

BE-AWARE risk assessment workshop, Tønsberg, 24-26 Sept. 2012

Task H: Bonn Agreement- wide risk assessment

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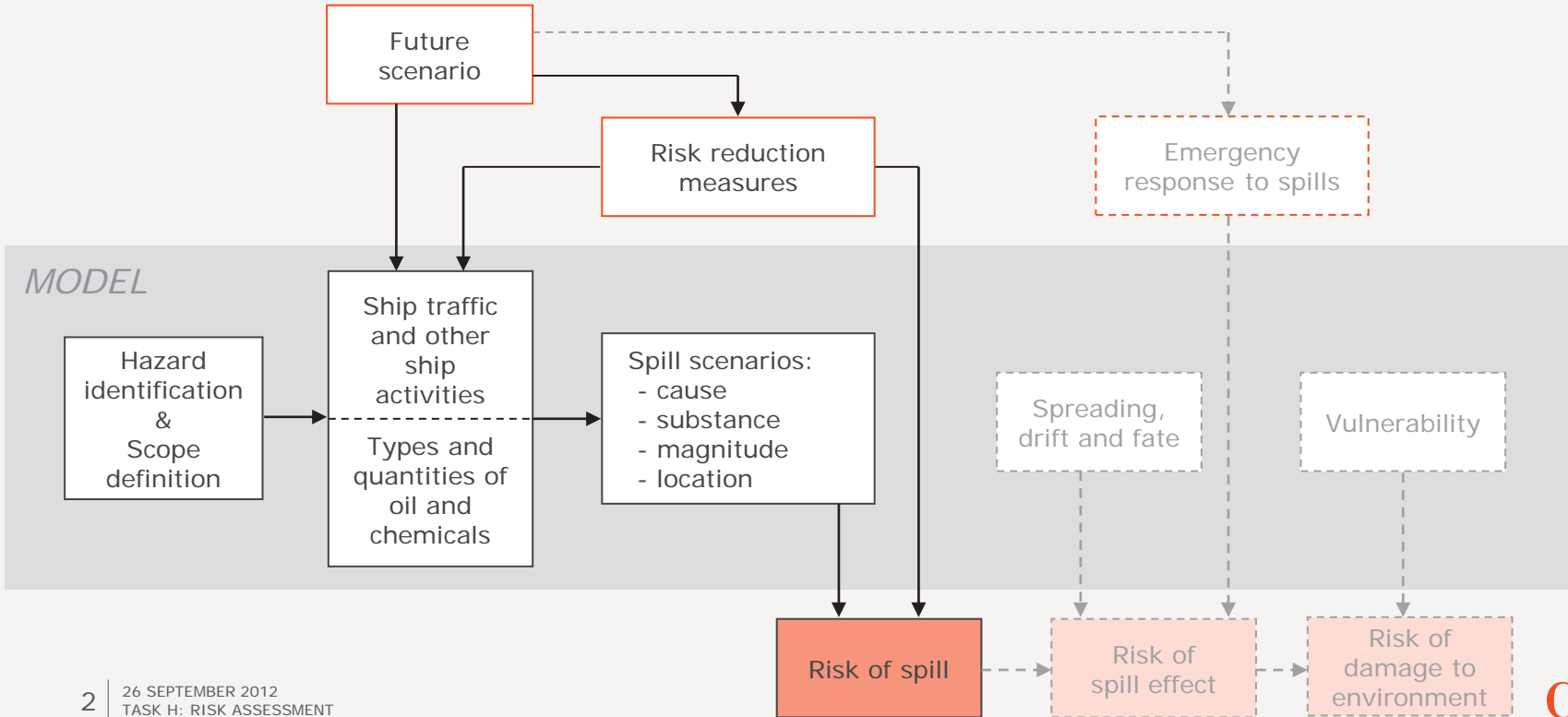
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26 SEPTEMBER 2012
TASK H: RISK ASSESSMENT



COWI

Model flow



Overview of Task H

Sub-task	Description	Status
H1.1	AIS traffic model	Ongoing
H1.2	Coordination with cargo model and prognosis	To begin after H1.1
H1.3	Modelling of accidents and oil releases	To begin after H1.1
H1.4	Reporting	Ongoing
H1.5	Communication	Ongoing
H3	Identification of possible risk-reducing measures	To begin after H1.3
H7	Qualitative assessment of HNS risks	→ See Task E (MARIN)

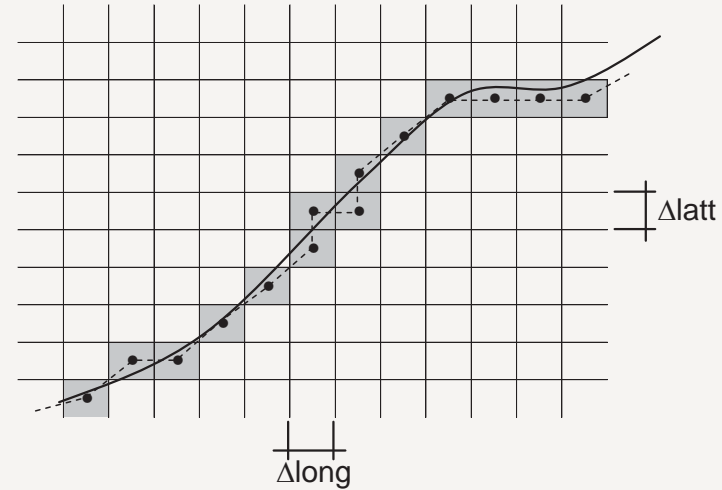
AIS traffic model

Collection of raw AIS data

- › Provided by the Danish Maritime Authority (DMA)
on behalf of the Bonn Agreement
- › Data period: 01.01.-31.12.2011
- › Sample interval: 6 minutes
- › Data size: 350 GB (*BRISK: 50 GB*)
- › Additional ship data: IHS Fairplay World Shipping Encyclopaedia

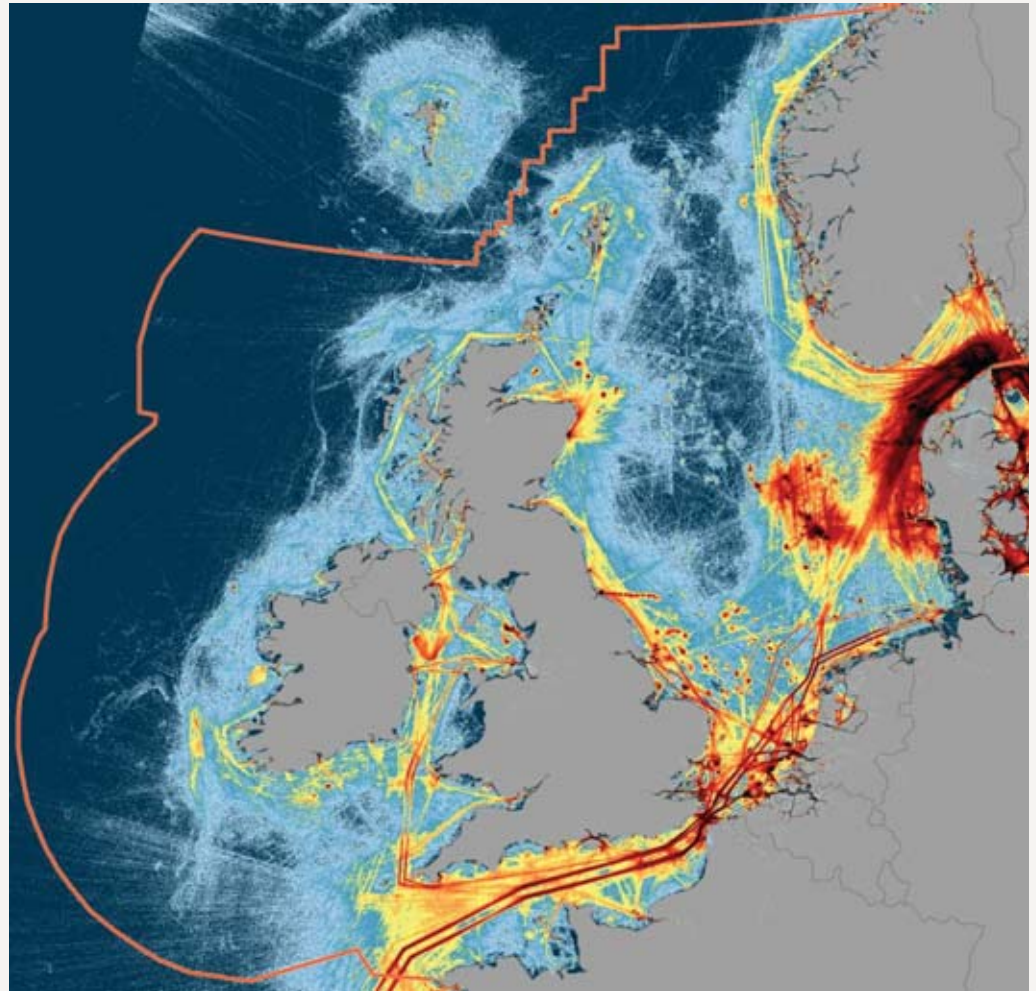
AIS traffic density plot

- › Sub-division of the sea into small squares
 - › Cell size 500 x 500 metres
 - › 5 million cells (*BRISK: 1.5 millions*)
- › Counting the number of passages through each square

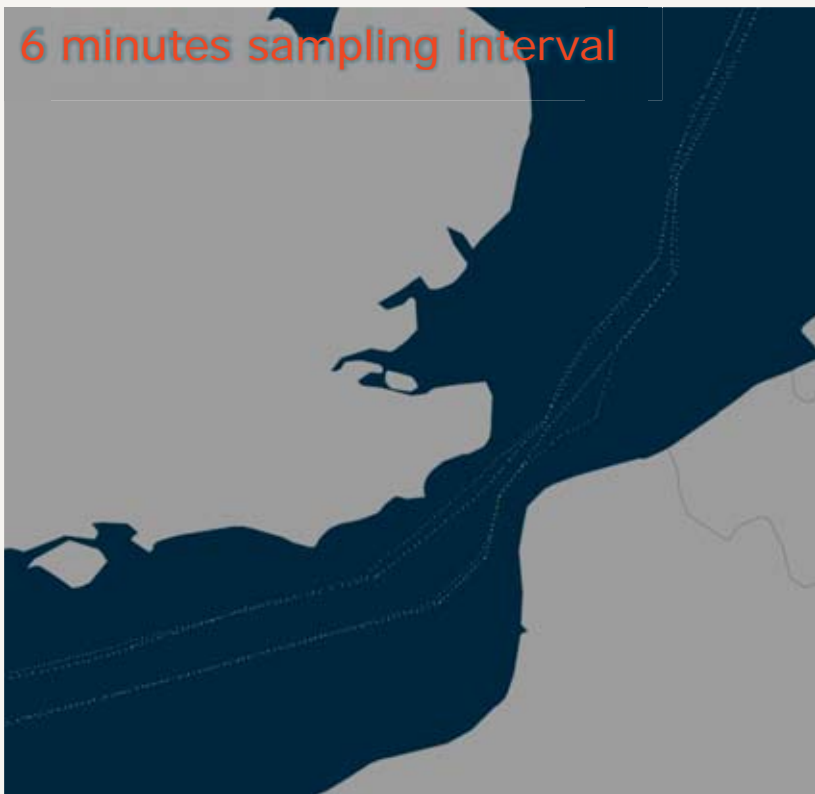


Raw AIS plot

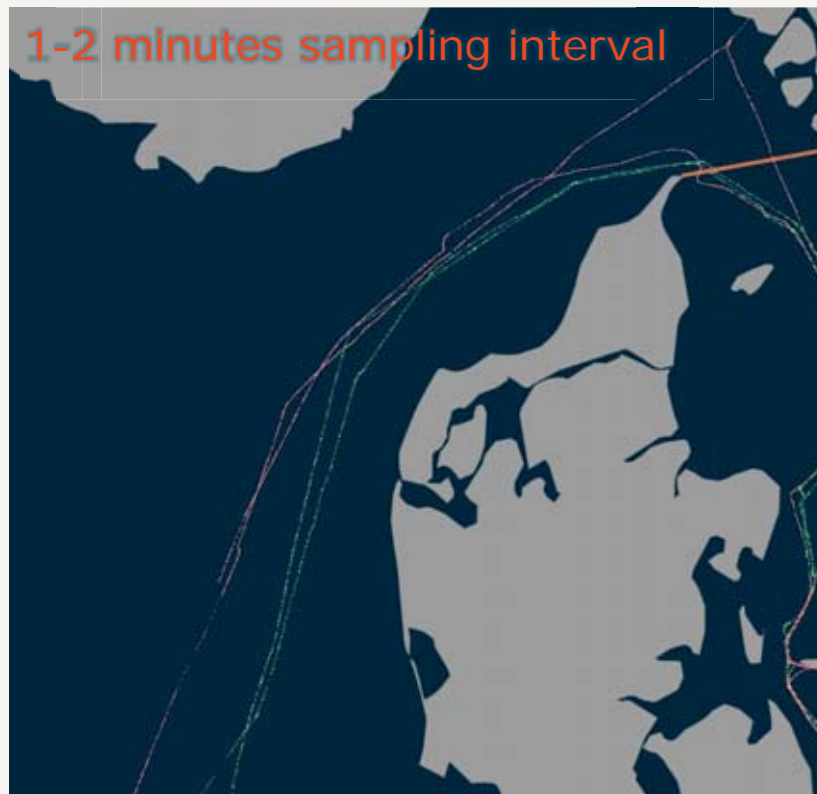
- › All ship types
- › All AIS classes
- › Moving and non-moving ships



6 minutes sampling interval

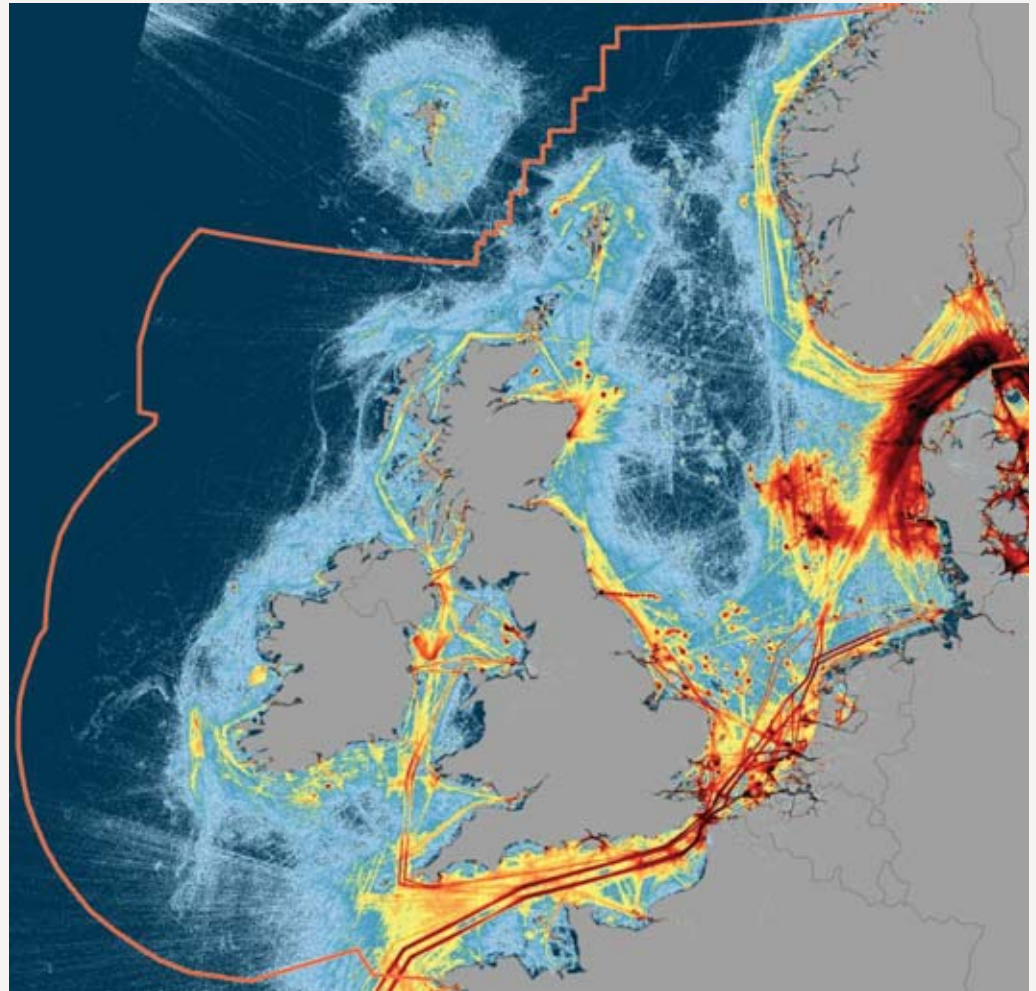


1-2 minutes sampling interval



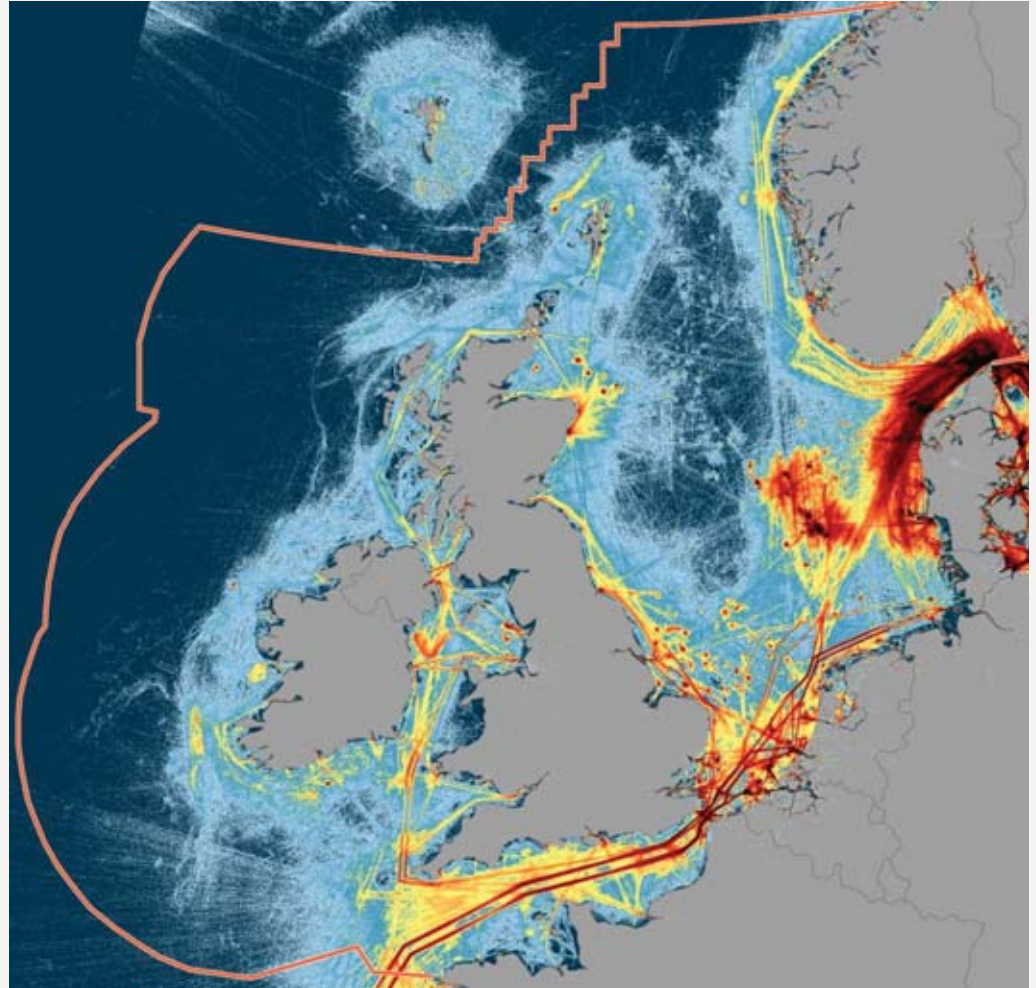
Raw AIS plot

- › All ship types
- › All AIS classes
- › Moving and non-moving ships

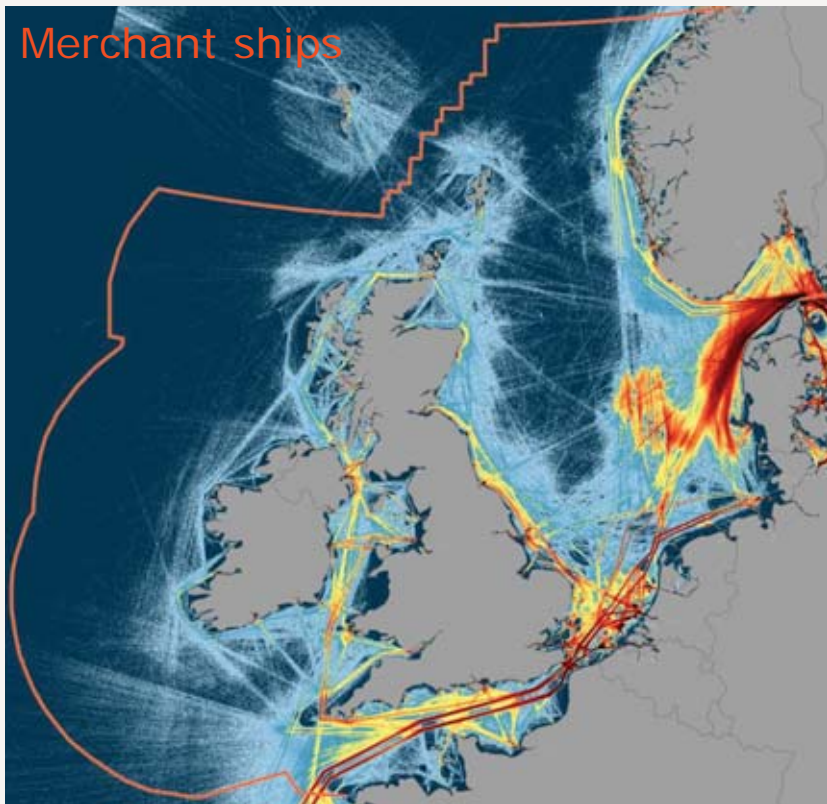


Cleansed AIS plot

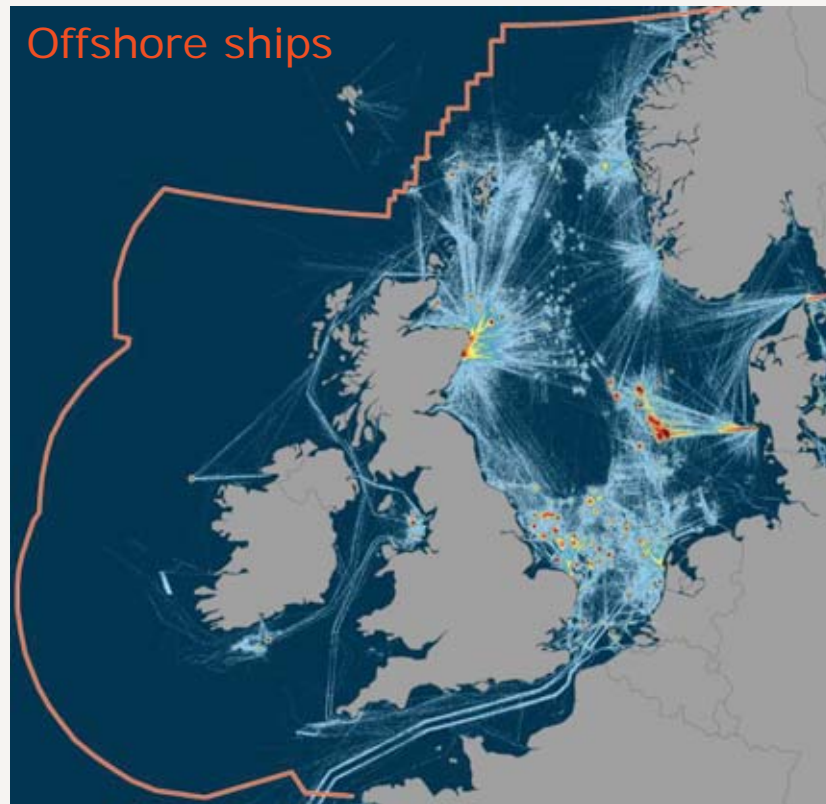
- › Only AIS target class 1 ships
 - › Long process to correct wrong target class indications
- › Only moving ships



Merchant ships



Offshore ships

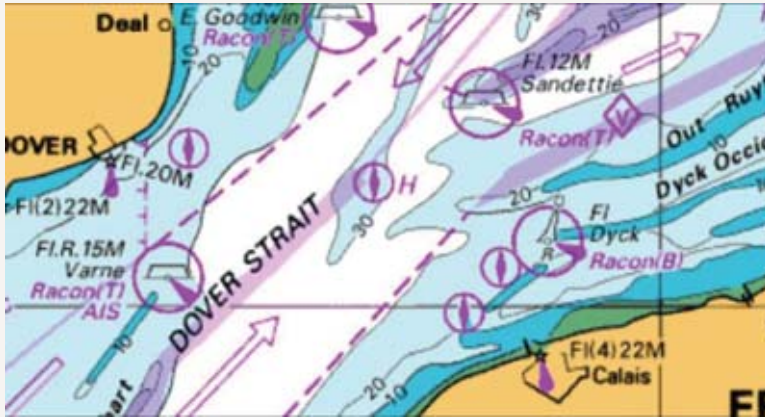


Design of the route net

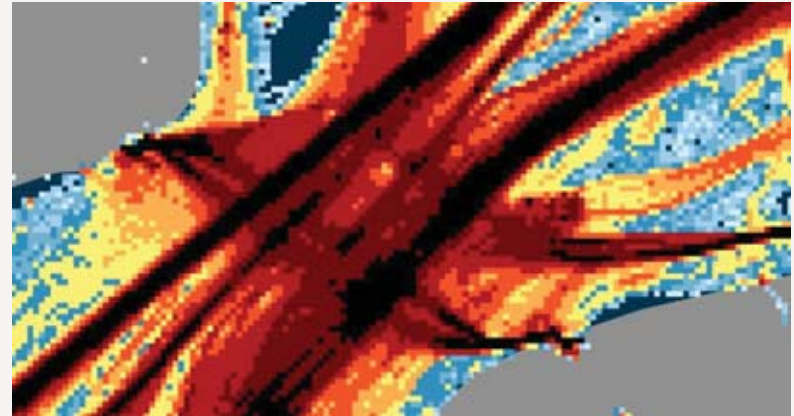
- › Follow AIS patterns as good as possible
- › Must be detailed, but not too detailed
 - › 6 minute sampling interval
 - › Avoid problems during mapping process
 - › Bear collision model in mind

Design of the route net: Dover Strait (1/4)

Navigational chart

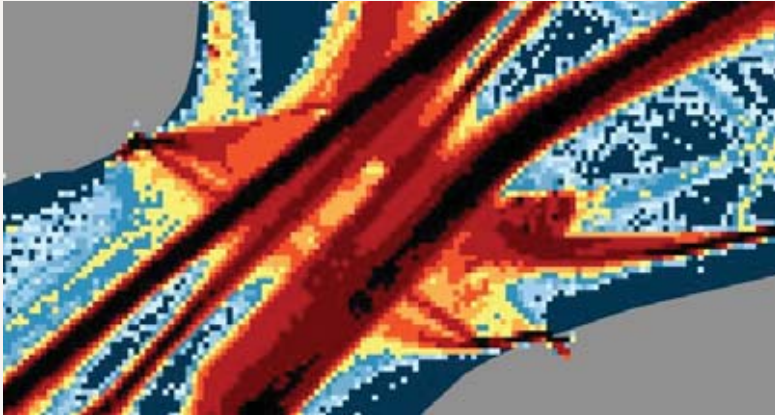


All moving merchant ships

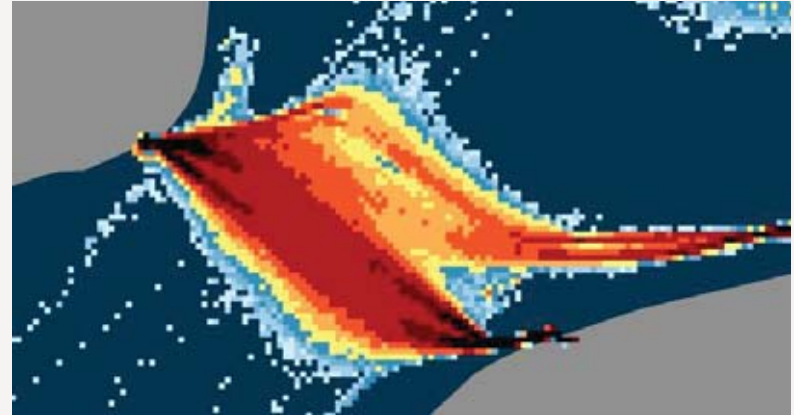


Design of the route net: Dover Strait (2/4)

Without ferries

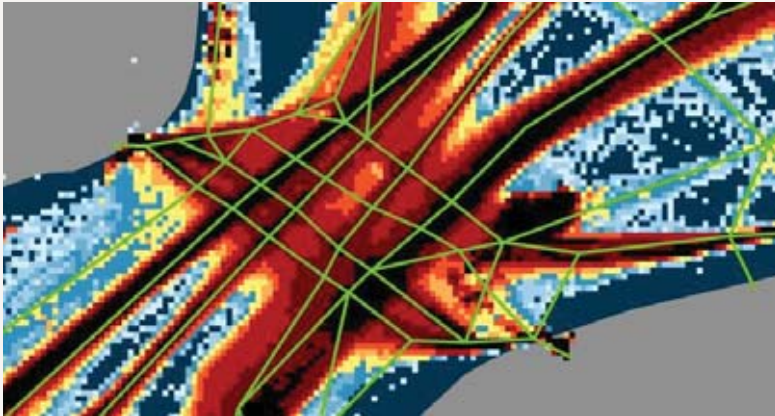


Only ferries

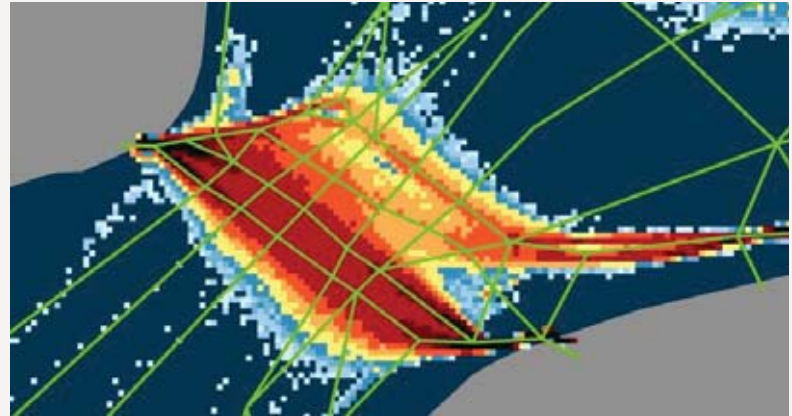


Design of the route net: Dover Strait (3/4)

Without ferries

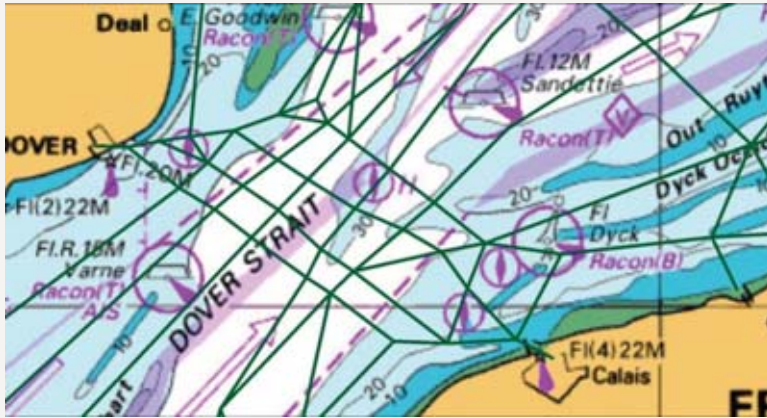


Only ferries

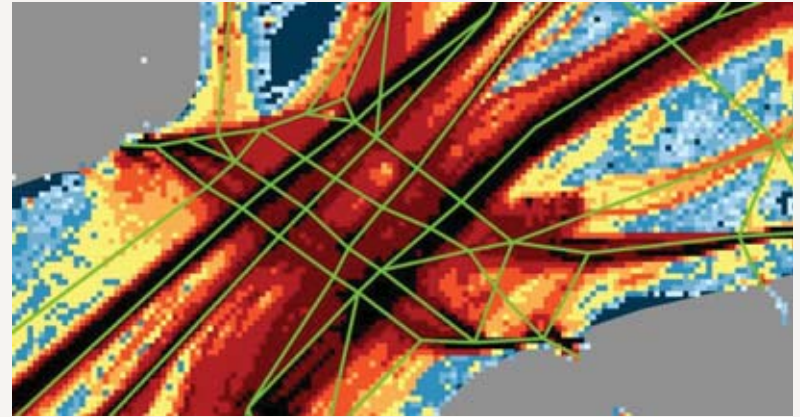


Design of the route net: Dover Strait (4/4)

Navigational chart



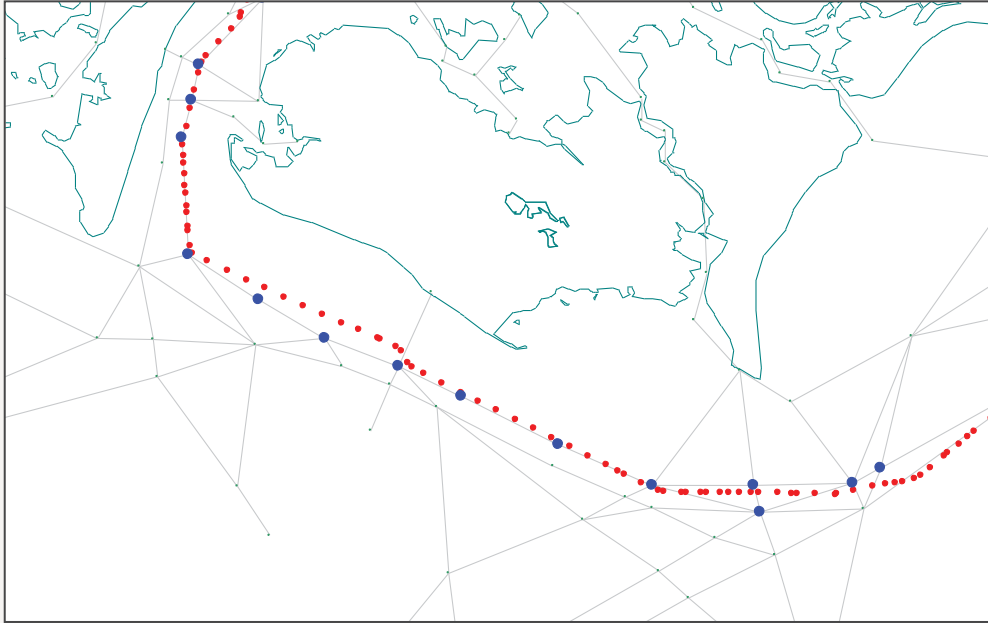
All moving merchant ships



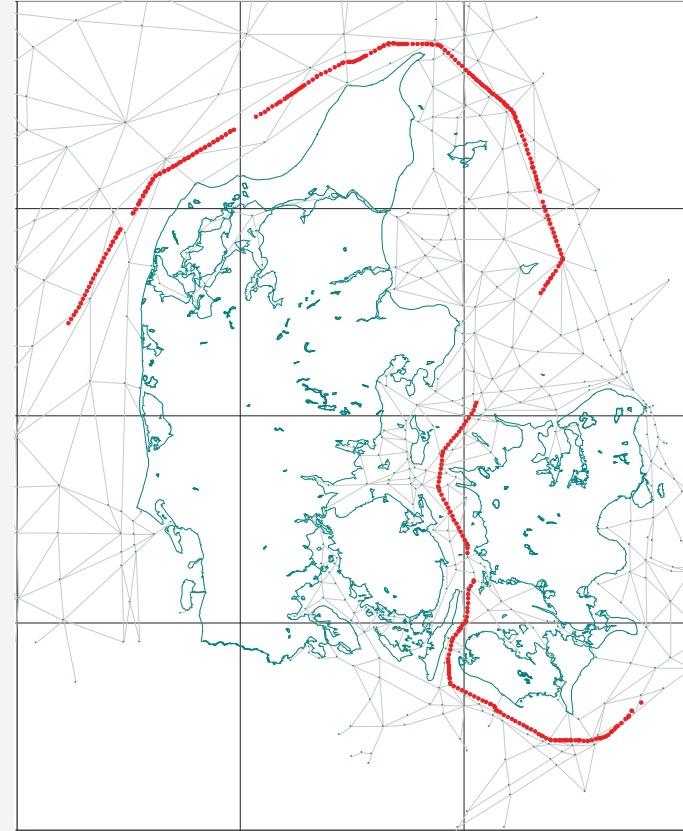
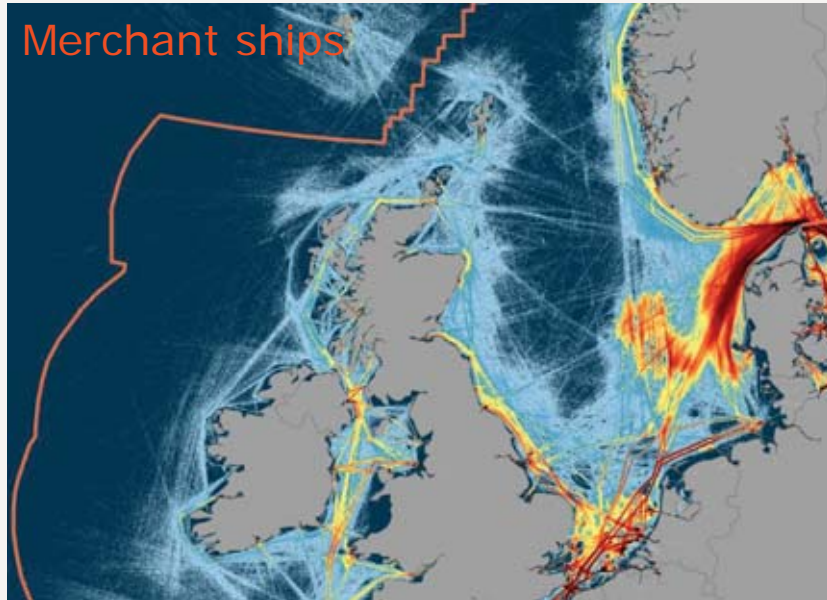
Remaining work: Population of the route net

- › Determination of the shortest paths through the route net
- › Traffic mapping: Convert journeys into sequences of route legs
- › Lateral deviation model

Traffic mapping: Allocation of AIS traces to route nodes



Traffic mapping: Fixing broken AIS traces

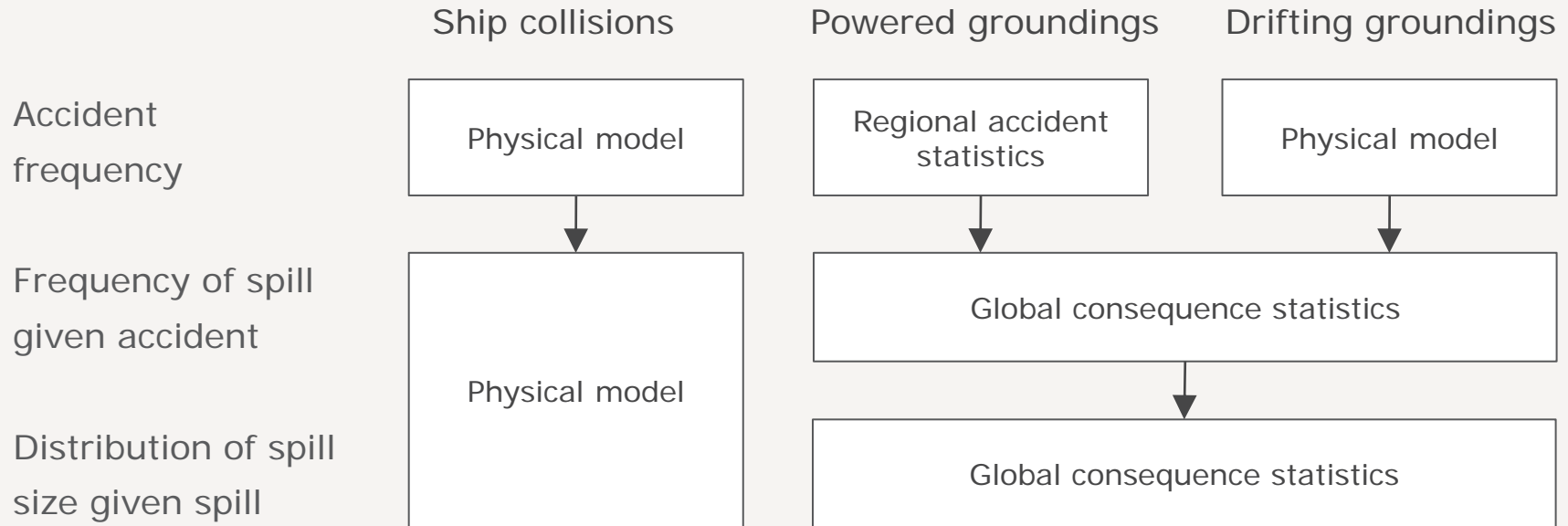


Lateral deviation model



Modelling of accidents and oil releases

Modelling of accidents at sea (1/3)



Modelling of accidents at sea (2/3)

- › Accidents involving offshore installations → *Task E5 (MARIN)*
- › Fire and explosion
- › Damage and foundering due to other causes
- › STS operations, bunkering at sea, collisions with ships at anchor

Modelling of accidents at sea (3/3)

- > All routes and locations
- > All ship types
- > All ship sizes
- > All oil types
- > All spill sizes



Accidents in the Baltic Sea, 2004-2008

(excl. ships <300 GT, excl. port accidents)

Accident type	Number of accidents	Relative contribution	BE-AWARE sub-model
Grounding	230	70.3 %	Grounding
Ship-ship collision	31	9.5 %	Ship-ship collision
Collision with object	23	7.0 %	Offshore installations
Fire	34	10.4 %	Fire & explosion
Physical damage	1	0.3 %	Other accidents
Pollution	6	1.8 %	
Foundering	2	0.6 %	
<i>Total</i>	<i>327</i>	<i>100.0 %</i>	-