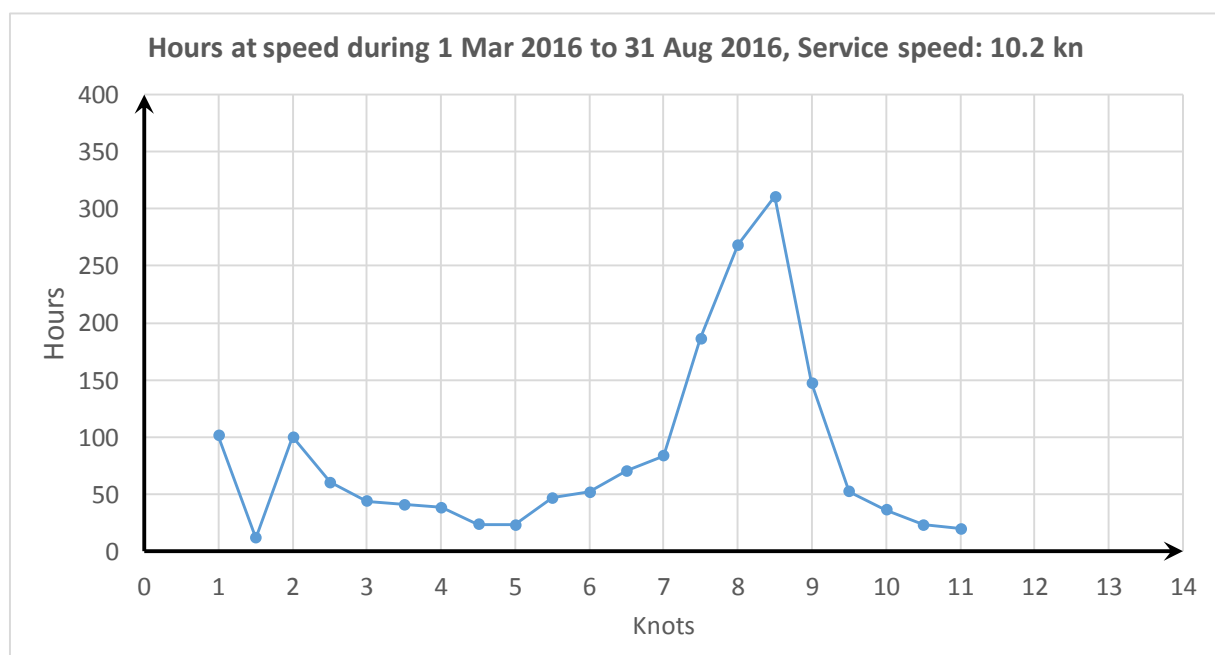
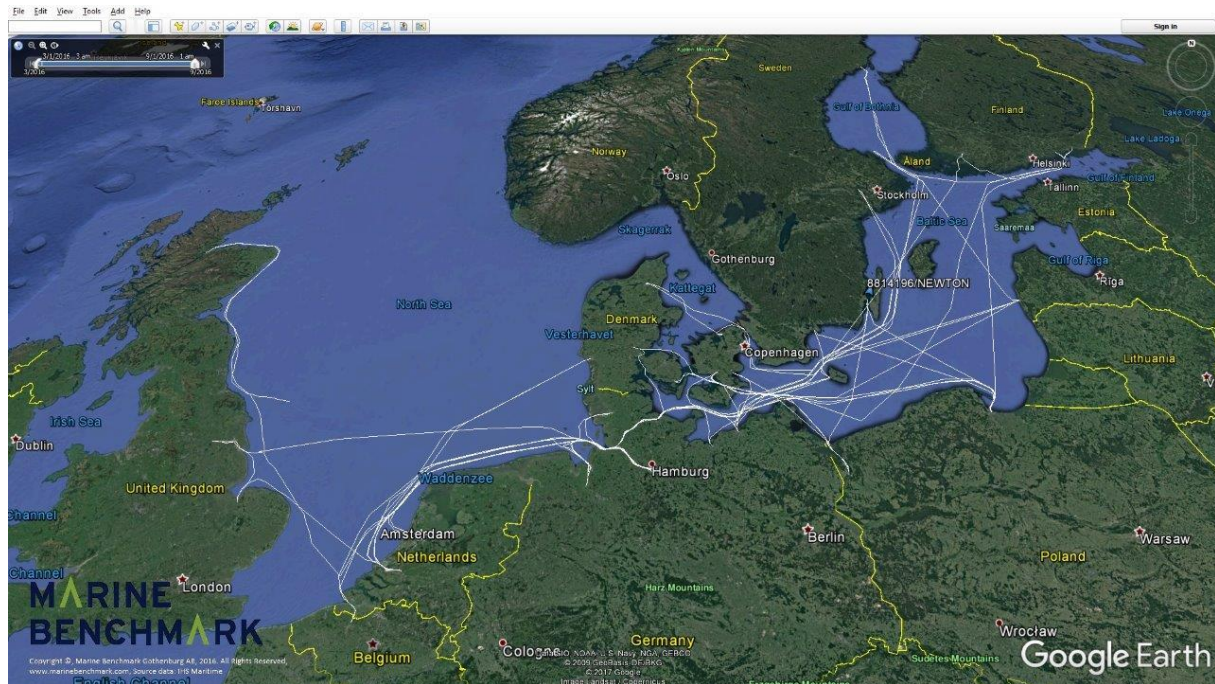


8813051-RIVER TRADER, 415 kg fuel/day, 1399 dwt, 535 kW, Cummins / KT-19-M  
 Dry Cargo vessel, Owner: River Trader Marine SA

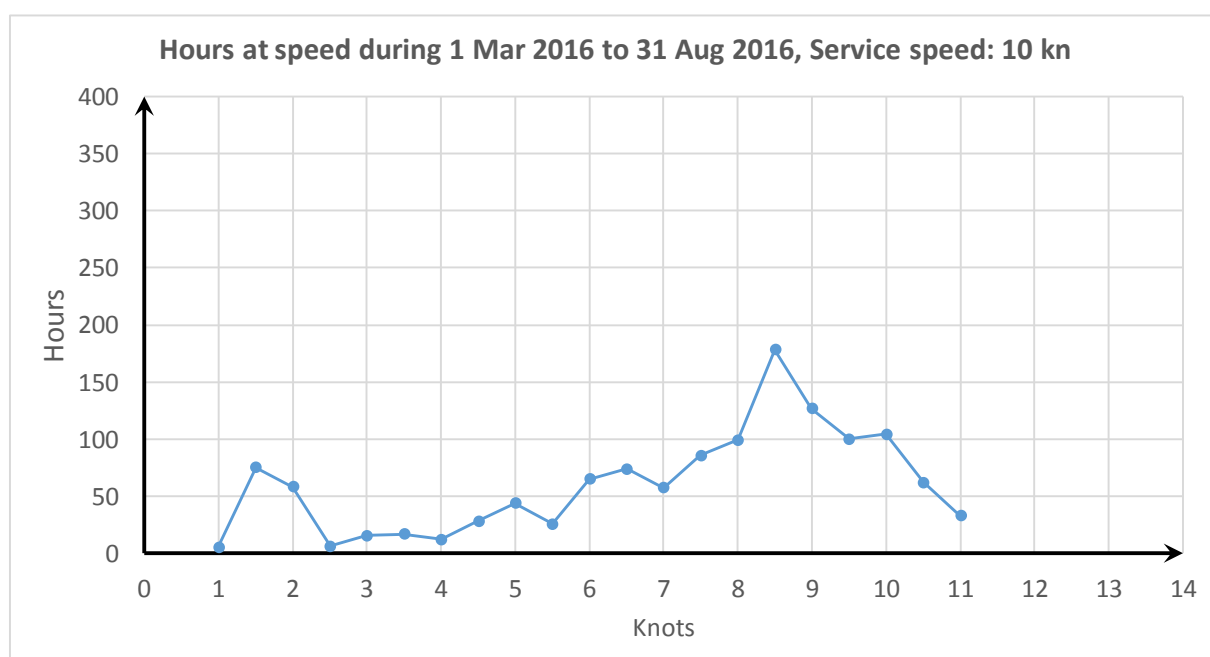
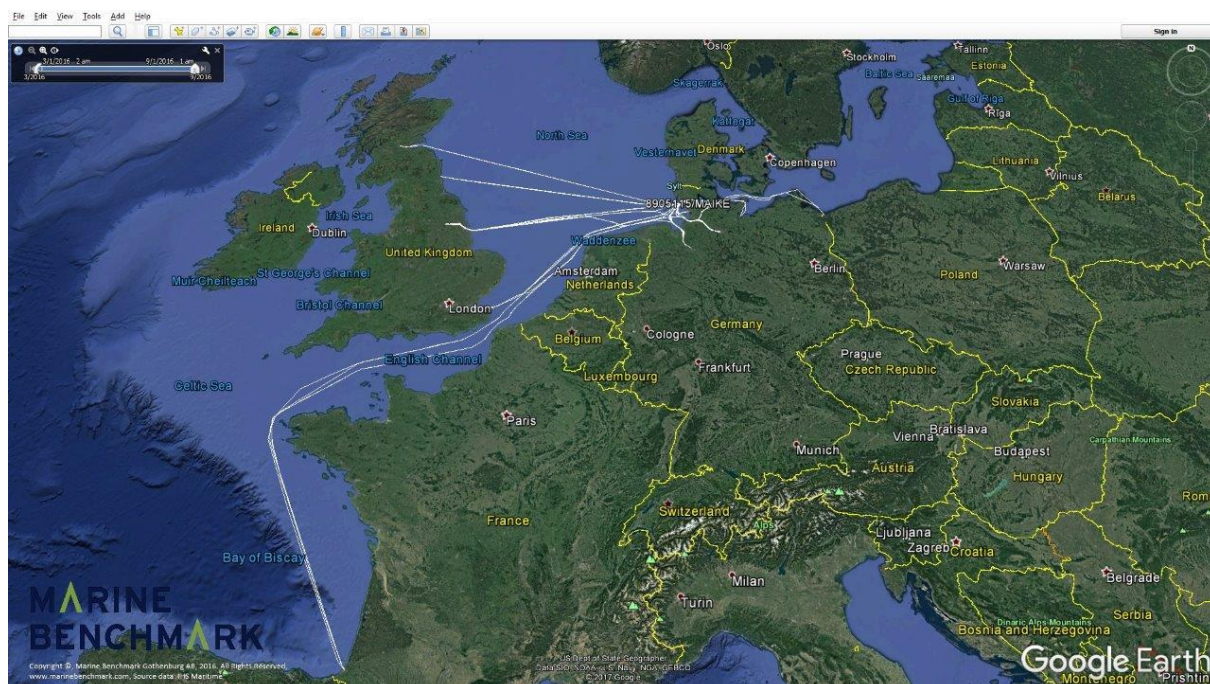




8814196-NEWTON, 553 kg fuel/day, 1529 dwt, 600 kW, MAN / 7L20/27  
 Dry Cargo vessel, Owner: Newton Schiffahrts UG

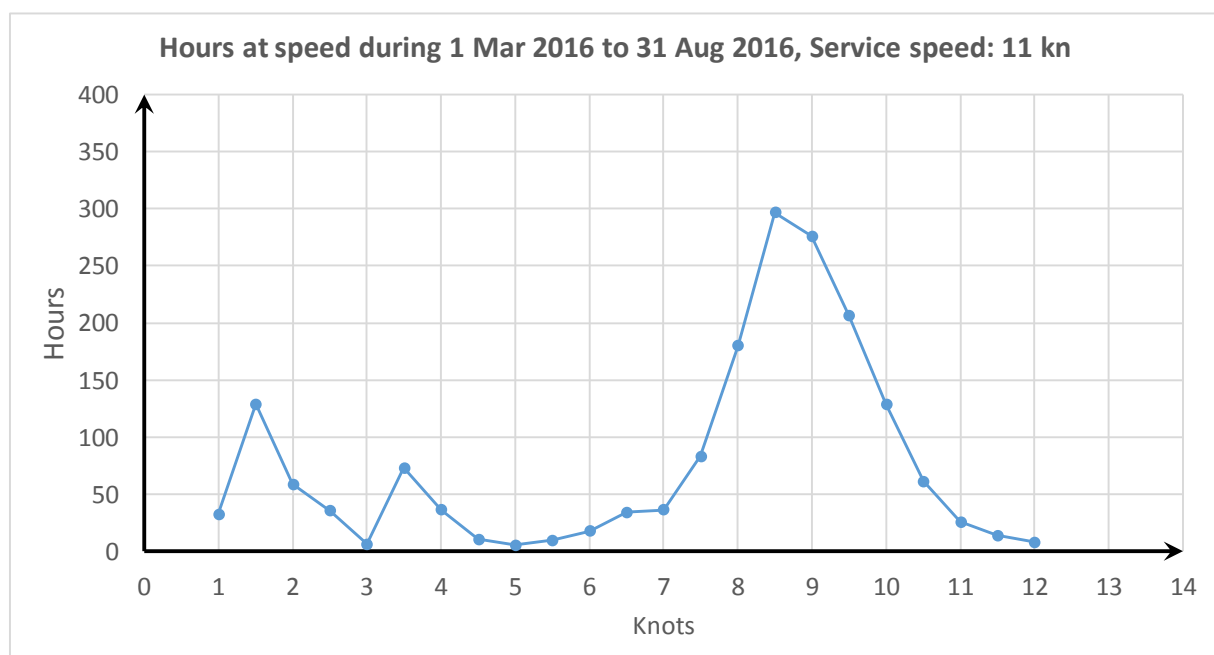
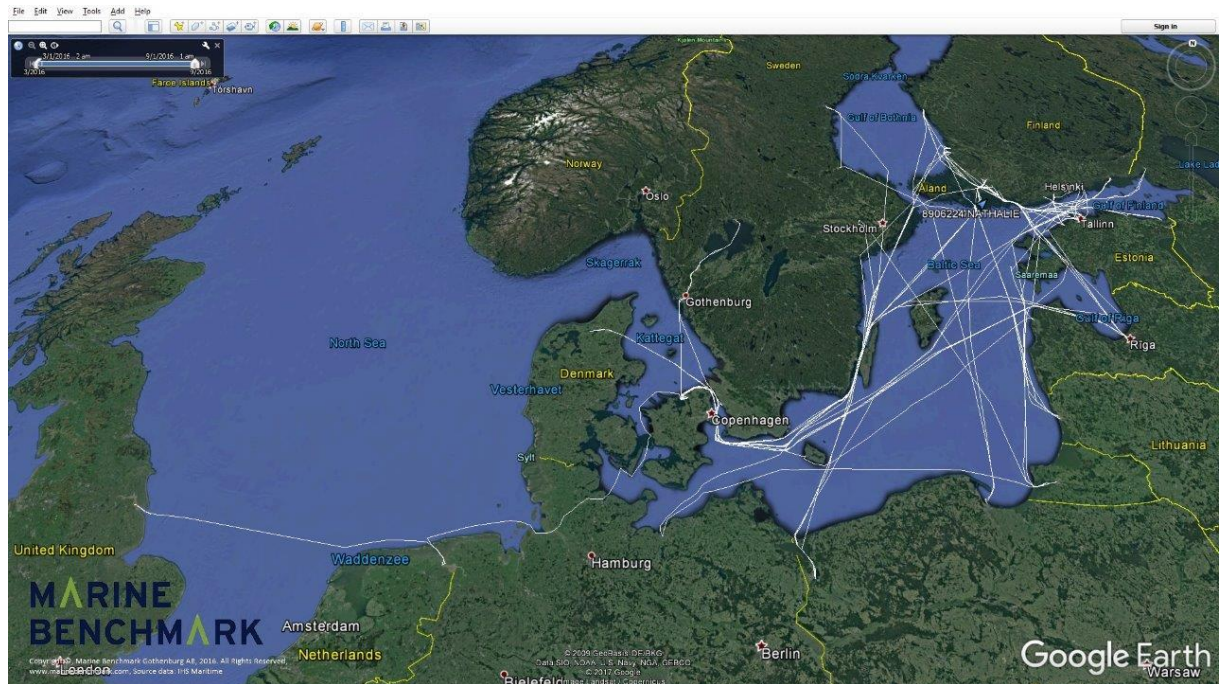


8905115-MAIKE, 513 kg fuel/day, 2339 dwt, 600 kW, Callesen / 6-427-FTKG  
 Dry Cargo vessel, Owner: ATR Landhandel GmbH & Co KG



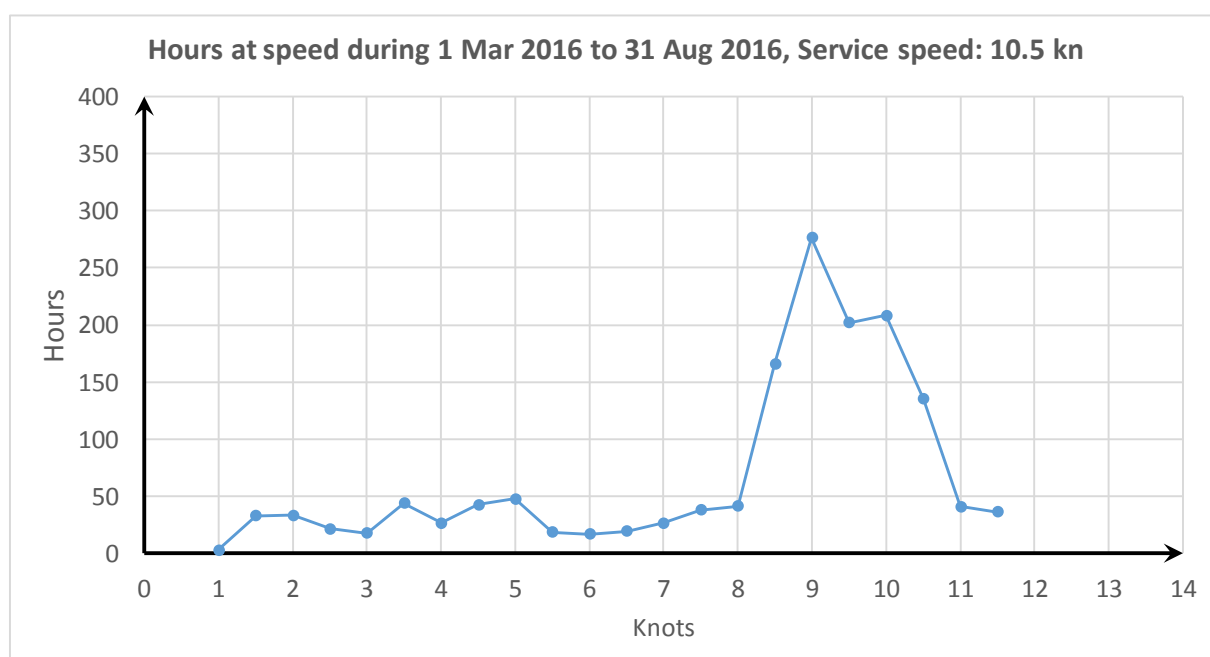
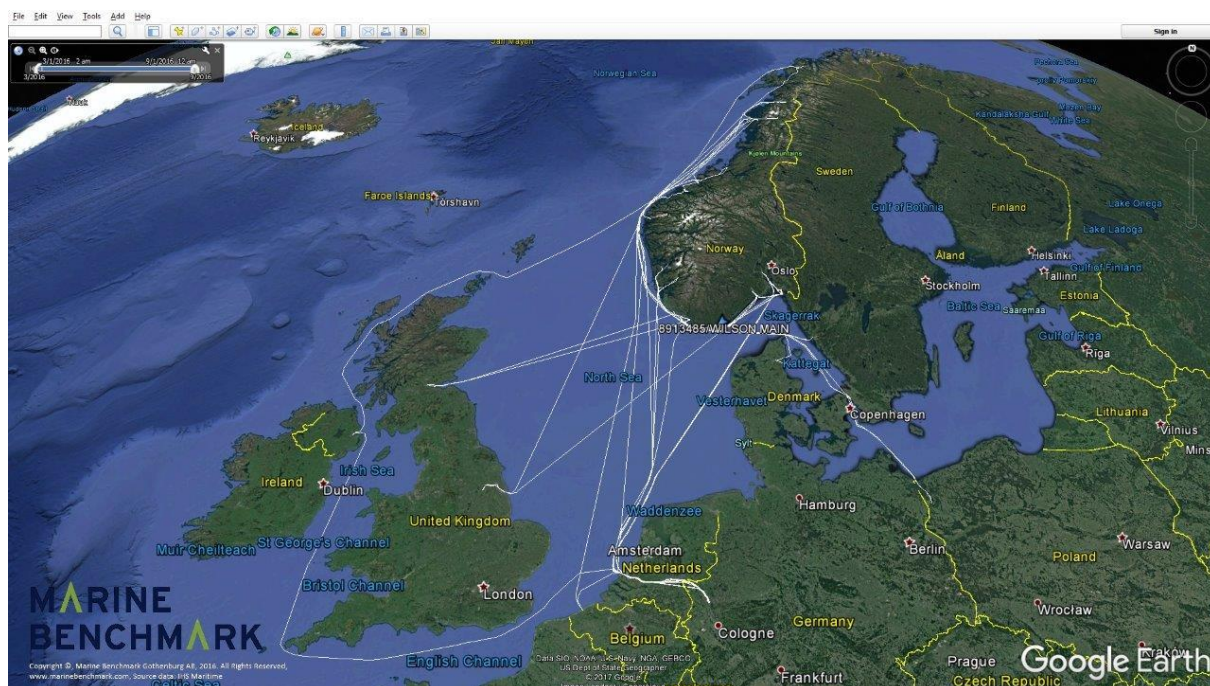


8906224-NATHALIE-, 576 kg fuel/day, 1300 dwt, 578 kW, Caterpillar / 3508TA  
 Dry Cargo vessel, Owner: Rederi Ab Nathalie

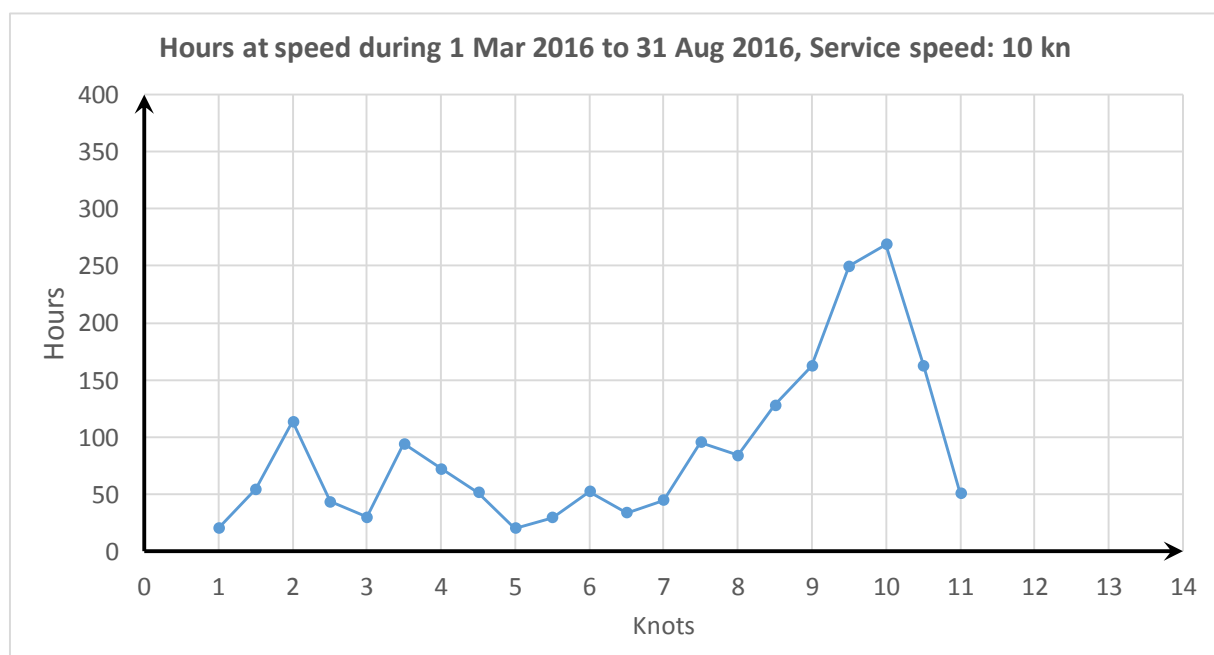
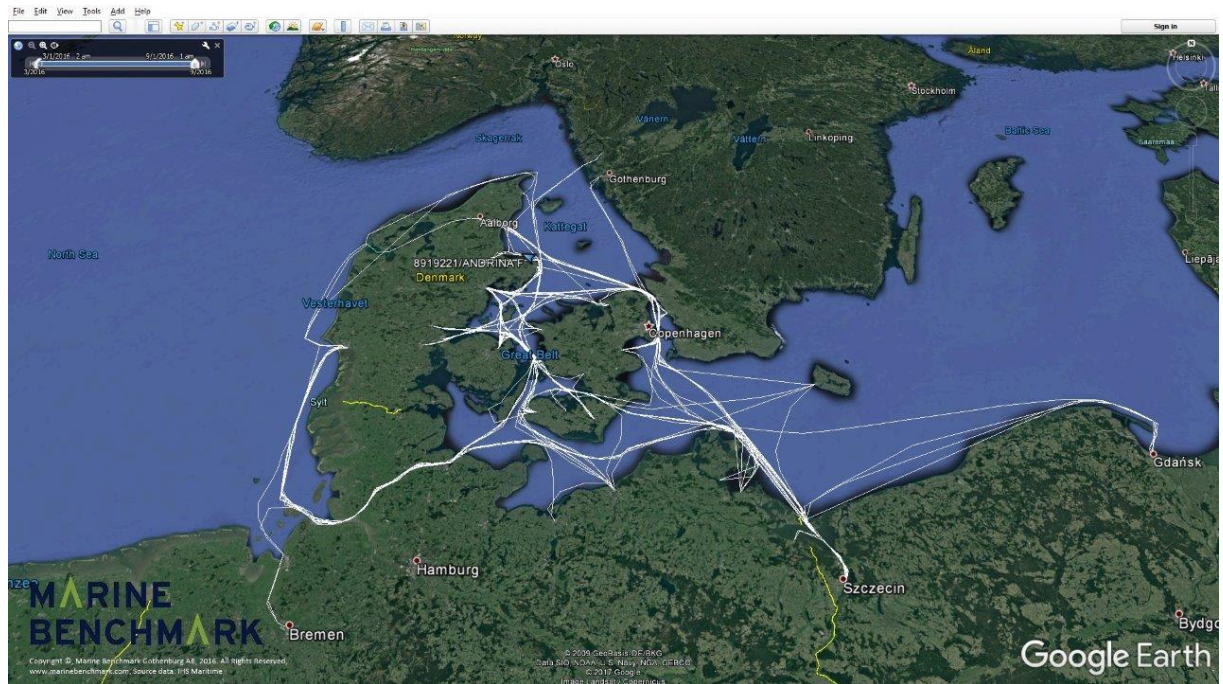




8913485-WILSON MAIN, 678 kg fuel/day, 2561 dwt, 600 kW, Deutz / SBV6M628  
 Dry Cargo vessel, Owner: Wilson ASA

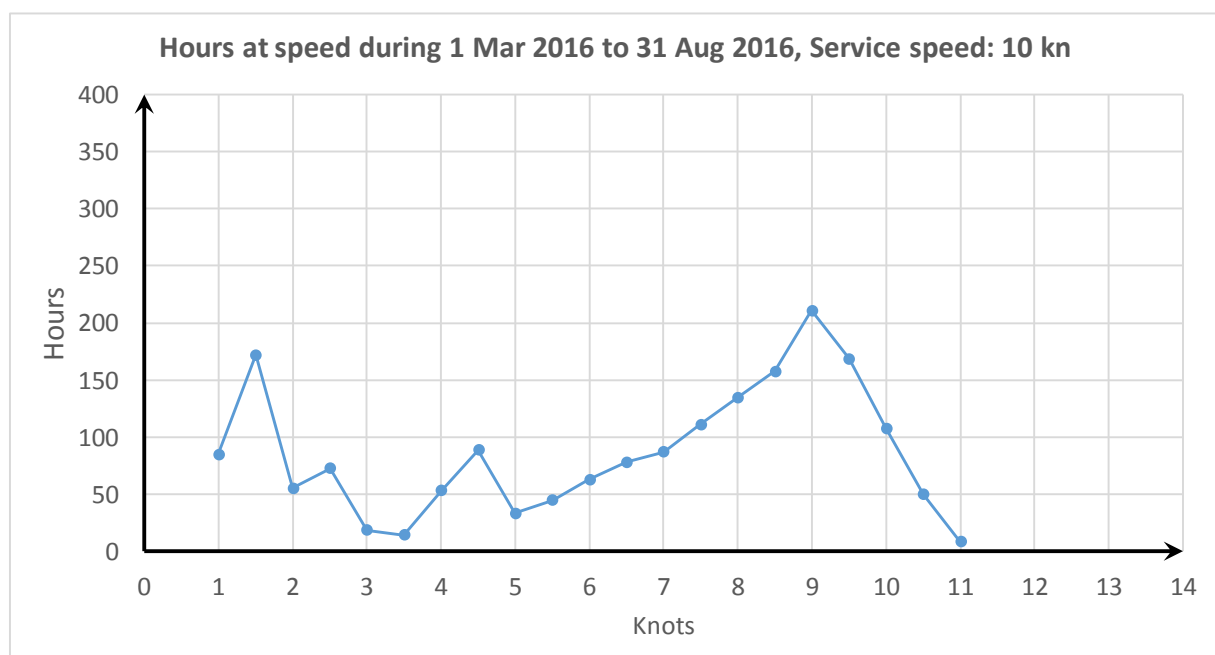
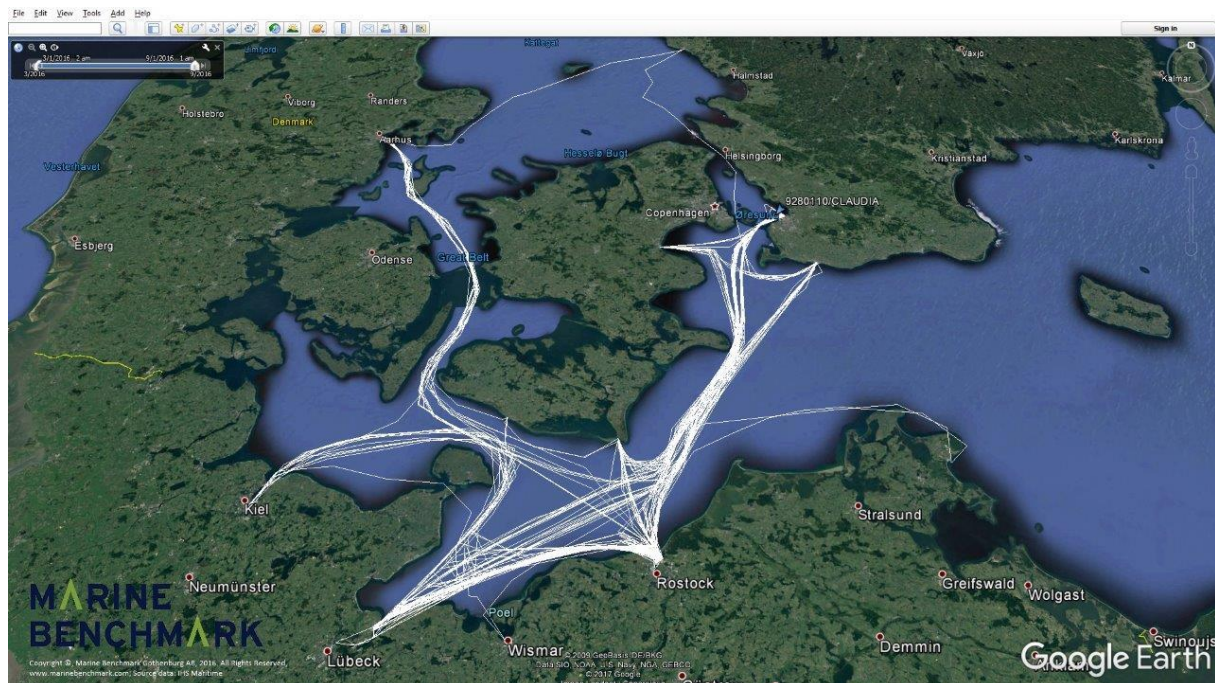


8919221-ANDRINA F., 814 kg fuel/day, 1890 dwt, 600 kW, MaK / 6M332AK  
 Dry Cargo vessel, Owner: Fischer U





9280110-CLAUDIA, 537 kg fuel/day, 1340 dwt, 528 kW, Caterpillar / 3412C  
 Tanker vessel, Owner: BMT Bunker und Mineraloeltrans

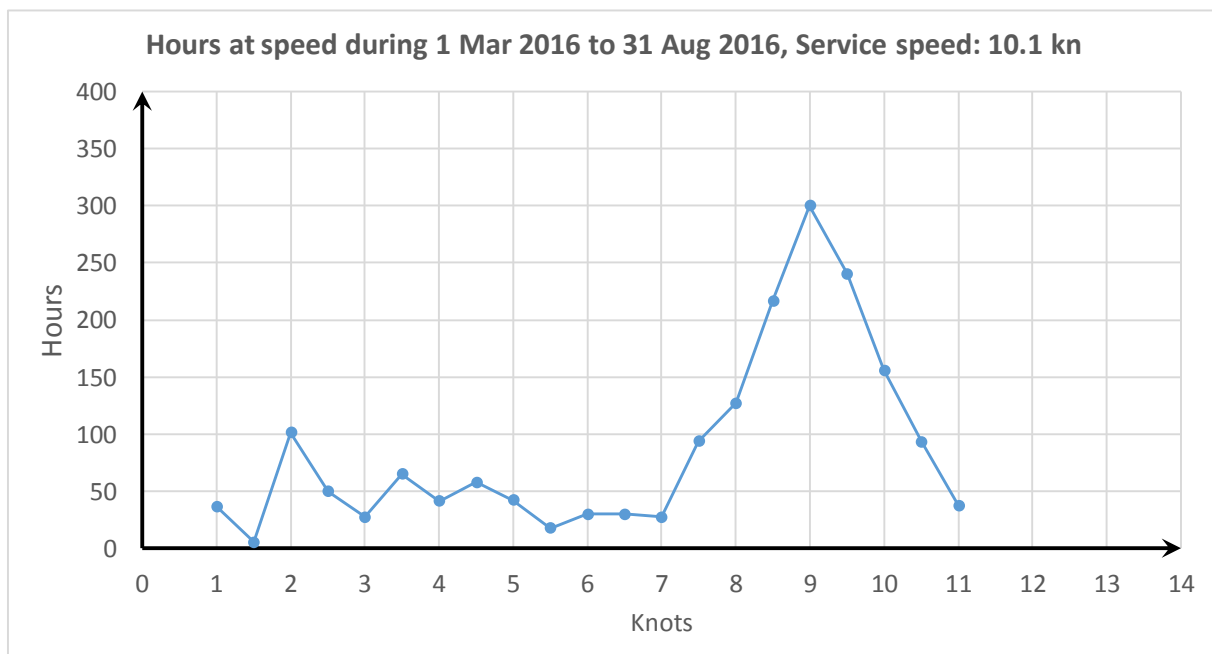
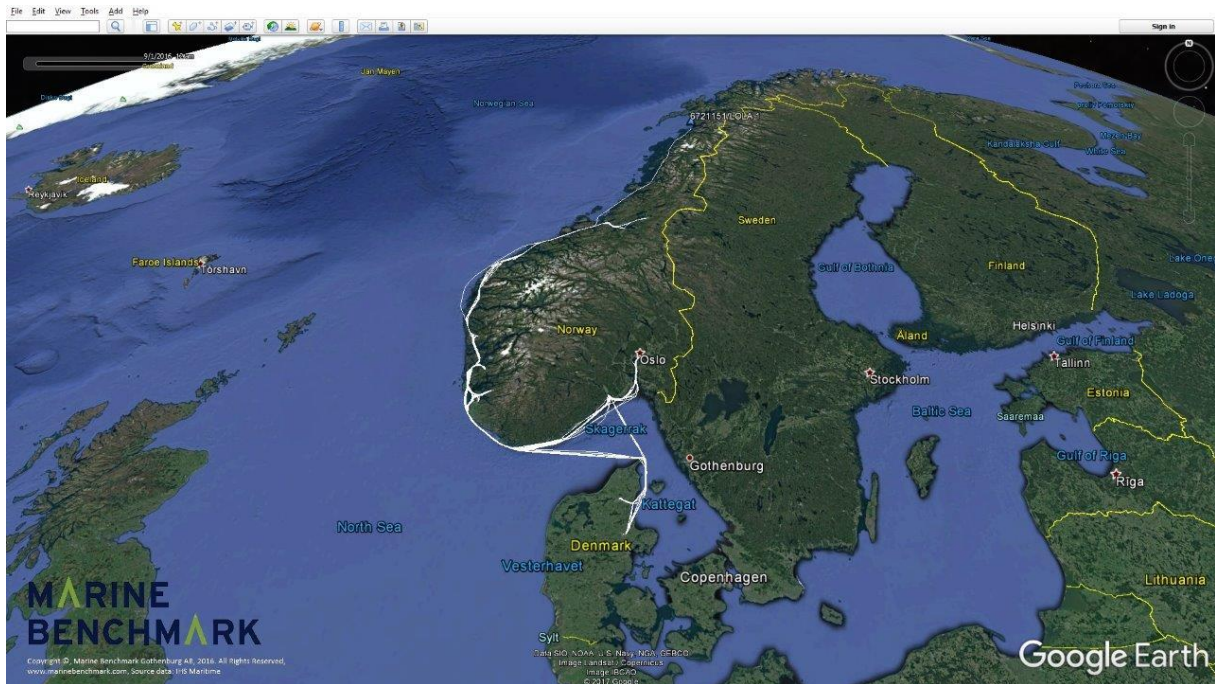




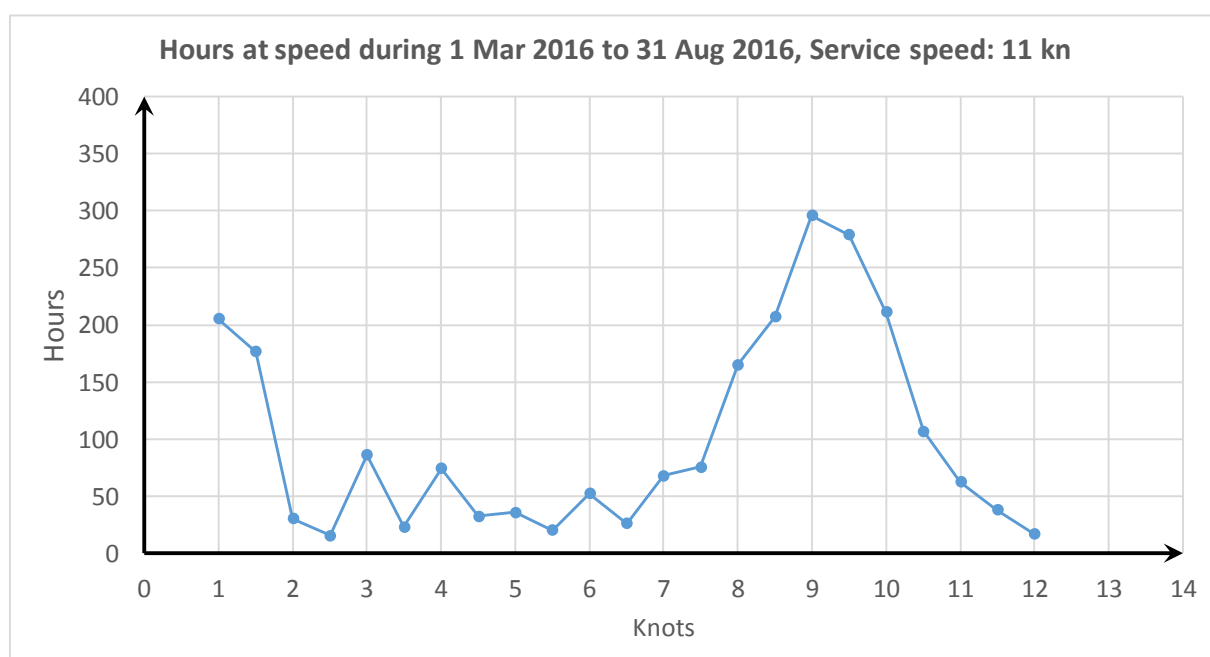
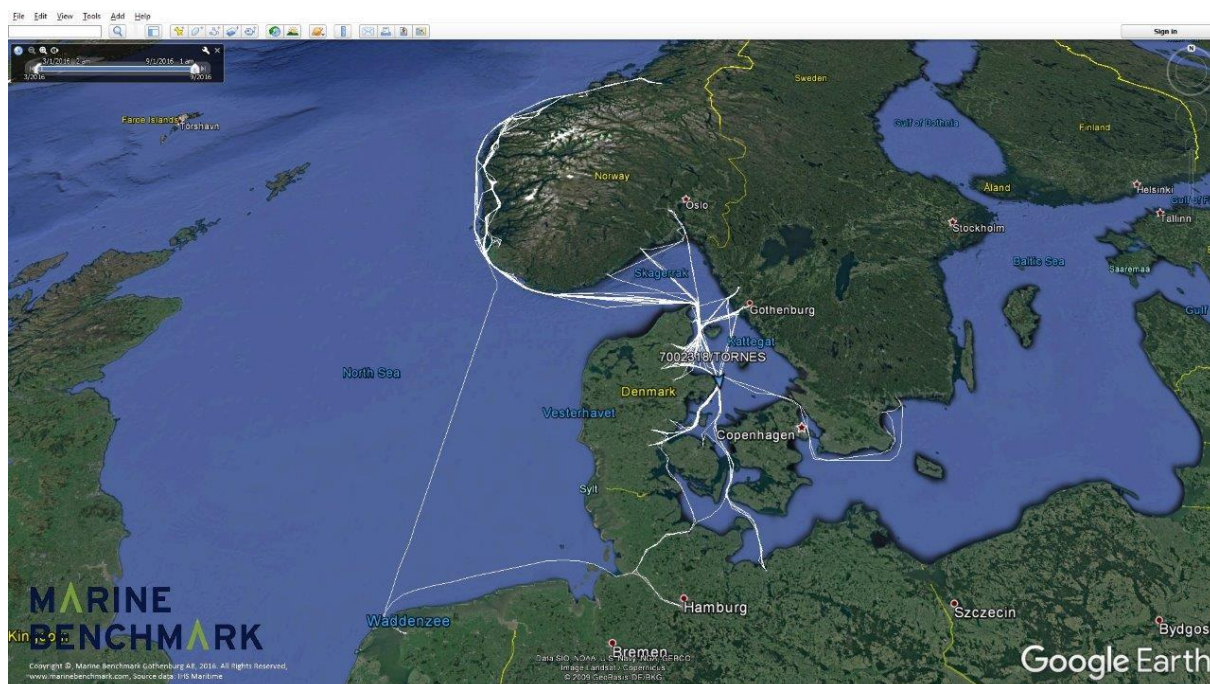
## APPENDIX III – TOP 25 VESSELS – ENGINE SIZE 600 - 900 kW

IMO	Current name	Vessel type	Fuel / day (kg)	Service speed	Propulsion power (kW)	Vessel beneficial owner	Vessel technical manager	Vessel operator
6721151	LOLA 1	Dry Cargo	846	10.1	662	Bulk Loaders AS	Karmoy Skipsconsult Management	Bulk Loaders AS
7002318	TORNES	Dry Cargo	938	11.0	748	Molde Sjøtransport AS	Torhus Shipping As	Torhus Shipping AS
7034969	KLEVSTRAND	Dry Cargo	1,097	10.5	883	Janus Andersen & Co A/S	Norresundby Rederi & Shipping	Norresundby Rederi & Shipping
8102476	RONEZ	Dry Cargo	1,226	10.0	730	SigmaRoc Plc	Ronez Ltd	SigmaGsy Ltd
8404458	FAST WIL	Dry Cargo	1,090	9.0	883	Fast Lines Belgium NV	Fast Baltic Sp Z Oo	Fast Lines Belgium NV
8505927	JEROME H	Dry Cargo	931	10.0	773	Helms Reederei KG	Hermann Lohmann Schifffahrts	Lohmann Bereederungen
8521490	ROVA	Dry Cargo	1,593	9.0	875	Rova Shipping GmbH & Co KG	Rova Shipping GmbH & Co Kg	Rova Shipping GmbH & Co KG
8711837	ZAPADNYY	Tanker	1,229	10.2	884	Status Shipping SA	Yugreftransflot Jsc-Rus	Yugreftransflot JSC-RUS
8713809	COPERNICUS	Tanker	1,037	10.5	748	World Logistics Ltd	Seatrans Ship Management As	Seatrans Chemical Tankers AS
8800157	HAVBRIS	Dry Cargo	944	10.5	748	Berge Rederi AS	Transmar As	Rimship
8912493	BAL BULK	Dry Cargo	1,164	11.5	748	Bal-Bulk	Bjerrum & Jensen Aps	Bal-Bulk
9015929	EEMS DELTA	Dry Cargo	868	9.0	745	Amasus Shipping BV	Shipowners Support Bv	Amasus Shipping BV
9030474	ISLAY TRADER	Dry Cargo	1,133	10.0	894	Faversham Ships Ltd	Faversham Ships Ltd	Faversham Ships Ltd
9120102	NOEST	Dry Cargo	1,042	11.0	748	Boomsma Shipping BV	Boomsma Shipping Bv	Boomsma Shipping BV
9155688	ALDEBARAN	Dry Cargo	1,125	9.5	750	Baltnautic Shipping Ltd	Baltnautic Shipping Ltd	Baltnautic Shipping Ltd
9195547	H&S BRAVERY	Dry Cargo	840	11.0	748	Amasus Shipping BV	Eems Werken Bv	Eems Werken BV
9330185	JANA	Tanker	971	11.0	736	Glusing R	Glusing Transport GmbH	Glusing Transport GmbH
9624811	LADY ANNA	Dry Cargo	1,066	10.0	745	Spliethoff's Bevrachtings BV	Wijnne & Barends Cargadoors	Wijnne & Barends Cargadoors
9624823	LADY ANNEKE	Dry Cargo	927	10.0	745	Spliethoff's Bevrachtings BV	Wijnne & Barends Cargadoors	Wijnne & Barends Cargadoors
9624835	LADY ALEXANDRA	Dry Cargo	1,078	10.0	745	Spliethoff's Bevrachtings BV	Wijnne & Barends Cargadoors	Wijnne & Barends Cargadoors
9624847	LADY AMALIA	Dry Cargo	1,012	10.0	745	Spliethoff's Bevrachtings BV	Wijnne & Barends Cargadoors	Wijnne & Barends Cargadoors
9624859	LADY ADELE	Dry Cargo	975	10.0	745	Spliethoff's Bevrachtings BV	Wijnne & Barends Cargadoors	Wijnne & Barends Cargadoors
9624861	LADY AMI	Dry Cargo	966	10.0	745	Spliethoff's Bevrachtings BV	Wijnne & Barends Cargadoors	Wijnne & Barends Cargadoors
9760366	LADY ARIANE	Dry Cargo	1,402	10.0	745	Spliethoff's Bevrachtings BV	Wijnne & Barends Cargadoors	Scotline Ltd
9760378	LADY ARIETTE	Dry Cargo	920	10.0	745	Spliethoff's Bevrachtings BV	Wijnne & Barends Cargadoors	Wijnne & Barends Cargadoors

6721151-LOLA 1, 846 kg fuel/day, 838 dwt, 662 kW, Grenaa / 6FR24TK  
 Dry Cargo vessel, Owner: Bulk Loaders AS

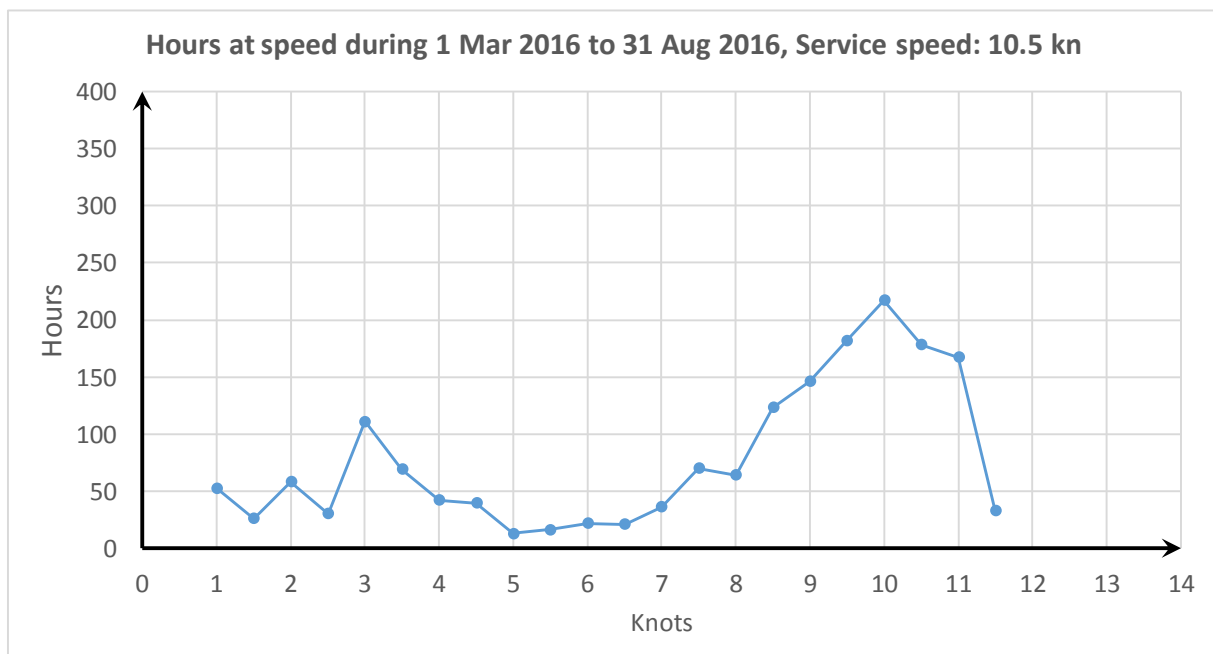
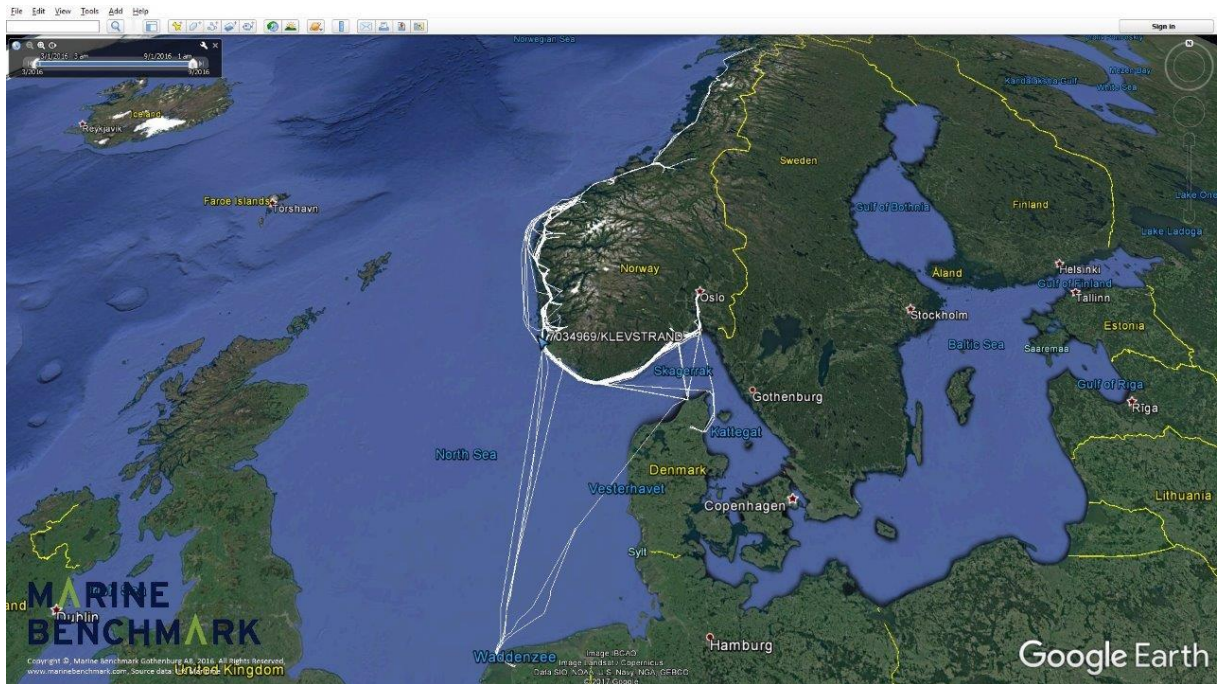


7002318-TORNES, 938 kg fuel/day, 925 dwt, 748 kW, MaK / 6M20  
 Dry Cargo vessel, Owner: Molde Sjøtransport AS

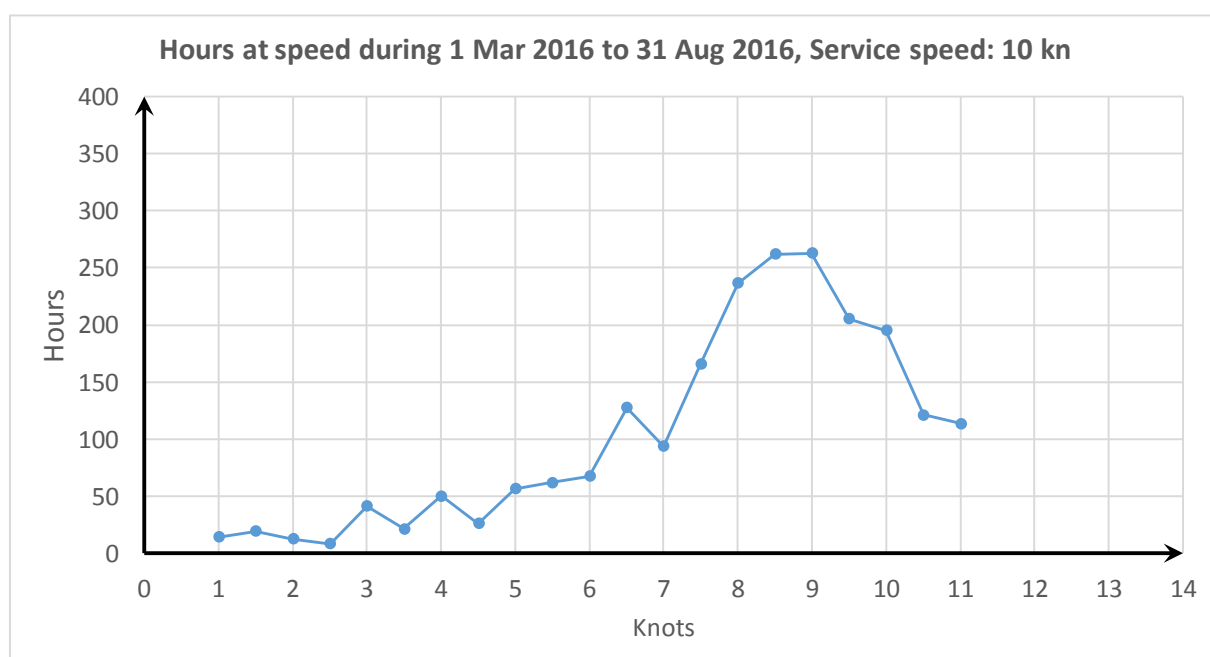
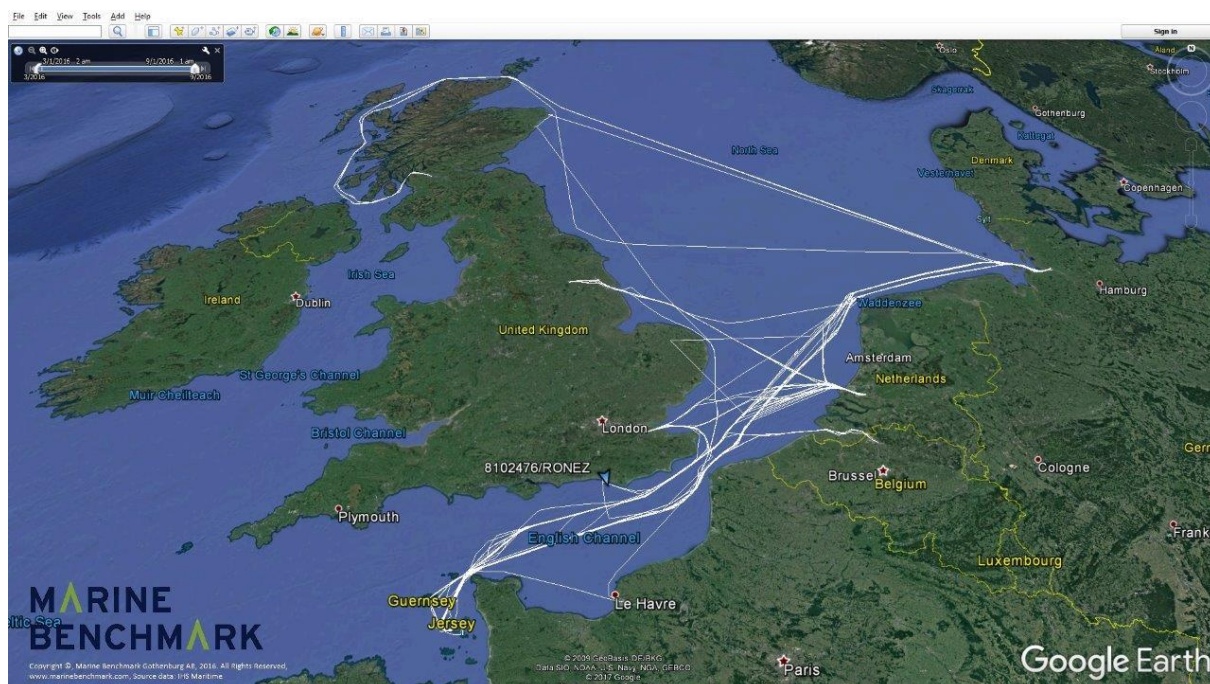




7034969-KLEVSTRAND, 1097 kg fuel/day, 1016 dwt, 883 kW, MaK / 6M451AK  
 Dry Cargo vessel, Owner: Janus Andersen & Co A/S

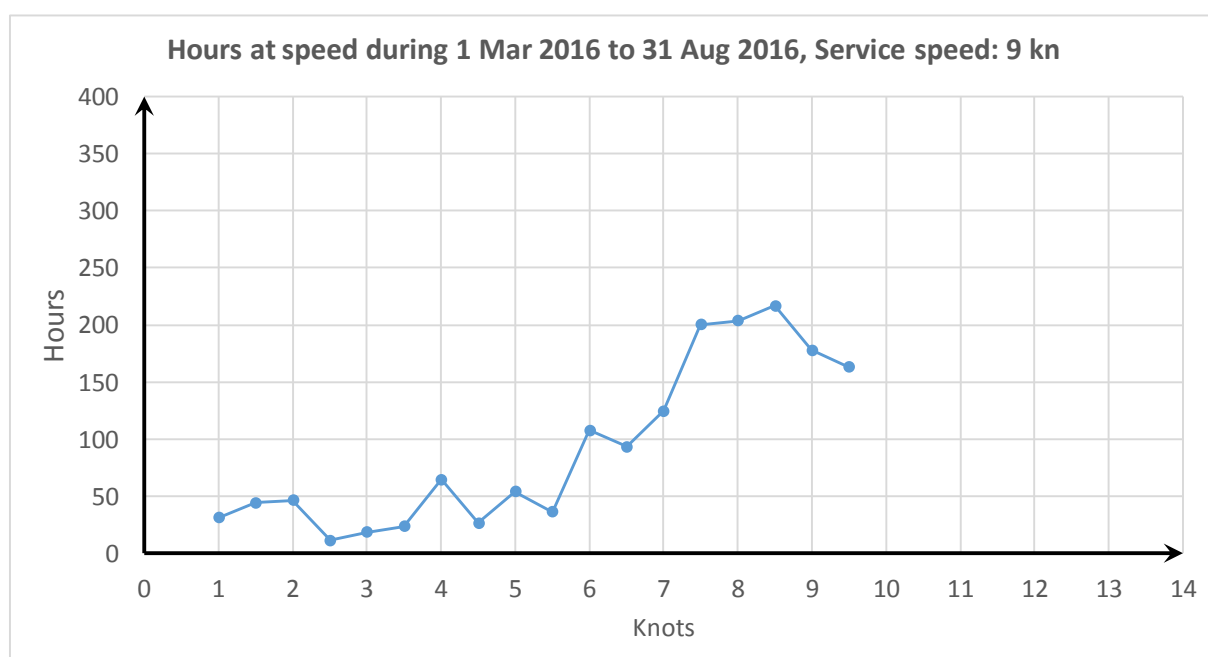
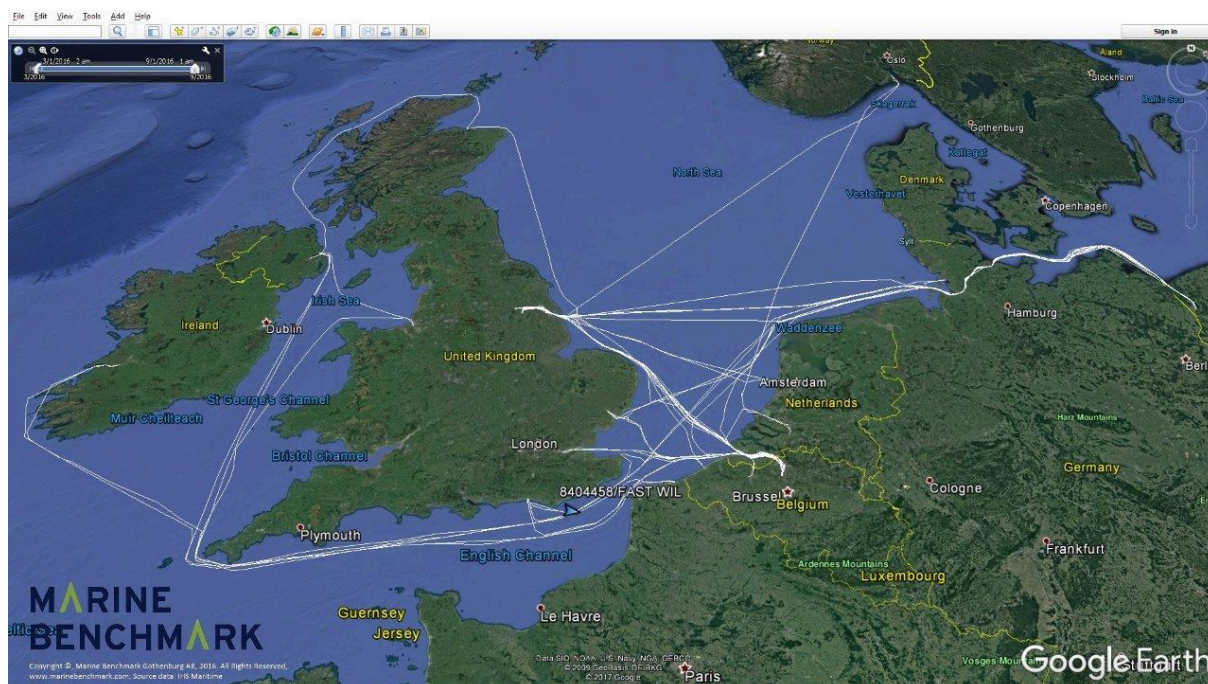


8102476-RONEZ, 1226 kg fuel/day, 1117 dwt, 730 kW, Kromhout / 6F/SW240  
 Dry Cargo vessel, Owner: SigmaRoc Plc



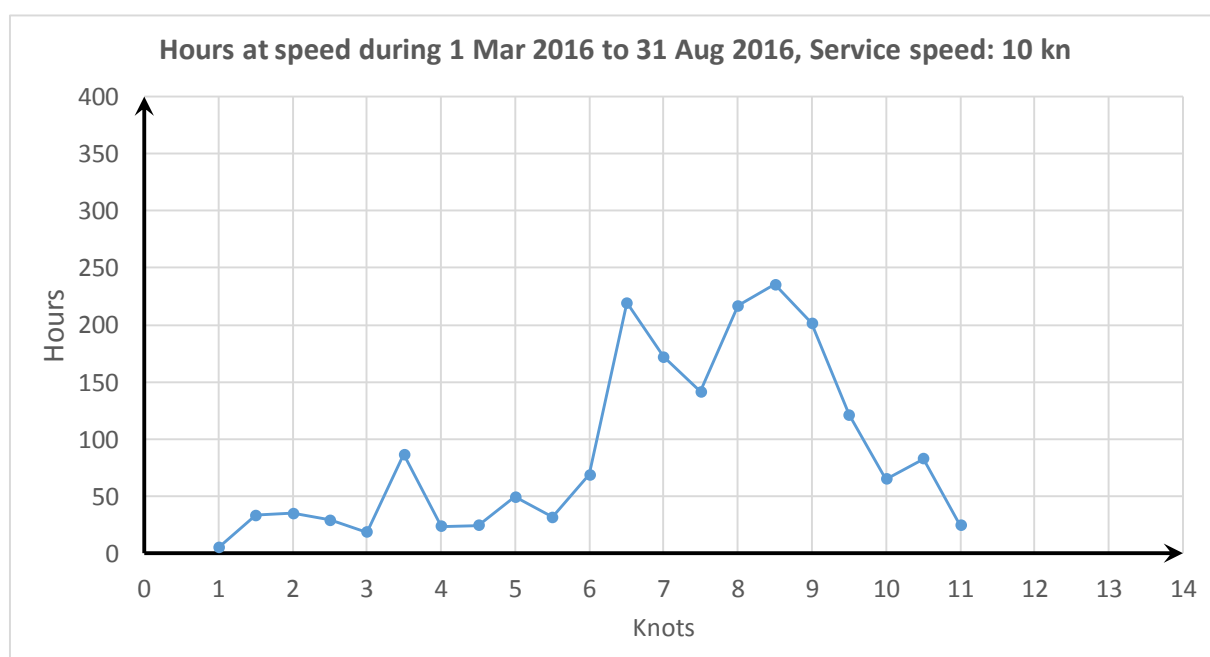
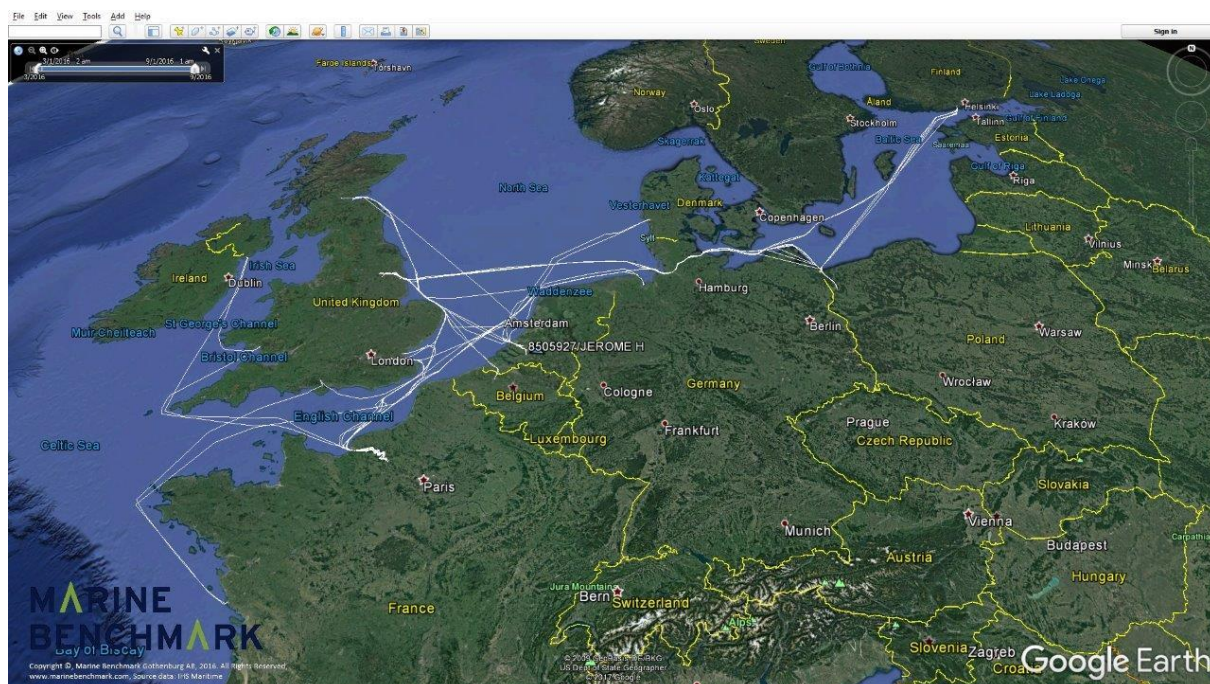


8404458-FAST WIL, 1090 kg fuel/day, 2285 dwt, 883 kW, Deutz / SBV6M628  
 Dry Cargo vessel, Owner: Fast Lines Belgium NV

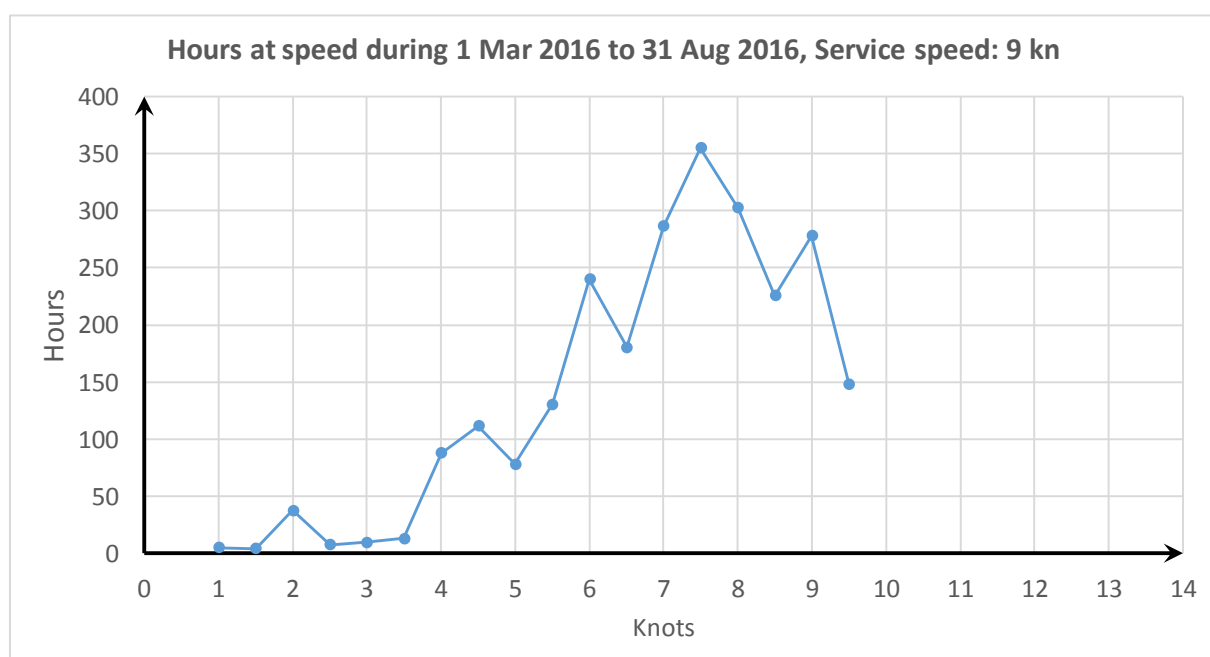
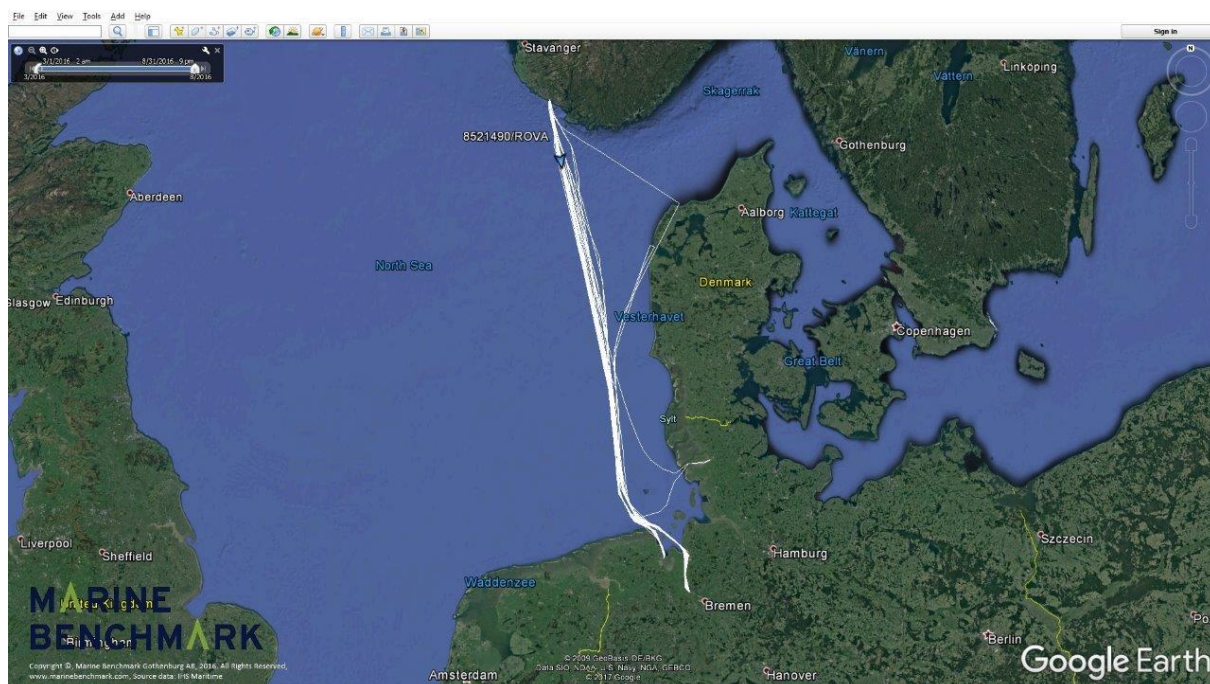




8505927-JEROME H, 931 kg fuel/day, 1741 dwt, 773 kW, MWM / TBD440-6  
 Dry Cargo vessel, Owner: Helms Reederei KG

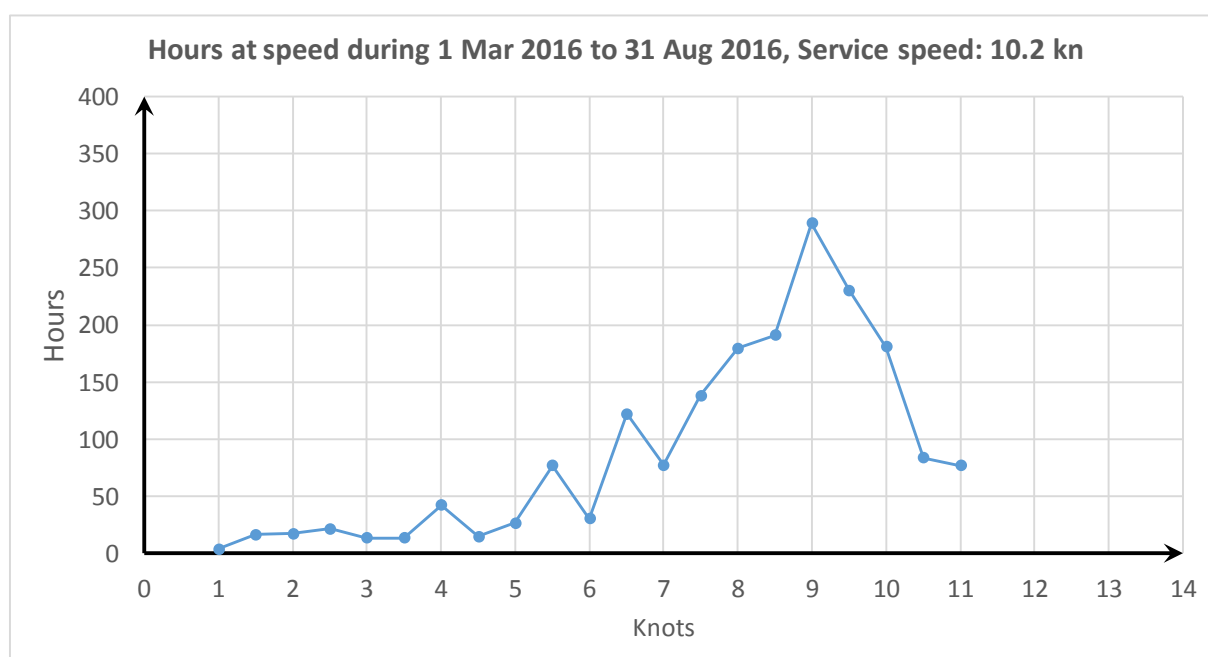
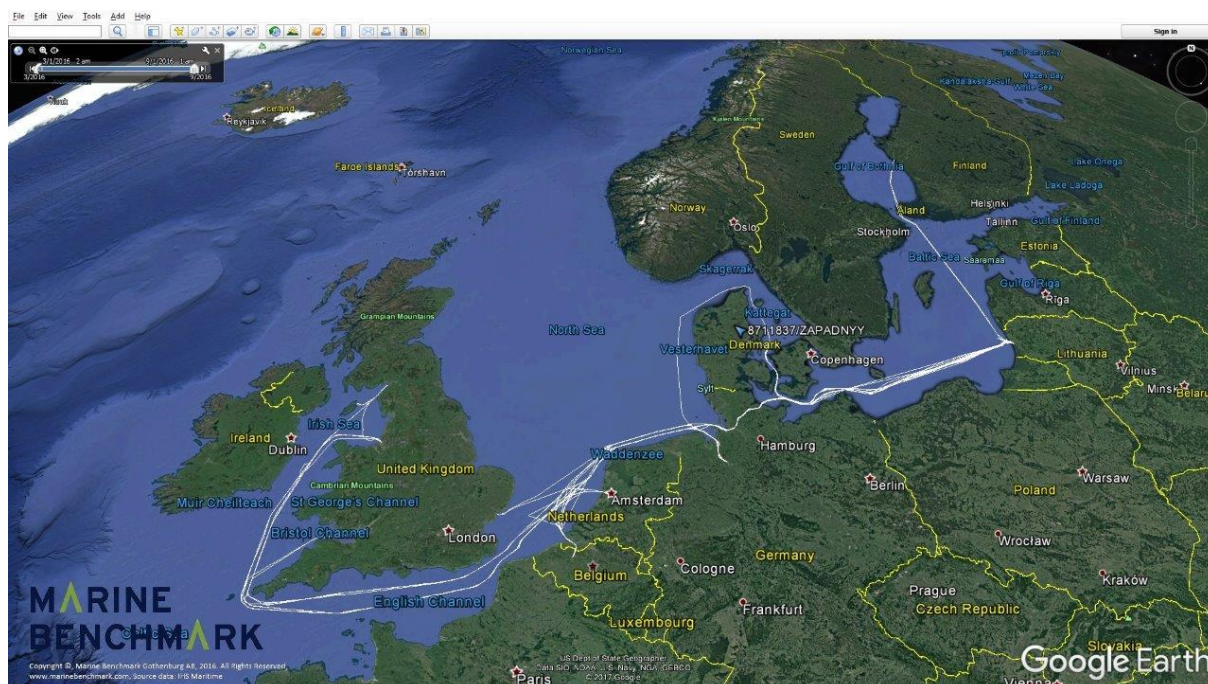


8521490-ROVA, 1593 kg fuel/day, 2798 dwt, 875 kW, Caterpillar / 3512TA  
 Dry Cargo vessel, Owner: Rova Shipping GmbH & Co KG



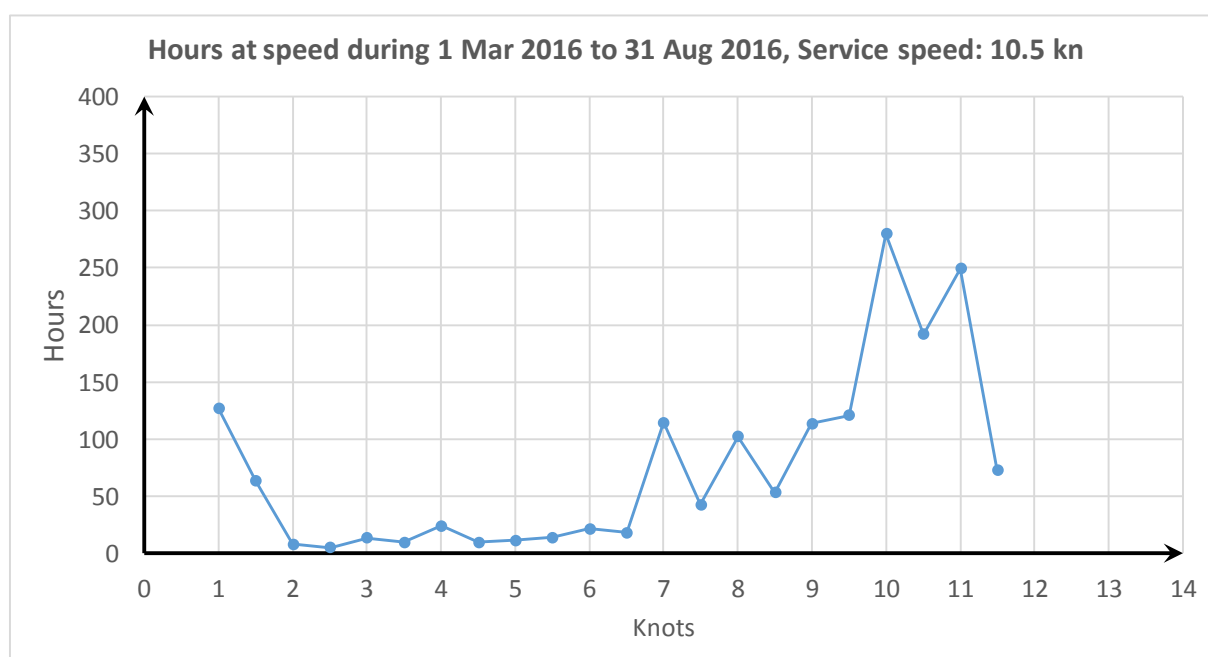
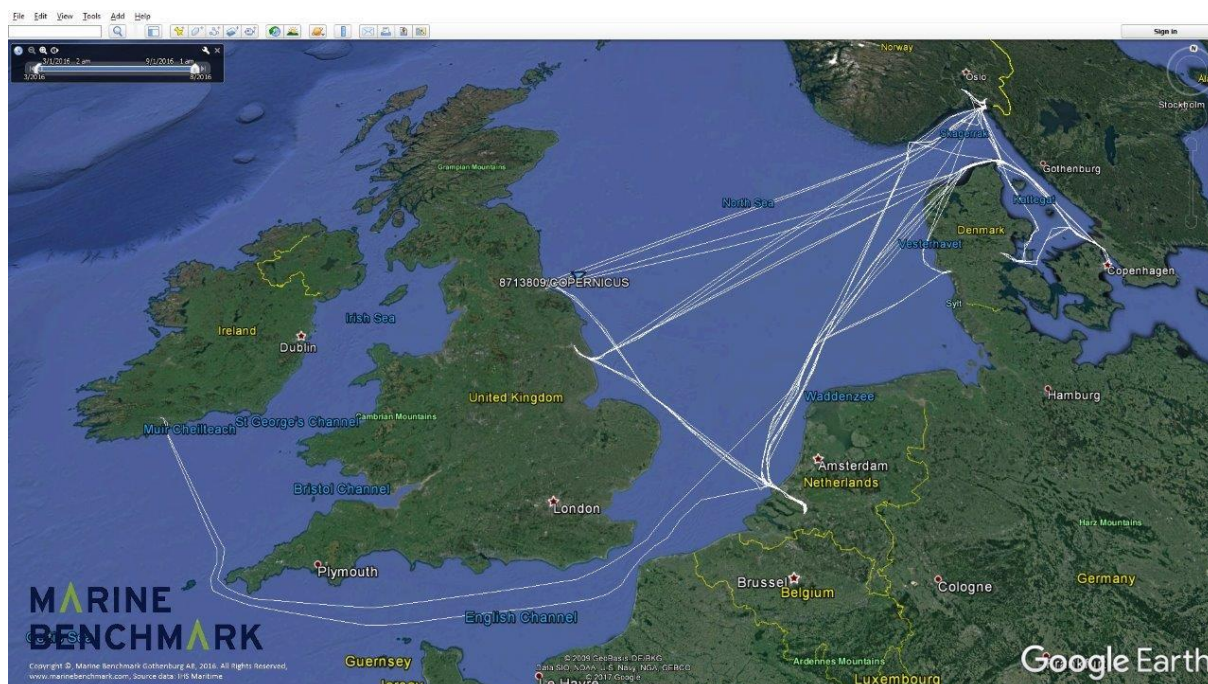


8711837-ZAPADNYY, 1229 kg fuel/day, 3297 dwt, 884 kW, S.K.L. / 8NVD48A-2U  
 Tanker vessel, Owner: Status Shipping SA

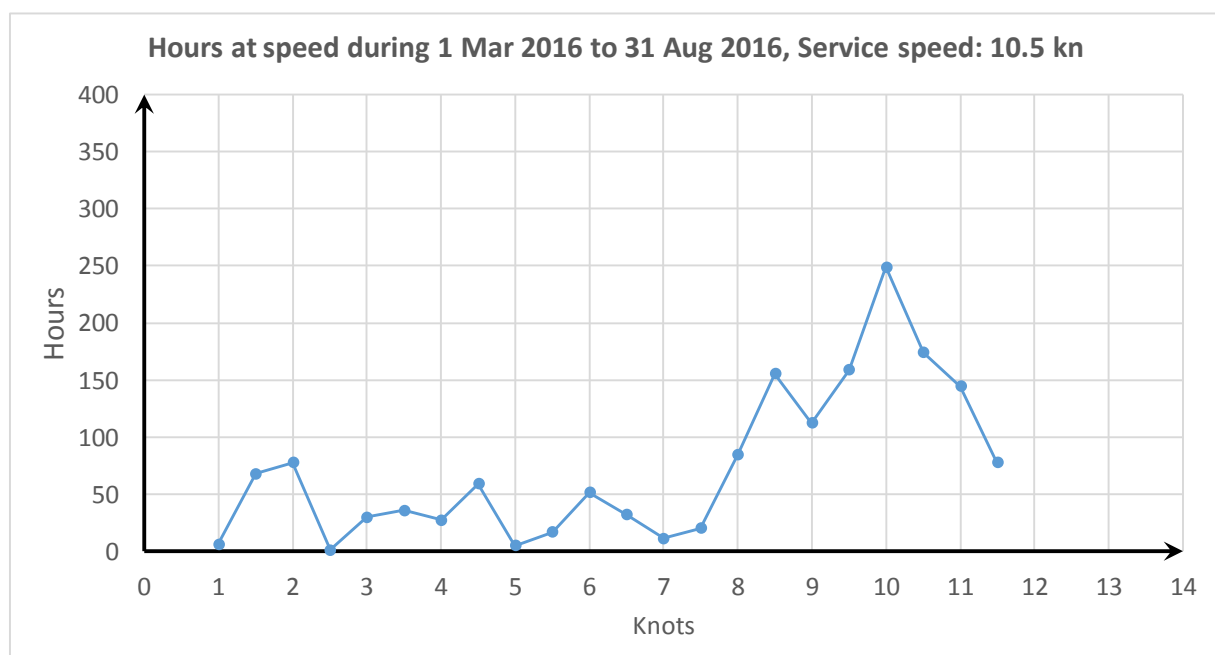
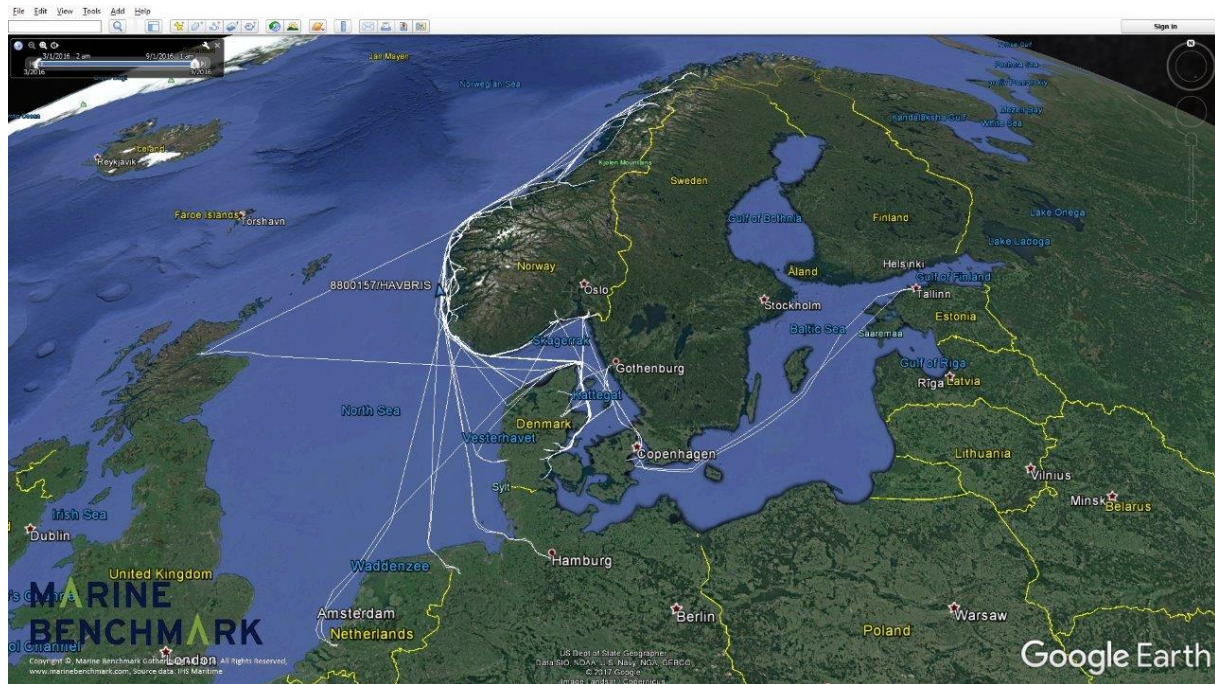




8713809-COPERNICUS, 1037 kg fuel/day, 2181 dwt, 748 kW, MaK / 6M332AK  
 Tanker vessel, Owner: World Logistics Ltd

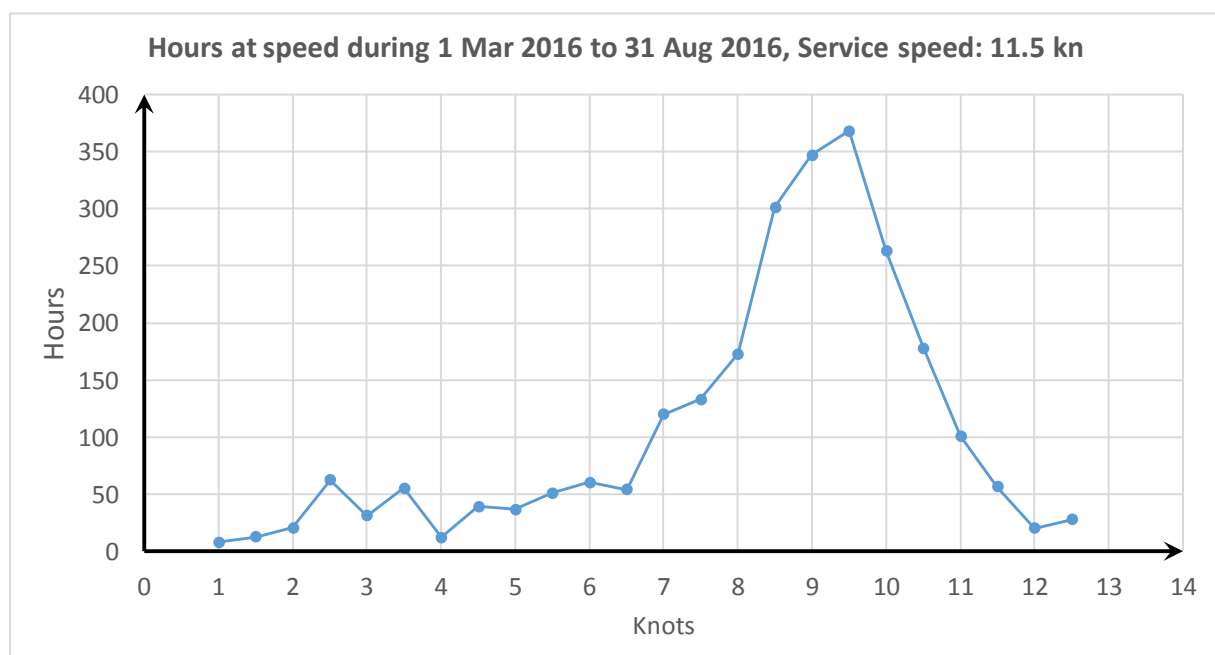
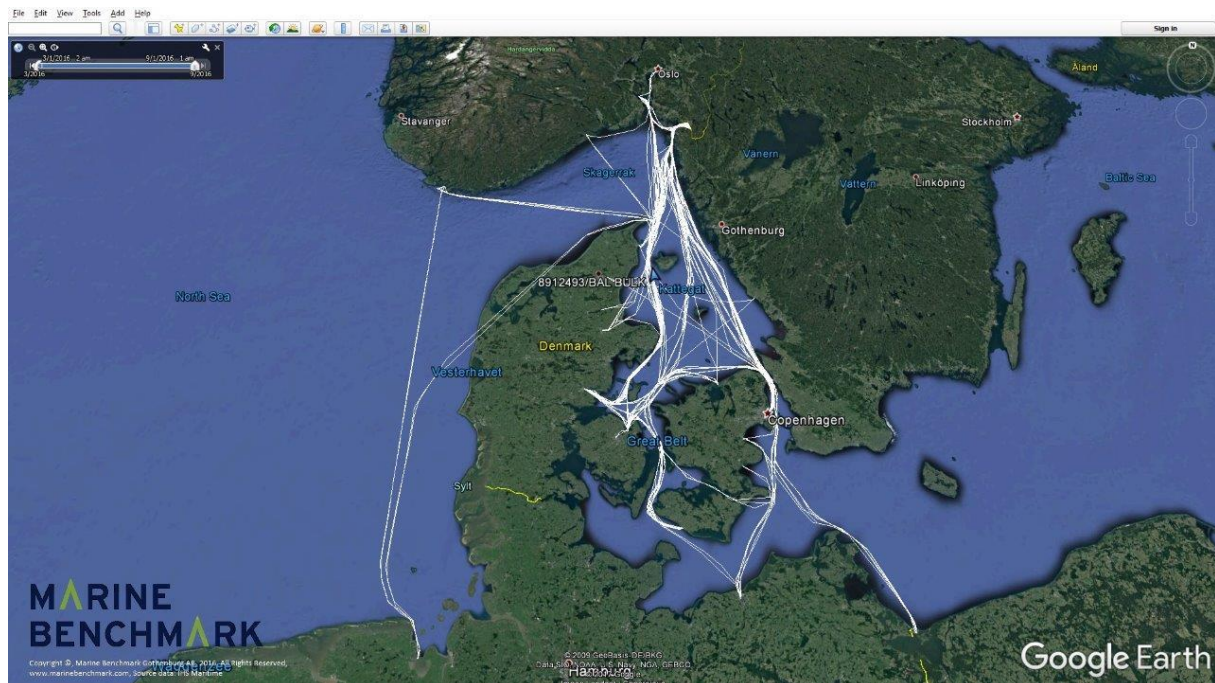


8800157-HAVBRIS, 944 kg fuel/day, 2179 dwt, 748 kW, MaK / 6M332AK  
 Dry Cargo vessel, Owner: Berge Rederi AS



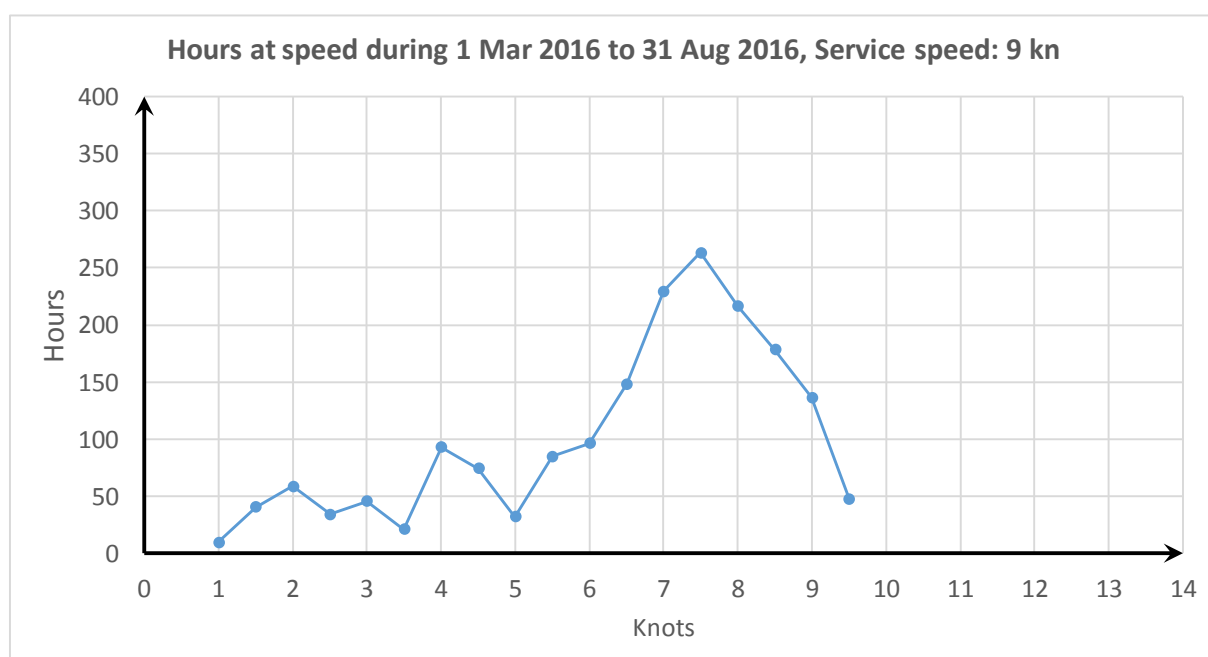
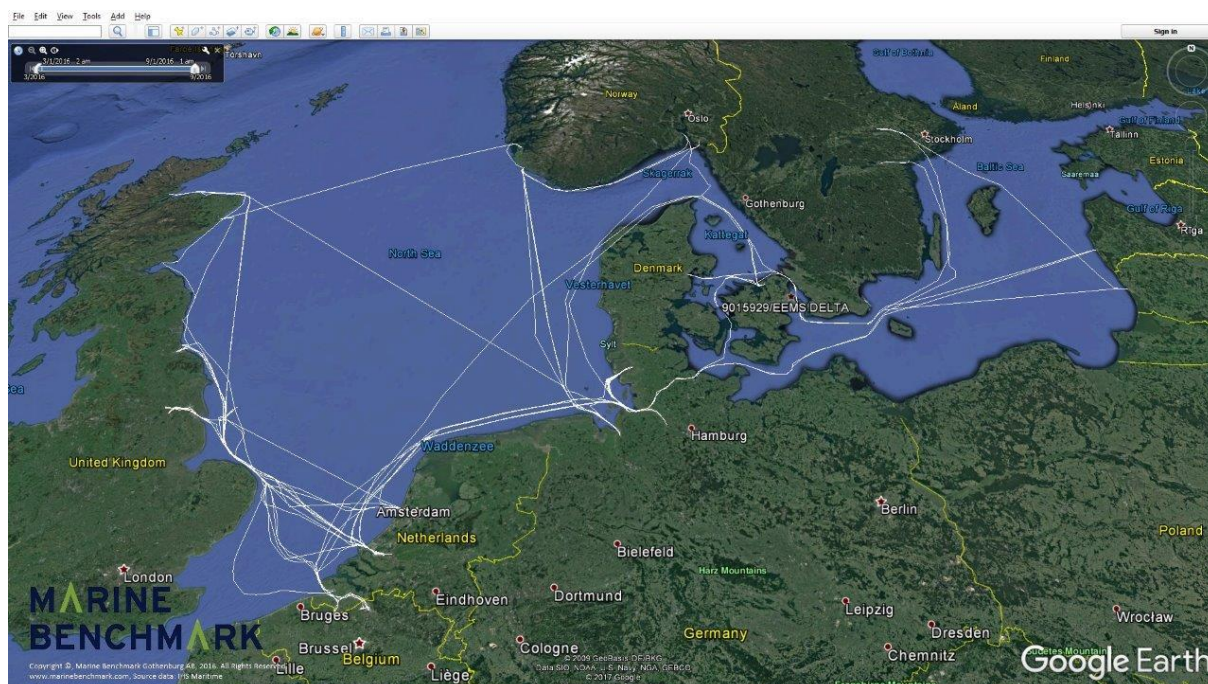


8912493-BAL BULK, 1164 kg fuel/day, 2165 dwt, 748 kW, MaK / 6M332AK  
 Dry Cargo vessel, Owner: Bal-Bulk

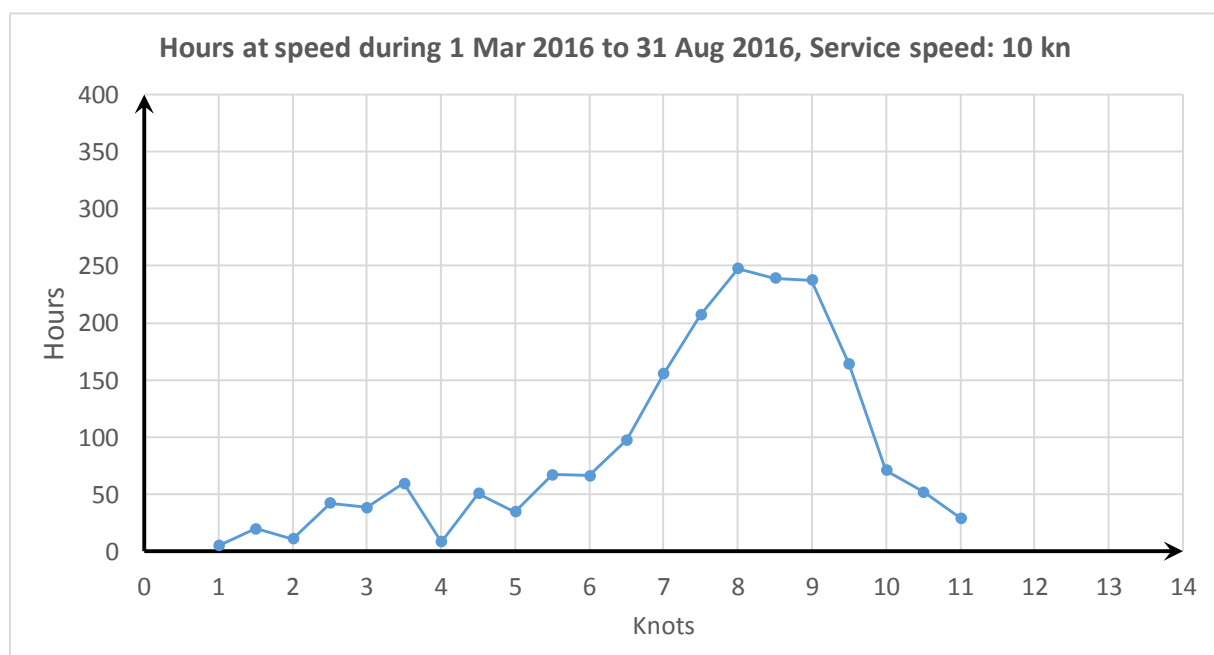
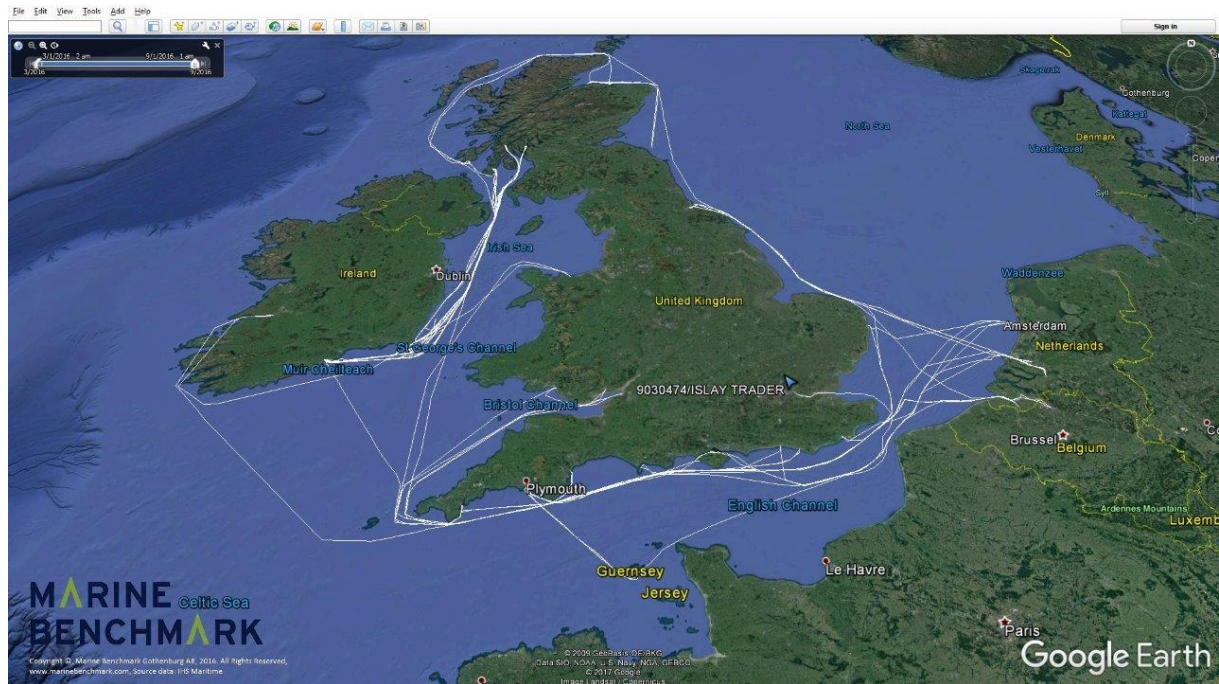




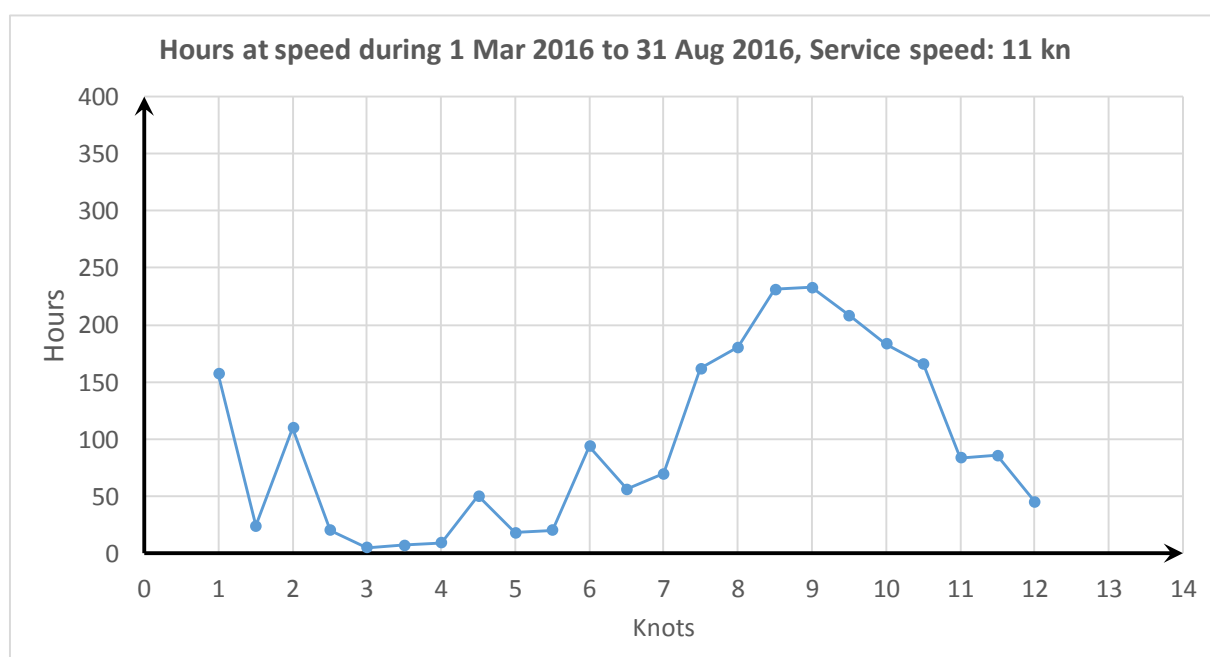
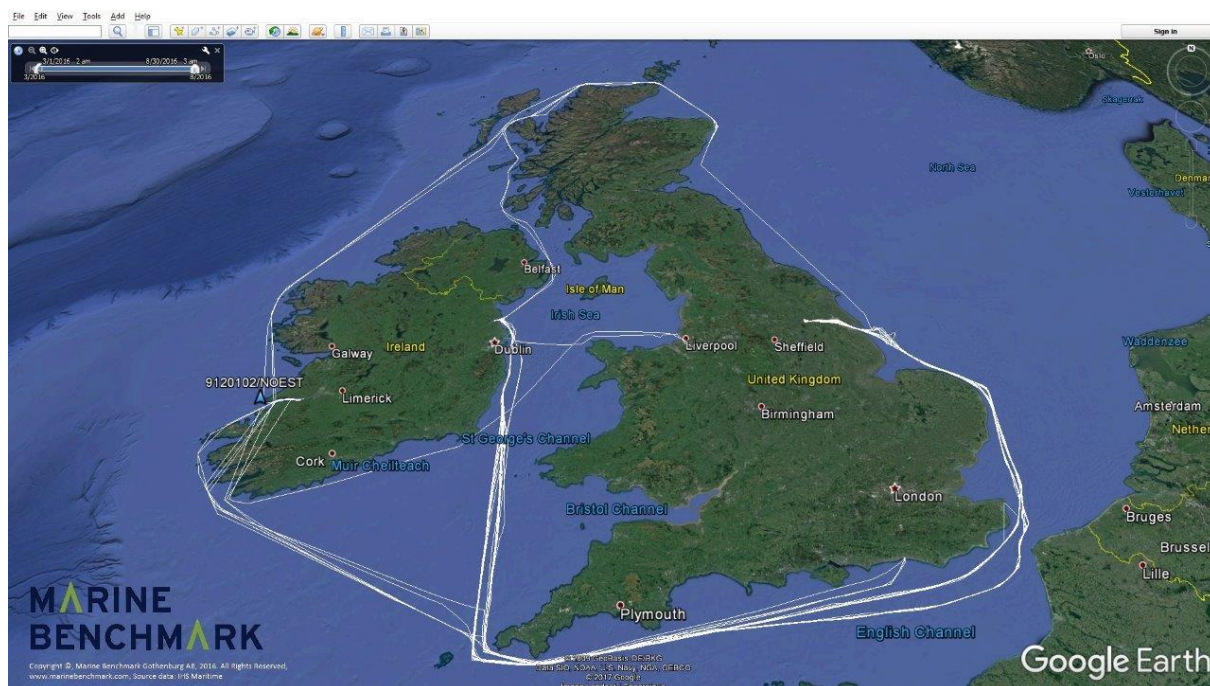
9015929-EEMS DELTA, 868 kg fuel/day, 1739 dwt, 745 kW, Cummins / KTA-19-M  
 Dry Cargo vessel, Owner: Amasus Shipping BV



9030474-ISLAY TRADER, 1133 kg fuel/day, 2386 dwt, 894 kW, Cummins / KT-19-M3  
 Dry Cargo vessel, Owner: Faversham Ships Ltd

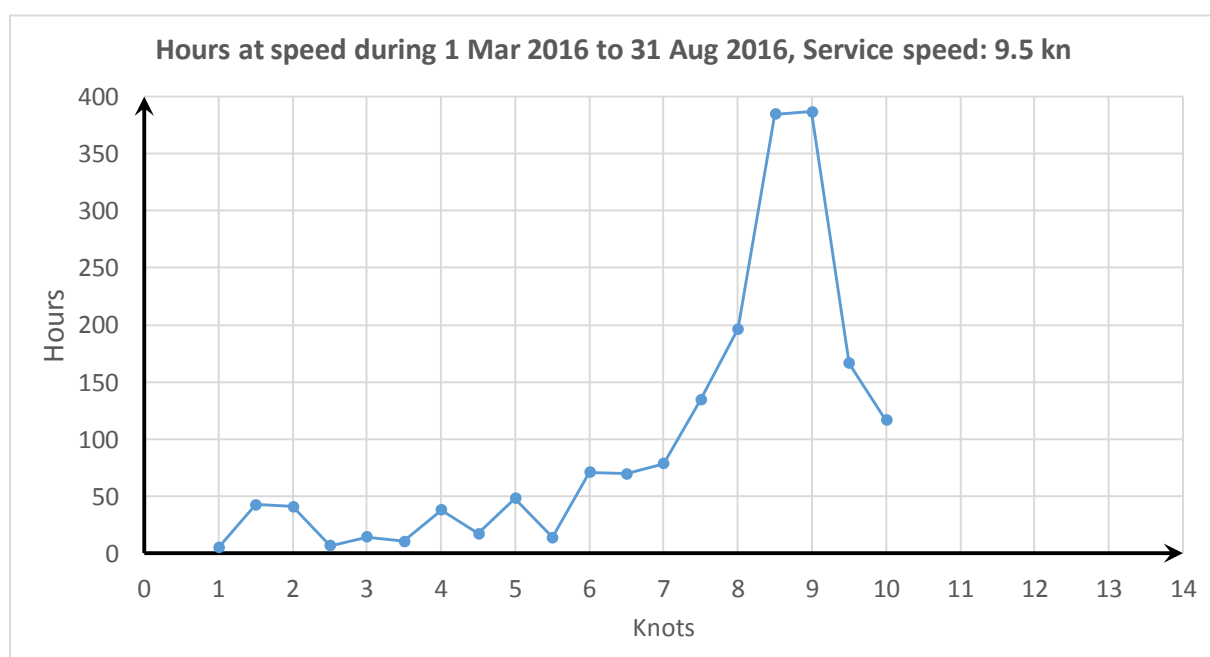
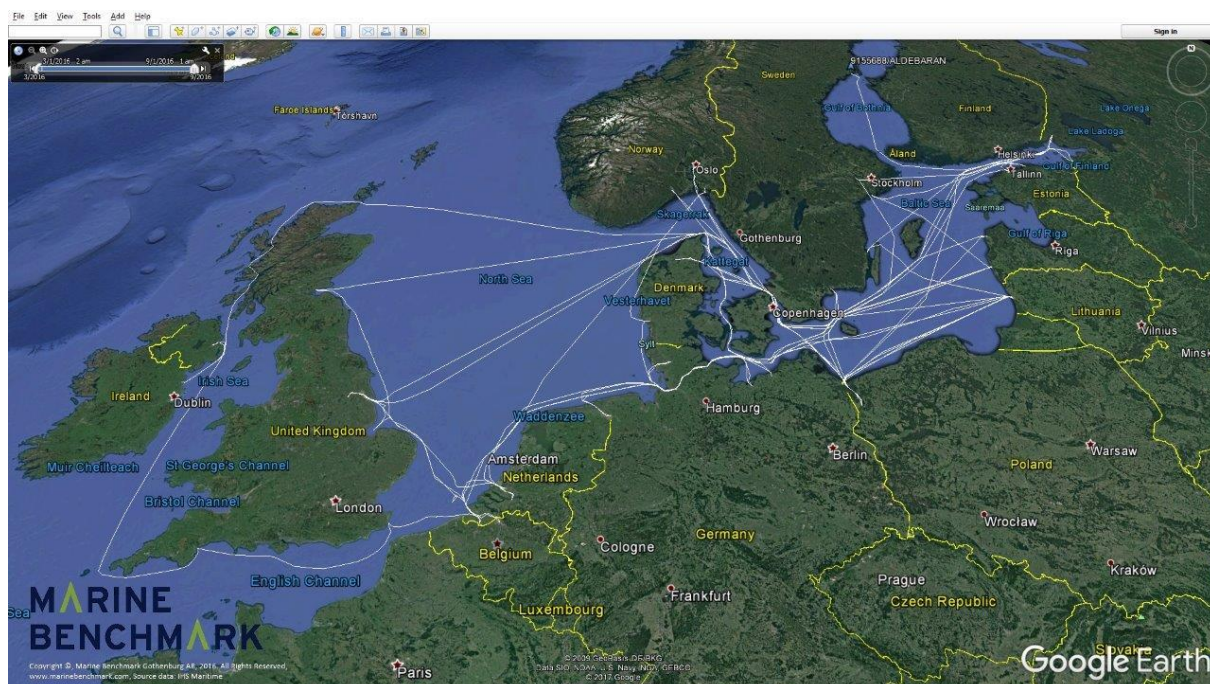


9120102-NOEST, 1042 kg fuel/day, 2335 dwt, 748 kW, A.B.C. / 6DZC  
 Dry Cargo vessel, Owner: Boomsma Shipping BV

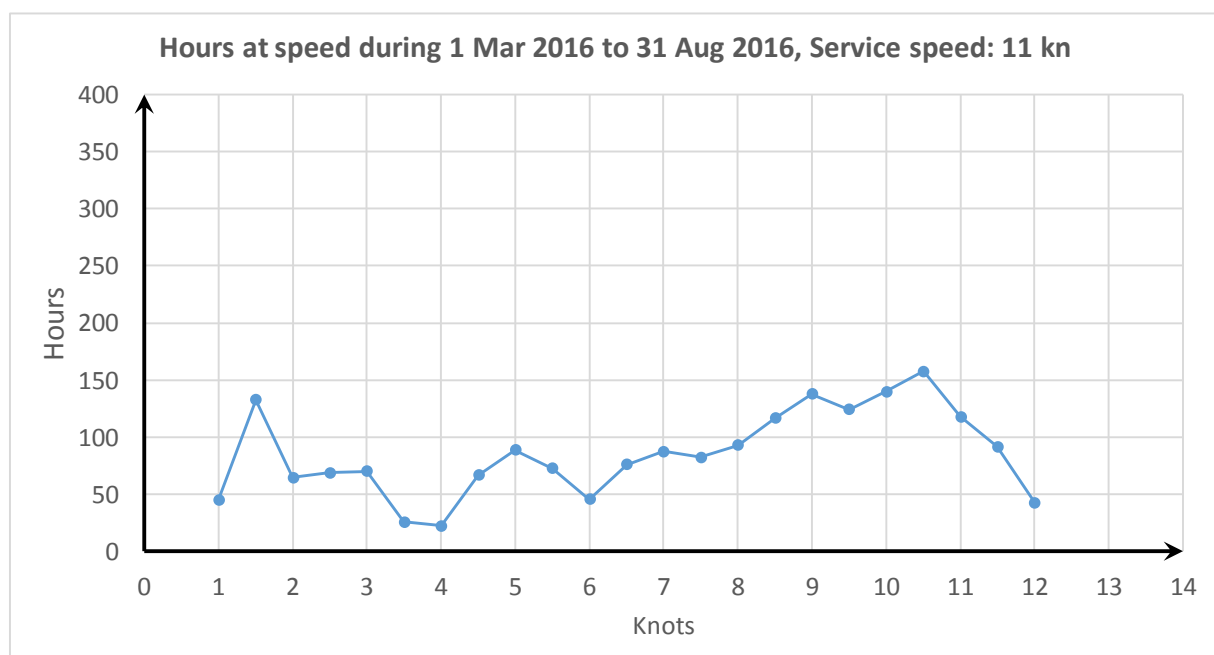
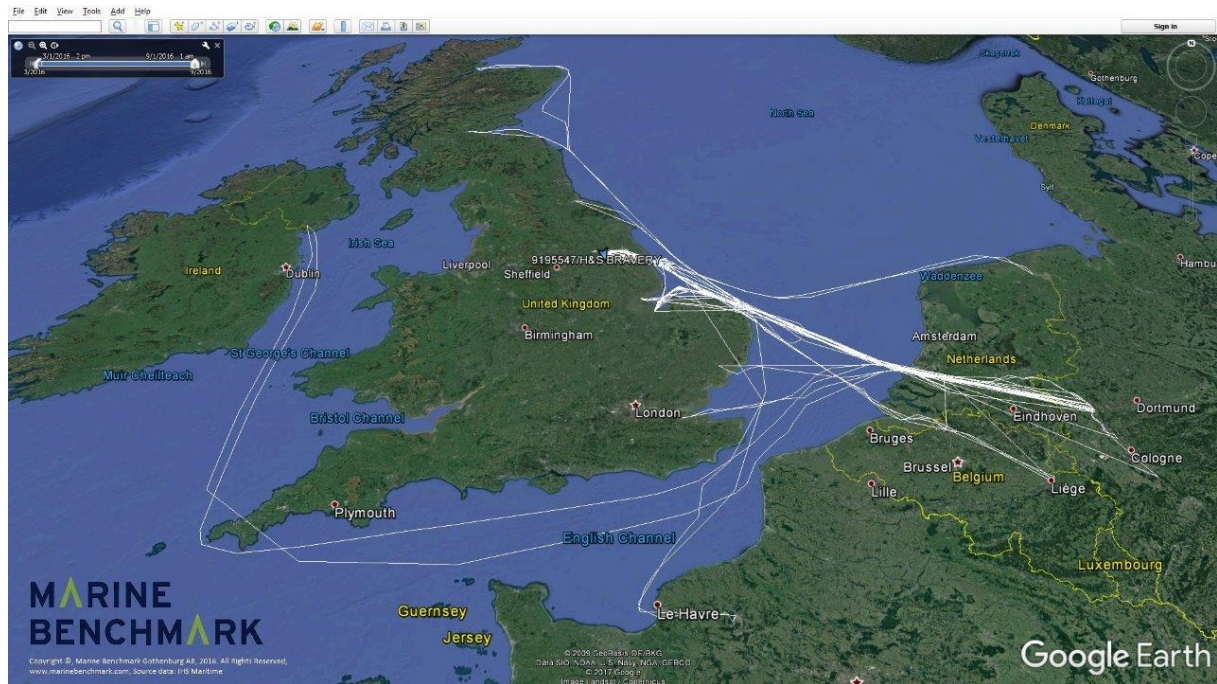




9155688-ALDEBARAN, 1125 kg fuel/day, 2270 dwt, 750 kW, Deutz / SBV6M628  
 Dry Cargo vessel, Owner: Baltnautic Shipping Ltd

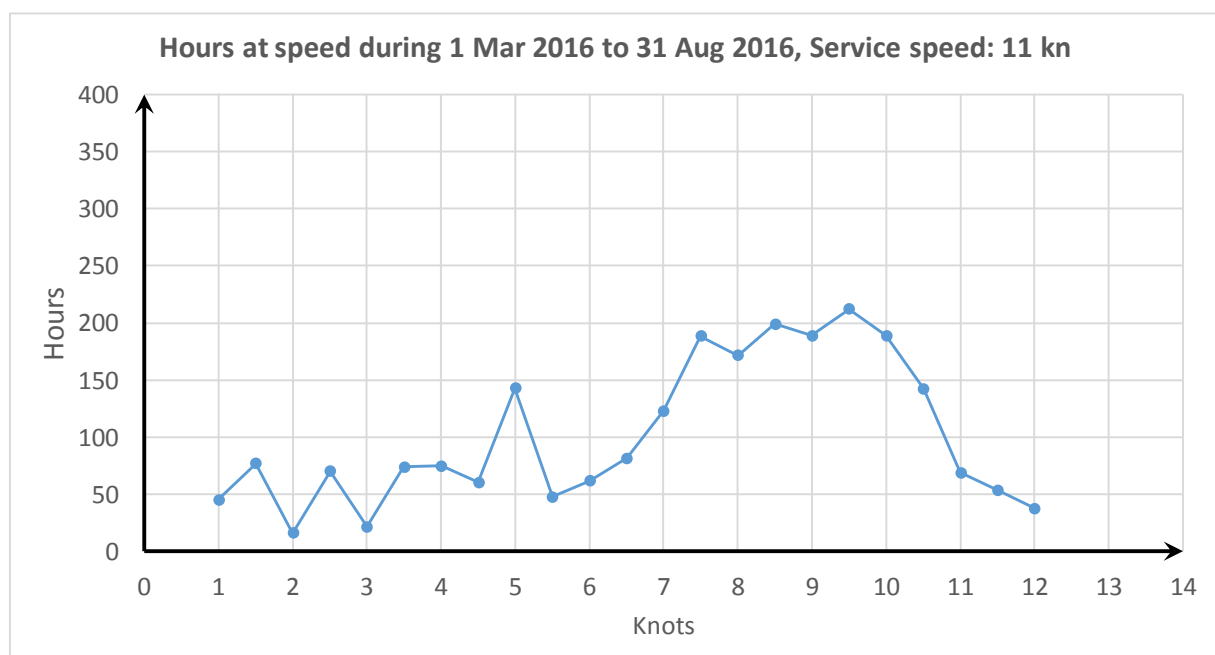
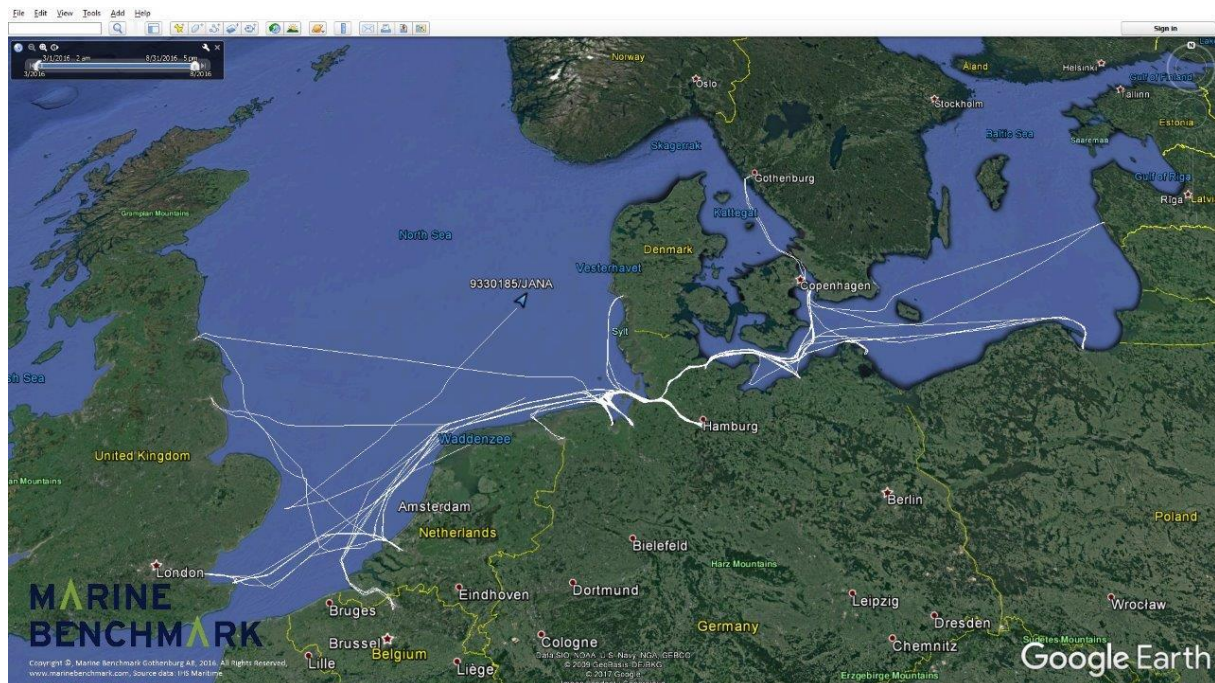


9195547-H&S BRAVERY, 840 kg fuel/day, 1864 dwt, 748 kW, Caterpillar / 3512B-TA  
Dry Cargo vessel, Owner: Amasus Shipping BV



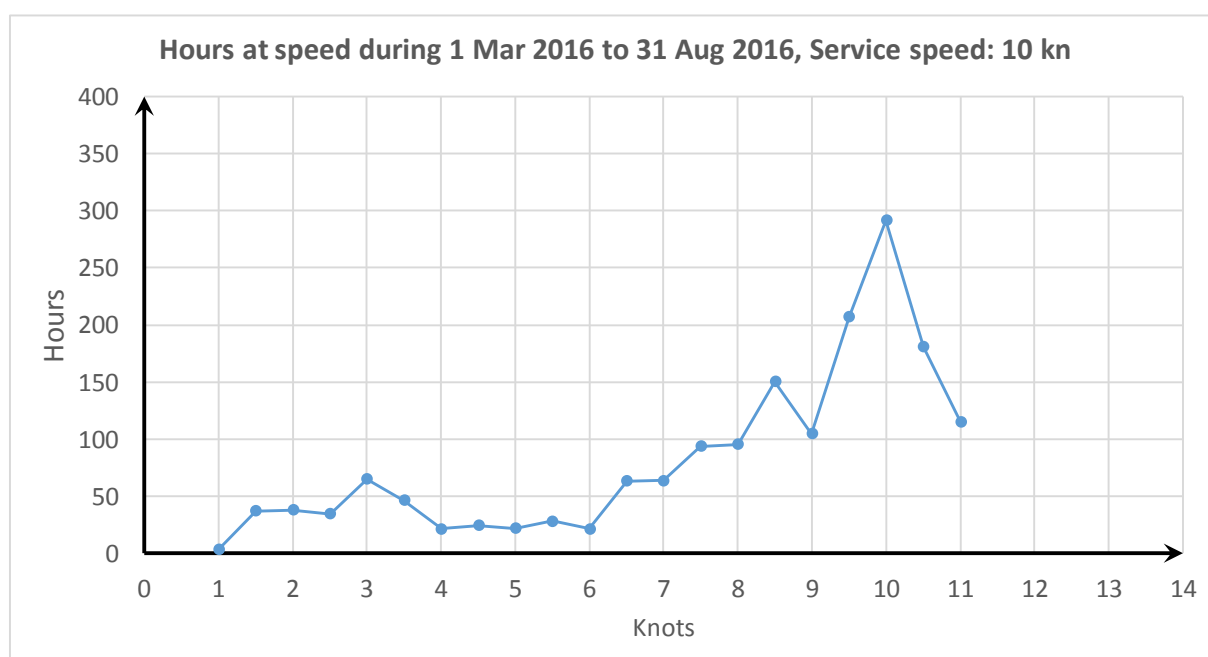
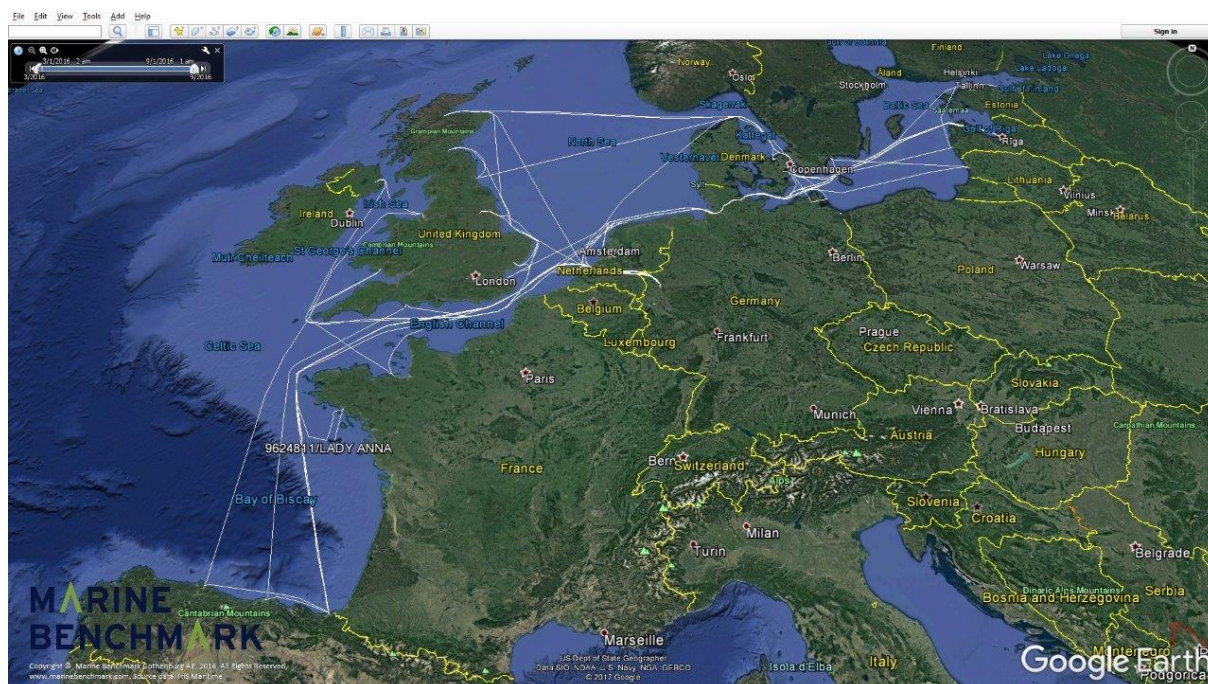


9330185-JANA, 971 kg fuel/day, 1323 dwt, 736 kW, MAN-B&W / 6L23/30A  
 Tanker vessel, Owner: Glusing R

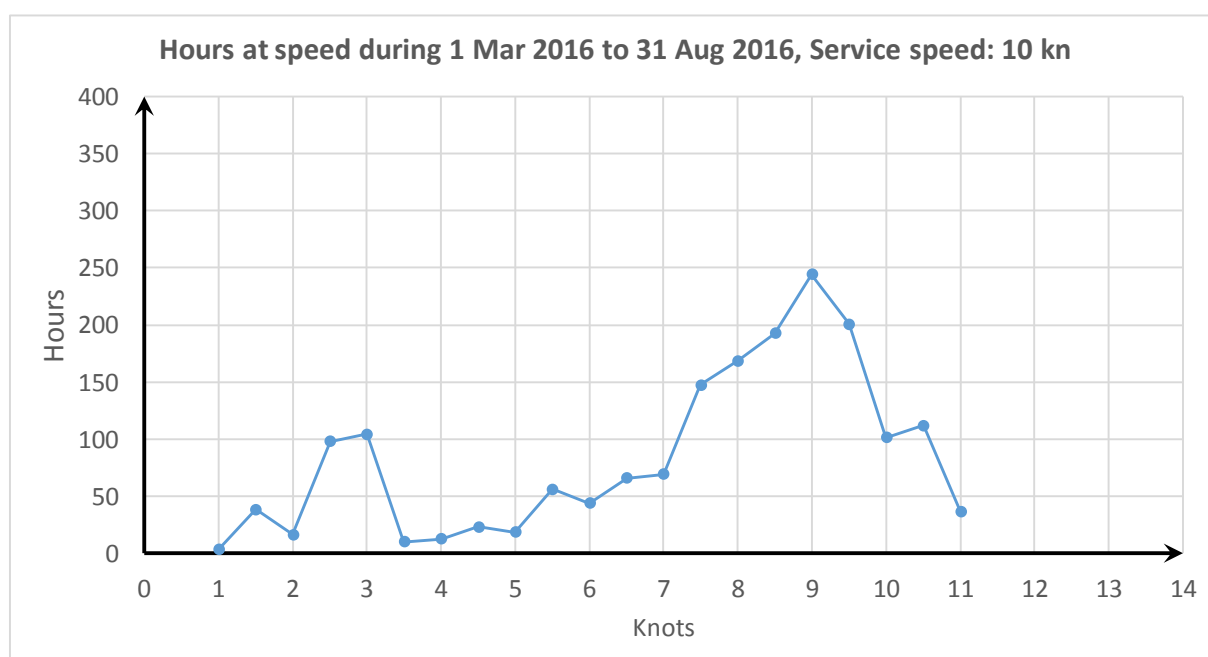
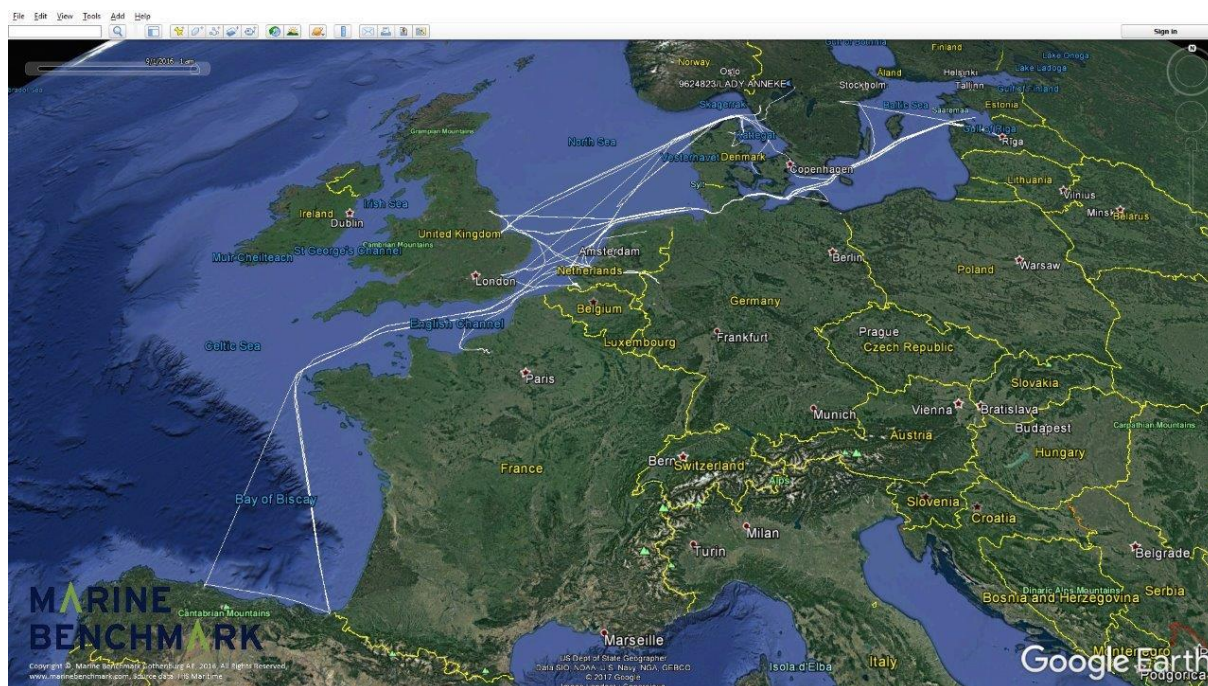




9624811-LADY ANNA, 1066 kg fuel/day, 3700 dwt, 745 kW, Caterpillar / 3508TA  
 Dry Cargo vessel, Owner: Spliethoff's Bevrachtings BV

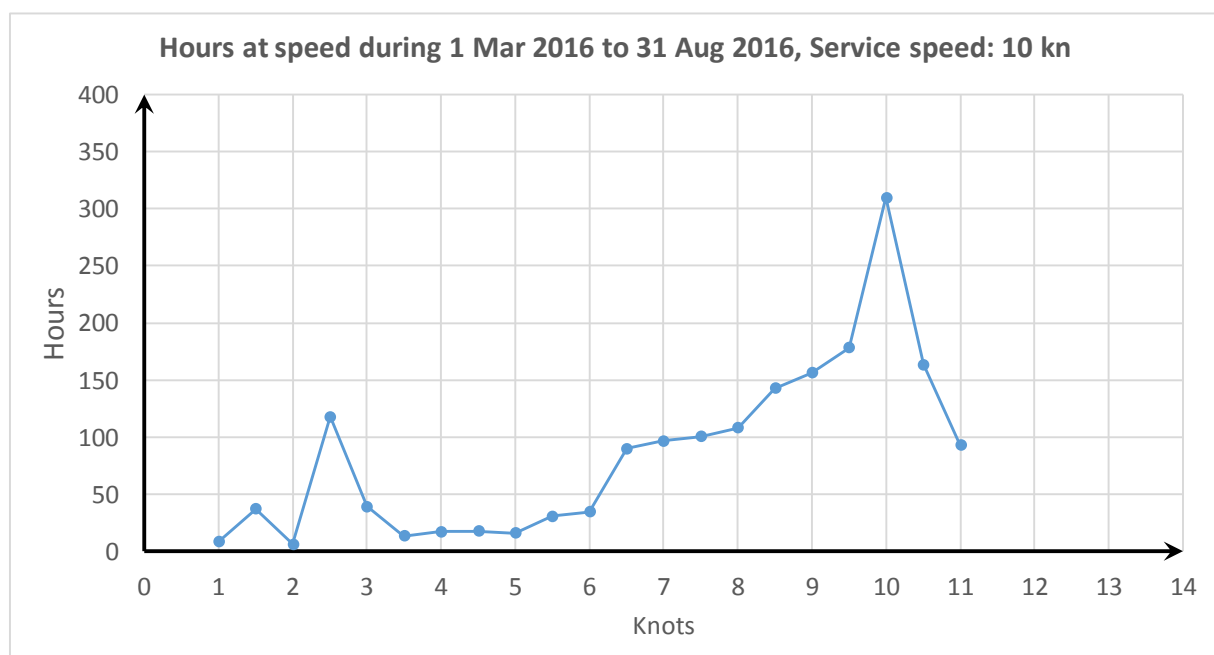
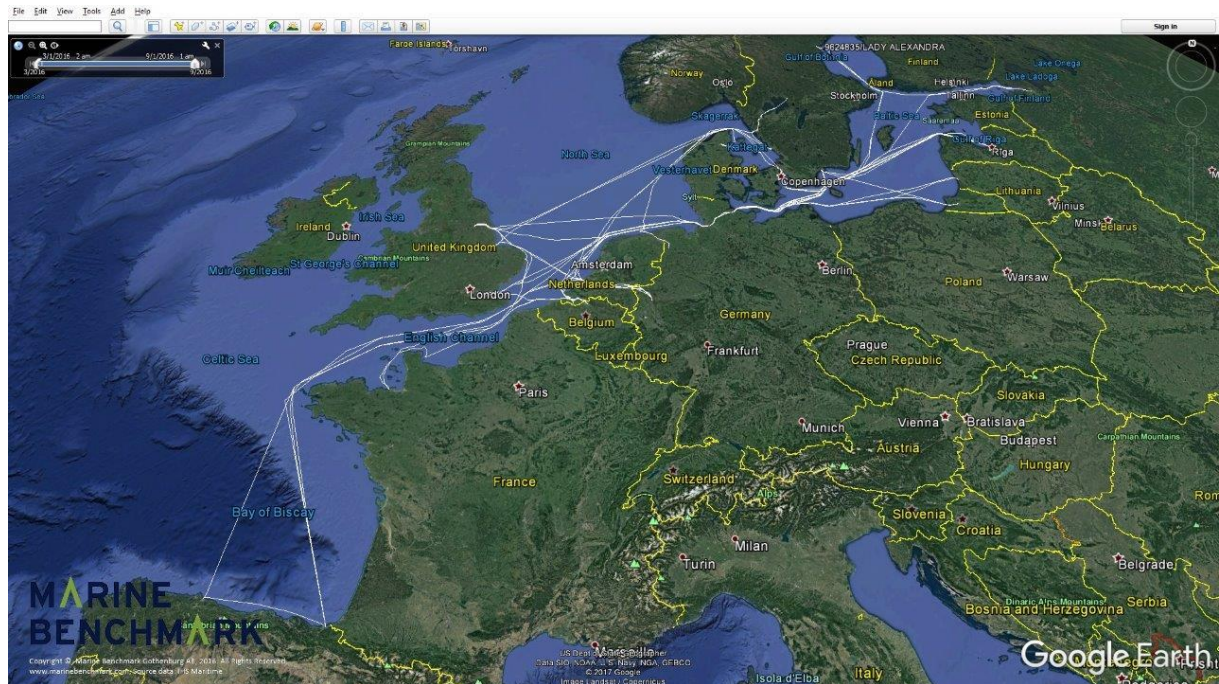


9624823-LADY ANNEKE, 927 kg fuel/day, 3718 dwt, 745 kW, Caterpillar / 3508TA  
 Dry Cargo vessel, Owner: Spliethoff's Bevrachtings BV



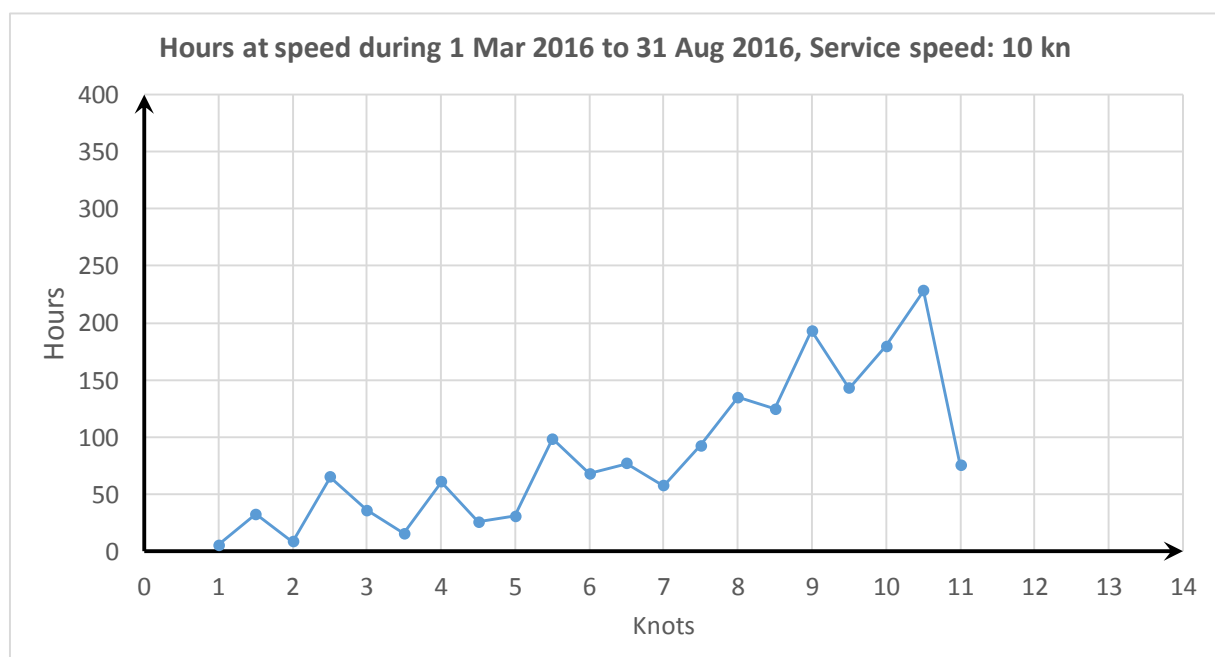
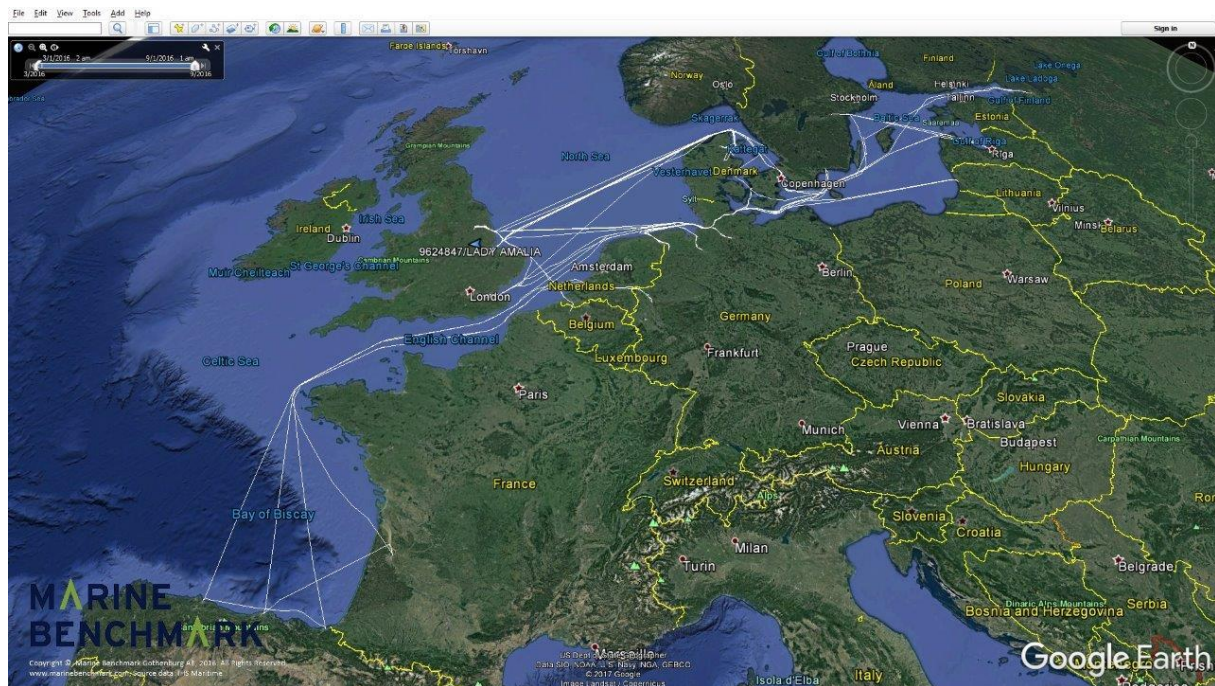


9624835-LADY ALEXANDRA, 1078 kg fuel/day, 3700 dwt, 745 kW, Caterpillar / 3508TA  
 Dry Cargo vessel, Owner: Spliethoff's Bevrachtings BV

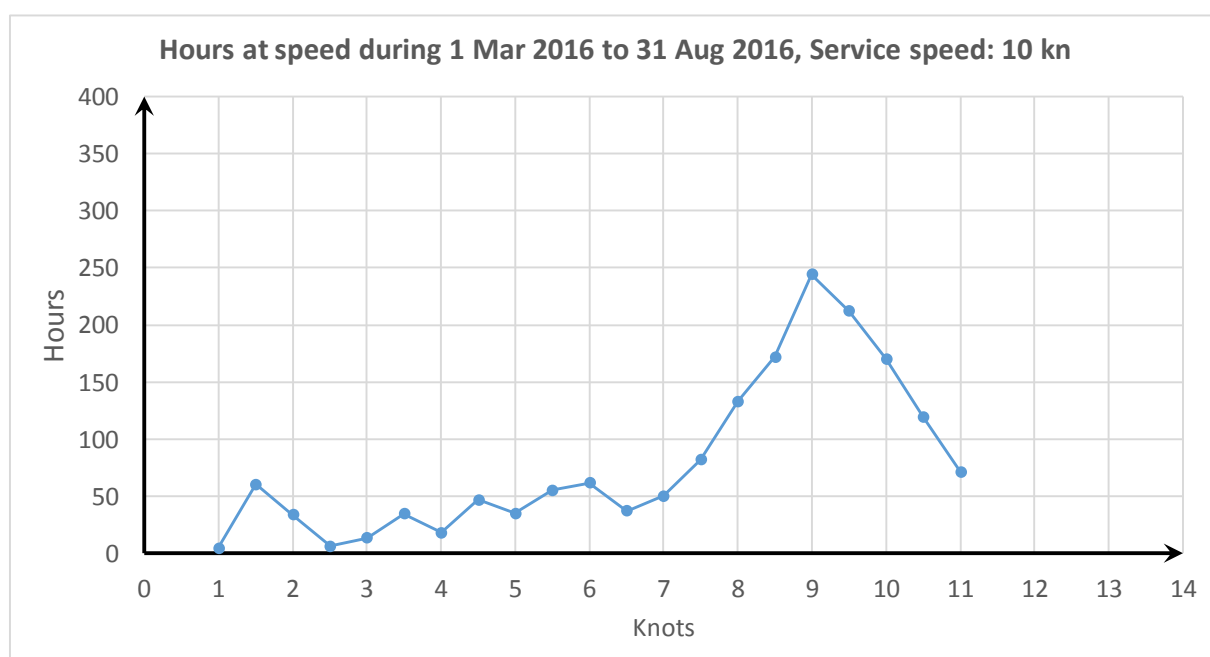
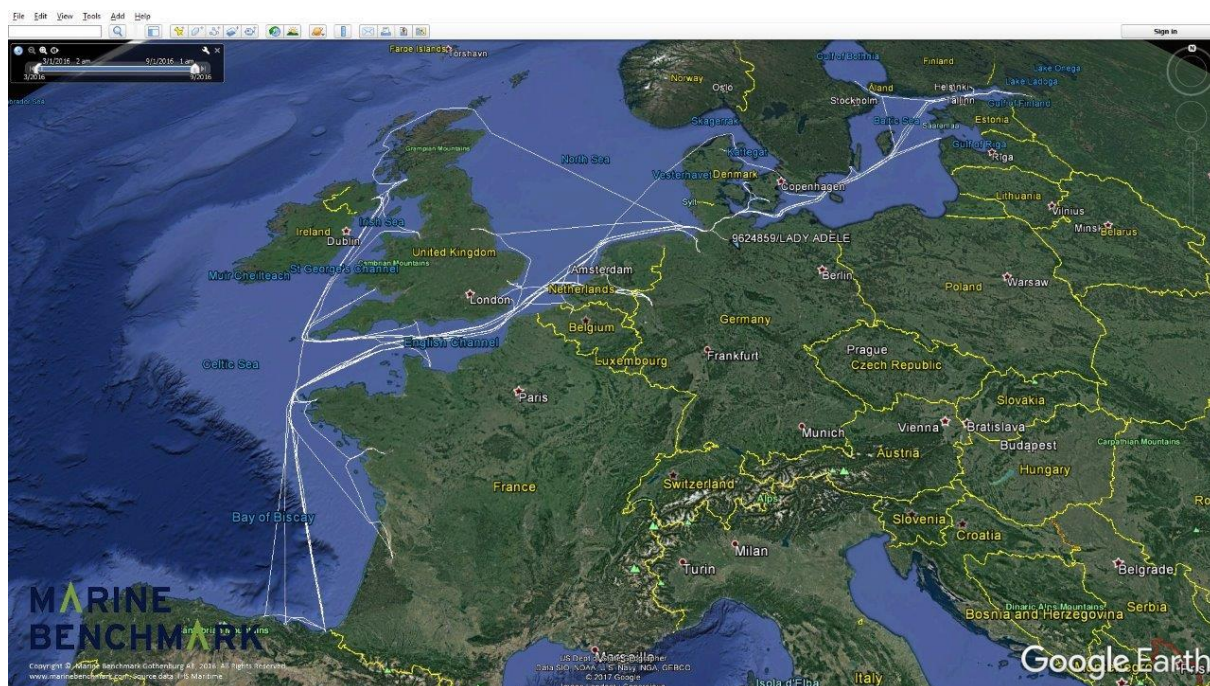




9624847-LADY AMALIA, 1012 kg fuel/day, 3700 dwt, 745 kW, Caterpillar / 3508TA  
 Dry Cargo vessel, Owner: Spliethoff's Bevrachtings BV

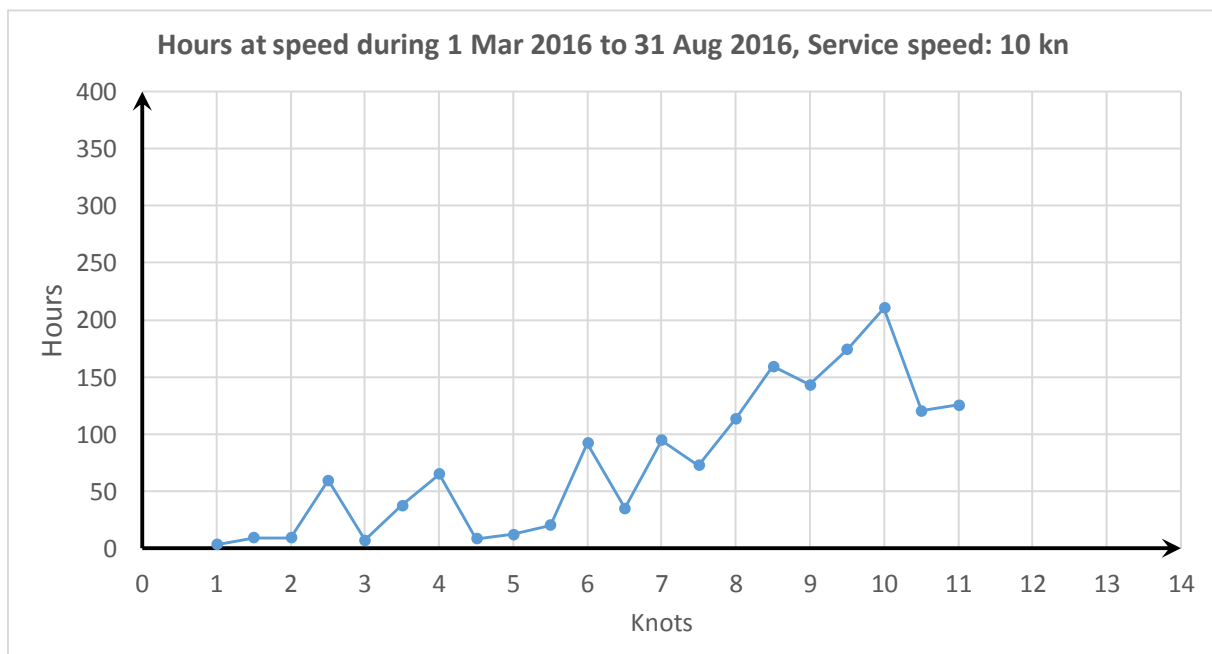
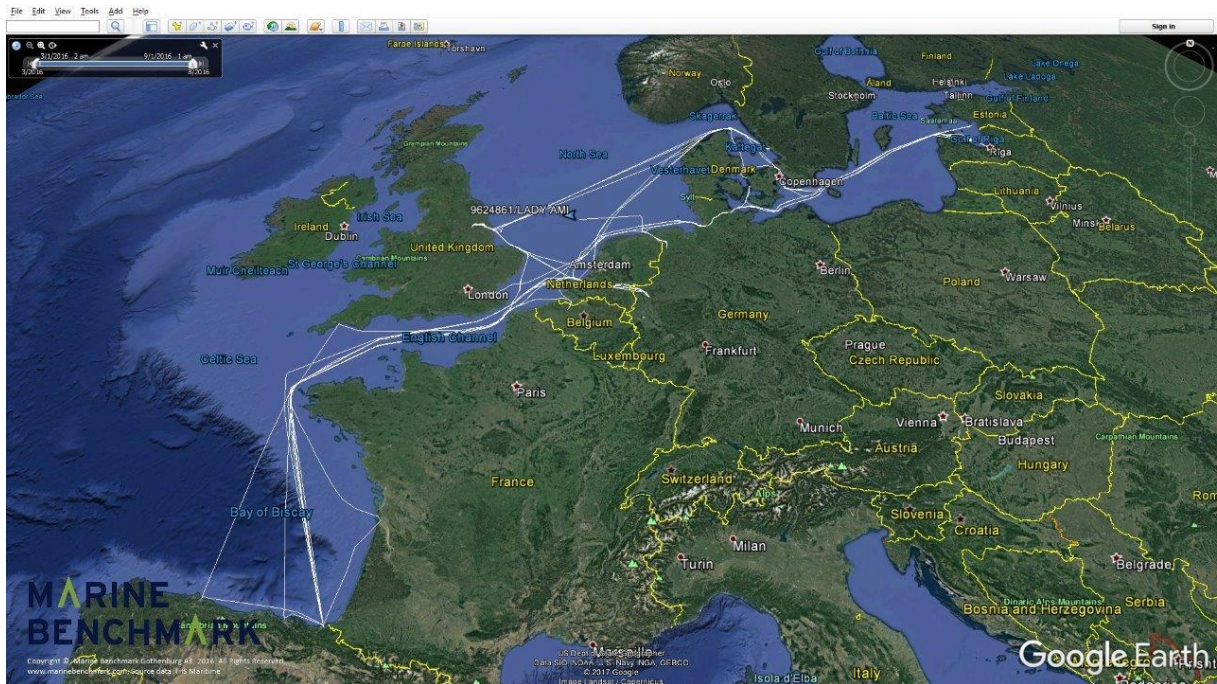


9624859-LADY ADELE, 975 kg fuel/day, 3694 dwt, 745 kW, Caterpillar / 3508TA  
 Dry Cargo vessel, Owner: Spliethoff's Bevrachtings BV



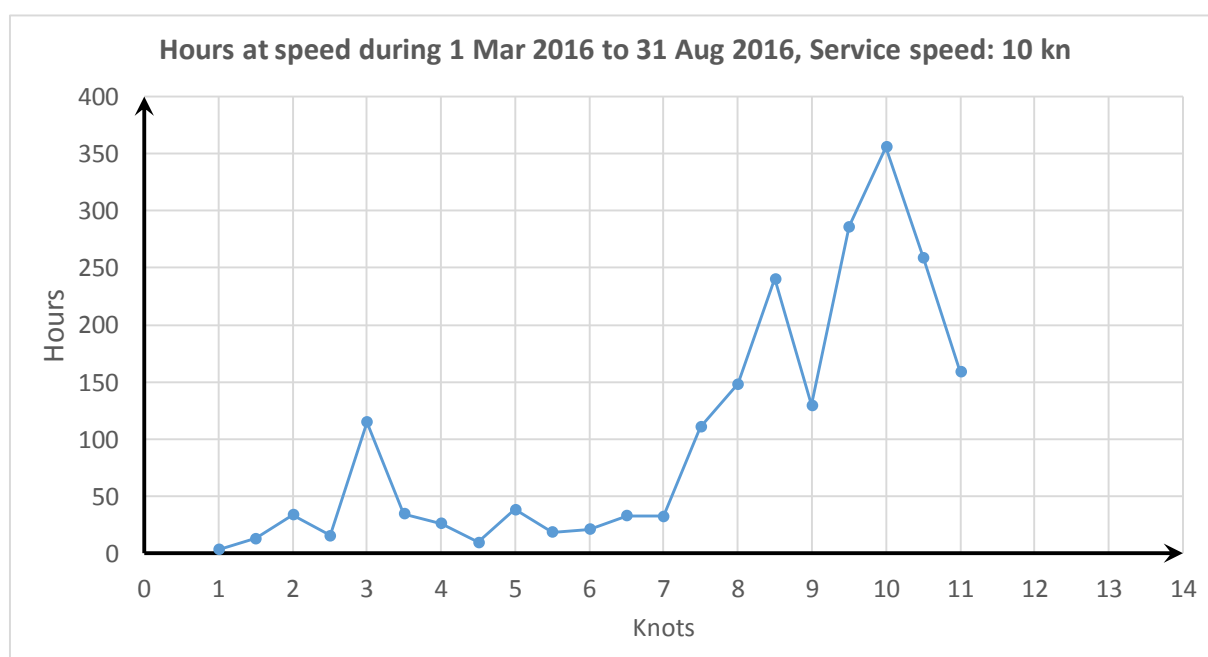
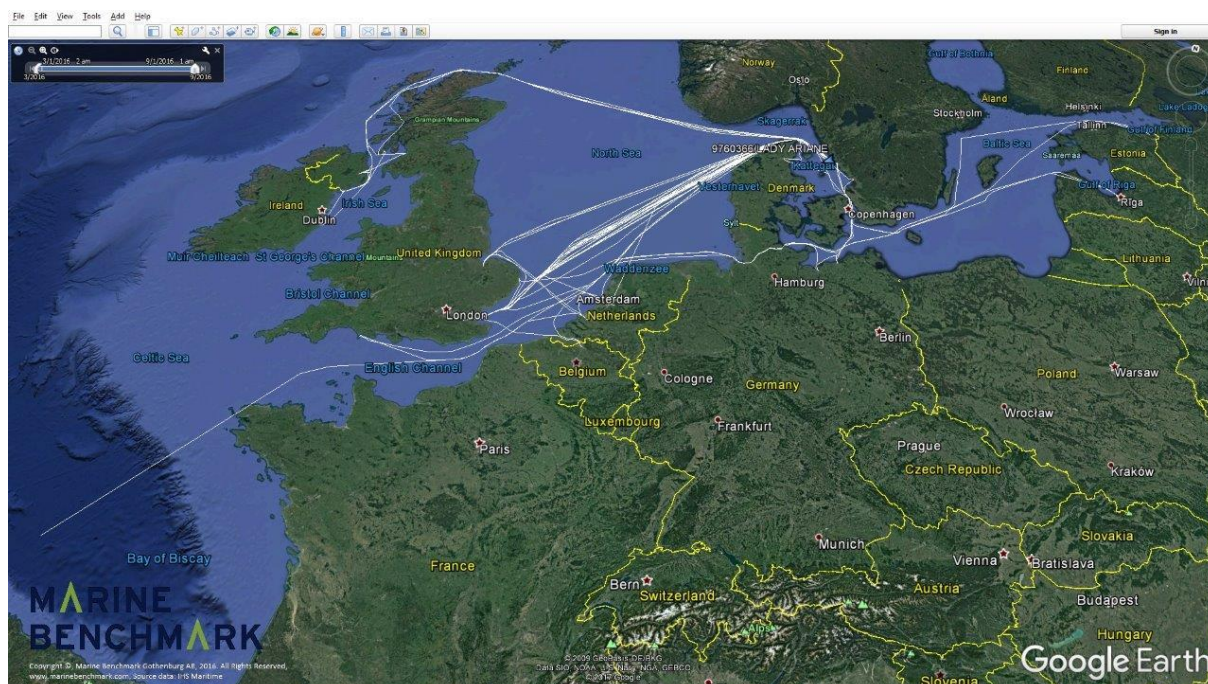


9624861-LADY AMI, 966 kg fuel/day, 3700 dwt, 745 kW, Caterpillar / 3508TA  
 Dry Cargo vessel, Owner: Spliethoff's Bevrachtings BV

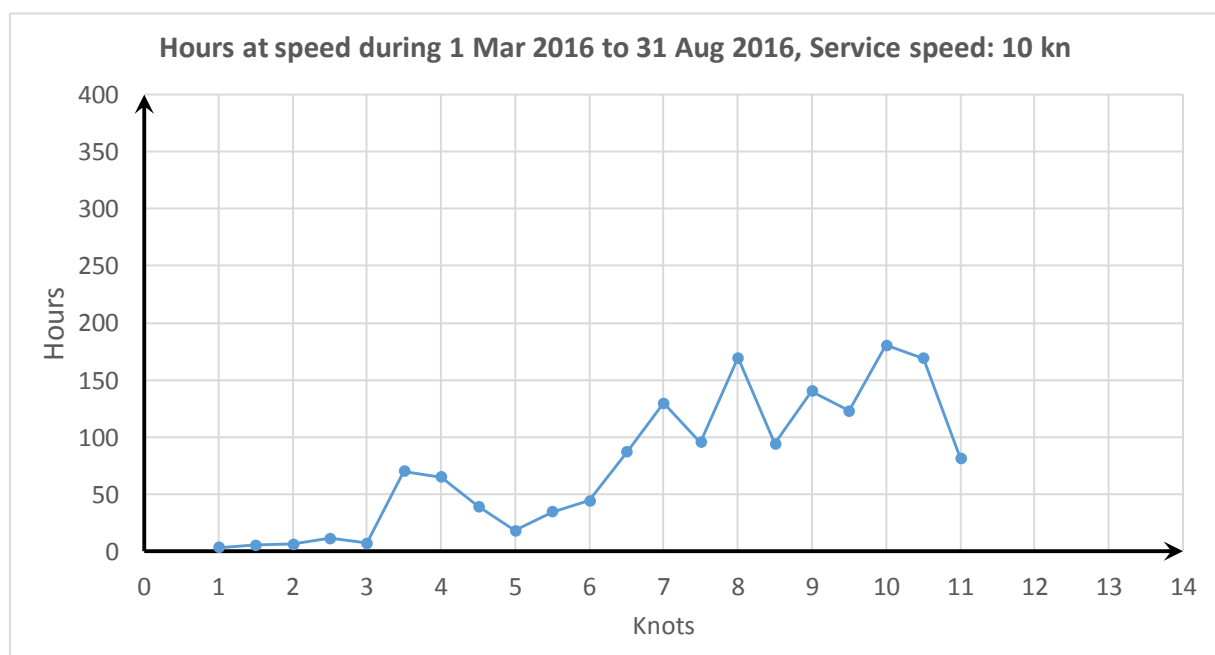
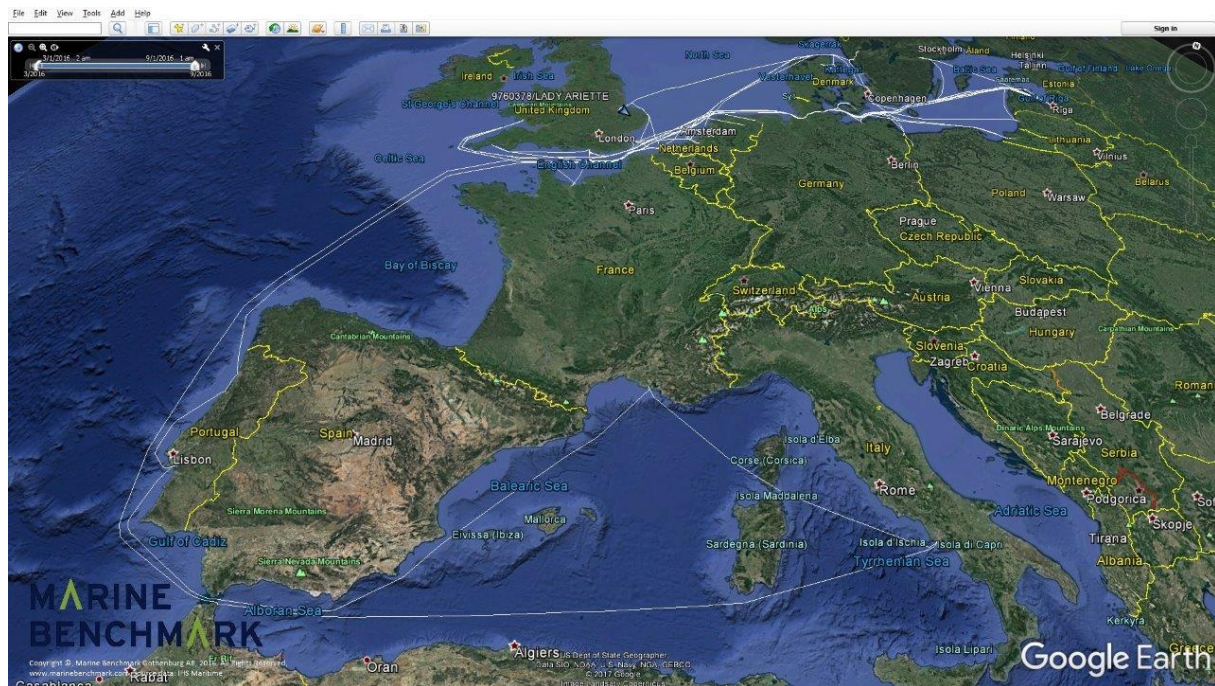




9760366-LADY ARIANE, 1402 kg fuel/day, 3700 dwt, 745 kW, Caterpillar / 3508TA  
 Dry Cargo vessel, Owner: Spliethoff's Bevrachtings BV



9760378-LADY ARIETTE, 920 kg fuel/day, 3702 dwt, 745 kW, Caterpillar / 3508TA  
 Dry Cargo vessel, Owner: Spliethoff's Bevrachtings BV

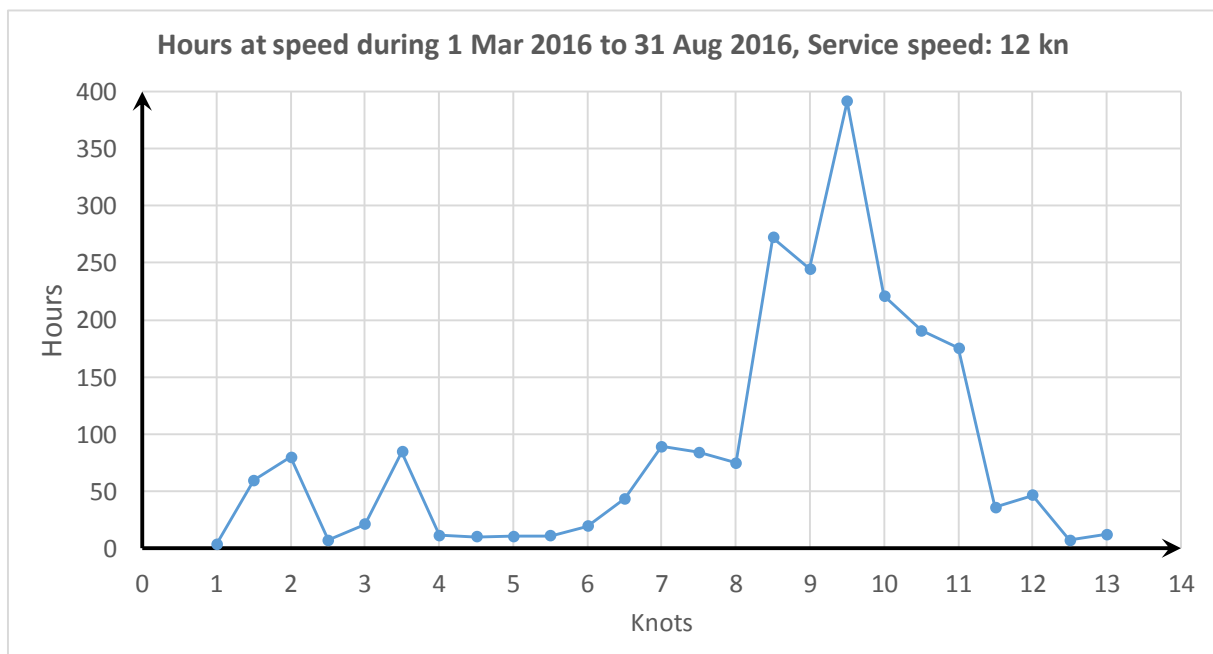
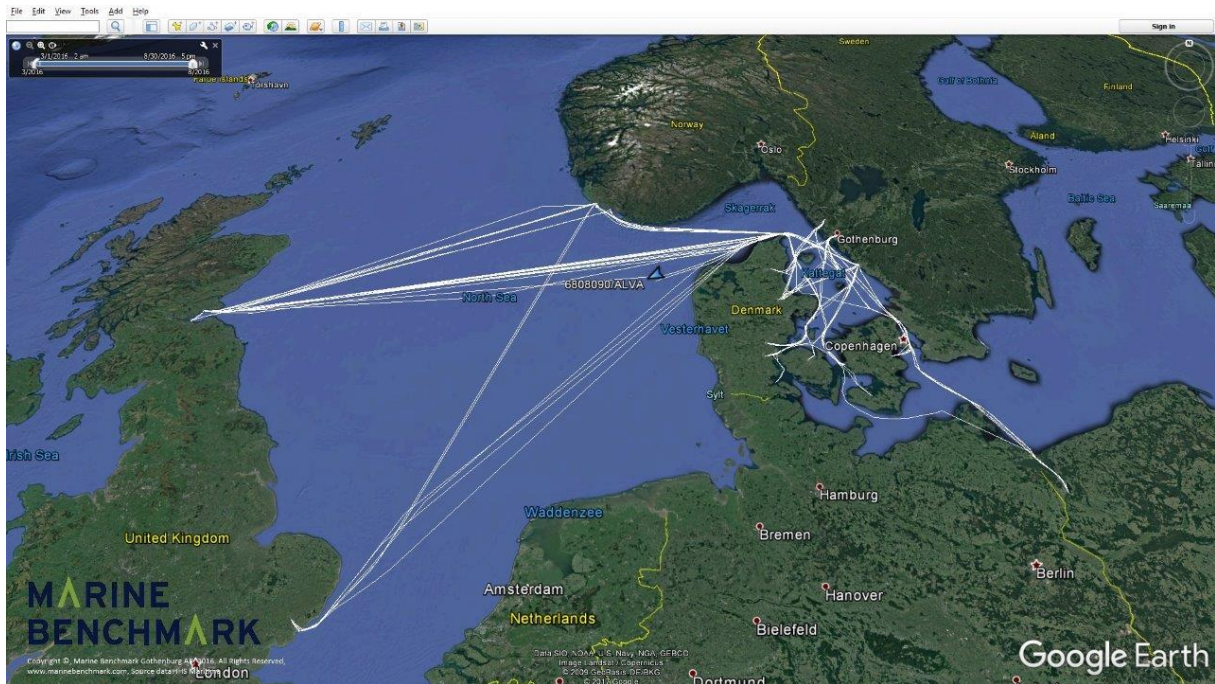


## APPENDIX IV – TOP 25 VESSELS – ENGINE SIZE 900 - 1200 kW

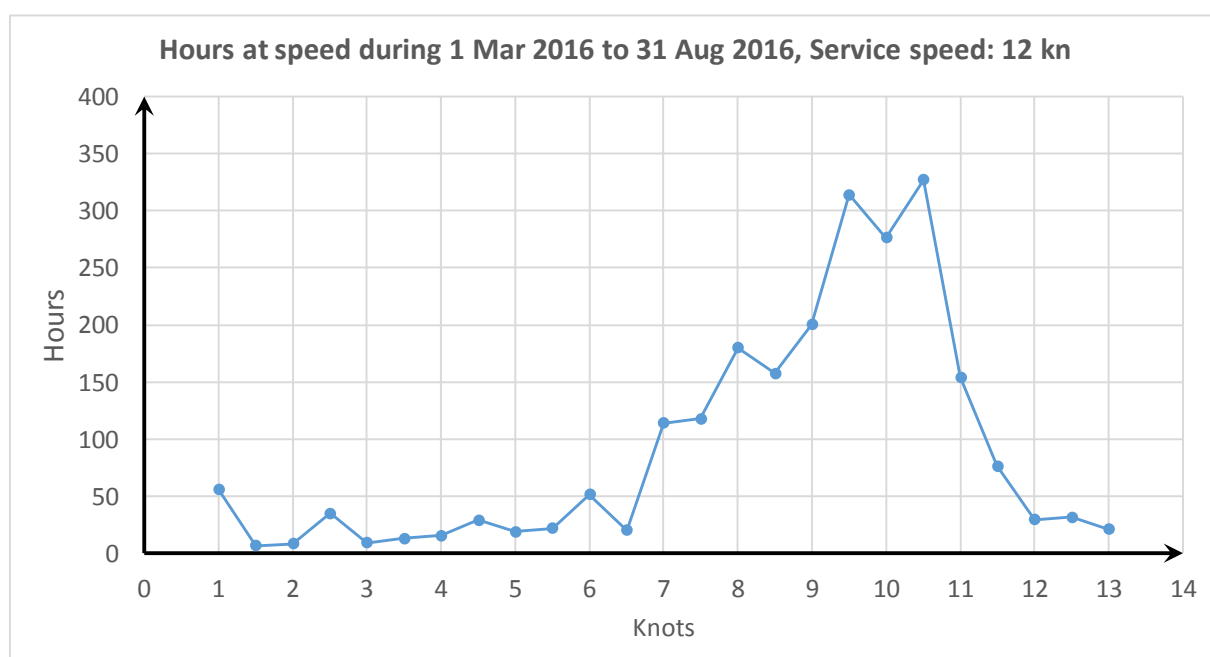
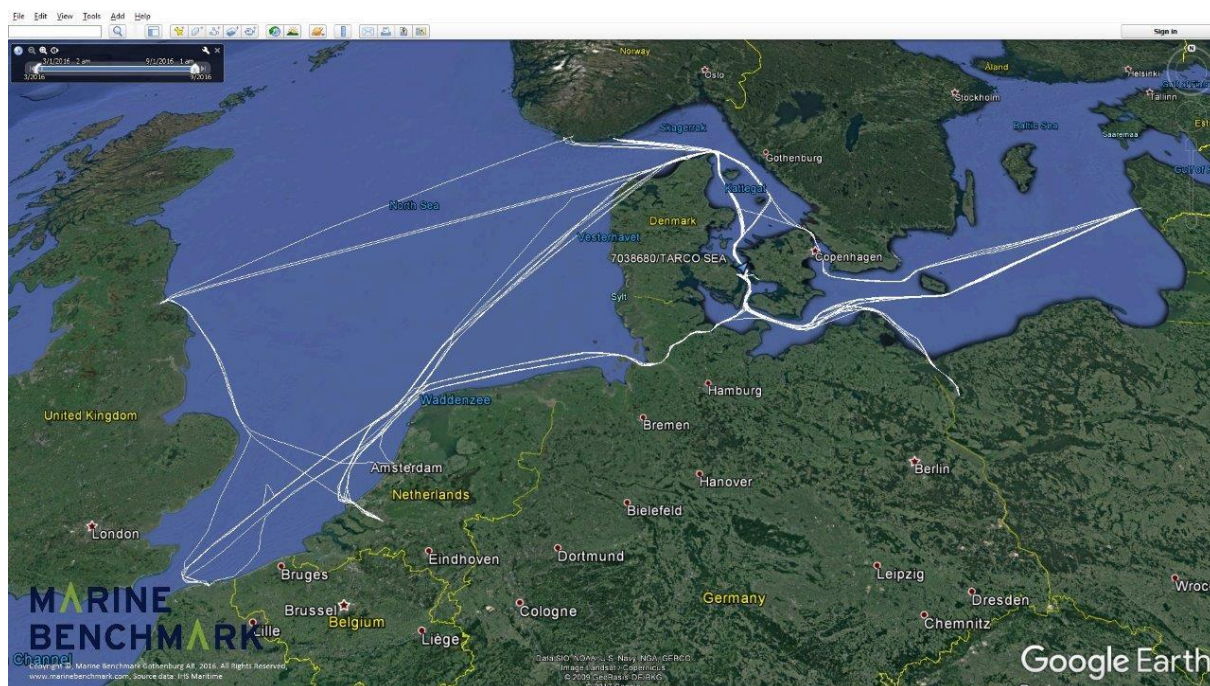
IMO	Current name	Vessel type	Fuel / day (kg)	Service speed	Propulsion power (kW)	Vessel beneficial owner	Vessel technical manager	Vessel operator
6808090	ALVA	Dry Cargo	1,256	12.0	970	Svenson E	M Hannestad As	Svenson E
7038680	TARCO SEA	Tanker	1,392	12.0	970	Aagesen & Partners	Aagesen & Partners	Aagesen & Partners
7724019	ABO ALYSSA	Dry Cargo	1,442	10.0	1103	Abo Alyssa Shipping Ltd	Unimed Navigation Sa	Unimed Navigation SA
8209743	LILL	Dry Cargo	1,215	10.5	1000	Wagle O	Kopervik Ship Mgmt Poland	Rolf Wagle AS
8518340	PLUTO	Dry Cargo	1,453	10.5	1176	Wilson ASA	Wilson Ship Management As	Wilson EuroCarriers AS
8710998	MOSVIK	Dry Cargo	1,515	11.5	1200	Klip Marine Shipmanagement Ltd	Bulkship Management As	Bulkship Management AS
8728048	DUNE-2	Dry Cargo	1,394	10.0	1029	Sand Shore Ltd	Oss Ltd	OSS Ltd
8915627	FRI WAVE	Dry Cargo	1,619	10.5	1100	Kopervik Ship Invest AS	Kopervik Ship Mgmt Poland	Hoyergruppen AS
9115987	ANJA	Dry Cargo	1,249	10.5	1000	Irving Management Ltd	Forsa Juru Agentura Uab	Forsa Juru Agentura UAB
9117973	RMS RAHM	Dry Cargo	1,387	10.0	968	Baltnautic Shipping Ltd	Baltnautic Shipmanagement Ltd	Baltnautic Shipmanagement Ltd
9125841	WILSON SAAR	Dry Cargo	1,145	10.5	929	Wilson ASA	Wilson Ship Management As	Wilson EuroCarriers AS
9137193	SCOT EXPLORER	Dry Cargo	1,957	11.0	1103	Scotline Ltd	Intrada Ships Management Ltd	Scotline Ltd
9137208	SCOT CARRIER	Dry Cargo	1,668	11.0	998	Scotline Ltd	Intrada Ships Management Ltd	Scotline Ltd
9226164	RHOON-C	Dry Cargo	1,208	10.0	1000	Cebo-Marine BV	Cebo-Marine Bv	Cebo-Marine BV
9232486	WILLEKE	Dry Cargo	1,212	9.5	990	Wagenborg Shipping BV	Concurrent Shipmanagement Bv	Wagenborg Shipping BV
9238387	ALDEBARAN	Dry Cargo	1,260	11.0	1000	Spliethoff's Bevrachtings BV	Unknown	Wijnne & Barends Cargadoors
9240744	SAMIRA	Dry Cargo	1,498	9.5	954	Wagenborg Shipping BV	Toucan Maritime	Wagenborg Shipping BV
9254977	VADERO HIGHLANDER	Tanker	1,579	10.5	1140	Vadero Ship Management AB	Vadero Ship Management Ab	Linnea Shipping AS
9258703	SETTLER	Fishing	1,336	10.0	1103	North Isles Marine Ltd	Unknown	North Isles Marine Ltd
9267704	SMARAGD	Dry Cargo	1,277	11.0	998	Bock Maritiem BV	Bock Maritiem Bv	Bock Maritiem BV
9421611	EEMS SPRINTER	Dry Cargo	1,335	10.0	1103	Rozema AJ	Amasus Support Bv	Amasus Shipping BV
9422275	LIANNE	Dry Cargo	1,389	9.8	1140	van Dam Scheepvaartbedrijf	Van Dam Scheepvaartbedrijf	Wagenborg Shipping BV
9454462	ELISE	Dry Cargo	1,569	10.5	1123	van Dam Scheepvaartbedrijf	Van Dam Scheepvaartbedrijf	Wagenborg Shipping BV
9559626	EEMS SPIRIT	Dry Cargo	1,360	11.0	1103	Kornet & Zonen BV	Eems Werken Bv	Kornet & Zonen BV
9650901	ARCTIC ROCK	Dry Cargo	1,454	11.0	1200	Hartman Seatrade CV	Hartman Seatrade Bv	Global Seatrade BV



6808090-ALVA, 1256 kg fuel/day, 1335 dwt, 970 kW, Deutz / RBV8M545  
 Dry Cargo vessel, Owner: Svenson E

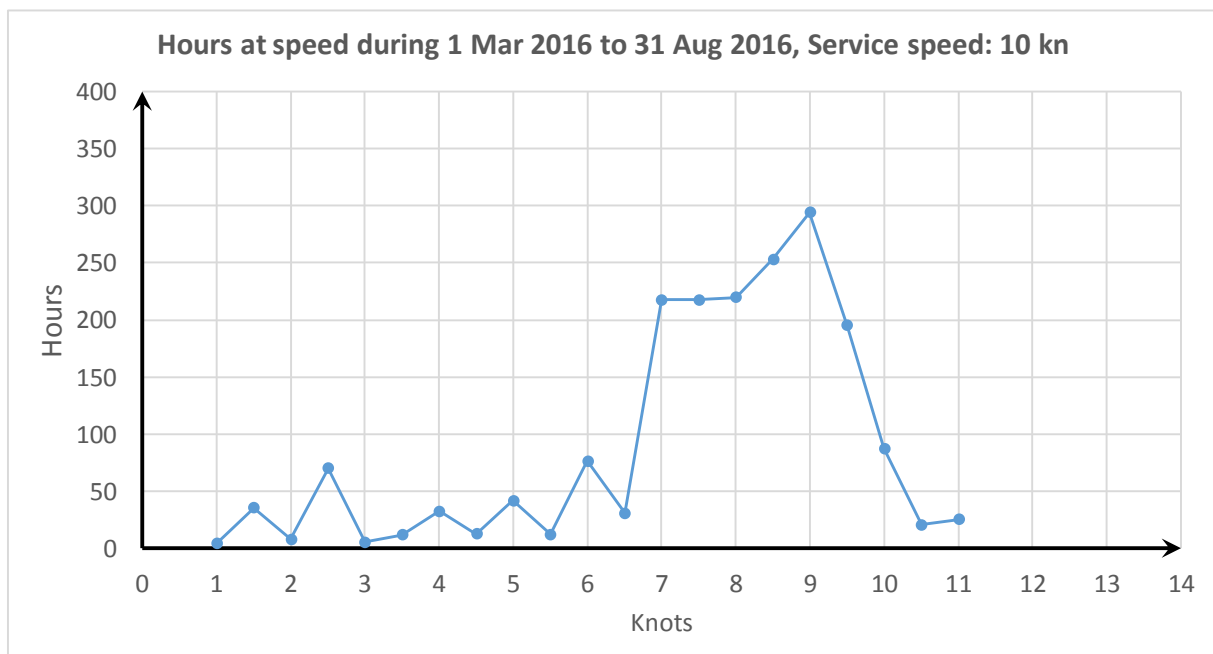
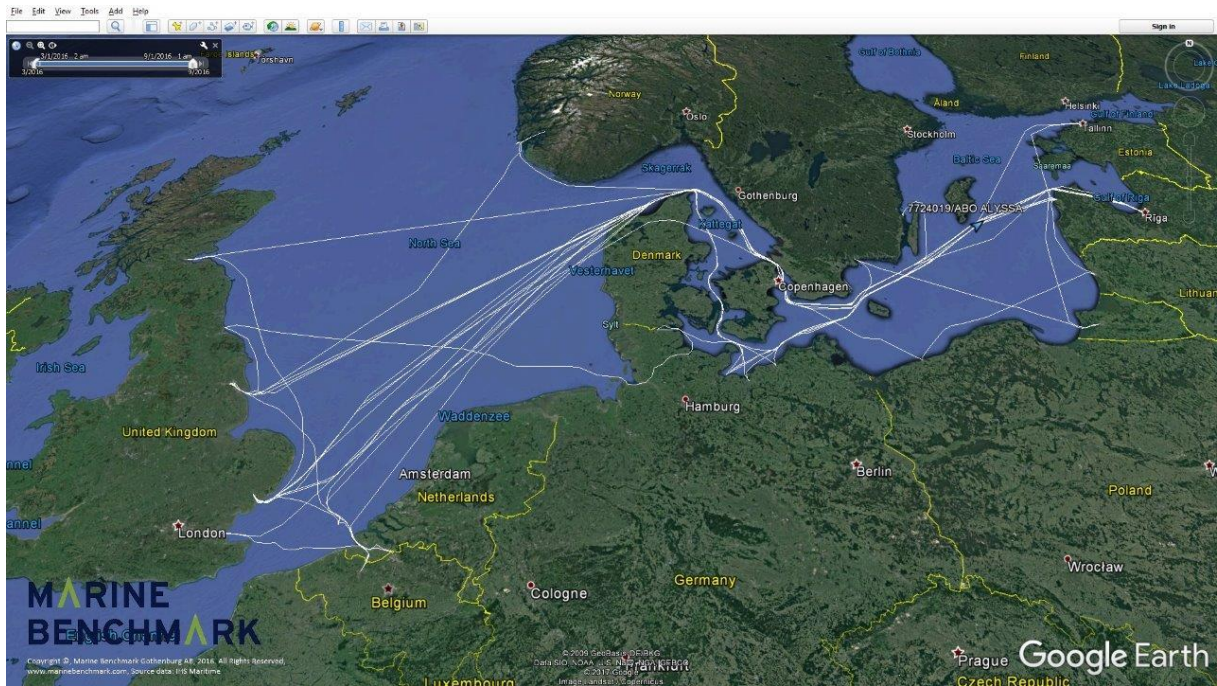


7038680-TARCO SEA, 1392 kg fuel/day, 1263 dwt, 970 kW, Deutz / RBV8M545  
 Tanker vessel, Owner: Aagesen & Partners



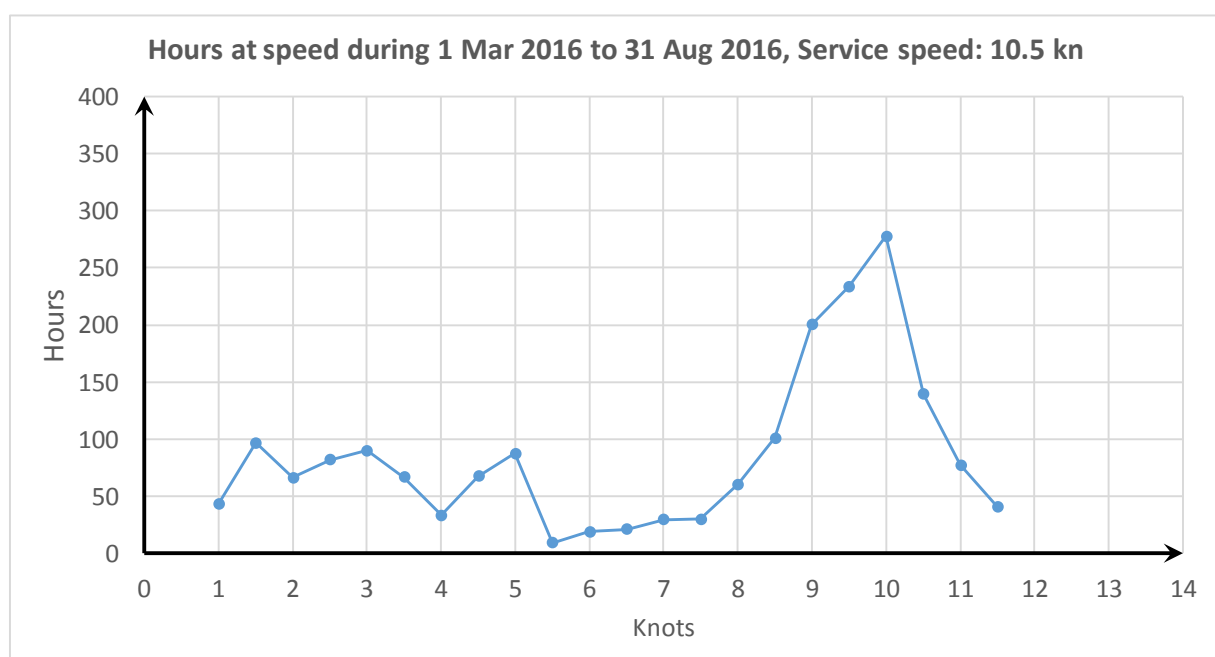
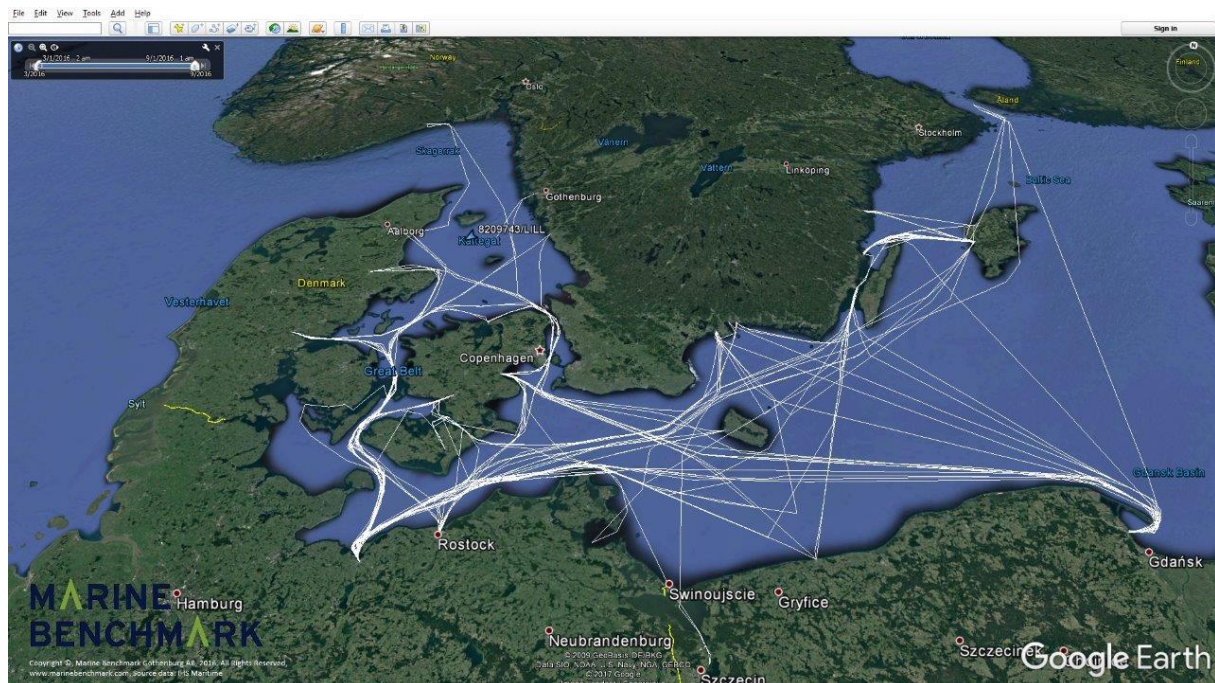


7724019-ABO ALYSSA, 1442 kg fuel/day, 3182 dwt, 1103 kW, MWM / TD500-8  
 Dry Cargo vessel, Owner: Abo Alyssa Shipping Ltd

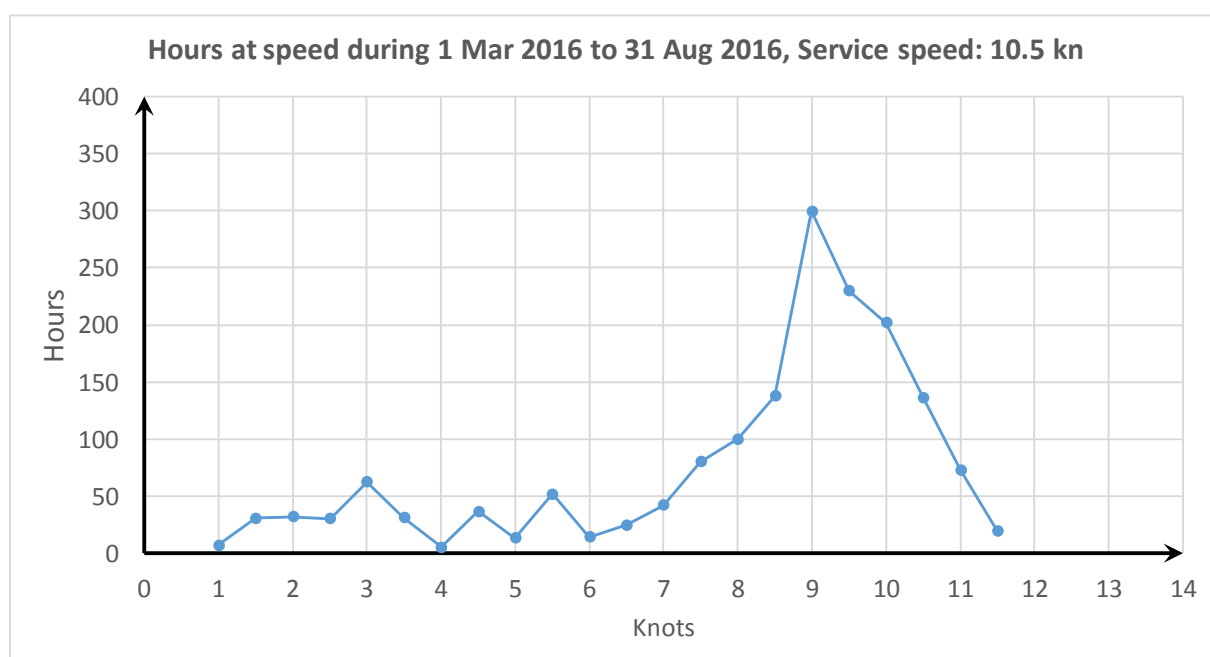
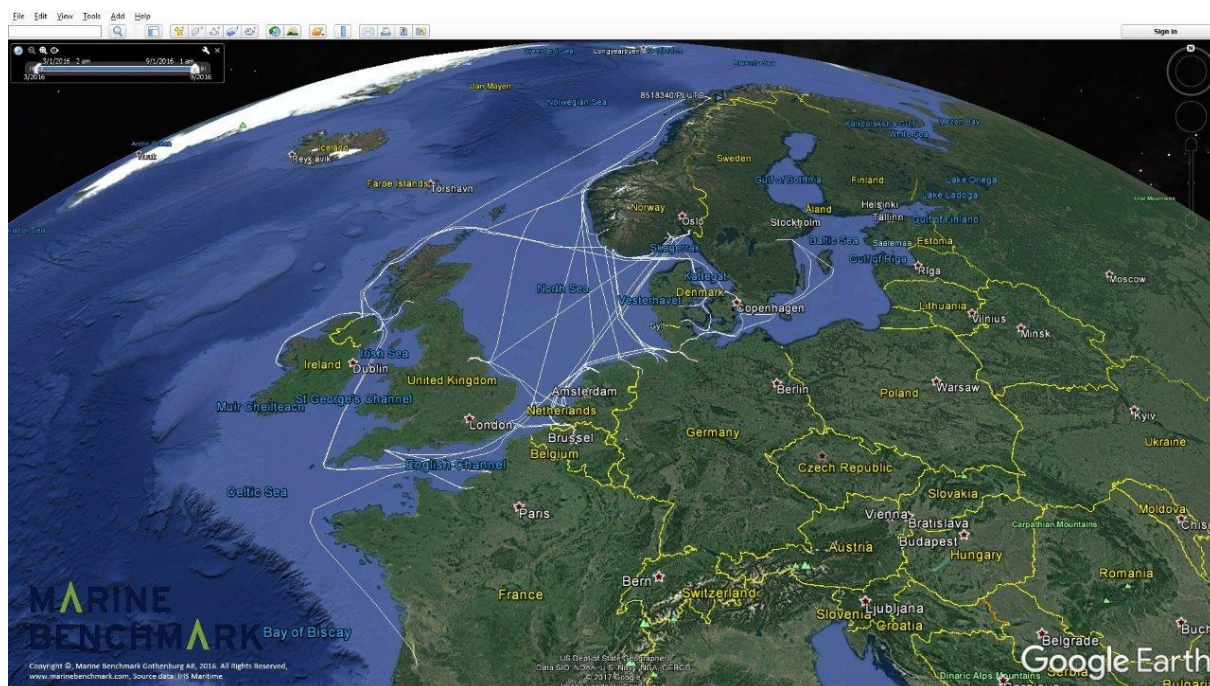




8209743-LILL, 1215 kg fuel/day, 2064 dwt, 1000 kW, MaK / 6M332AK  
 Dry Cargo vessel, Owner: Wagle O

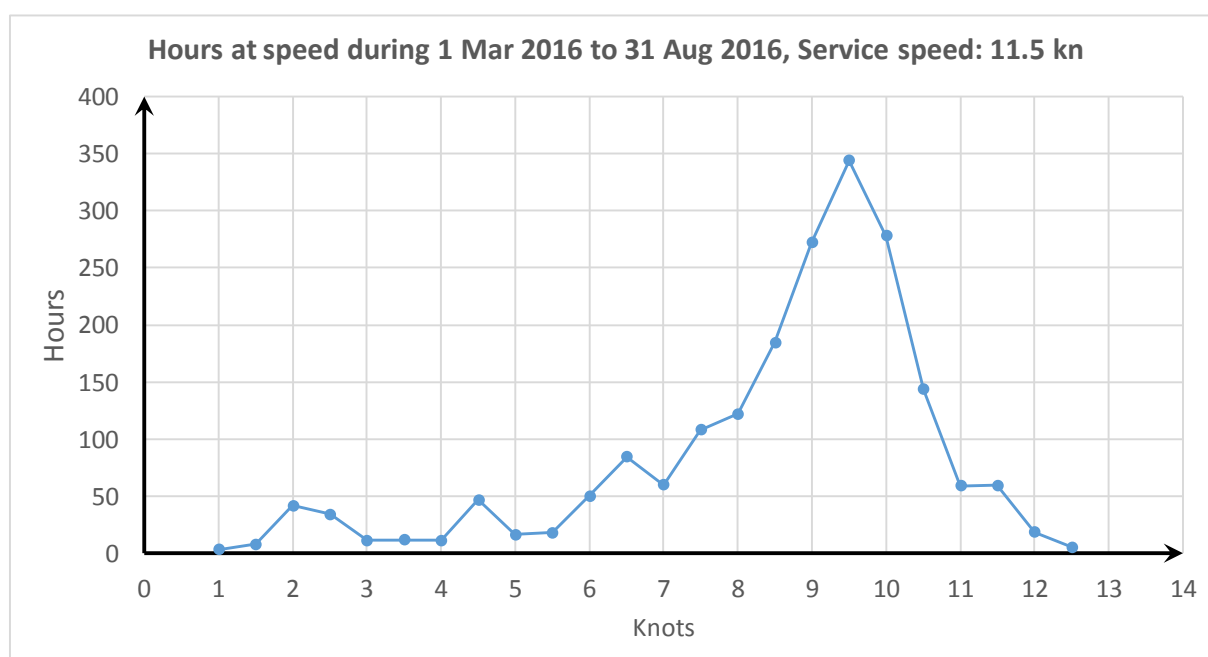
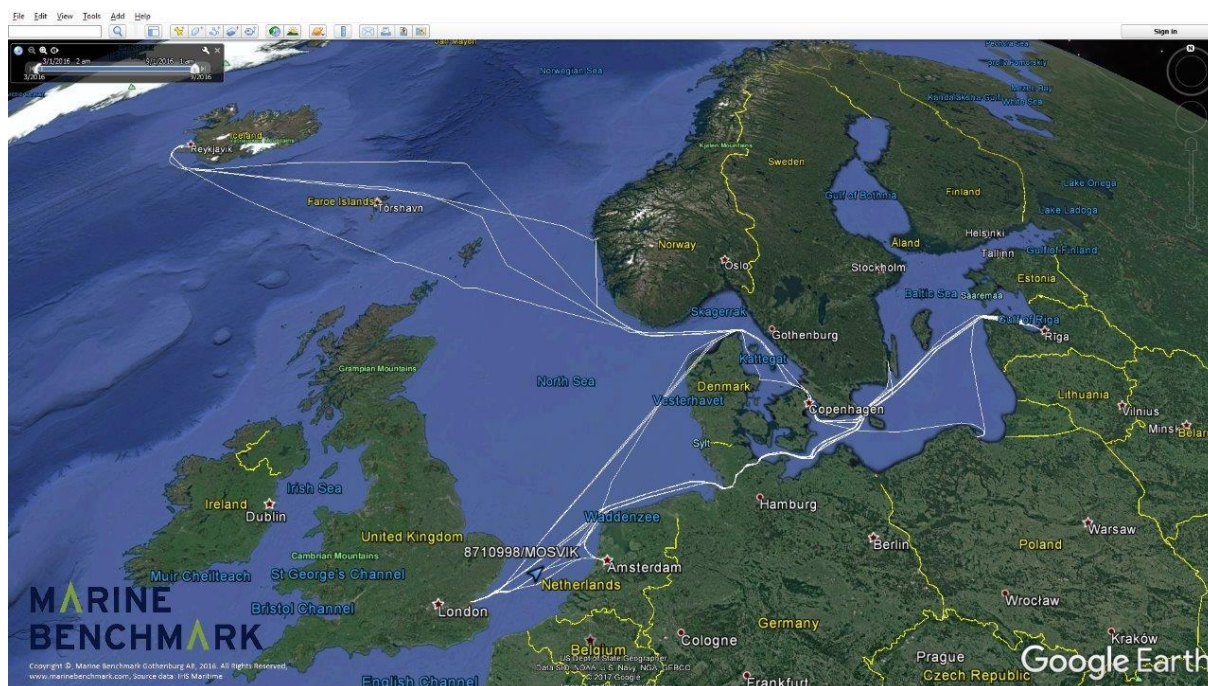


8518340-PLUTO-, 1453 kg fuel/day, 3697 dwt, 1176 kW, MaK / 6M452AK  
 Dry Cargo vessel, Owner: Wilson ASA



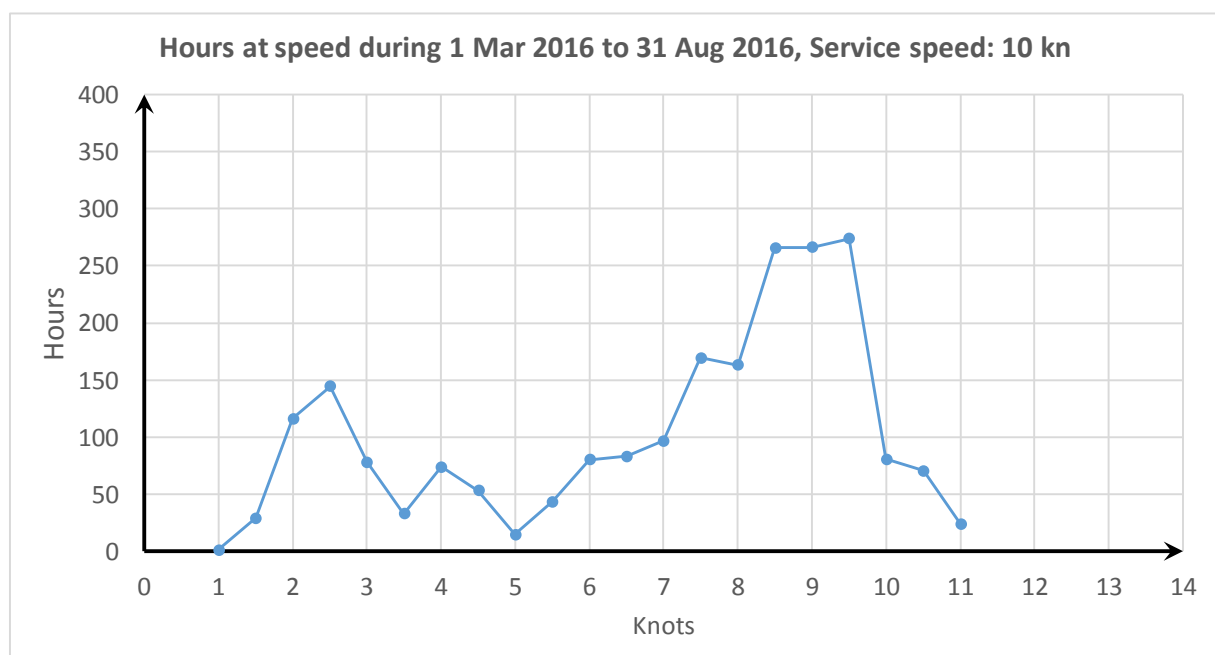
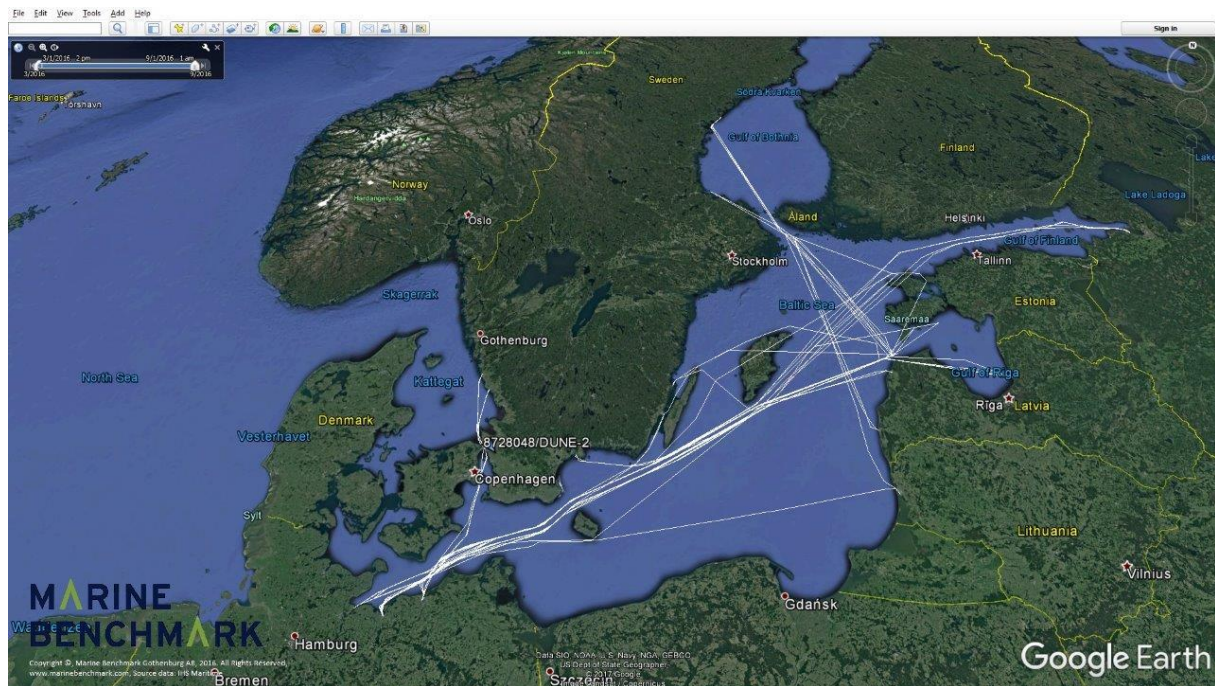


8710998-MOSVIK, 1515 kg fuel/day, 2850 dwt, 1200 kW, Wichmann / 4L28  
 Dry Cargo vessel, Owner: Klip Marine Shipmanagement Ltd

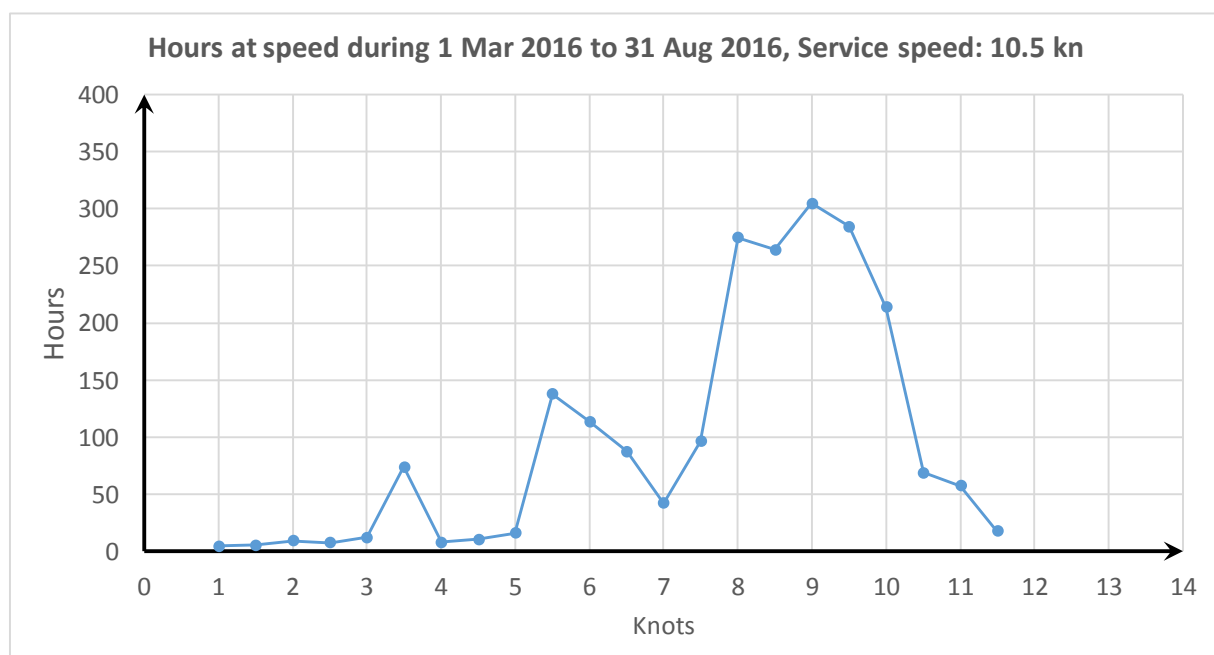
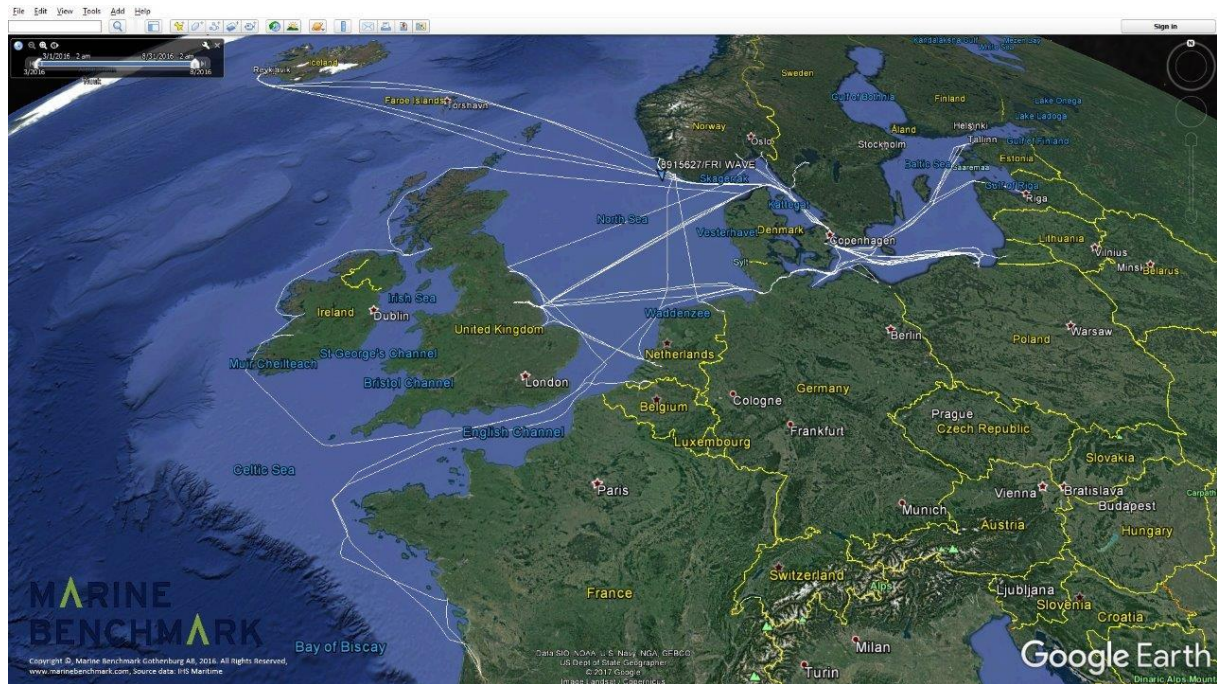




8728048-DUNE-2, 1394 kg fuel/day, 3472 dwt, 1029 kW, Skoda / 6L275A2  
 Dry Cargo vessel, Owner: Sand Shore Ltd

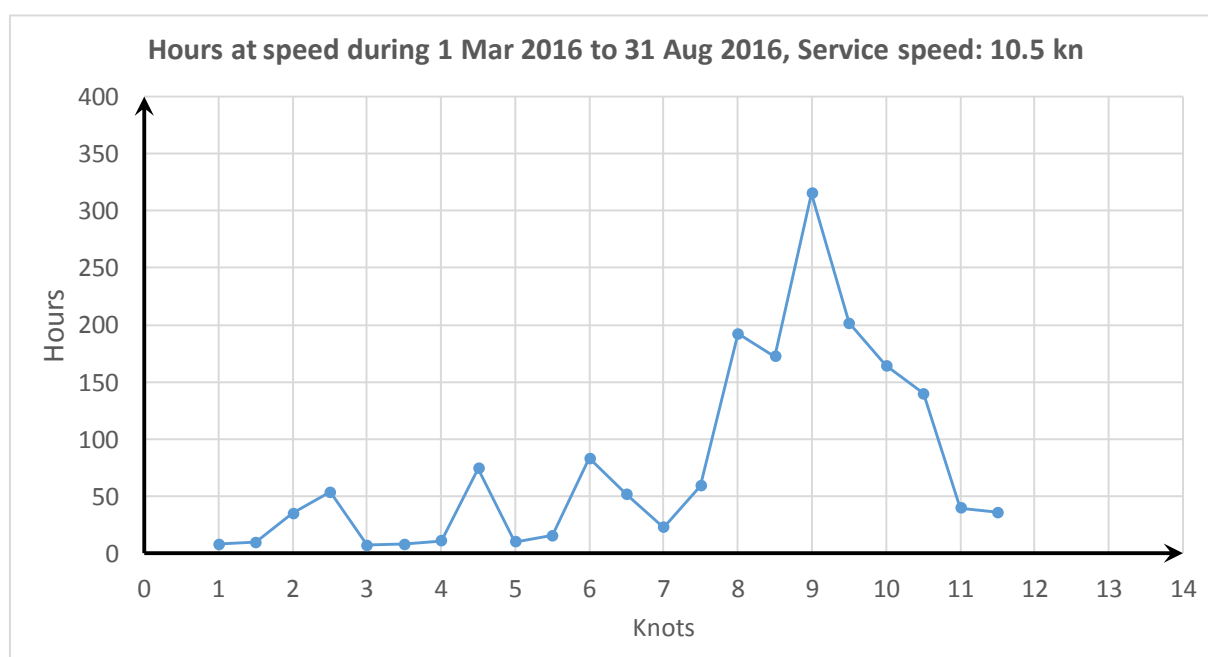
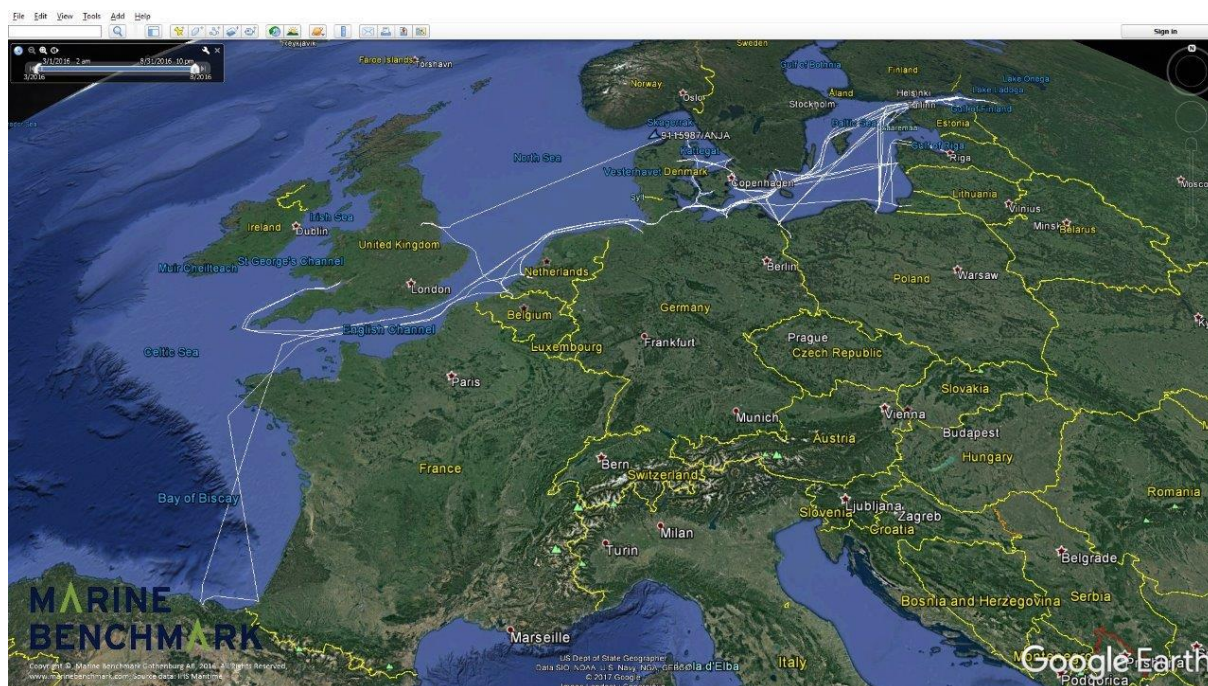


8915627-FRI WAVE, 1619 kg fuel/day, 3283 dwt, 1100 kW, Deutz / SBV8M628  
 Dry Cargo vessel, Owner: Kopervik Ship Invest AS



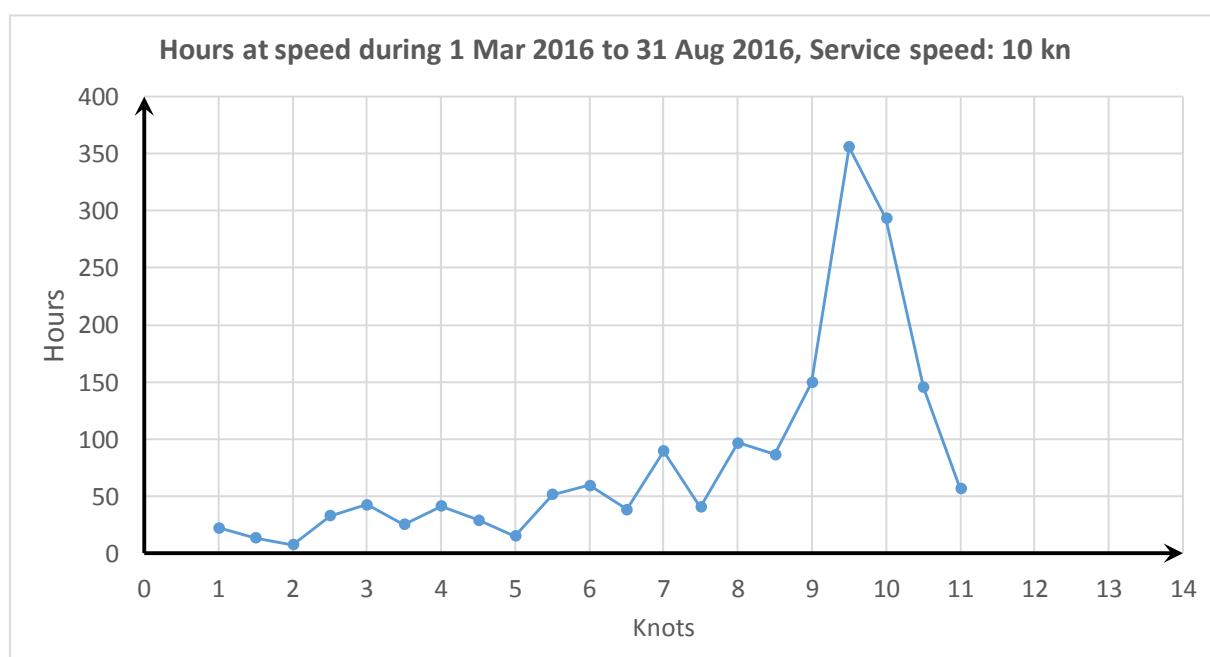
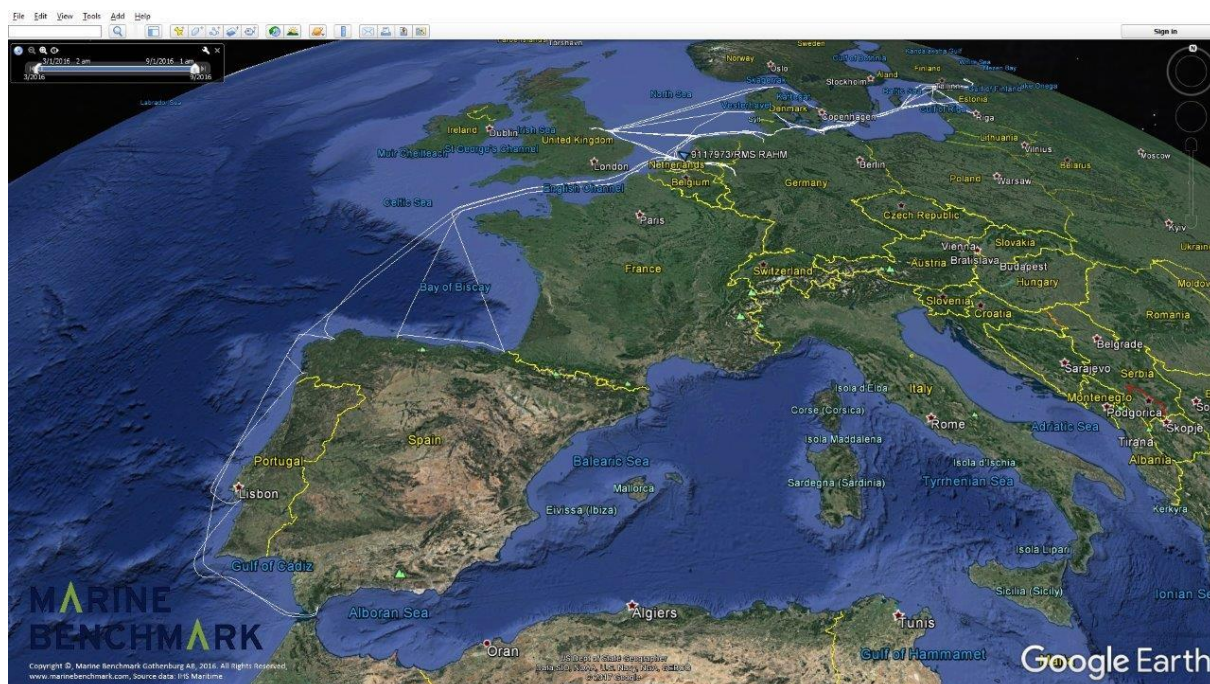


9115987-ANJA, 1249 kg fuel/day, 3246 dwt, 1000 kW, Kromhout / 8FHD240  
 Dry Cargo vessel, Owner: Irving Management Ltd

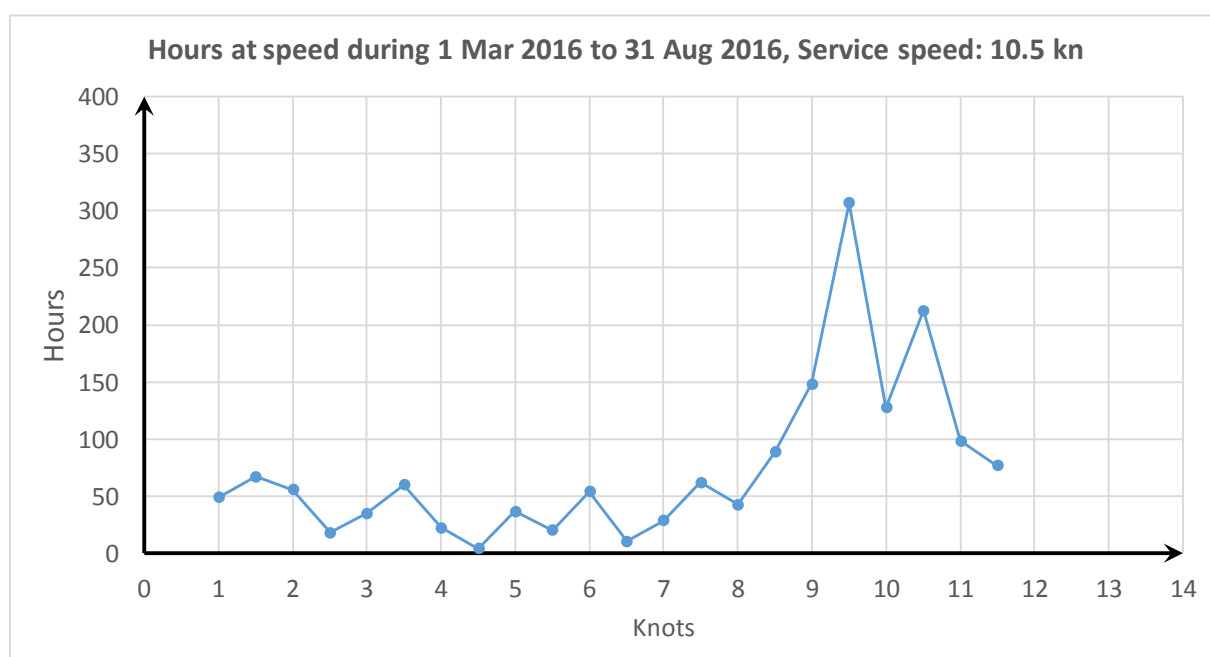
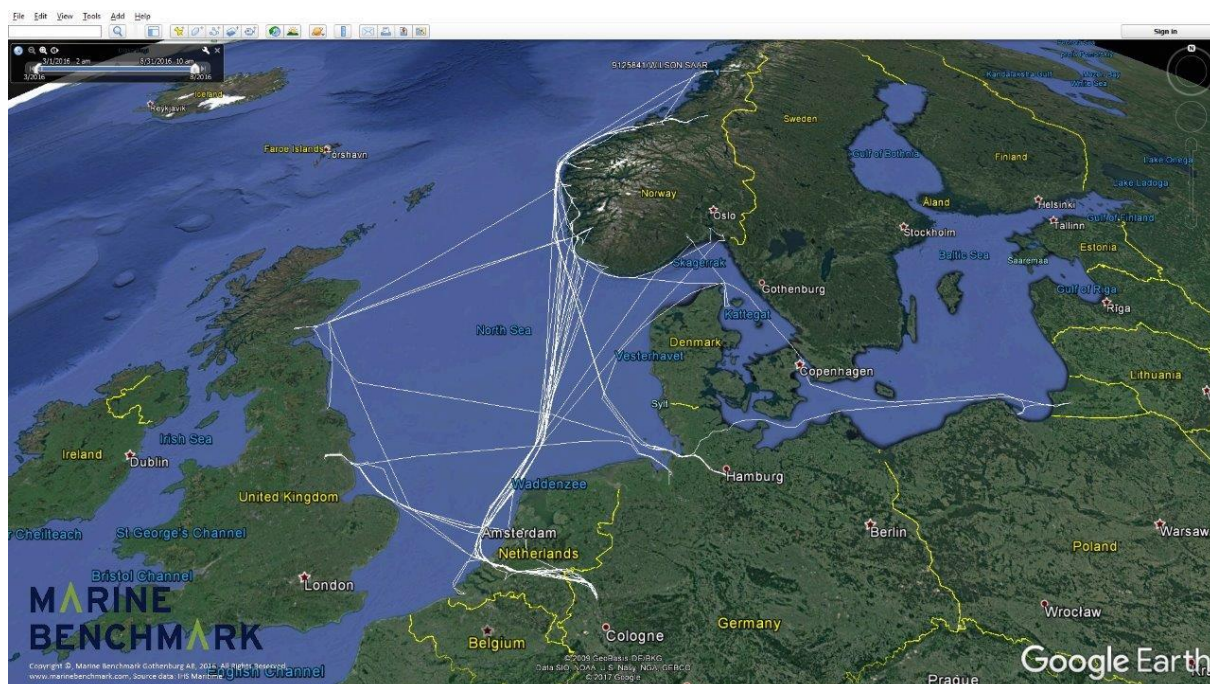




9117973-RMS RAHM, 1387 kg fuel/day, 2503 dwt, 968 kW, Caterpillar / 3512TA  
 Dry Cargo vessel, Owner: Baltnautic Shipping Ltd

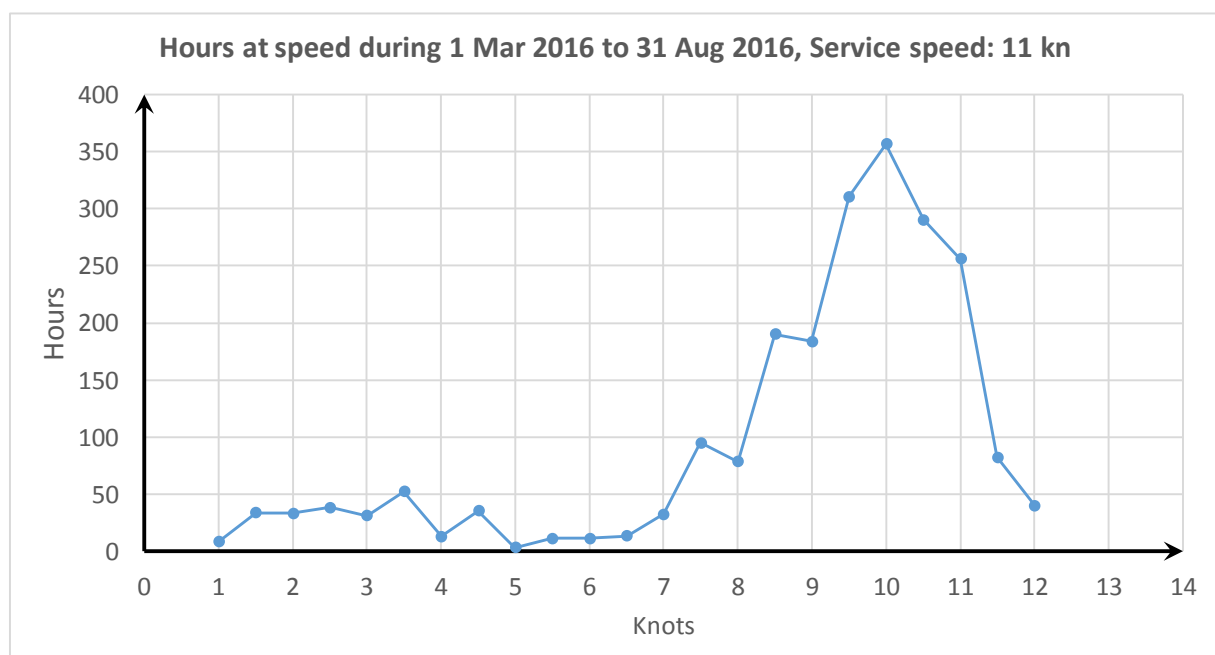
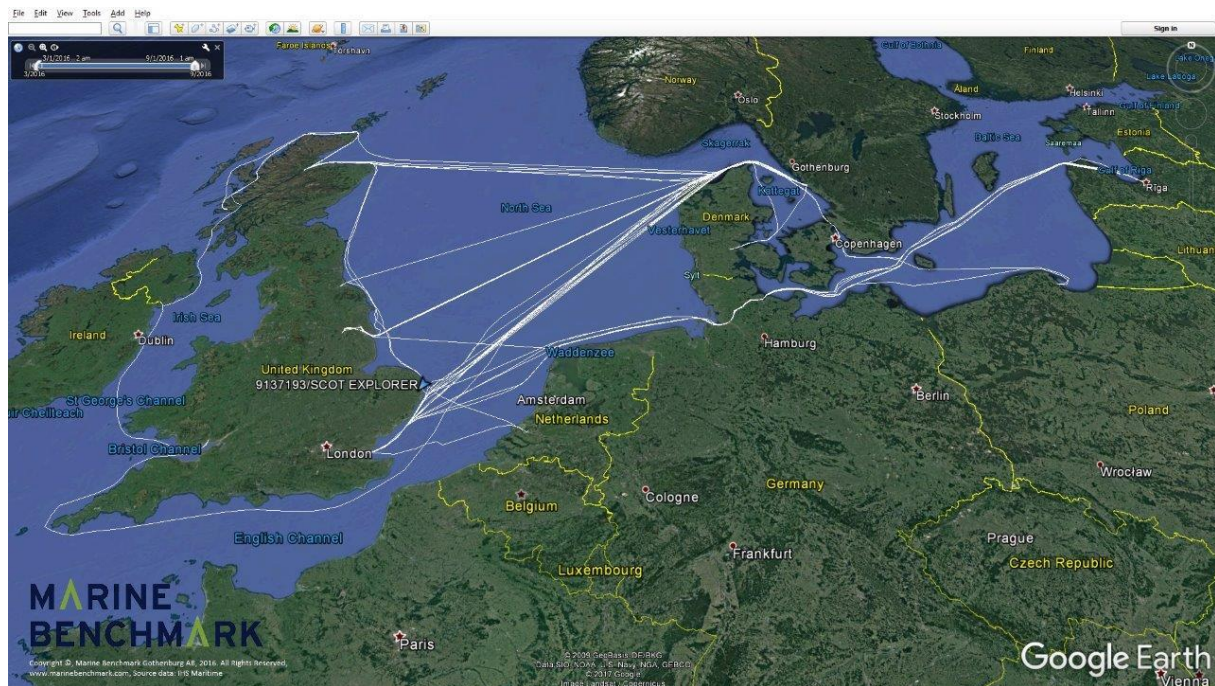


9125841-WILSON SAAR, 1145 kg fuel/day, 1687 dwt, 929 kW, Deutz / SBV6M628  
 Dry Cargo vessel, Owner: Wilson ASA



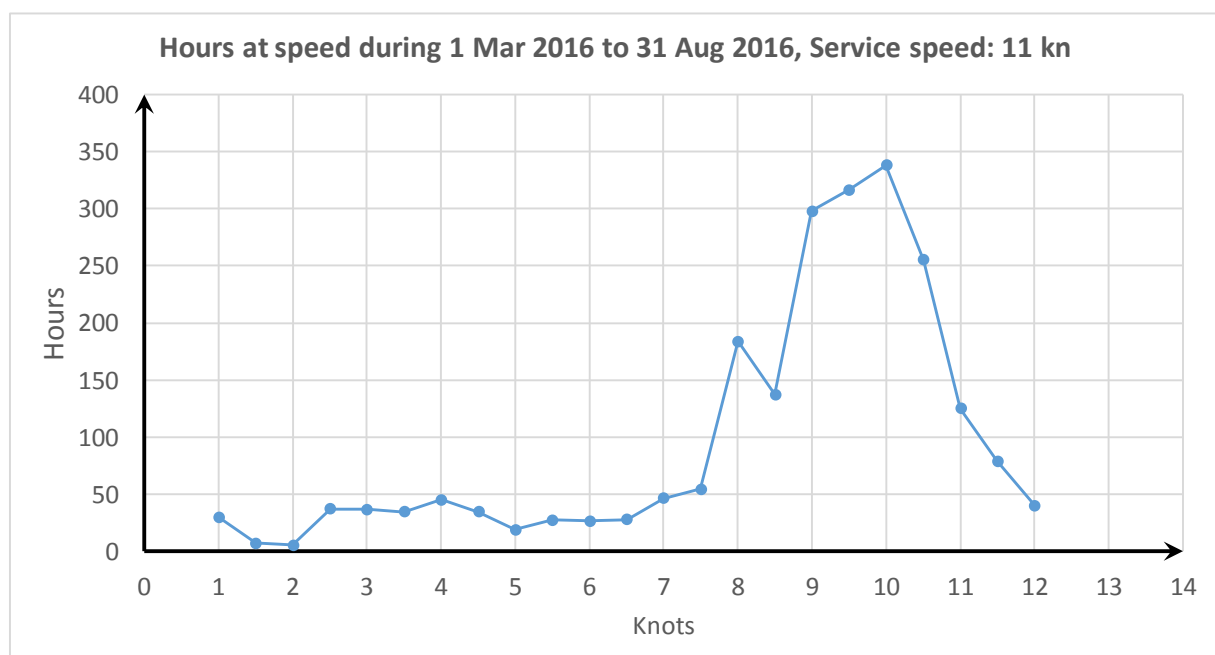
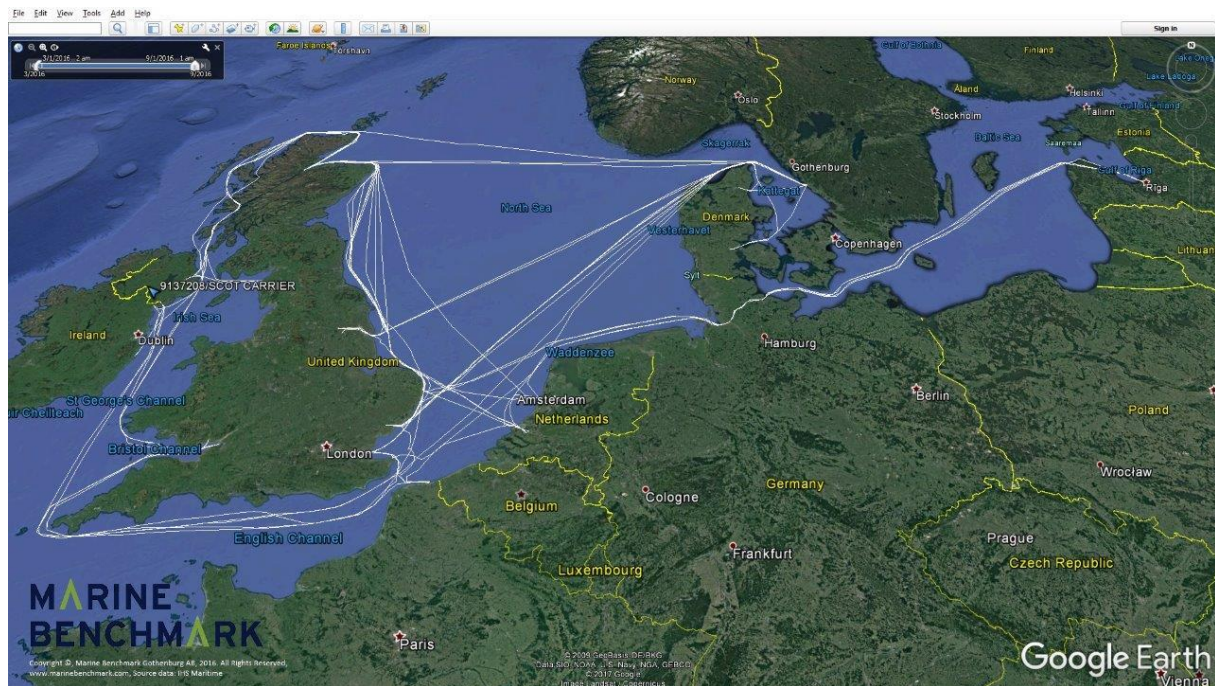


9137193-SCOT EXPLORER, 1957 kg fuel/day, 2521 dwt, 1103 kW, A.B.C. / 6MDZC  
 Dry Cargo vessel, Owner: Scotline Ltd

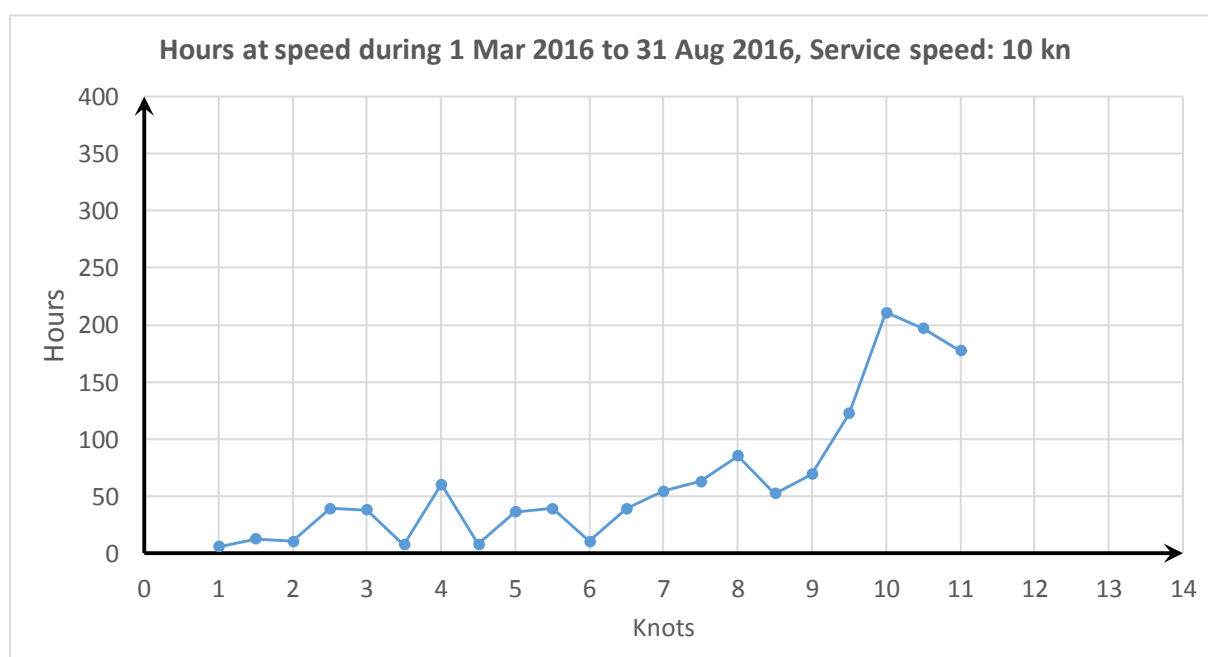
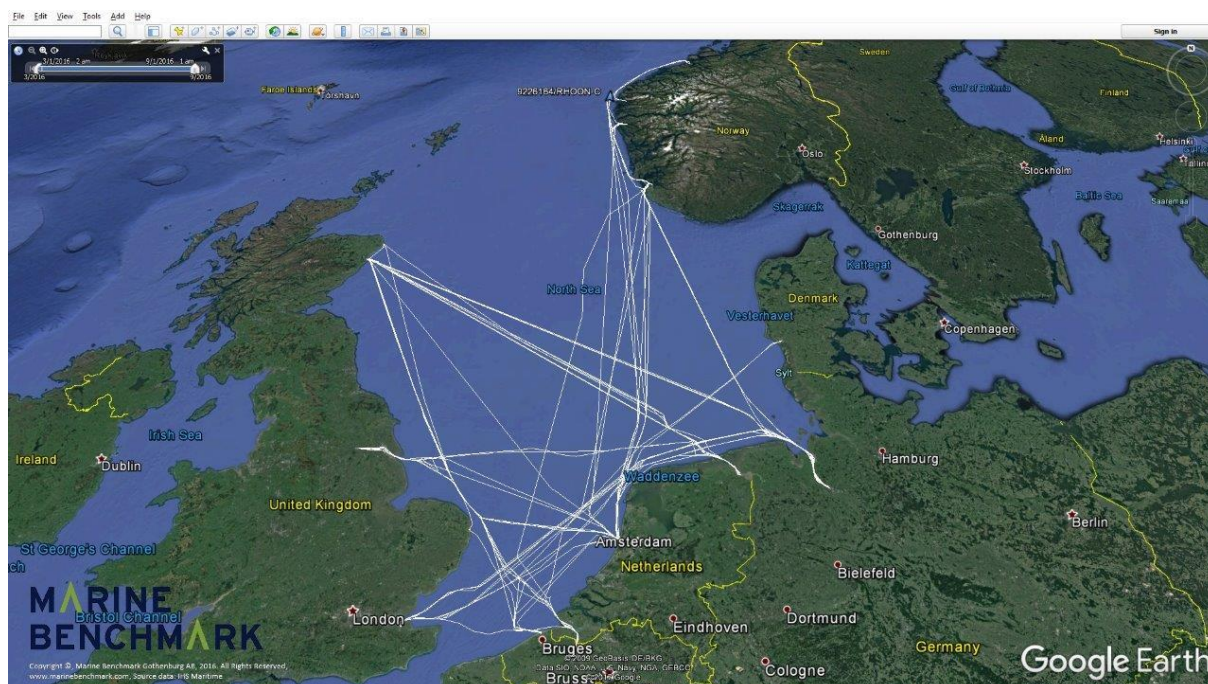




9137208-SCOT CARRIER, 1668 kg fuel/day, 2508 dwt, 998 kW, A.B.C. / 6DZC  
 Dry Cargo vessel, Owner: Scotline Ltd

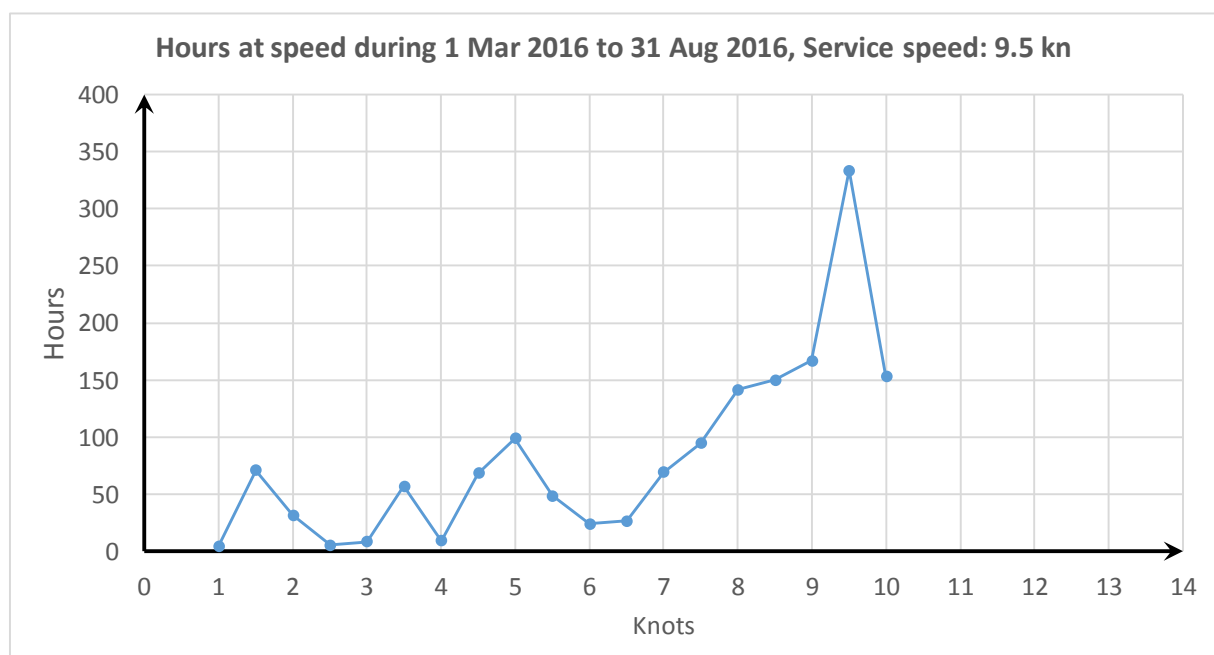
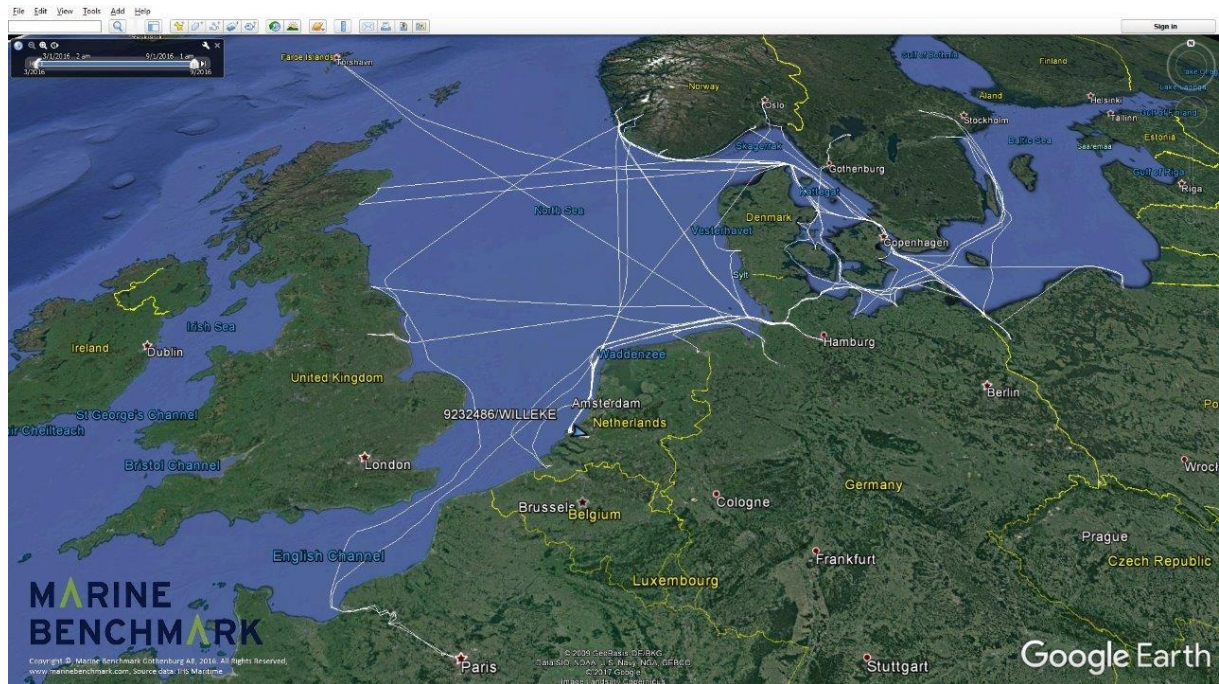


9226164-RHOON-C, 1208 kg fuel/day, 2432 dwt, 1000 kW, Caterpillar / 3512B-HD  
 Dry Cargo vessel, Owner: Cebo-Marine BV



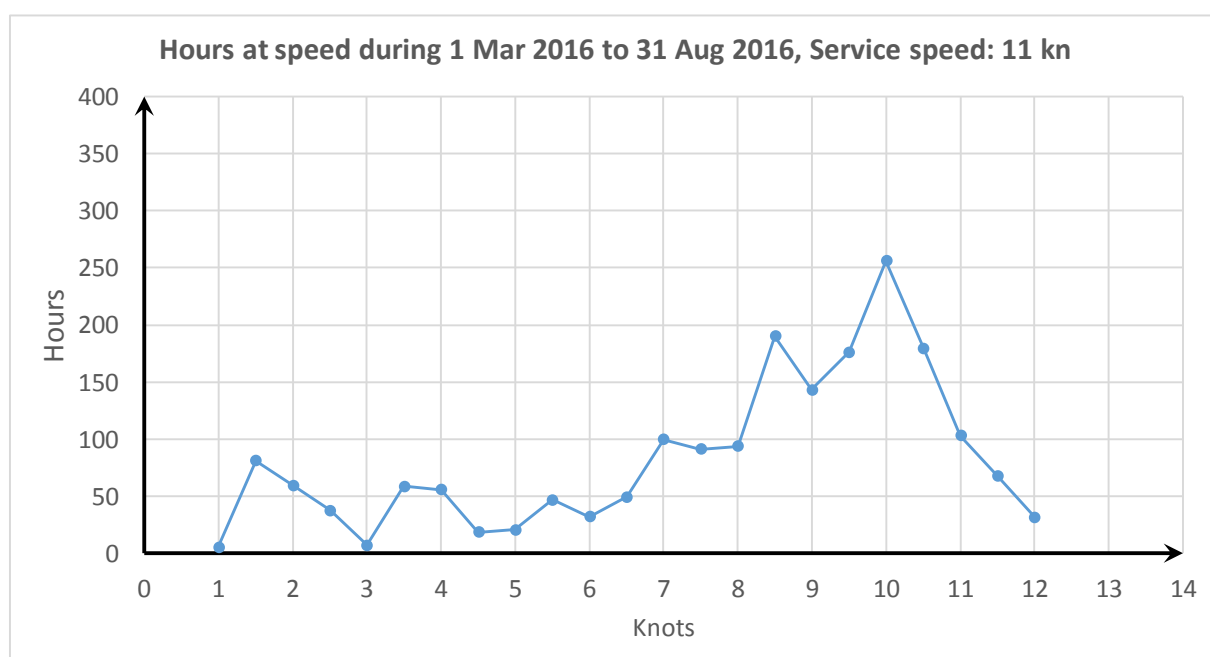
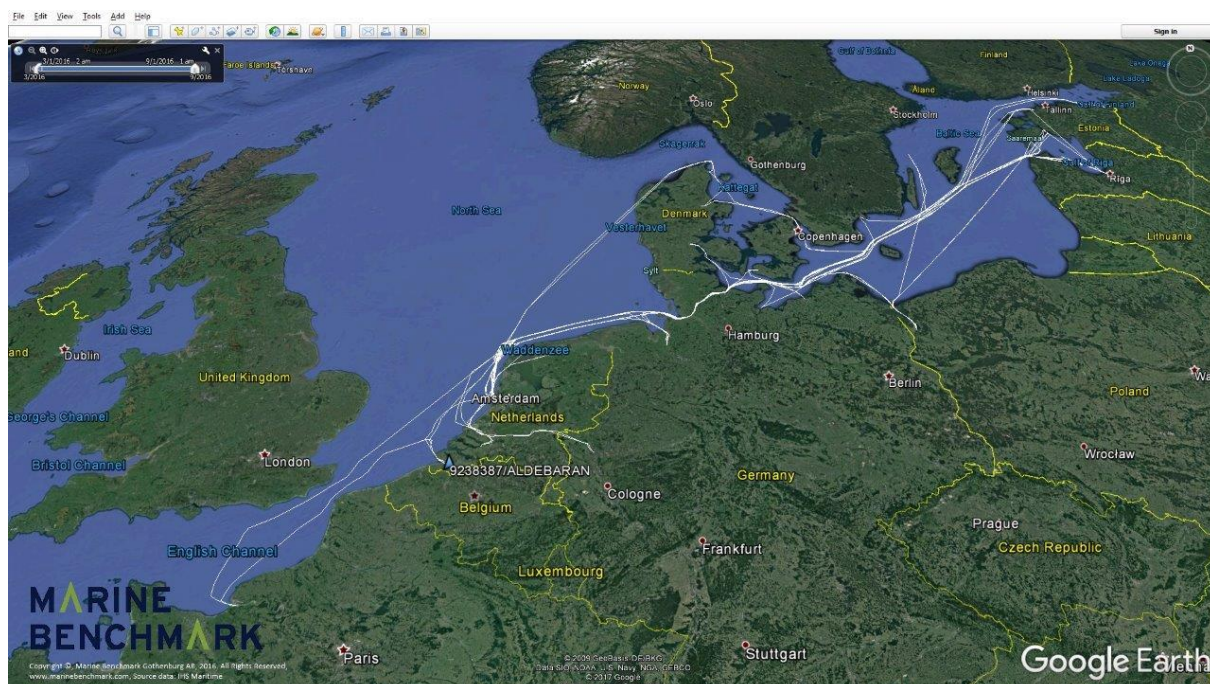


9232486-WILLEKE, 1212 kg fuel/day, 1680 dwt, 990 kW, Caterpillar / 3512TA  
 Dry Cargo vessel, Owner: Wagenborg Shipping BV

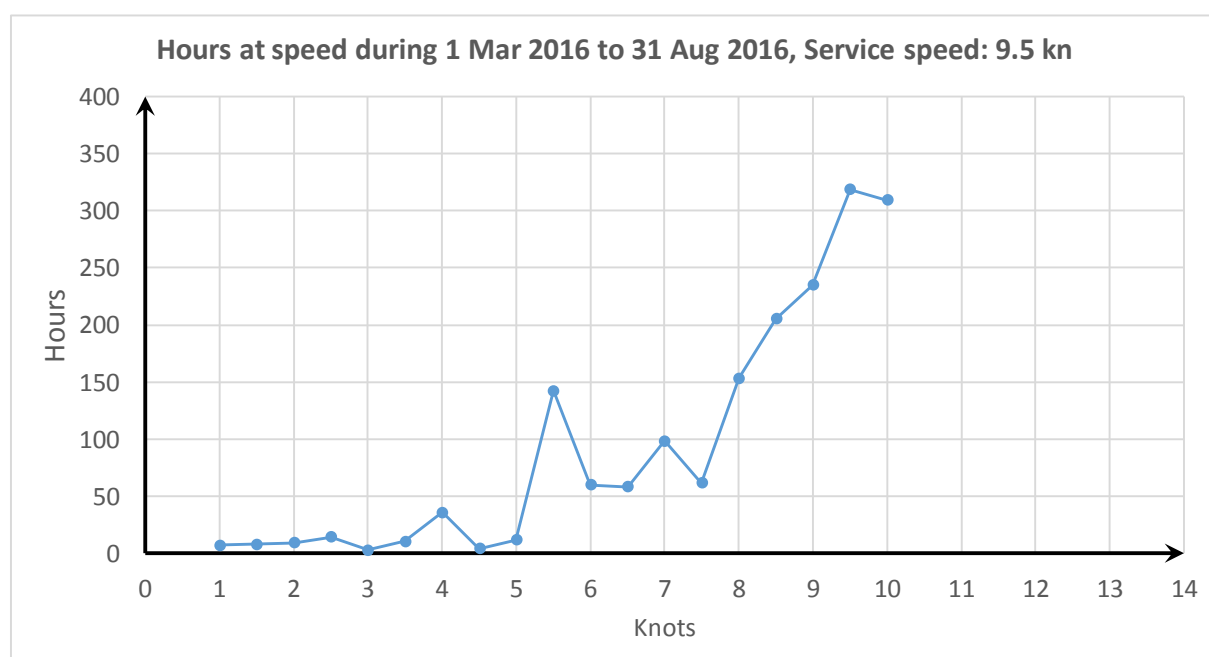
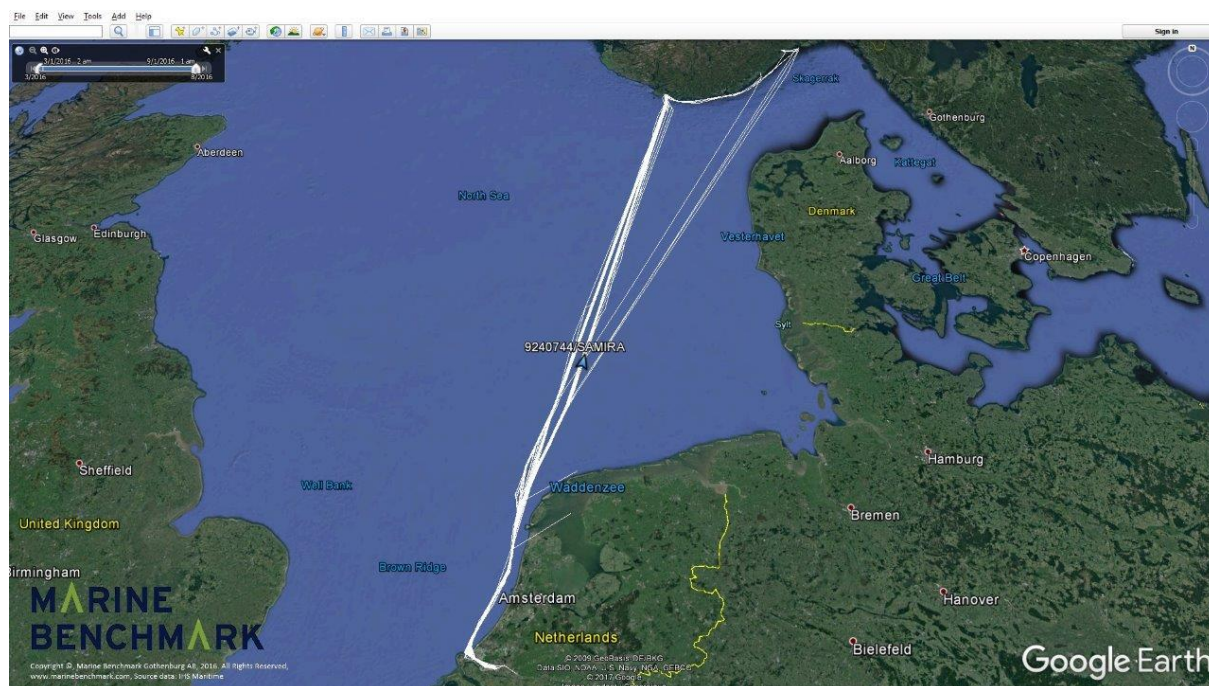




9238387-ALDEBARAN-, 1260 kg fuel/day, 3193 dwt, 1000 kW, Wartsila / 8L20  
 Dry Cargo vessel, Owner: Spliethoff's Bevrachtings BV

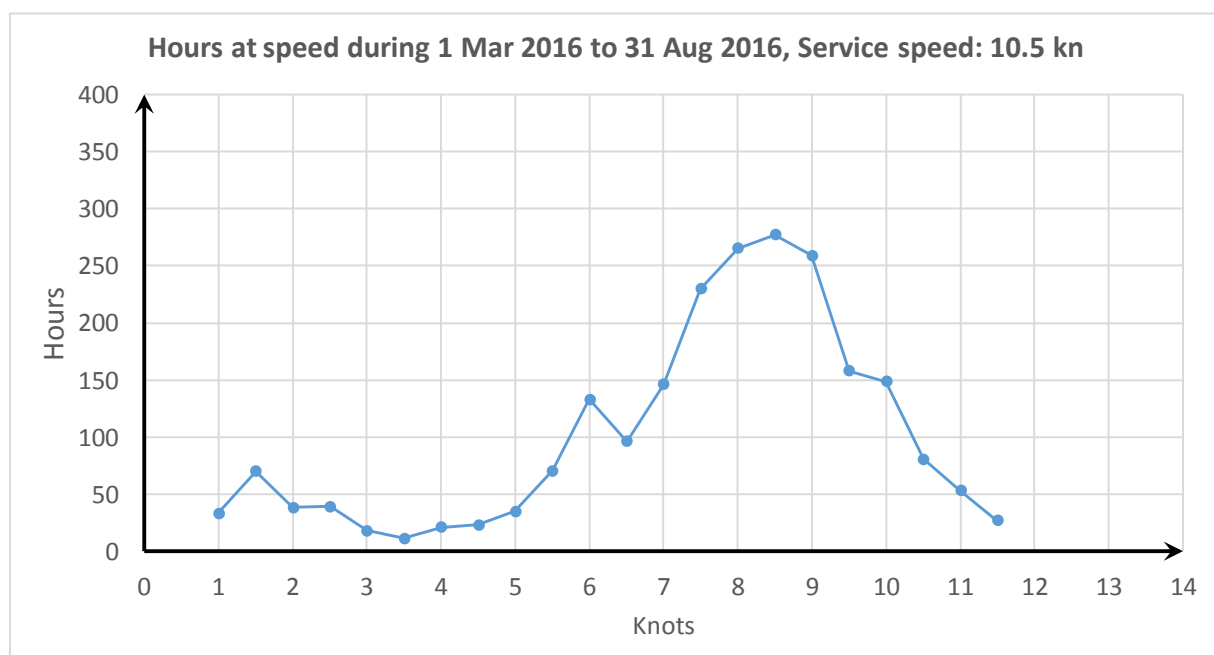
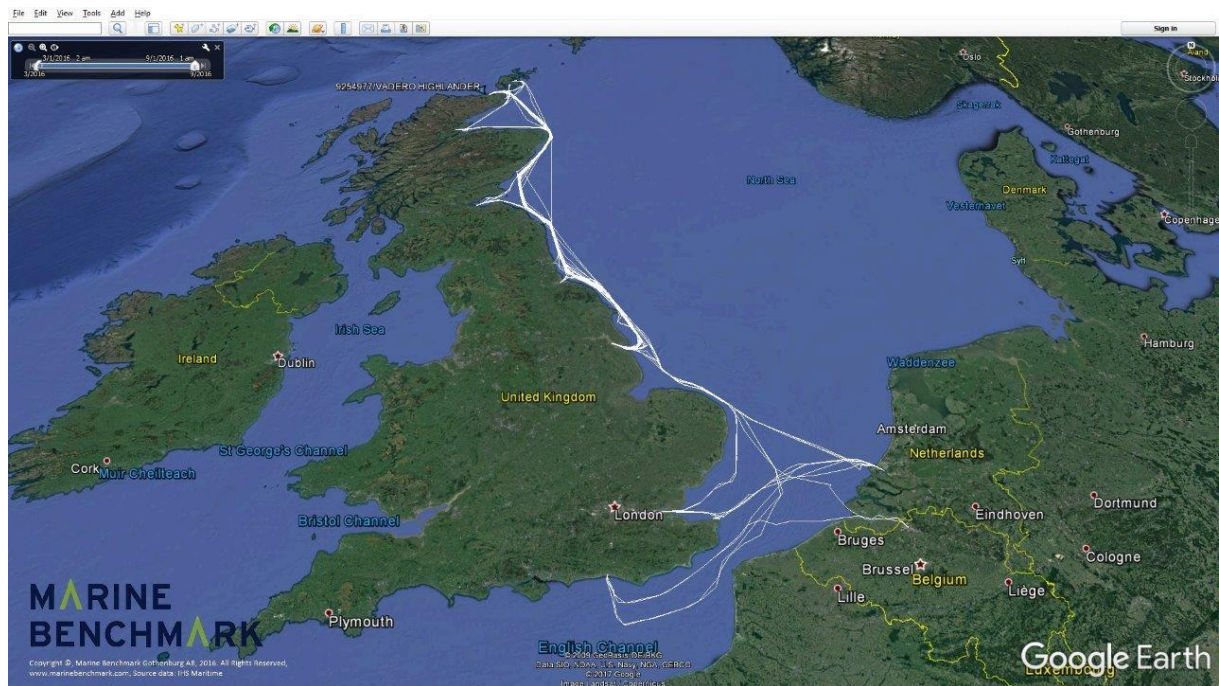


9240744-SAMIRA, 1498 kg fuel/day, 1700 dwt, 954 kW, Caterpillar / 3512TA  
Dry Cargo vessel, Owner: Wagenborg Shipping BV



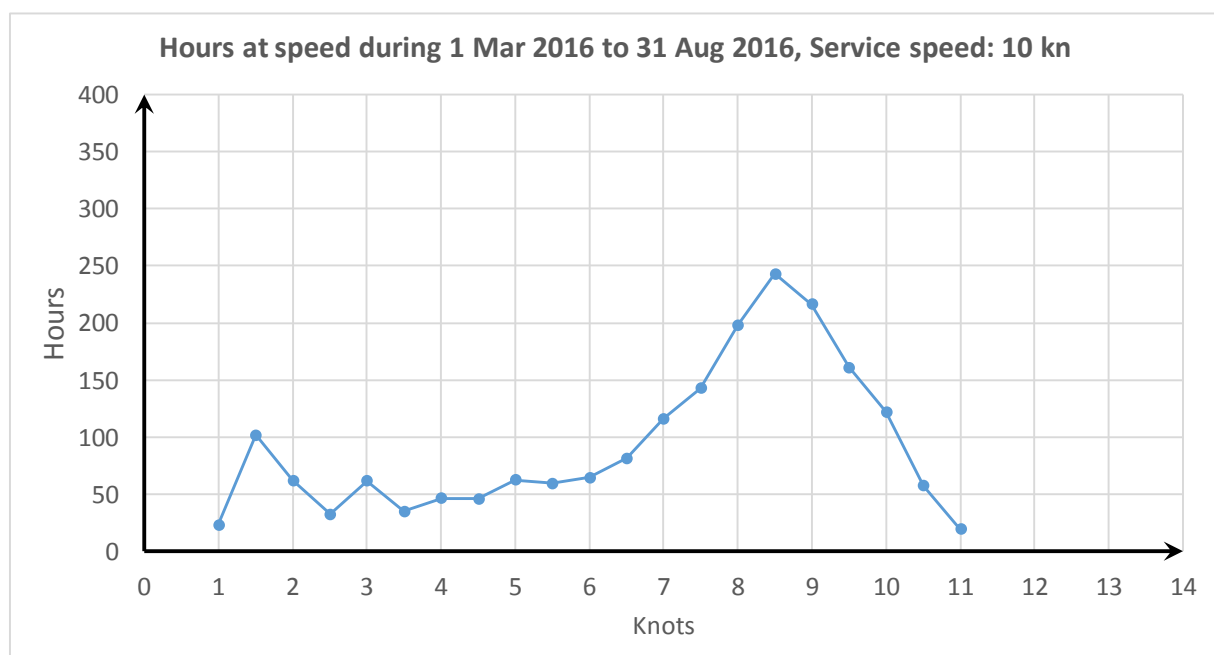
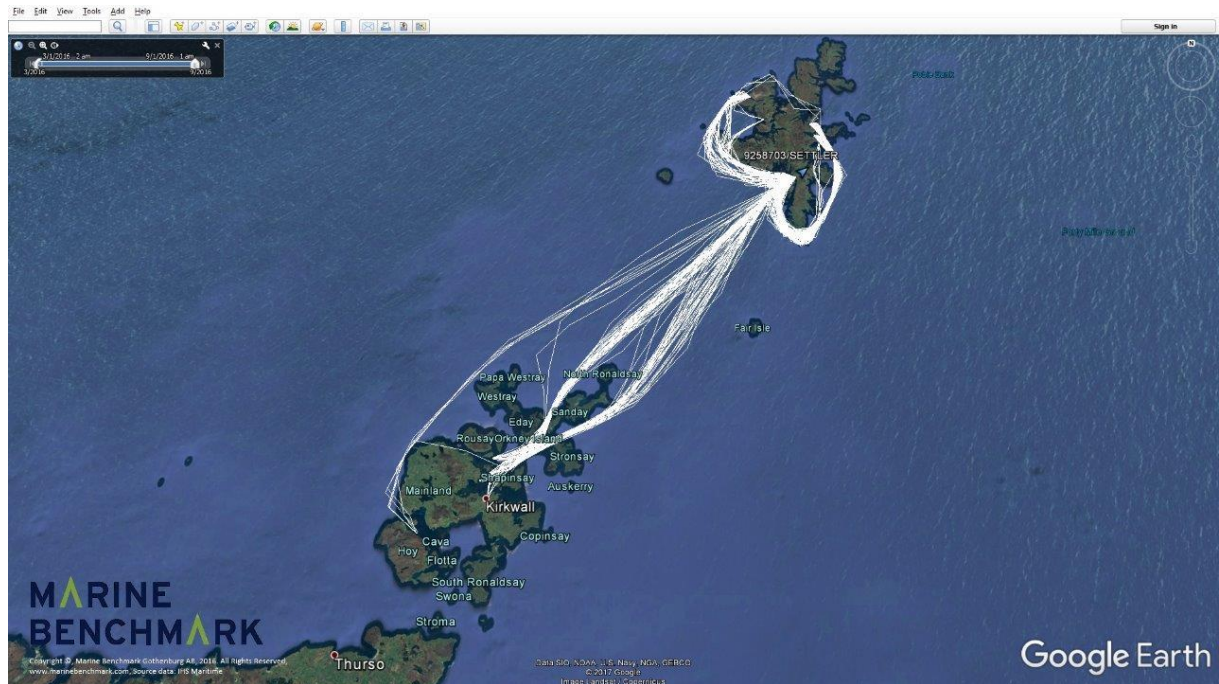


9254977-VADERO HIGHLANDER, 1579 kg fuel/day, 1862 dwt, 1140 kW, MaK / 6M20  
 Tanker vessel, Owner: Vadero Ship Management AB

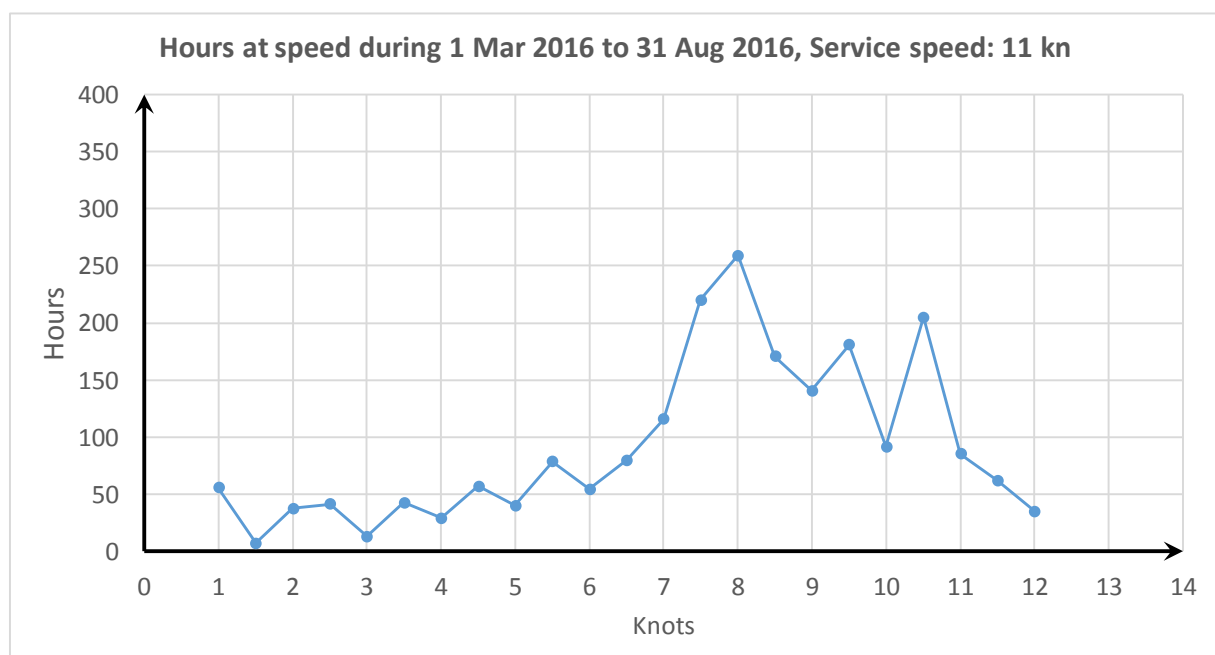
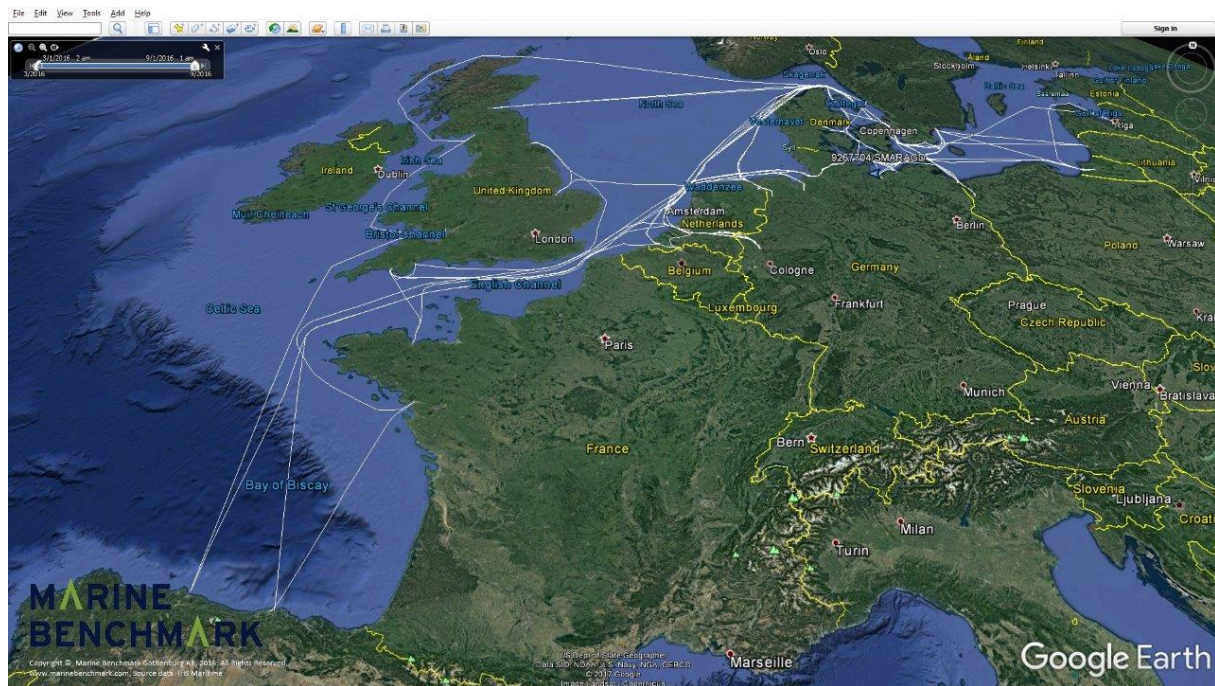




9258703-SETTLER, 1336 kg fuel/day, 650 dwt, 1103 kW, Caterpillar / 3512B-HD  
Fishing vessel, Owner: North Isles Marine Ltd

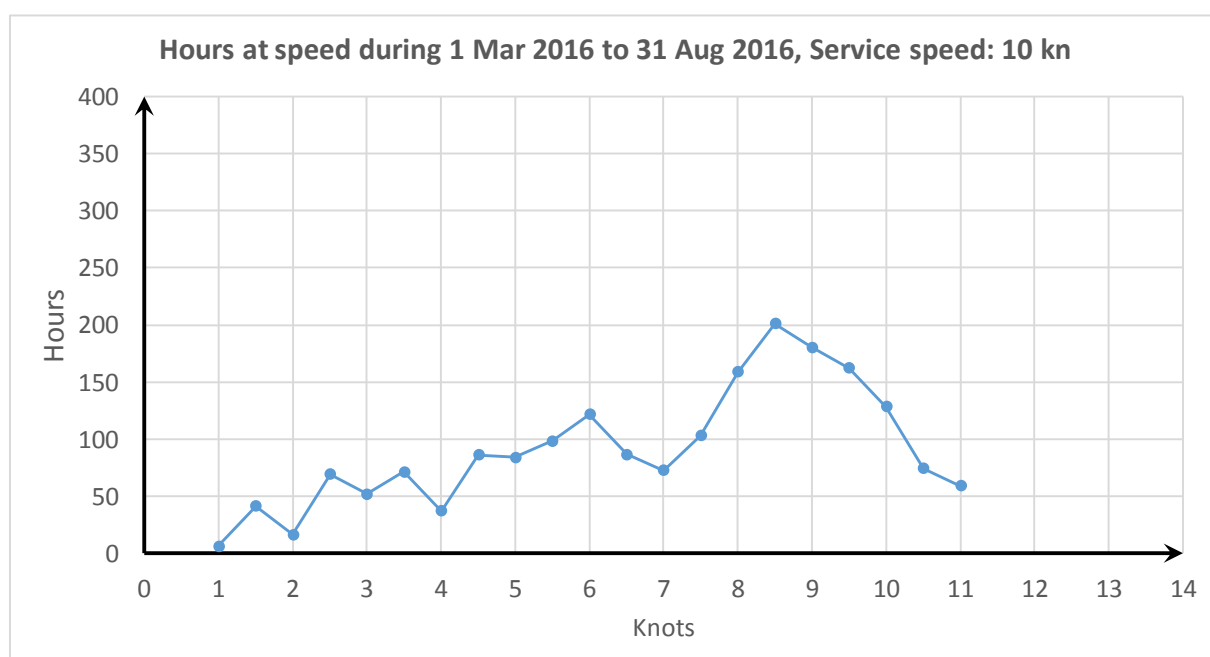
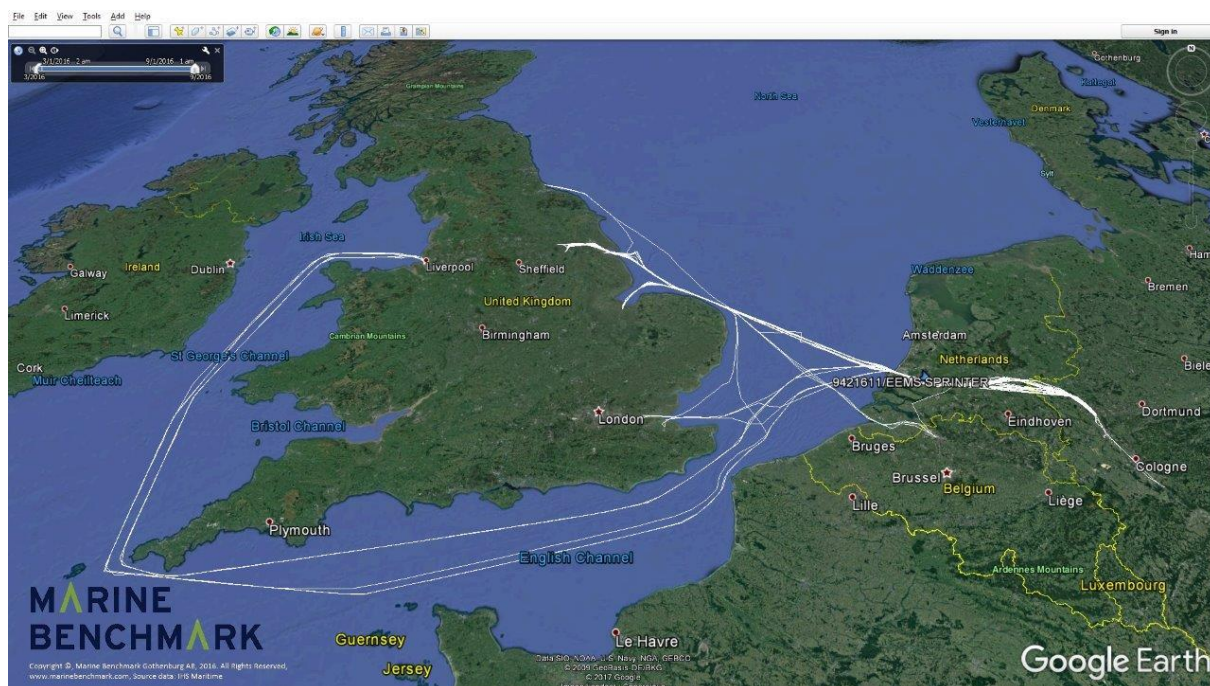


9267704-SMARAGD, 1277 kg fuel/day, 3195 dwt, 998 kW, Caterpillar / 3516B  
 Dry Cargo vessel, Owner: Bock Maritiem BV



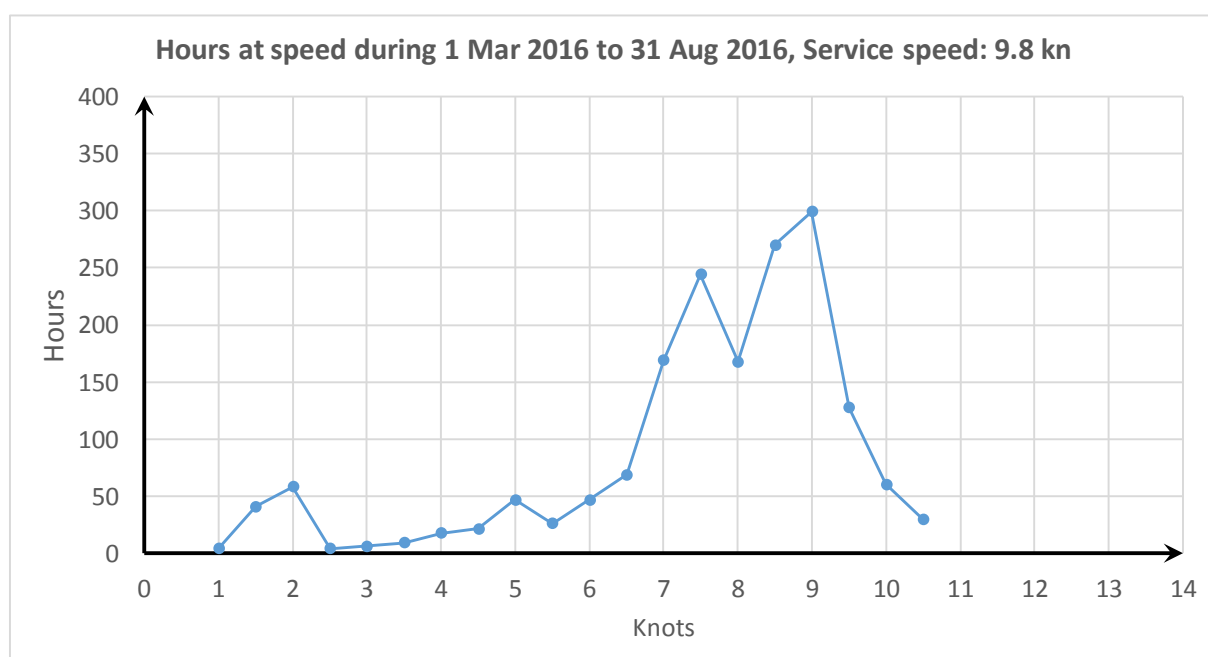
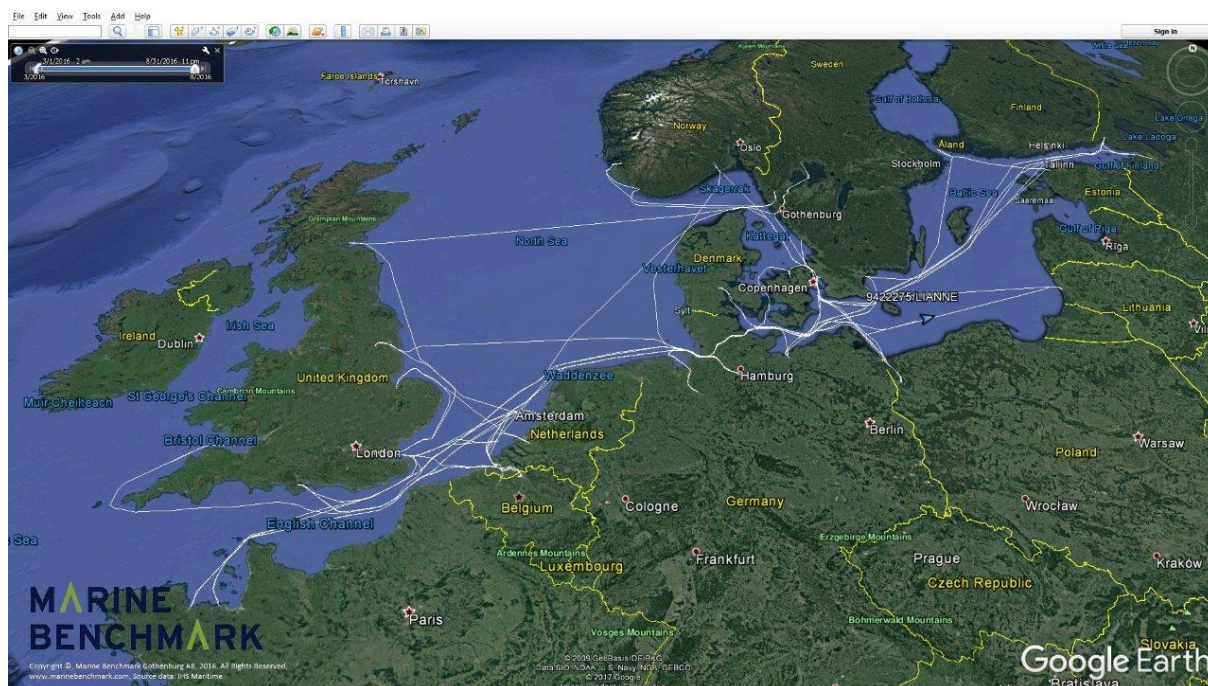


9421611-EEMS SPRINTER, 1335 kg fuel/day, 2620 dwt, 1103 kW, A.B.C. / 6DZC  
 Dry Cargo vessel, Owner: Rozema AJ

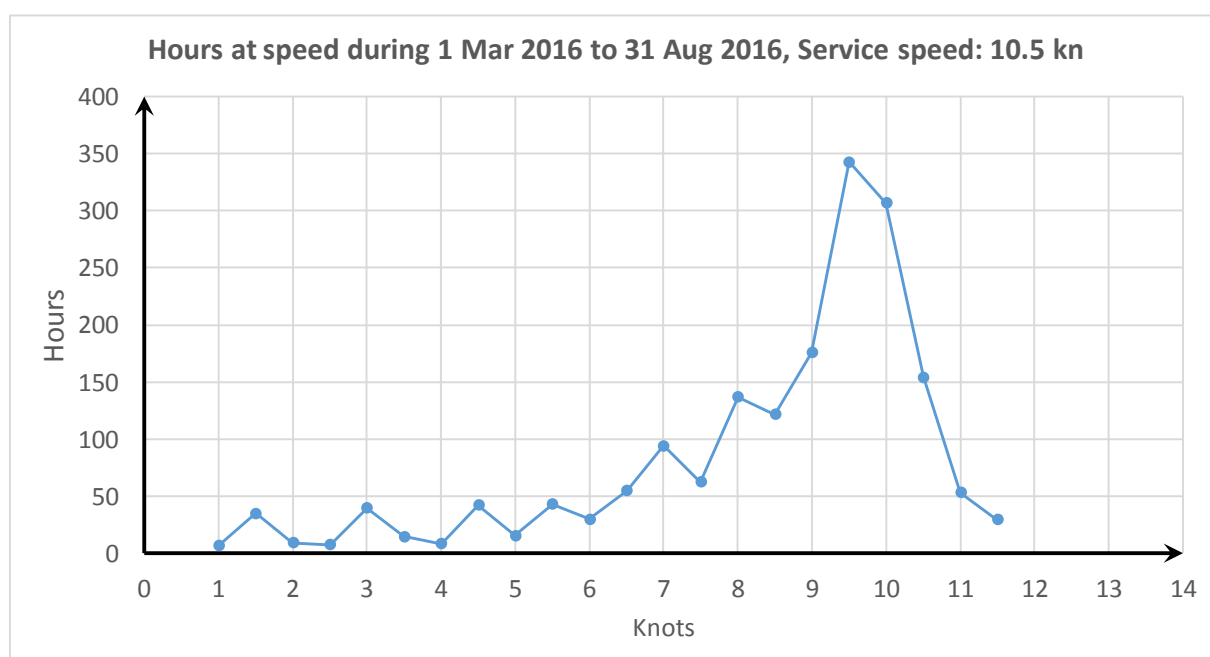
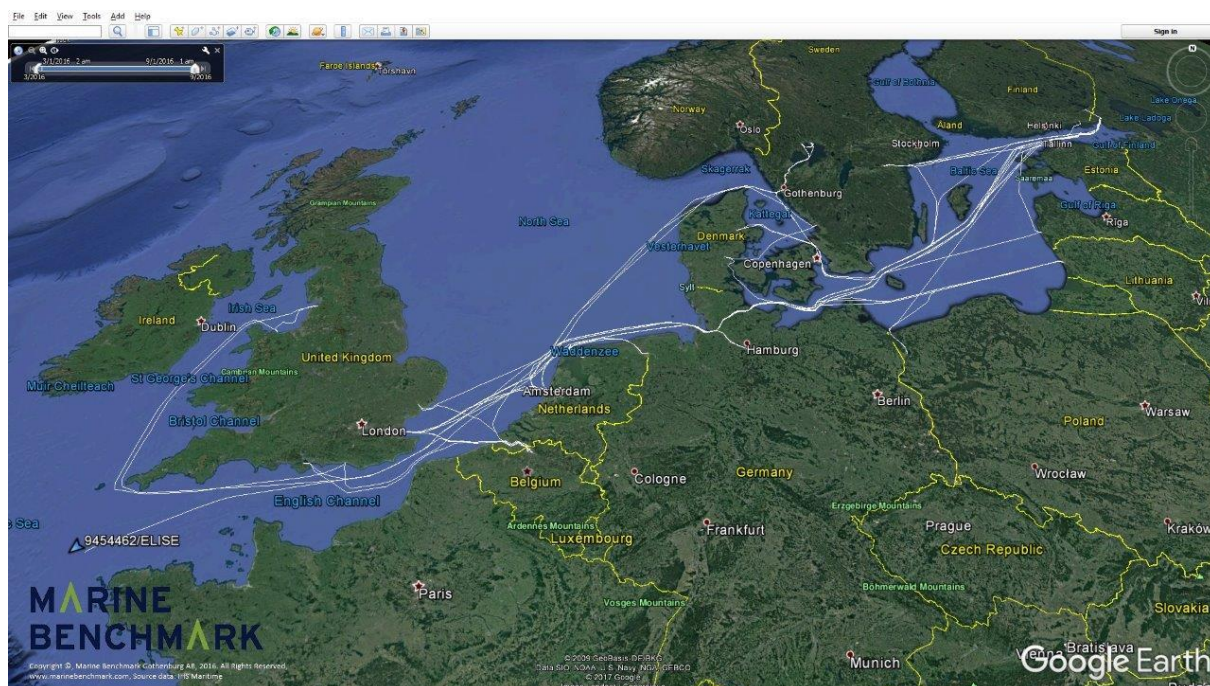




9422275-LIANNE, 1389 kg fuel/day, 3075 dwt, 1140 kW, MaK / 6M20  
 Dry Cargo vessel, Owner: van Dam Scheepvaartbedrijf

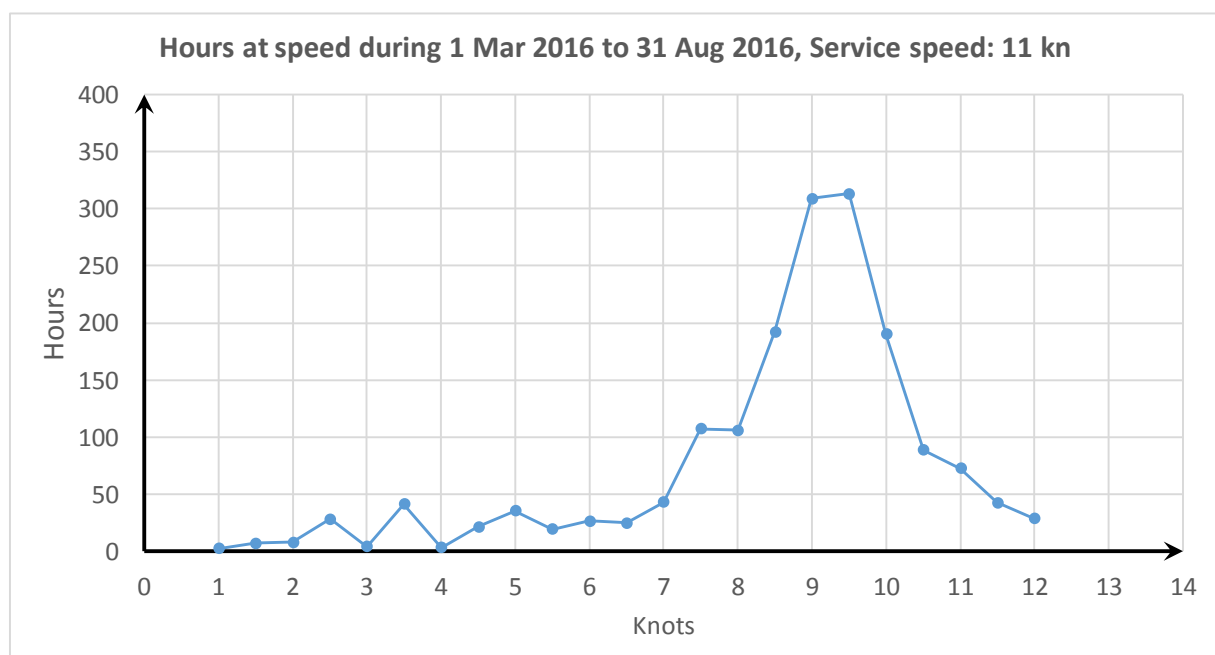
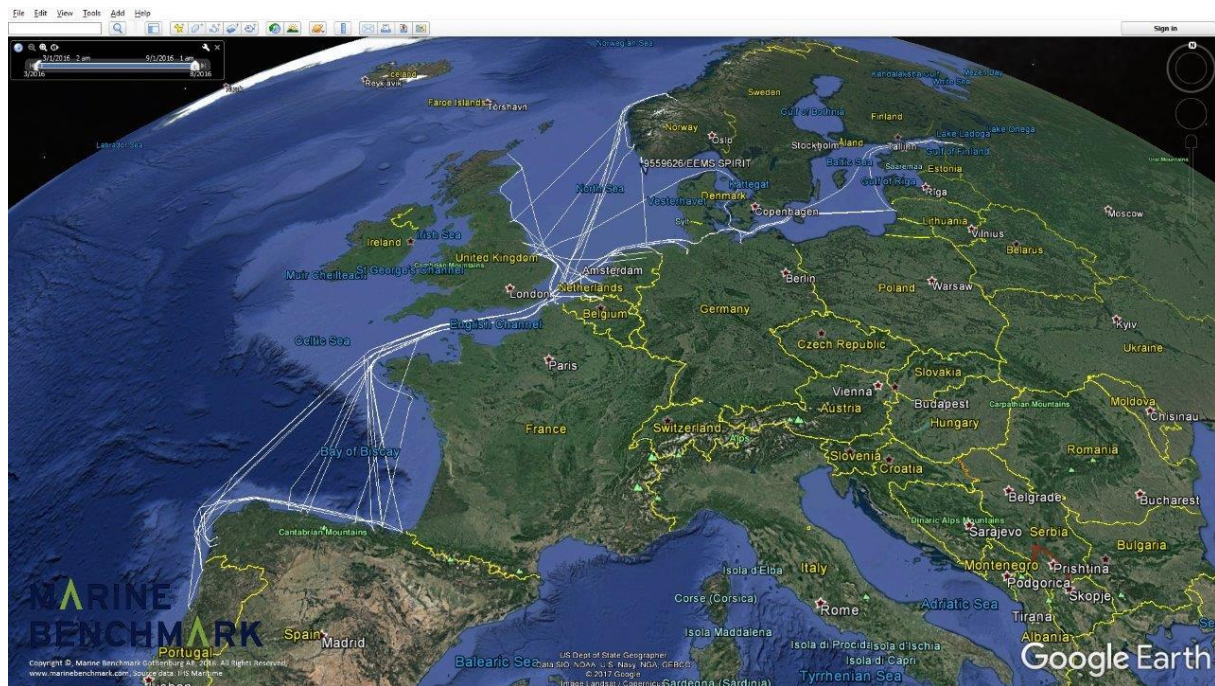


9454462-ELISE, 1569 kg fuel/day, 3075 dwt, 1123 kW, MaK / 6M20  
 Dry Cargo vessel, Owner: van Dam Scheepvaartbedrijf



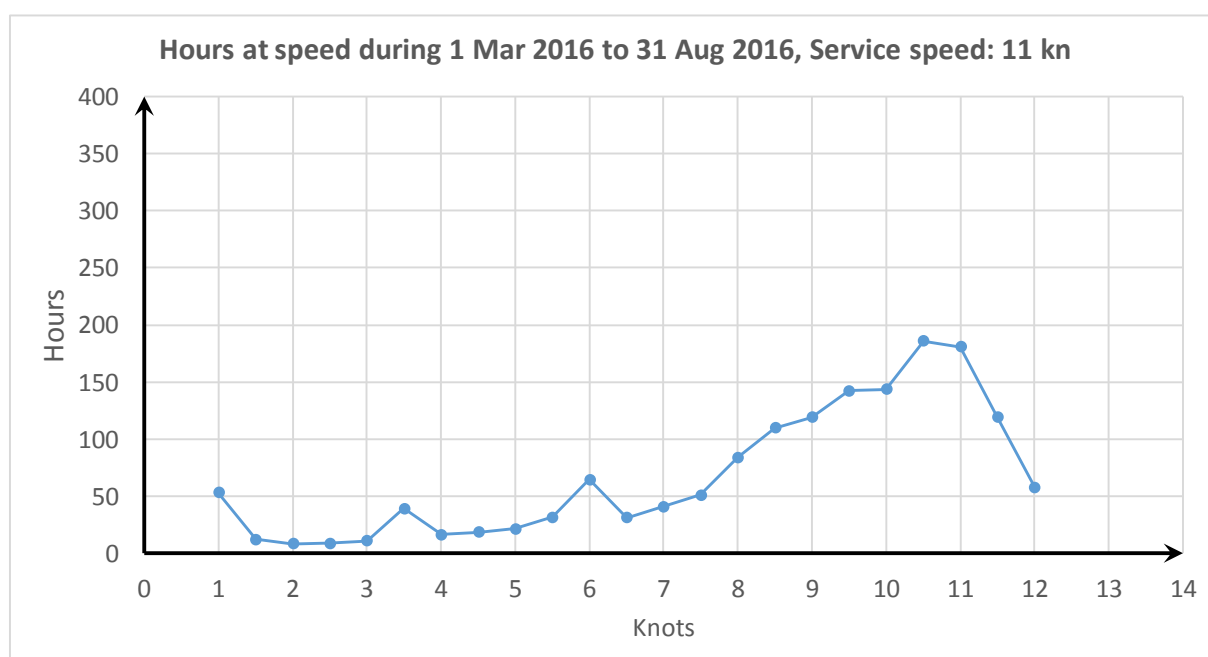
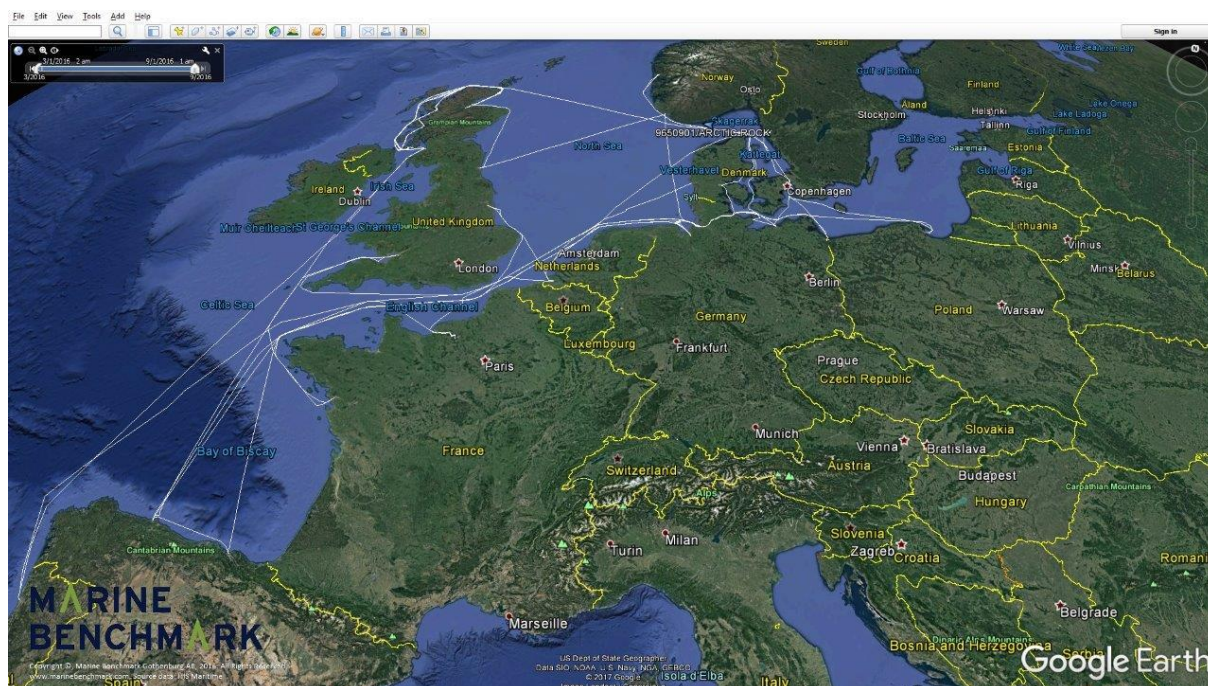


9559626-EEMS SPIRIT, 1360 kg fuel/day, 2620 dwt, 1103 kW, A.B.C. / 8DZC  
 Dry Cargo vessel, Owner: Kornet & Zonen BV





9650901-ARCTIC ROCK, 1454 kg fuel/day, 3285 dwt, 1200 kW, Wartsila / 6L20  
 Dry Cargo vessel, Owner: Hartman Seatrade CV

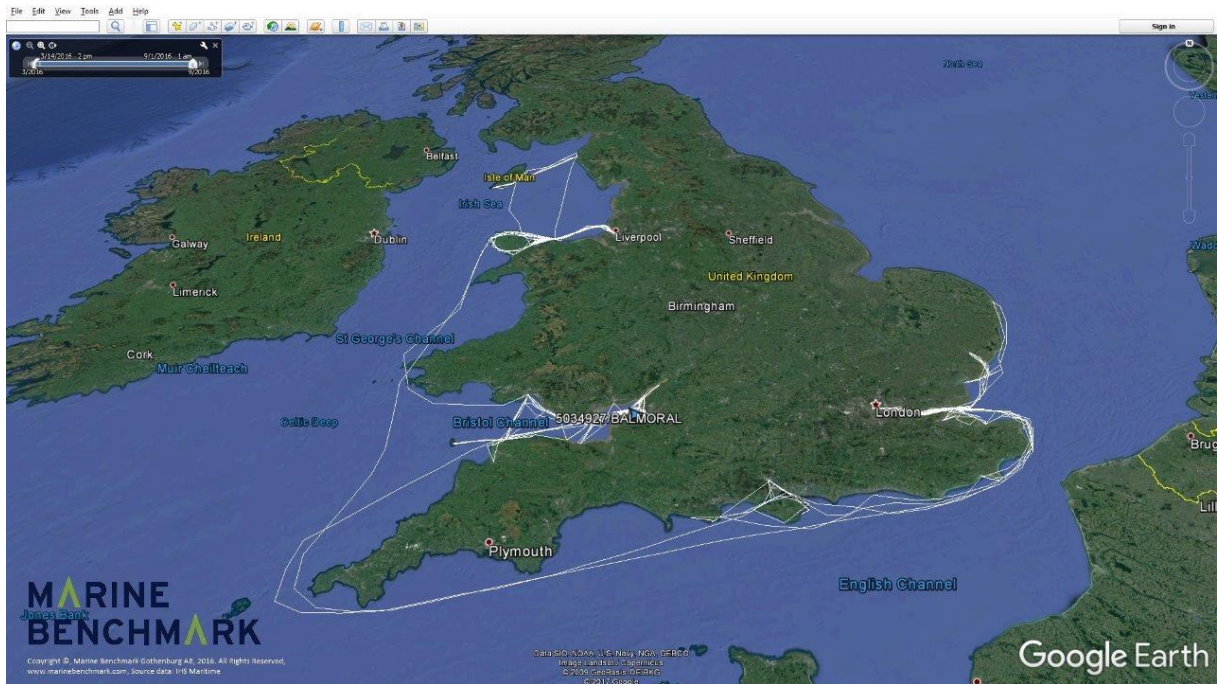


## APPENDIX V – ADDITIONAL TOP 8 FERRIES – ENGINE SIZE 450 - 1200 kW

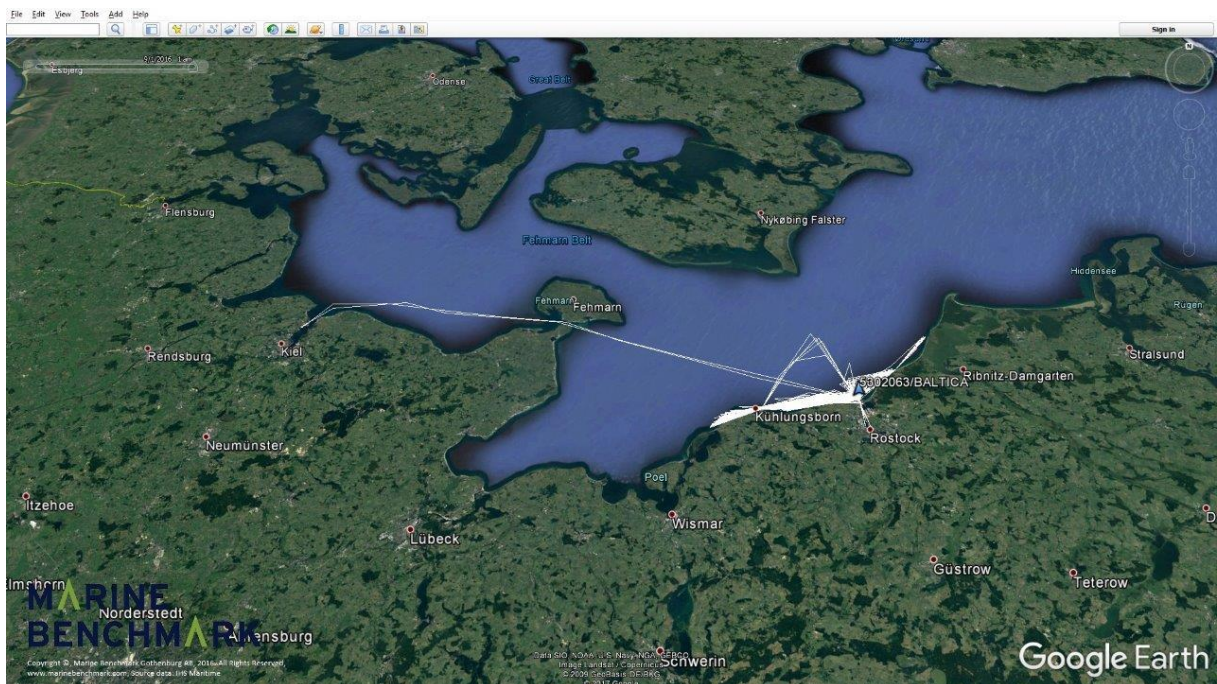
IMO	Current name	Vessel type	Service speed	Propulsion power (kW)	Vessel beneficial owner	Vessel technical manager	Vessel operator
5034927	BALMORAL	Ferry	12.0	1175	Waverley Steam Navigation Co	Seaspan Shipping Ltd-Gbi	Waverley Steam Navigation Co
5302063	BALTICA	Ferry	12.0	588	BSTW-Baltic Schifffahrt	Bstw-Baltic Schifffahrt	BSTW-Baltic Schifffahrt
7700403	EID	Ferry	11.3	956	Fjord1 AS	Fjord1 As	Fjord1 AS
7925649	SKJOLDNAES	Ferry	10.5	650	AEro Kommune	Aerofergerne	AErofergerne
8009258	LADY VON BUSUM	Ferry	13.5	656	Rahder H-G	Hg Rahder Reederei Gmbh	HG Rahder Reederei GmbH
9081722	HOY HEAD	Ferry	10.0	956	Orkney Islands Council	Orkney Ferries Ltd	Orkney Ferries Ltd
9117337	RED EAGLE	Ferry	13.0	1194	RED FUNNEL GROUP	Red Funnel Group	Red Funnel Group
9169794	HOJESTENE	Ferry	10.1	551	Svendborg Kommune	Svendborg Kommune	Svendborg Kommune



5034927-BALMORAL, 78 dwt, 1175 kW, Grenaa / 6F24  
Ferry, Owner: Waverley Steam Navigation Co

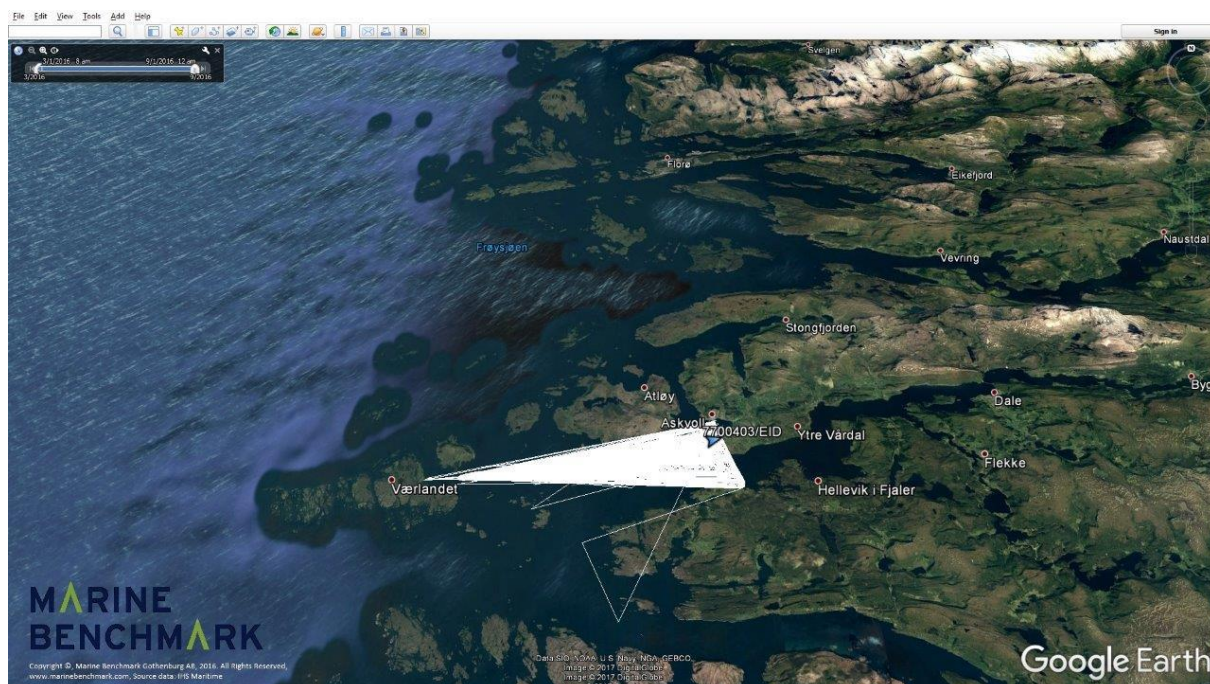


5302063-BALTICA, 122 dwt, 588 kW, MaK / MSU36A  
Ferry, Owner: BSTW-Baltic Schiffahrt

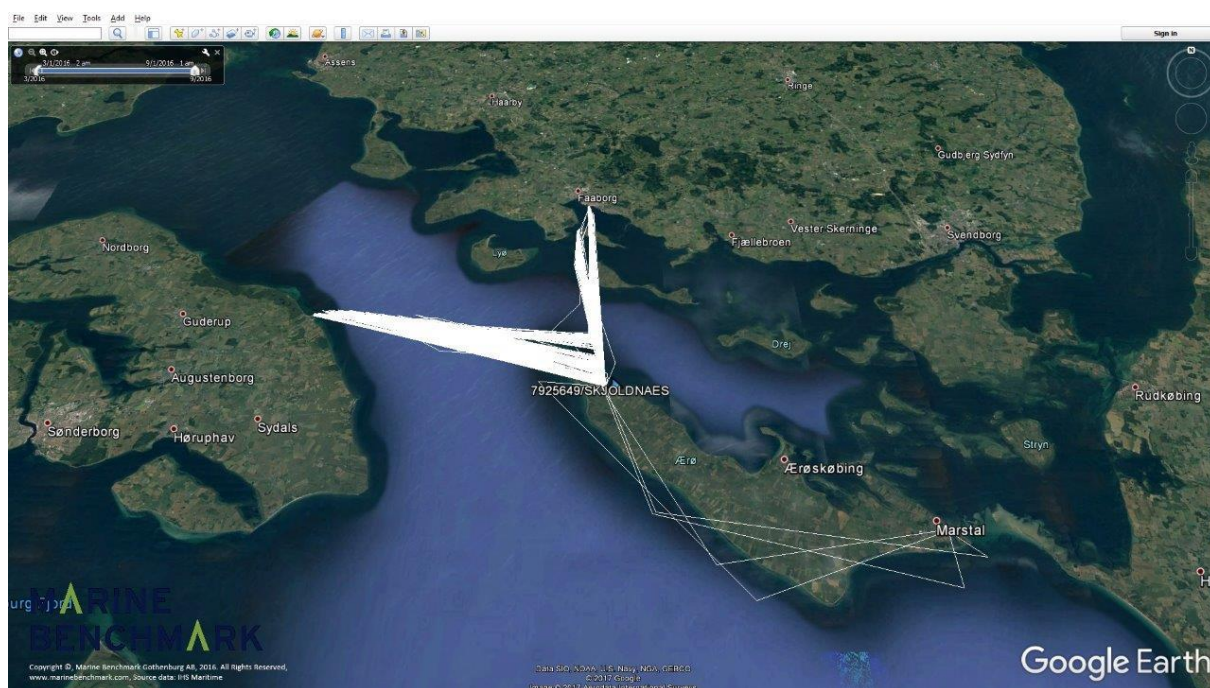




7700403-EID, 150 dwt, 956 kW, Wichmann / SAXA  
Ferry, Owner: Fjord1 AS

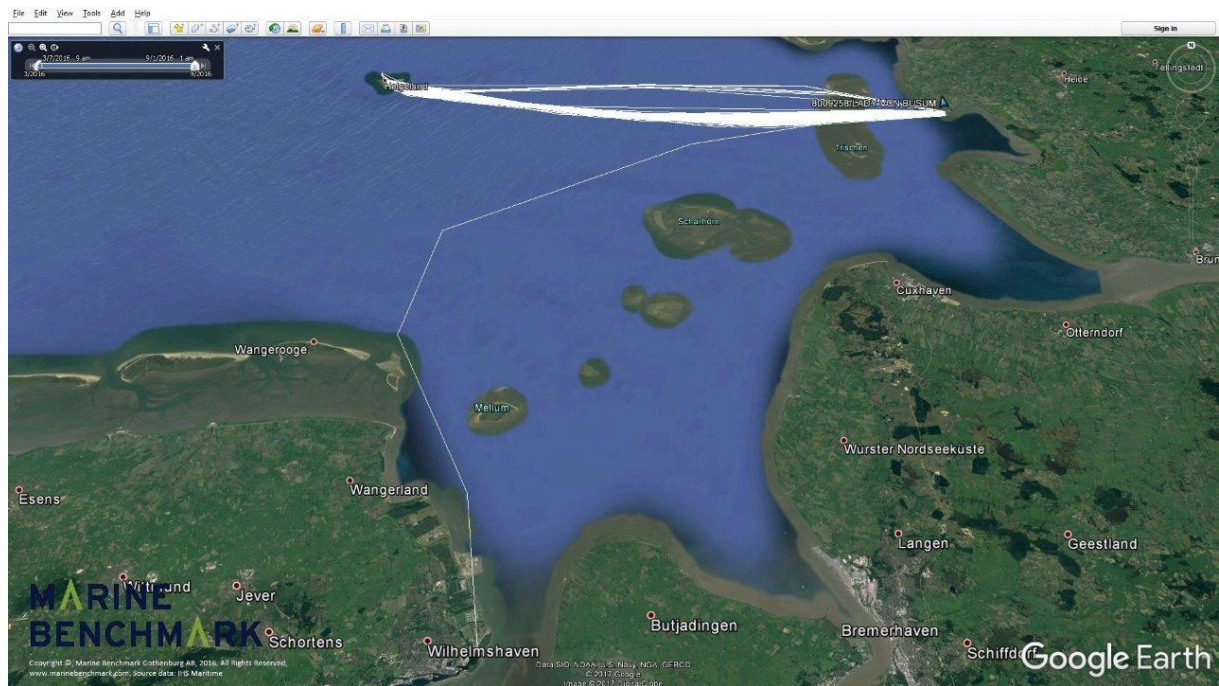


7925649-SKJOLDNAES, 125 dwt, 650 kW, Cummins / N14-M  
Ferry, Owner: AEro Kommune

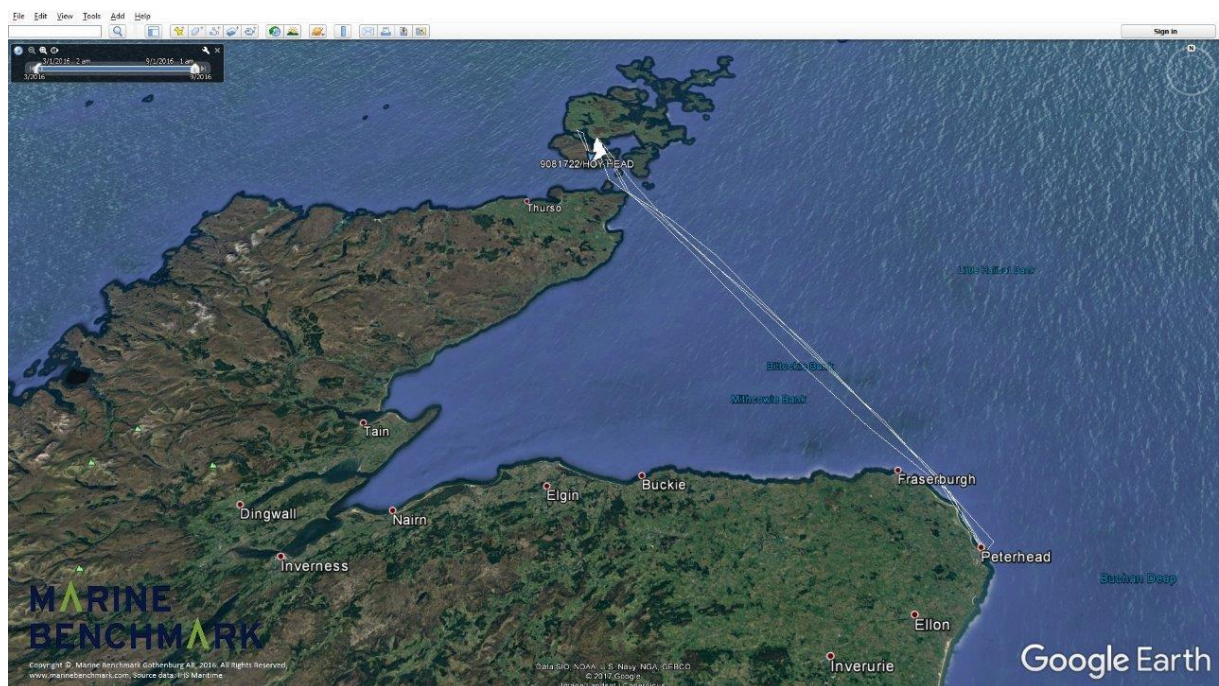




8009258-LADY VON BUSUM, 115 dwt, 656 kW, M.T.U. / 8V183TE92  
Ferry, Owner: Rahder H-G

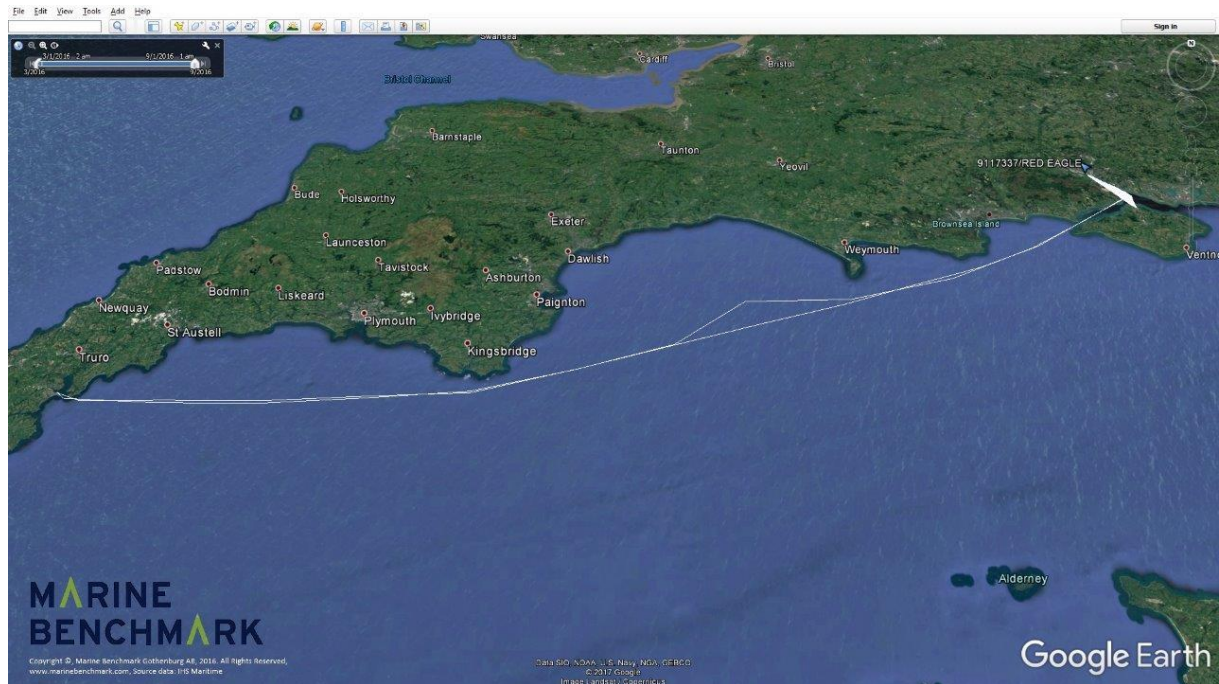


9081722-HOY HEAD, 212 dwt, 956 kW, Volvo Penta / D16  
Ferry, Owner: Orkney Islands Council





9117337-RED EAGLE, 612 dwt, 1194 kW, Kromhout / 8FHD240  
Ferry, Owner: RED FUNNEL GROUP



9169794-HOJESTENE, 64 dwt, 551 kW, Volvo Penta / TAMD163A  
Ferry, Owner: Svendborg Kommune

