Task E:
Area-wide traffic and use study

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Task E3: Cargo transport analysis

Task E4: Future increase in ship traffic (2020) analysis

Task E5: Offshore installations analysis

Task E6: Collection of all accident and use data and risk reducing measures → including some results!!

Task E3: Cargo transport analysis

Objective:

- Determine the probability that a tanker of a certain type and size at a certain location is loaded with oil;

- Determine the expected amount of cargo oil that is on board, in case the tanker is loaded.

Scope:

- Two types of transport routes:
  - Oil transported to and from ports in the Bonn-area
  - Oil transported between ports outside the Bonn-area

- The traffic network obtained from AIS by COWI will be used.
- Four groups of oil types will be distinguished, based on UN-number:
  - Crude oil
  - Fuel oil
  - Diesel
  - Petrol

Methodology:

The following steps can be distinguished:

- Research the transport routes in the Bonn Agreement area

    → Definition of the main transport routes in the area.

- Data analysis for each of the transport routes, determine:

    The probability that an oil tanker at that location is loaded with oil;

    The expected amount and type of cargo oil that is on board, in case the tanker is loaded.

- Extrapolation of derived properties towards ship traffic outside the main transport routes.

Progress:

Cargo data has been collected:

- Data from Norway (with confidentiality agreement) provided by some oil-compagnies;

- Data from the port of Rotterdam has been requested (almost there);

- Data from other countries mostly "totals", not on voyage-level.

- Request at EMSA for SafeSeaNet data → approved, but not yet received....

Next steps:

➤ When SSN-data is avaiable it will be more clear what is contained in the data and how is can be used.

➤ The cargo-data will be connected with the traffic database from COWI based on AIS

(Per Oct 1st a new person will start at MARIN, dedicated to the work for BE-AWARE……)

Task E4: Future increase in ship traffic (2020) analysis

Objective:

Make a prognosis for the shipping traffic in 2020, based on the expected fleet and cargo transport developments.

The prognosis will be based on the available literature and the prognoses of ports and countries on cargo transport and ship calls.

Scope:

The analysis will focus both on "moving" ships and on the filling rate of anchorage areas.

Methodology:

Three questions are to be answered in this task in order to arrive at the prognosis for each of the main transport routes:

➢ Which are the main transport routes in the Bonn Agreement area?

➢ What increase of cargo is expected on each of those routes?

➢ How does the cargo increase relate to the number of vessels per ship type and size on each of the routes?

Data sources:

Based on various data sources an answer to these questions will be found:

- Historical data on goods / passenger transports to the ports of each member country
- Import /export statistics from ports for 2011
- Forecasts of ports for different types of cargo/ ship movements / passenger transport
- Relevant future port development plans from each member country
- Literature on cargo transport in Europe and worldwide
- Literature on fleet development
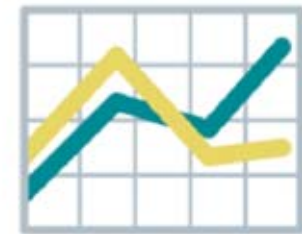
Progress & next steps

➢ Some data has been collected

➢ Real work still needs to start…..

Task E5: Offshore installations analysis

Objective:

Analysis of oil spill frequencies per spill size from offshore installations.

Scope:

➢ Offshore installations include:

- •Offshore platforms;
- •Offshore wind farms;
- •Subsea pipelines;
- •Other offshore structures, if considered relevant.

➢ The focus is on oil spills as a result of damage to vessels

➢ If information can be obtained regarding oil spills from subsea pipelines and offshore platforms, this type of spills will be included in a more generic way

Platform collision risk based on AIS; Progress:

➢ Risk is calculated for Dutch Platforms for the whole year (2011)

➢ Collision probability for each ship type and size for each platform is calculated for each Beaufort class.

➢ Probability of wind within a certain Beaufort class multiplied with the probability of collision gives the collision risk

➢ With the corresponding ship speed (drifting or ramming), the kinetic energy involved in the collision can be determined

➢ Based on the kinetic energy it will be determined whether a hole in the outer hull (bunker tank) or also in the inner hull (cargo tank) will occur

➢ Also based on the kinetic energy a probability can be estimated that the platform will collapse
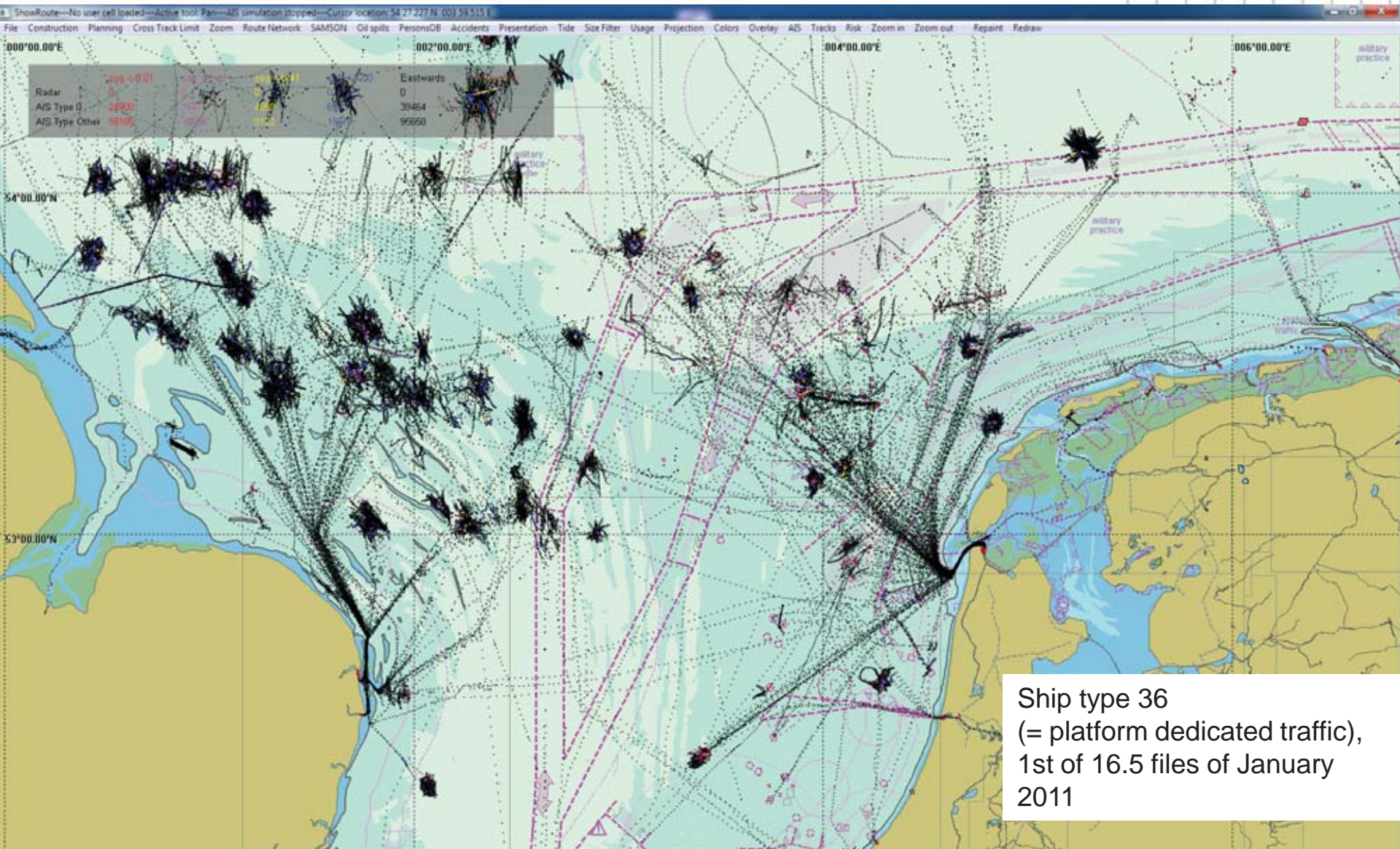
Ship type 36
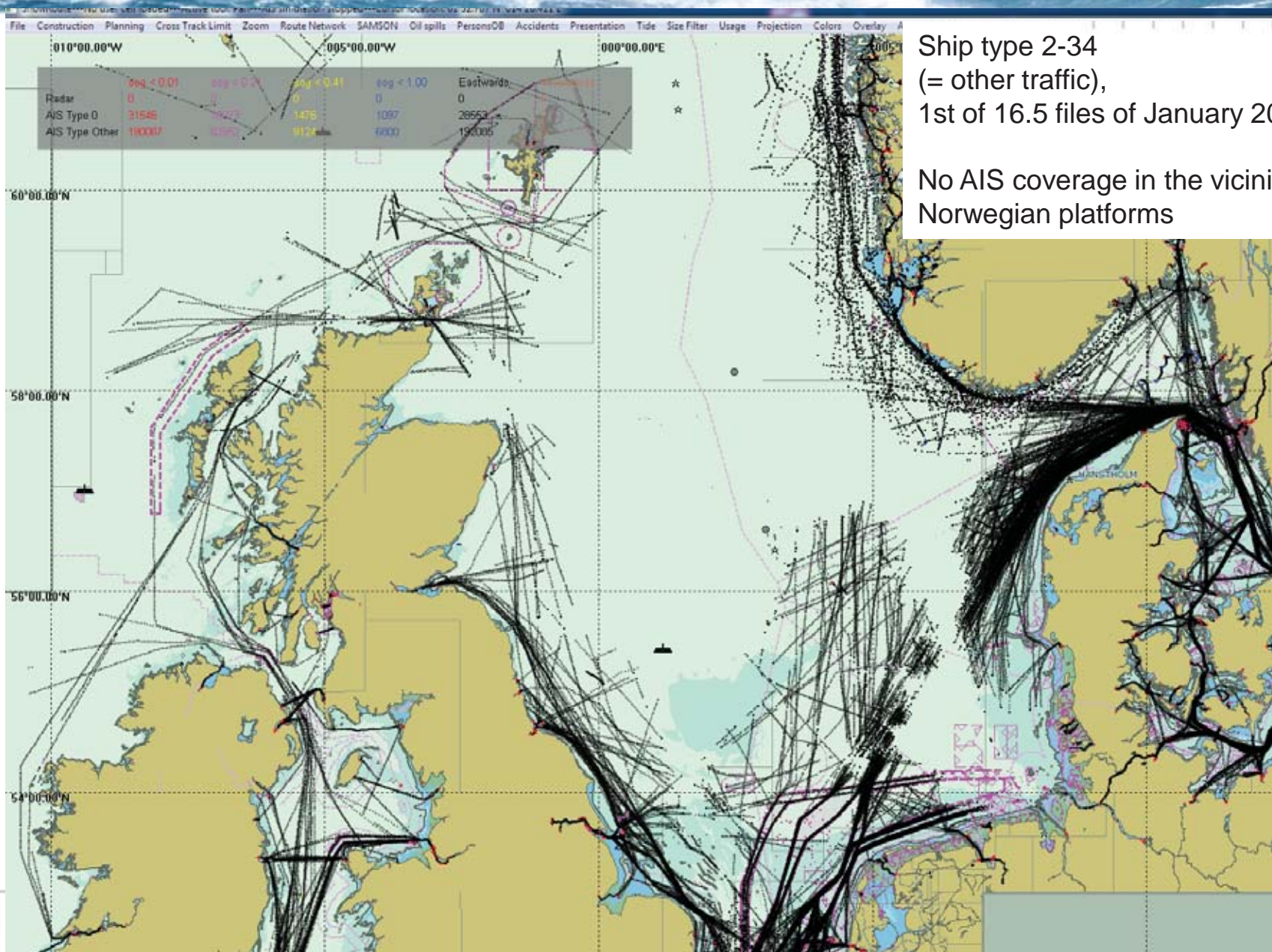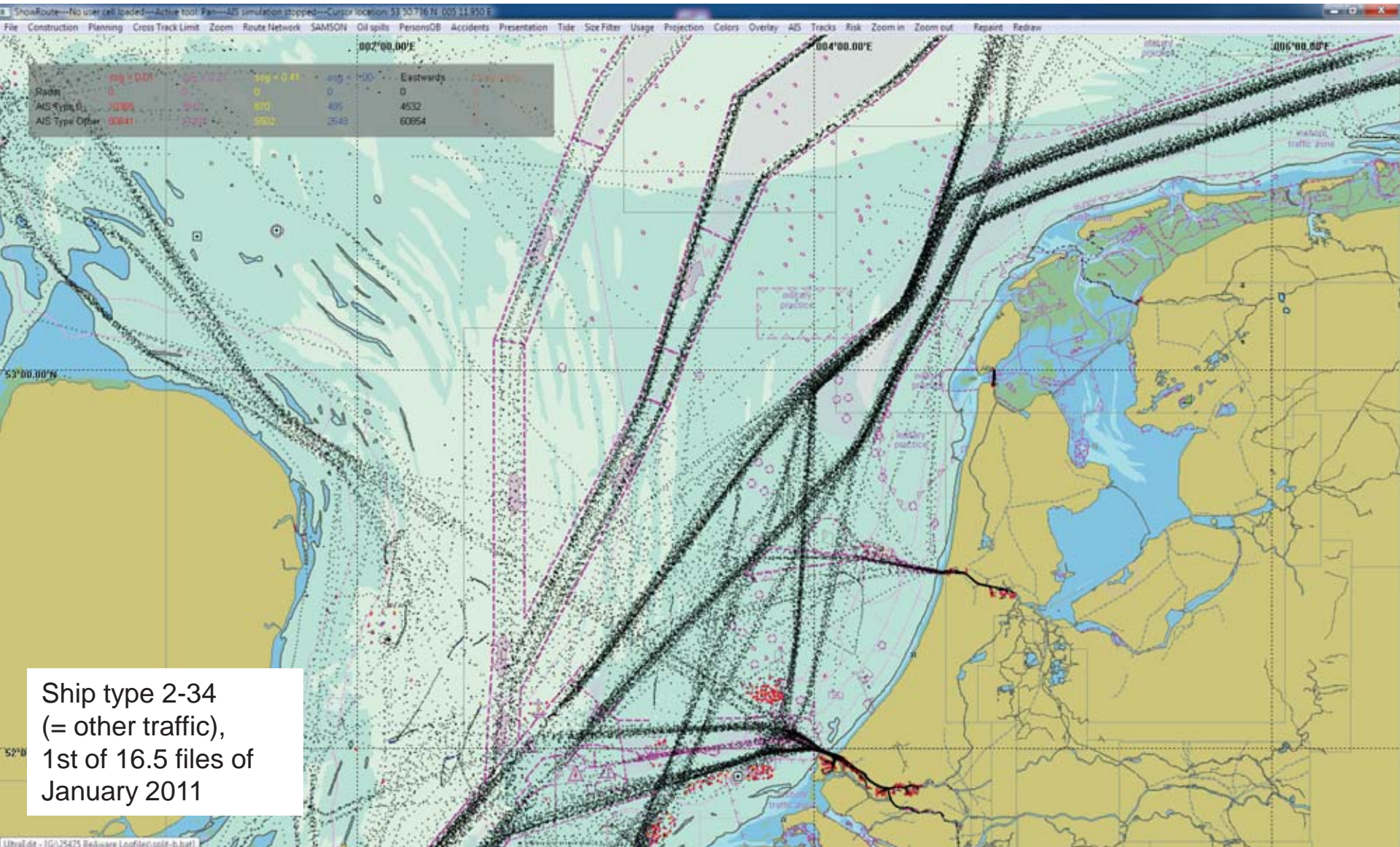(= platform dedicated traffic),
1st of 16.5 files of January
2011

Ship type 2-34
(= other traffic),
1st of 16.5 files of January 2011

No AIS coverage in the vicinity of Norwegian platforms

Ship type 2-34
(= other traffic),
1st of 16.5 files of
January 2011

Drifting collision frequency per year In MJ energy classes

type	(Multiple Items)
size	(All)

Other traffic

Upper limits of energy classes (MJ)

PlatformNr

Sum of P_drift	Column Labels									
Row Labels	1	3	5	10	15	50	100	200	above	Grand Total
1	0.000023	0.000148	0.000088	0.000053	0.000041	0.000099	0.000040	0.000012	0.000000	0.000503
2	0.000020	0.000128	0.000076	0.000053	0.000031	0.000112	0.000042	0.000013	0.000000	0.000476
3	0.000058	0.000337	0.000170	0.000102	0.000056	0.000143	0.000061	0.000018	0.000000	0.000945
4	0.000030	0.000214	0.000107	0.000084	0.000050	0.000126	0.000057	0.000017	0.000000	0.000705
142	0.000029	0.000217	0.000096	0.000060	0.000055	0.000109	0.000042	0.000015	0.000001	0.000554
143	0.000104	0.000391	0.000202	0.000138	0.000116	0.000230	0.000093	0.000034	0.000002	0.001310
144	0.000103	0.000255	0.000202	0.000114	0.000061	0.000137	0.000056	0.000015	0.000000	0.000871
145	0.000039	0.000125	0.000048	0.000024	0.000009	0.000020	0.000013	0.000003	0.000000	0.000282
146	0.000065	0.000206	0.000075	0.000037	0.000011	0.000024	0.000014	0.000004	0.000000	0.000437
147	0.000047	0.000150	0.000042	0.000027	0.000008	0.000021	0.000013	0.000003	0.000000	0.000312
148	0.000005	0.000044	0.000028	0.000026	0.000013	0.000051	0.000008	0.000004	0.000000	0.000179
Grand Total	**0.001946**	**0.015283**	**0.009480**	**0.005767**	**0.003303**	**0.011197**	**0.003541**	**0.001444**	**0.000075**	**0.052035**
	3.7%	29.4%	18.2%	11.1%	6.3%	21.5%	6.8%	2.8%	0.1%	100.0%

Ramming collision frequency per year In MJ energy classes

type	(Multiple Items)
size	(All)

Other traffic

Upper limits of energy classes [MJ]

PlatformNr

Sum of P_ram	Column Labels					
Row Labels	15	50	00	200	above	Grand Total
1	0.000005	0.00000	0.000003	0.000001	0.000087	0.000097
2	0.000013	0.00 008	0.000007	0.000002	0.000186	0.000215
3	0.000001	0.00 067	0.000186	0.000015	0.002784	0.003053
4	0.000000	0.000004	0.000025	0.000011	0.001332	0.001372
142	0.000	0.000003	0.000008	0.000002	0.000083	0.000097
143	0.000001	0.000042	0.000131	0.000054	0.002953	0.003182
144	0.000082	0.000011	0.000157	0.000031	0.001952	0.002233
145	0.000023	0.000134	0.000000	0.000000	0.000000	0.000157
146	0.000050	0.000236	0.000000	0.000000	0.000000	0.000286
147	0.000034	0.000151	0.000000	0.000000	0.000000	0.000185
148	0.000000	0.000001	0.000019	0.000000	0.000033	0.000053
Grand Total	**0.001583**	**0.002434**	**0.005205**	**0.000846**	**0.050866**	**0.060934**
	2.6%	4.0%	8.5%	1.4%	83.5%	100.0%

Drifting collision frequency per year In MJ energy classes

type	(Multiple Items)
size	(All)

Platform dedicated vessels

Upper limits of energy classes [MJ]

Platform_nr

Sum of P_drift	Column Labels								
Row Labels	1	3	5		15	50	100	200	Grand Total
1	0.000008	0.000030	0.000054	0.000028	0.000007	0.000006	0.000003	0.000000	0.000133
2	0.000005	0.000018	0.000017	0.000026	0.000006	0.000006	0.000003	0.000000	0.000080
3	0.000011	0.000030	0.000028	0.000047	0.000010	0.000009	0.000004	0.000000	0.000139
4	0.000006	0.000028	0.000143	0.000153	0.000008	0.000005	0.000003	0.000000	0.000345
142	0.000016	0.000069	0.000382	0.000111	0.000011	0.000015	0.000009	0.000000	0.000614
143	0.000083	0.000173	0.000092	0.000100	0.000031	0.000052	0.000044	0.000001	0.000576
144	0.000113	0.000335	0.000317	0.000081	0.000008	0.000008	0.000003	0.000000	0.000865
145	0.000090	0.000314	0.000490	0.000137	0.000027	0.000013	0.000000	0.000000	0.001071
146	0.000155	0.000542	0.001002	0.000253	0.000041	0.000019	0.000001	0.000000	0.002013
147	0.000239	0.000359	0.000517	0.000164	0.000039	0.000006	0.000001	0.000000	0.001324
148	0.000005	0.000023	0.000034	0.000047	0.000010	0.000007	0.000004	0.000000	0.000130
Grand Total	**0.006049**	**0.024944**	**0.020428**	**0.034999**	**0.003861**	**0.002632**	**0.002278**	**0.000095**	**0.095286**
	6.3%	26.2%	21.4%	36.7%	4.1%	2.8%	2.4%	0.1%	100.0%

Ramming collision frequency per year In MJ energy classes

Platform dedicated vessels
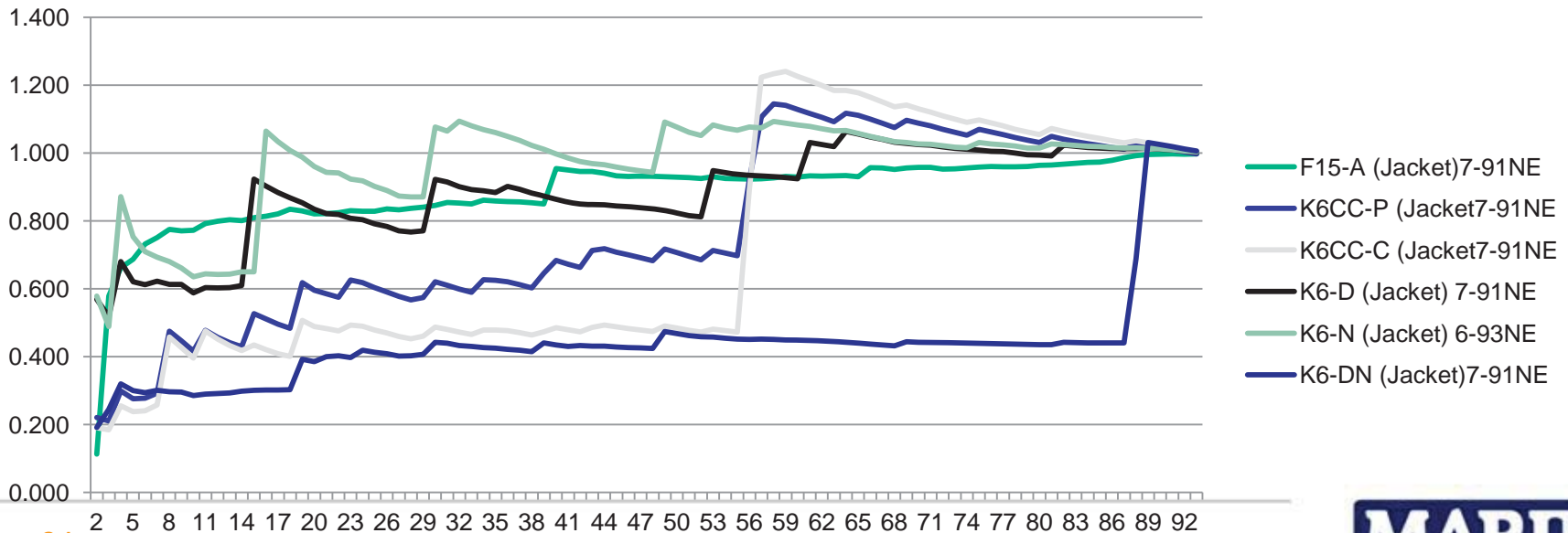Upper limits of energy classes [MJ]

type	(Multiple Items)					
size	(All)					
Platform_nr						
Sum of P_ram	**Column Labels**					
Row Labels	**15**	**50**	~~**100**~~	**200**	**above**	**Grand Total**
1	0.000000	0.000000	0.000160	0.000144	0.000001	0.000306
2	0.000000	0.000000	0.000001	0.000048	0.000003	0.000051
3	0.000000	0.000001	0.000001	0.000308	0.000012	0.000321
4	0.000000	0.000000	0.000000	0.000943	0.000003	0.000947
142	0.000000	0.000000	0.000262	0.000874	0.000000	0.001137
143	0.000000	0.000126	0.000059	0.000211	0.000040	0.000436
144	0.000000	0.001535	0.000495	0.001071	0.000012	0.003113
145		0.000584	0.000060	0.001383	0.000048	0.002076
146		0.001312	0.000140	0.003741	0.000083	0.005277
147		0.000729	0.000077	0.002018	0.000077	0.002900
148		0.000000	0.000056	0.000412	0.000004	0.000472
Grand Total	**0.000414**	**0.023580**	**0.025587**	**0.171414**	**0.016872**	**0.237867**
	0.2%	9.9%	10.8%	72.1%	7.1%	100.0%

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Convergence of collision risk

• The figure shows the result of 92 intermediate results within 120 days, as fraction of the result after 120 days.

• The peaks are mostly caused by platform dedicated activities

• The period starts at 1 January and ends at 30 April 2011 and shows less activities in the first month

→ It can be concluded that a longer period (one year) is necessary for an estimation of the collision risk

Legend:
- F15-A (Jacket)7-91NE
- K6CC-P (Jacket7-91NE
- K6CC-C (Jacket7-91NE
- K6-D (Jacket) 7-91NE
- K6-N (Jacket) 6-93NE
- K6-DN (Jacket)7-91NE

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Progress & next steps:

➢ Method has been further developed and tested.

➢ First "runs" have been made based on the AIS and the platforms on the Dutch part of the North Sea → results look promising.

➢ When last tests are performed risk will be determined for all platforms in the whole area.

? Question about future plans for the platforms (news ones and ones that will be removed)

Remarks and next steps regarding windturbines:

➢ Method can be used for offshore wind turbines

➢ Exact locations of the turbines is required ➔ now only the contour of an area is known

➢ Agreed that the known areas will be "filled" with turbines

Task E6: Collection of all accident and use data and risk reducing measures

Objective:

Collection of data regarding:

- ✓ accidents and oil spills at sea
- ✓ the use of maritime space (STS-operations, loading bouys etc)
- ✓ risk reducing measures.

Progress:

➢ Data on accidents and oil spills at sea has been collected and analysed (results will be discused later).

➢ Data on the use of maritime space has been collected, and partly analysed (results later).

➢Questionnairs regarding the risk reducing measures has been distributed and collected. These questionaires still need to be processed.

Next steps:

➢ Further analyse all data regarding the use of maritime space.

➢ Process and analyse the questionnairs regarding the risk reducing measures.

➢ Report results......

Task E6:

Results analysis accidents and spill data

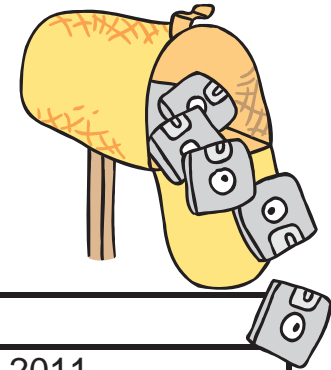The following accident types will be included:

- ➤ Ship accidents;
- ➤ Platform accidents;
- ➤ Wind farm accidents;
- ➤ Subsea oil pipeline accidents

The following types of ship accidents are considered:

- ➤ Collision with vessel;
- ➤ Collision with object;
- ➤ Grounding;
- ➤ Fire;
- ➤ Sinking/foundering;
- ➤ Hull damage;
- ➤ Pollution.

Overview data received:

Country	Data on accidents	Data on spills
Belgium	1992 – 2011	Including aerial observations 1992 - 2011
Denmark	2002 – 2011	Only as a result of shipping accidents 2002 - 2011
France	2002 – 2011	Including aerial observations 2002 - 2011
Germany	Statistics 2000 – 2011	No data
Ireland	2000 – 2011	Including aerial observations 2000 – 2011
Netherlands	2000 – 2011	Only as a result of shipping accidents 2000 - 2011
Norway	2000 – 2011	Including aerial observations 2000 – 2011
Sweden	2002 – 2011	Only as a result of shipping accidents 2002 - 2011
United Kingdom	1991 – 2011	Only as a result of shipping accidents 1991 - 2011

## Total number of relevant incidents and spills as reported per country:

Country	Total number			Annual average number		
	Incidents	Accidents	Spills	Incidents	Accidents	Spills
Belgium	21	18	12	1.15	1.05	0.6
Denmark	57	57	1	5.7	5.7	0.1
France	163	43	133	16.3	4.3	13.3
Germany	25	25	?	2.08	2.08	?
Ireland	19	2	18	1.58	1.33	1.5
Netherlands	11	15	7	0.92	0.83	0.58
Norway					0	
Sweden	2	2	0	0.2	0.2	0
United Kingdom	1007	997	28	47.95	47.48	1.33
Total						

Incident: all entries in each database (can also be spills as a results of other reason than shipping accident)

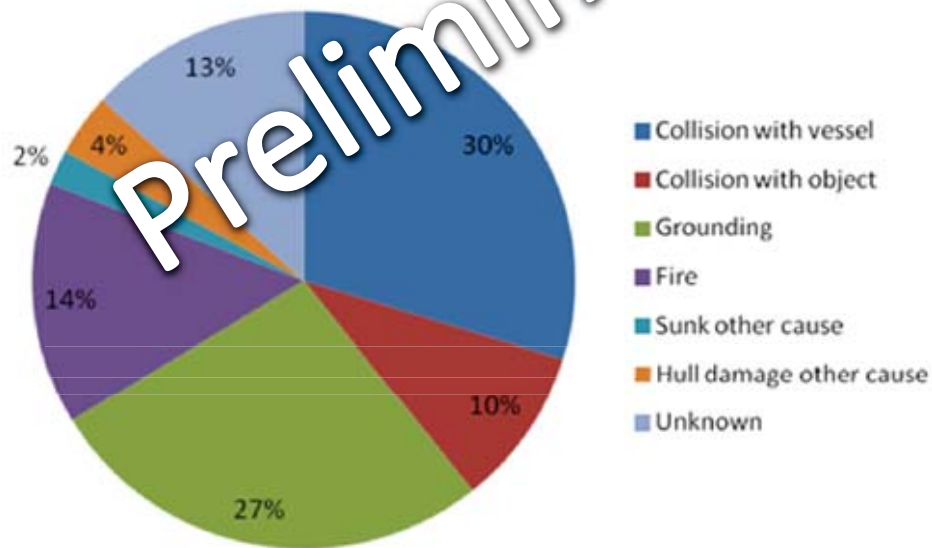## Selection of area for accidents from IHS Fairplay casualty database

It was found that in the indicated area, during the years 2008 – 2010 about 168 accidents took place involving ships larger than 300 GT and excluding machinery failures without consequences.

This corresponds to 56 accidents every year.
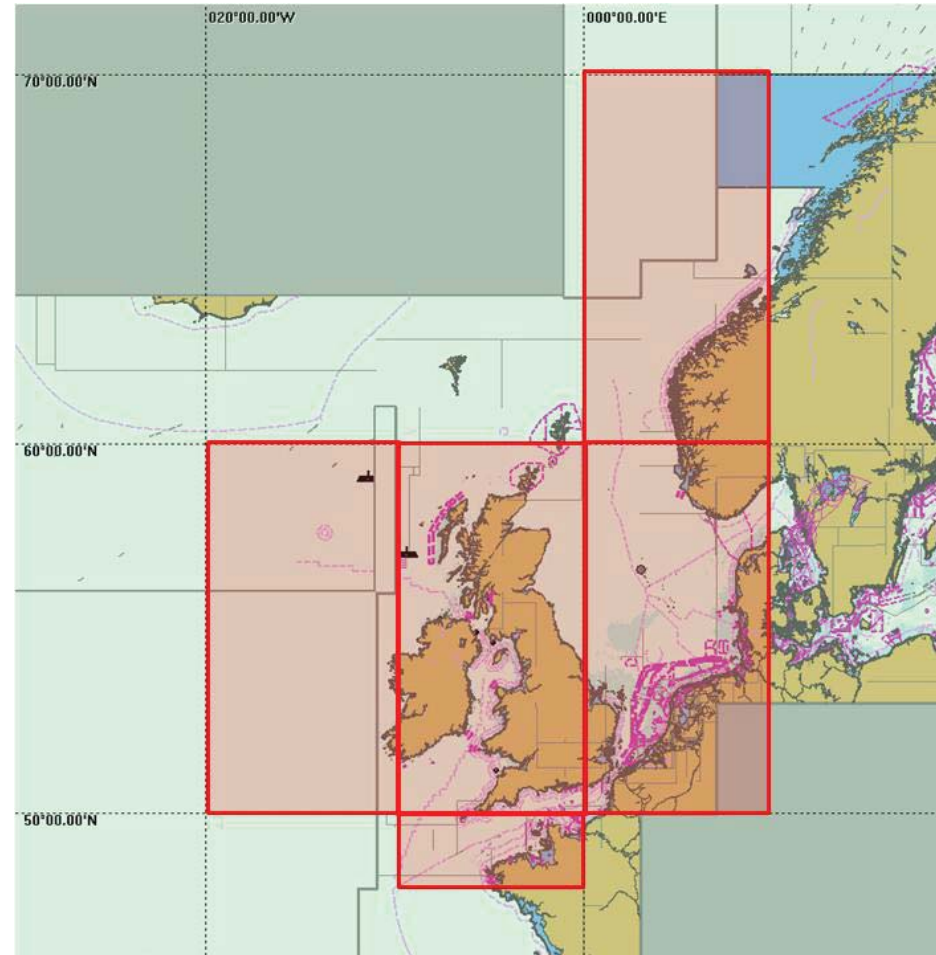
Shipping accidents per accidents type

Accident type	Annual number	% of total
Collision with vessel	18.3	29.7%
Collision with object	5.9	9.6%
Grounding	16.6	27.0%
Fire	9.0	14.5%
Sunk other cause	1.3	2.1%
Hull damage other cause	2.3	3.7%
Unknown	8.2	13.3%
Total	63.0	100%

Preliminary results!!

- Collision with vessel — 30%
- Collision with object — 10%
- Grounding — 27%
- Fire — 14%
- Sunk other cause — 2%
- Hull damage other cause — 4%
- Unknown — 13%

Number of accidents resulting in a spill per accident type (*excluding Germany*)

| Accident type	Annual number	Number of cases resulting in spill	% of cases resulting in spill
Collision with vessel	17.8	1.45	8.1%
Collision with object	5.9	0.10	1.6%
Grounding	16.6	0.57	3.5%
Fire	8.8	0.20	2.3%
Sunk other cause	1.0	0.78	81.3%
Hull damage other cause	2.3	0.10	4.3%
Unknown	7.2	0.05	0.7%
Total	59.5	3.24	5.4%

Spills as result of shipping accidents

For *46* shipping accidents details were available on the type/size of the pollution resulting from the accident

Percentage of spills per pollution type:
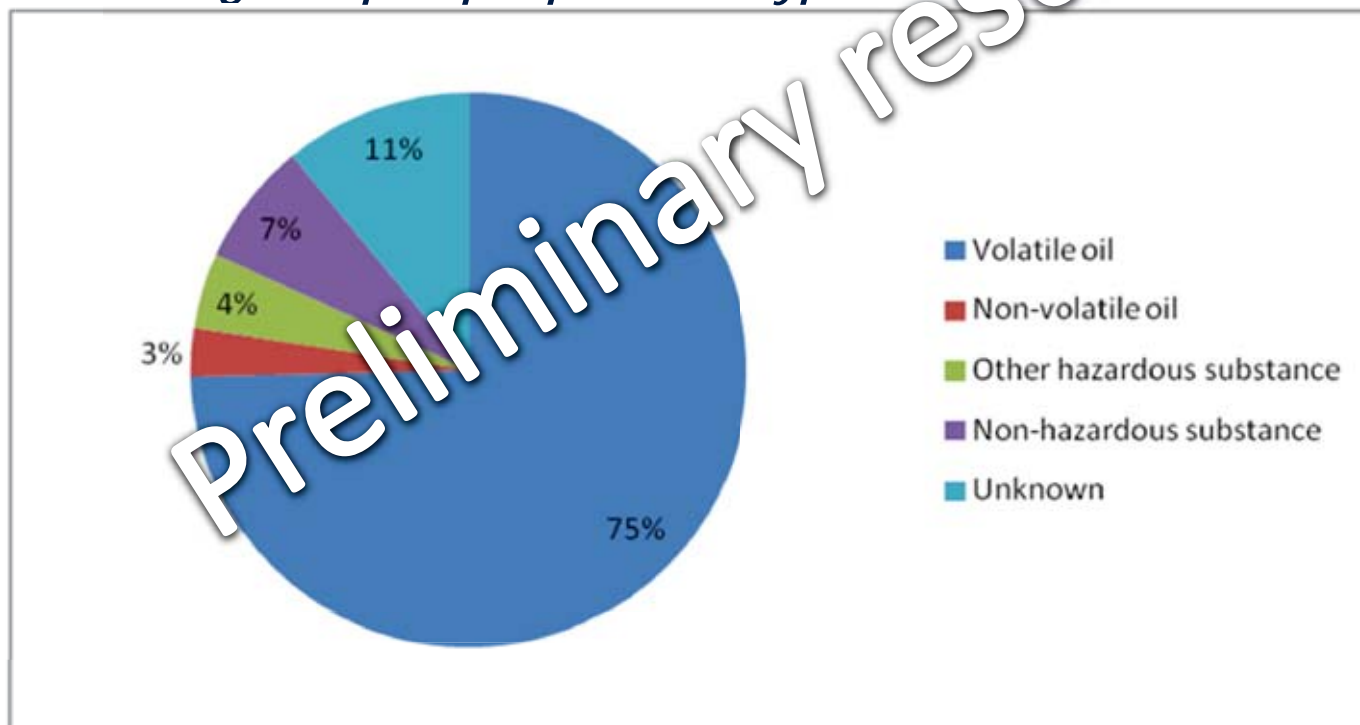
Spills as result of shipping accidents

For **46** shipping accidents details were available on the type/size of the pollution resulting from the accident
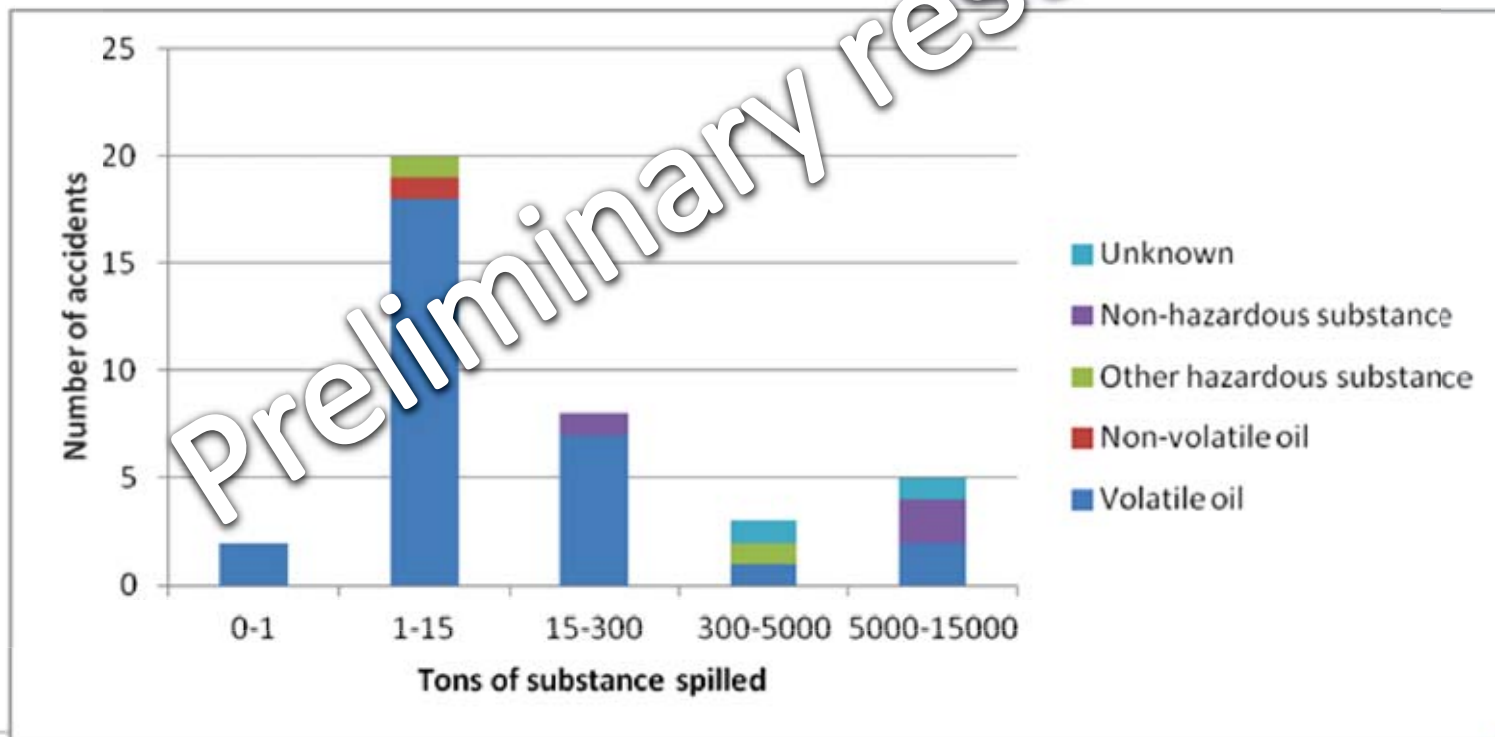
Spill size per substance

Spill with other causes than shipping accidents

➢ **Deliberate, inadvertent spills:**

In total 145 spills in the accident databases:

- 140 spills that can be classified as "deliberate and inadvertent spills"
- 5 HNS spills resulting from a loss of cargo

➢ **Spills from offshore activities**

In total 6245 spills reported (2000 – 2009),

with an average number of spills per platform of 0.59

Spill with other causes than shipping accidents

Oil spill statistics in the OSPAR region from offshore activities

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Total
Number of platforms	717	869		1,167		1,131		1,281		1,340	
Number of spills	722	768	801	621	678	655	509	515	491	485	6245
Quantity spilled (ton)	514	605	214	824	199	399	173	3,907	305	180	7320
Spills per platform	1.01	0.88	0.79	0.53	0.59	0.58	0.42	0.40	0.37	0.36	0.59
Quantity per spill (ton)	0.7	0.8	0.3	1.3	0.3	0.6	0.3	7.6	0.6	0.4	1.2

The number of spills decreases from 722 in 2000 to 485 in 2008

The number of platforms increases from 717 to 1340

→**The average number of spills per platform decreases from 1 in 2000 to 0.36 in 2008!**

Spill with other causes than shipping accidents

Chemical spill statistics in the OSPAR region from offshore activities

	2006	2007	2008	2009	Total
Number of platforms		1,281		1,340	
Number of spills	230	307	306	354	1197
Quantity spilled (ton)	732	1,164	1,075	13,941	16912
Spills per platform	0.19	0.24	0.23	0.26	0.23
Quantity per spill (ton)	3.2	3.8	3.5	39.4	14.1

→The average number of chemical spills per platform is constant.

Task E6:

Results analysis use maritime space

Objective:

The objective is to create an overview of offshore oil-transferring activities in the area:

➢ Assemble the coordinates of all locations where the following operations are performed, per activity:

  ➢ STS operations
  ➢ Oil loading/discharging at loading buoys
  ➢ Bunkering at sea

➢ Assemble the yearly number of operations per location and per activity

➢ Assemble the type and size of the ships involved

Overview:

Country	STS		Bunkering at sea		Loading buoy	
	Locations	Operations/ year	Locations	Operations/ year	Locations	Operations/ year
Belgium	-	-	-	-	-	-
Denmark	-	-	-	-	-	-
France	-	0-1	-	0-1	-	-
Germany	-	-	-	-	-	-
Ireland	-	0-1	-	0-1	1	25
Netherlands	-	-	-	-	-	-
Norway	6	282	-	5	11	>145
Sweden	-	-	-	-	-	-
United Kingdom	1	?	1	?	?	?
Total BA area						

Information from UK not complete at the time of the analysis

To do: create map with all locations in the Bonn Agreement area