SMART MARITIME

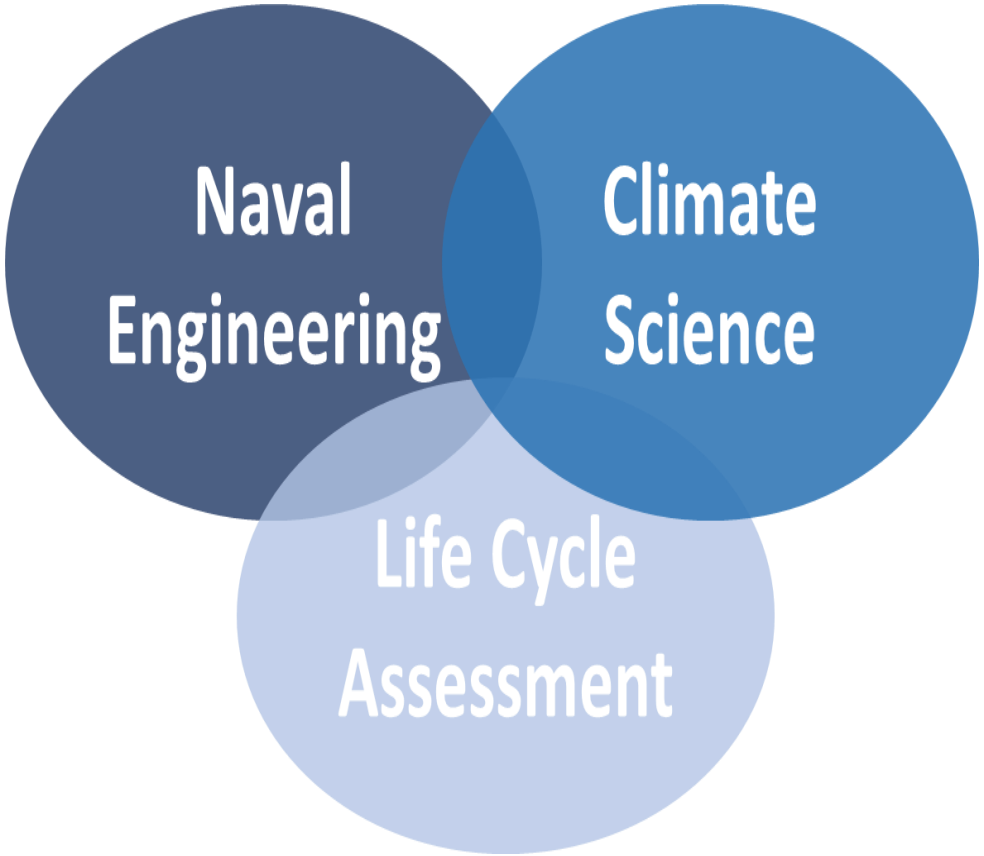
Centre for Research-based Innovation

The Research Council of Norway

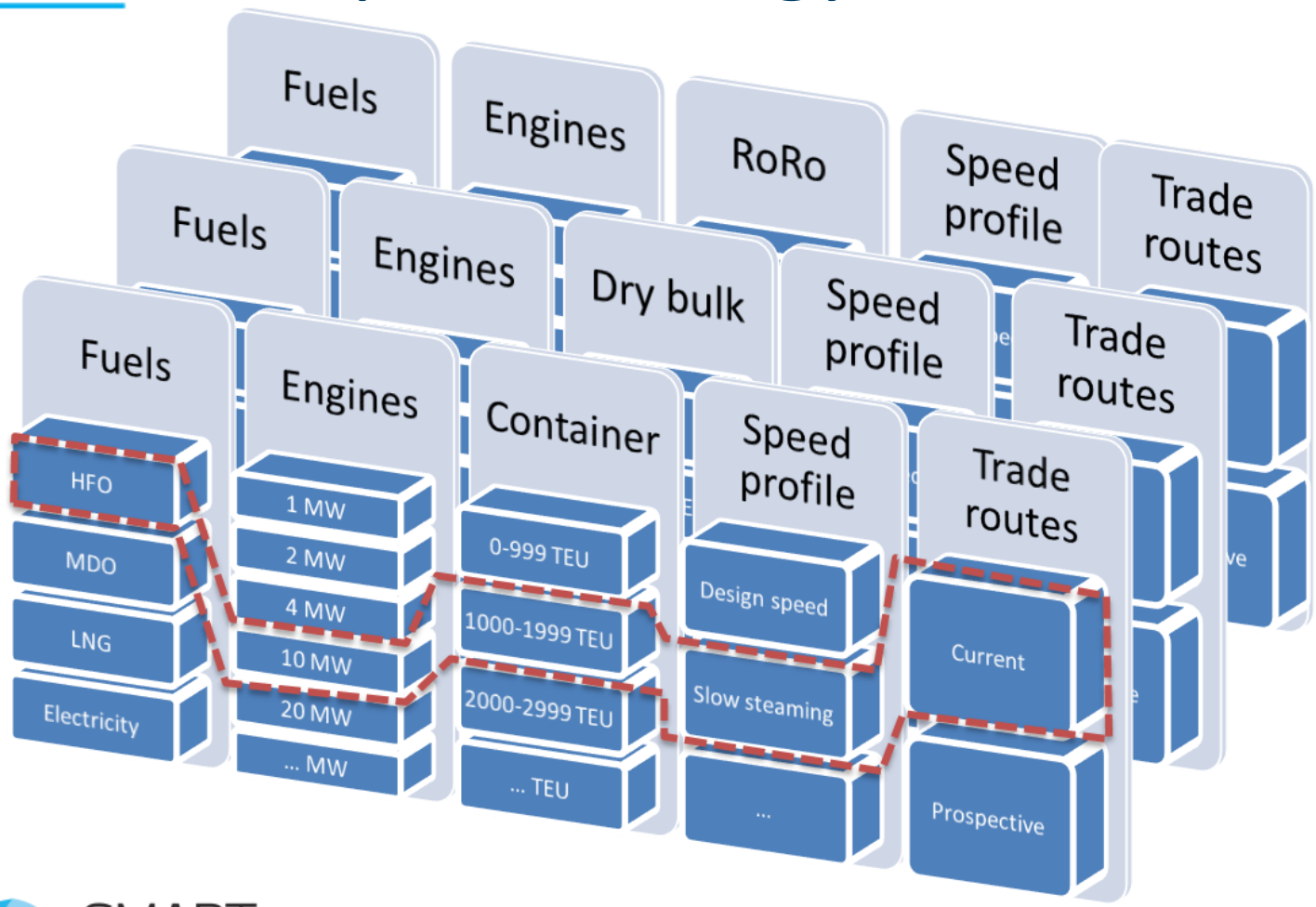
www.smartmaritime.no

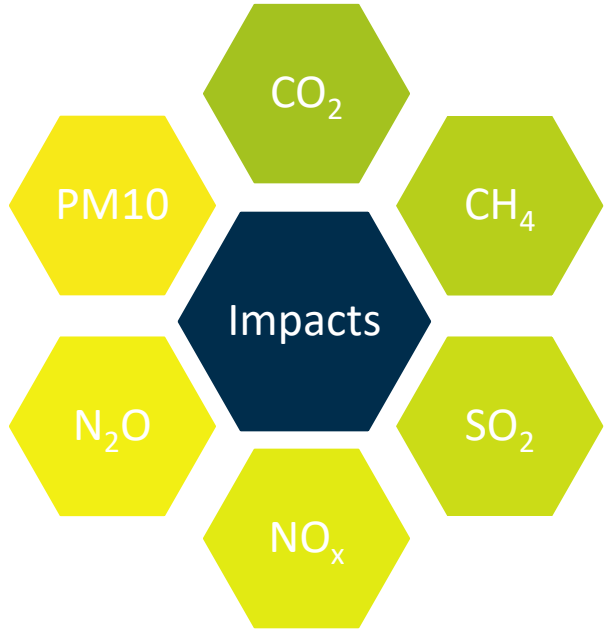
WP5 - DEVELOPMENTS OF THE MARITEAM MODEL

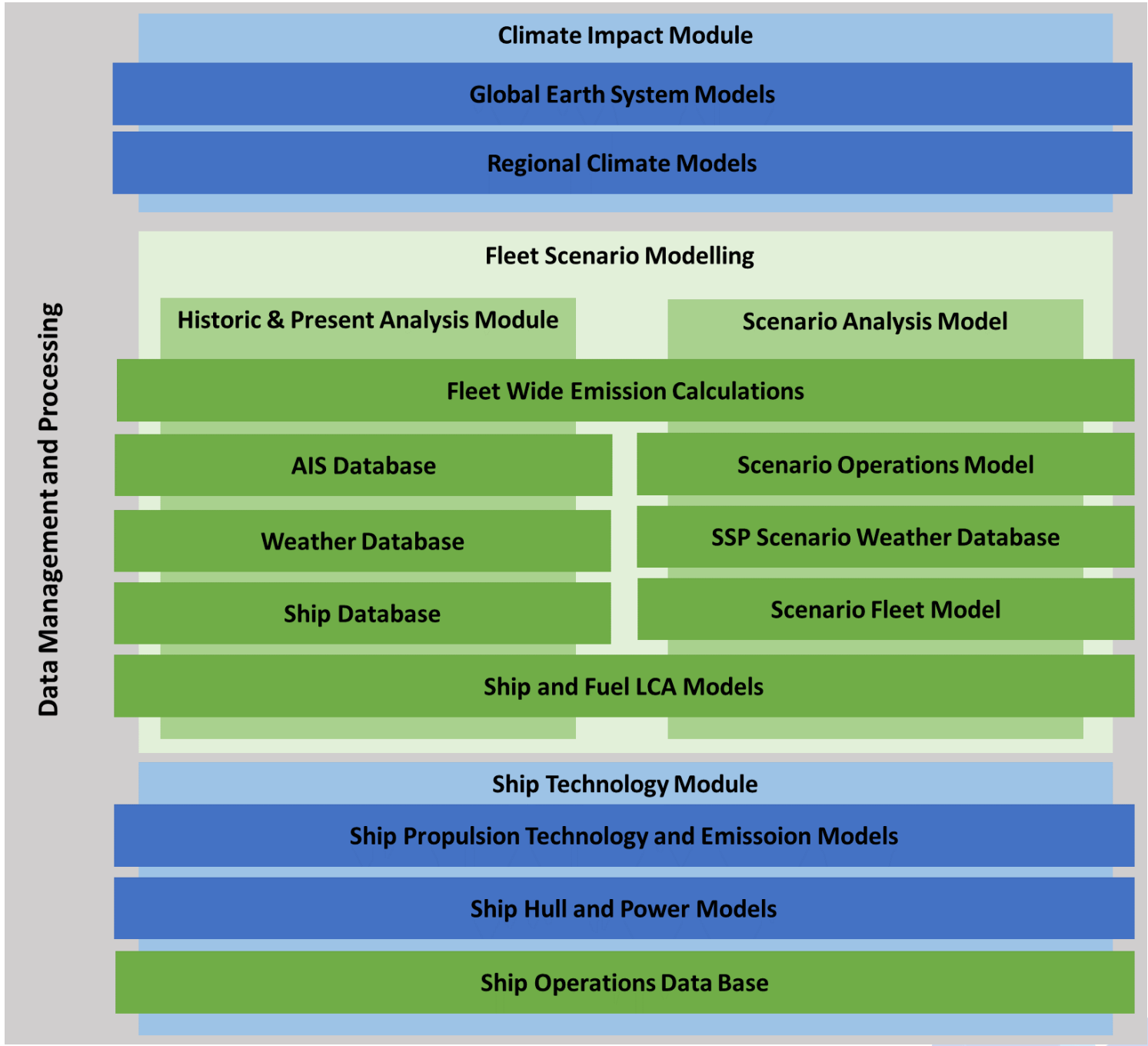
Interdiciplinary Approach



MariTEAM Model
- from ship technology to fleet level assessments






Climate Impact Module
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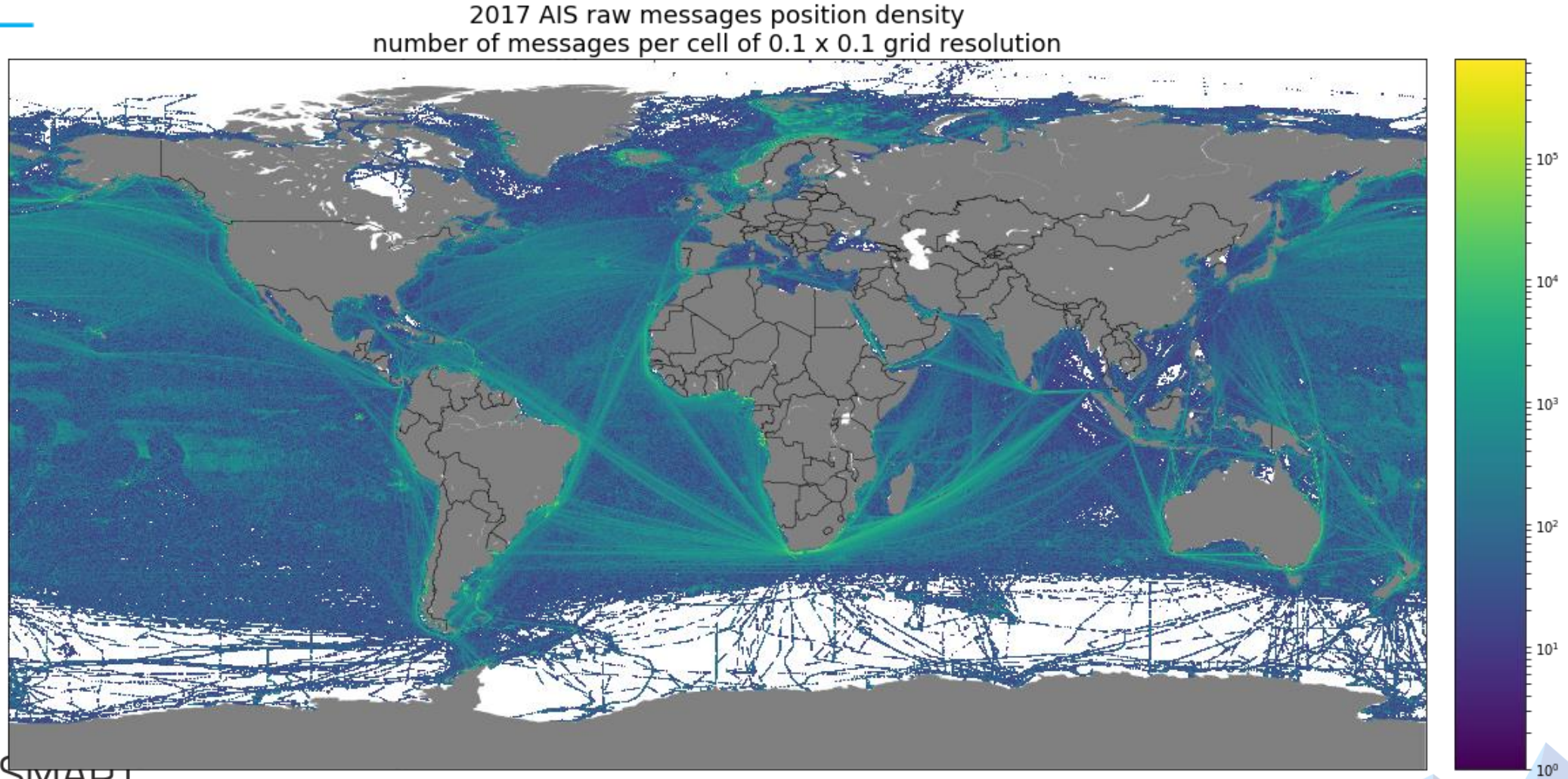
WP5 MariTEAM work 2018

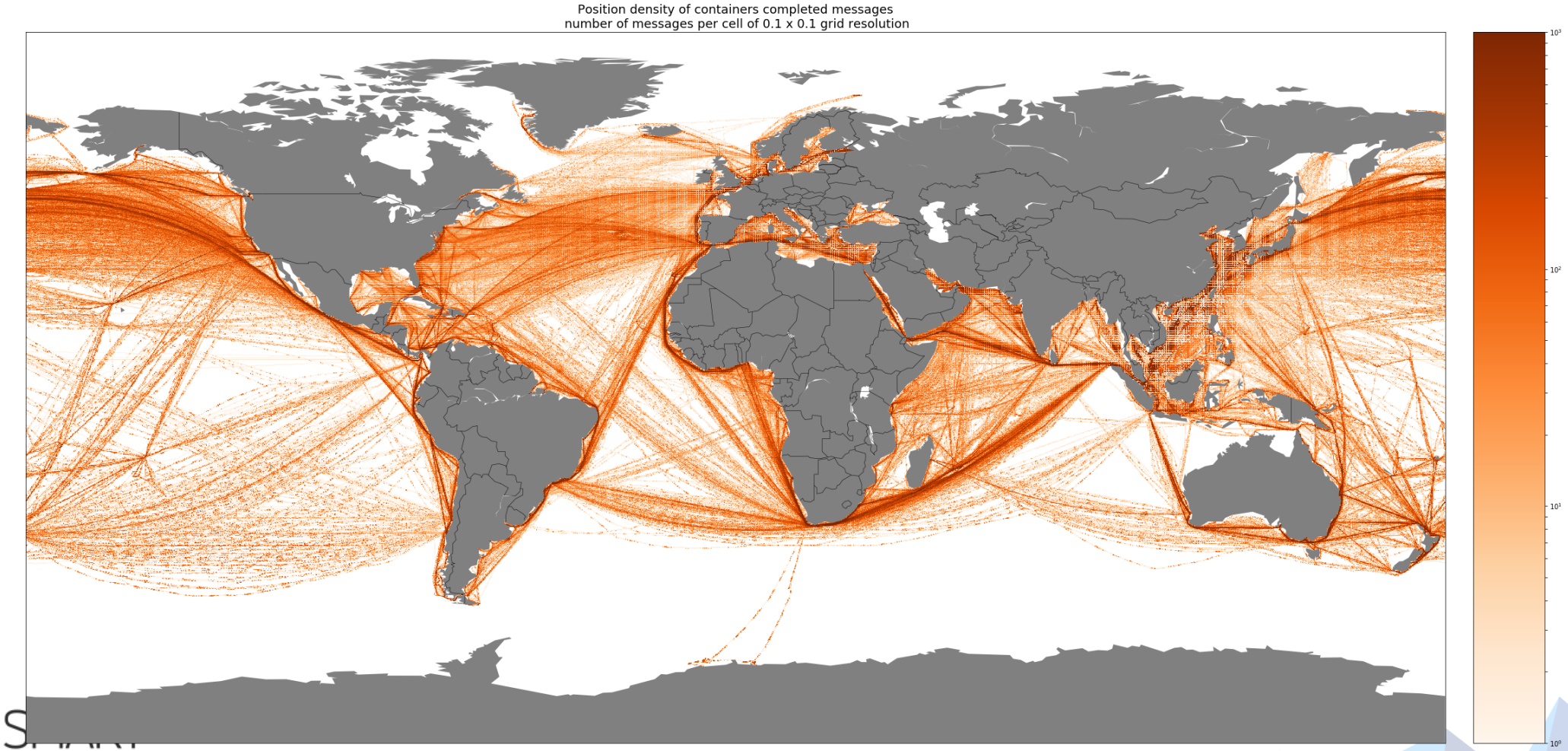
Senter for forskningsdrevet novasjon

Download ship profiles from SeaWeb
Data cleaning
Access / download AIS data from Kystverket
Data cleaning
Access / download ECMWF weather data
Implement and test weather drag module, based on Kwon 2008
Develop and test ship track completer
Acquire port call data
Data cleaning
Implement port call data to improve ship tracks
Creation of emission curves for species: CO2, SOx, NOx,BC, CO, OC, EC
Testing of model, including operational profile, load curves, speeds
Data cleaning, code debug & improvements
Matching of each vessel's location with instantaneous wind and waves
Code to output emission: 0.1 deg lat x lon gridded data, on a daily accumulation, in netcdf format
Write model documentation
Run MariTEAM1 with and without the effects of 'weather' (ongoing)
Input MariTEAM emissions to Earth System Model (TBD)

AIS satellite messages 2017

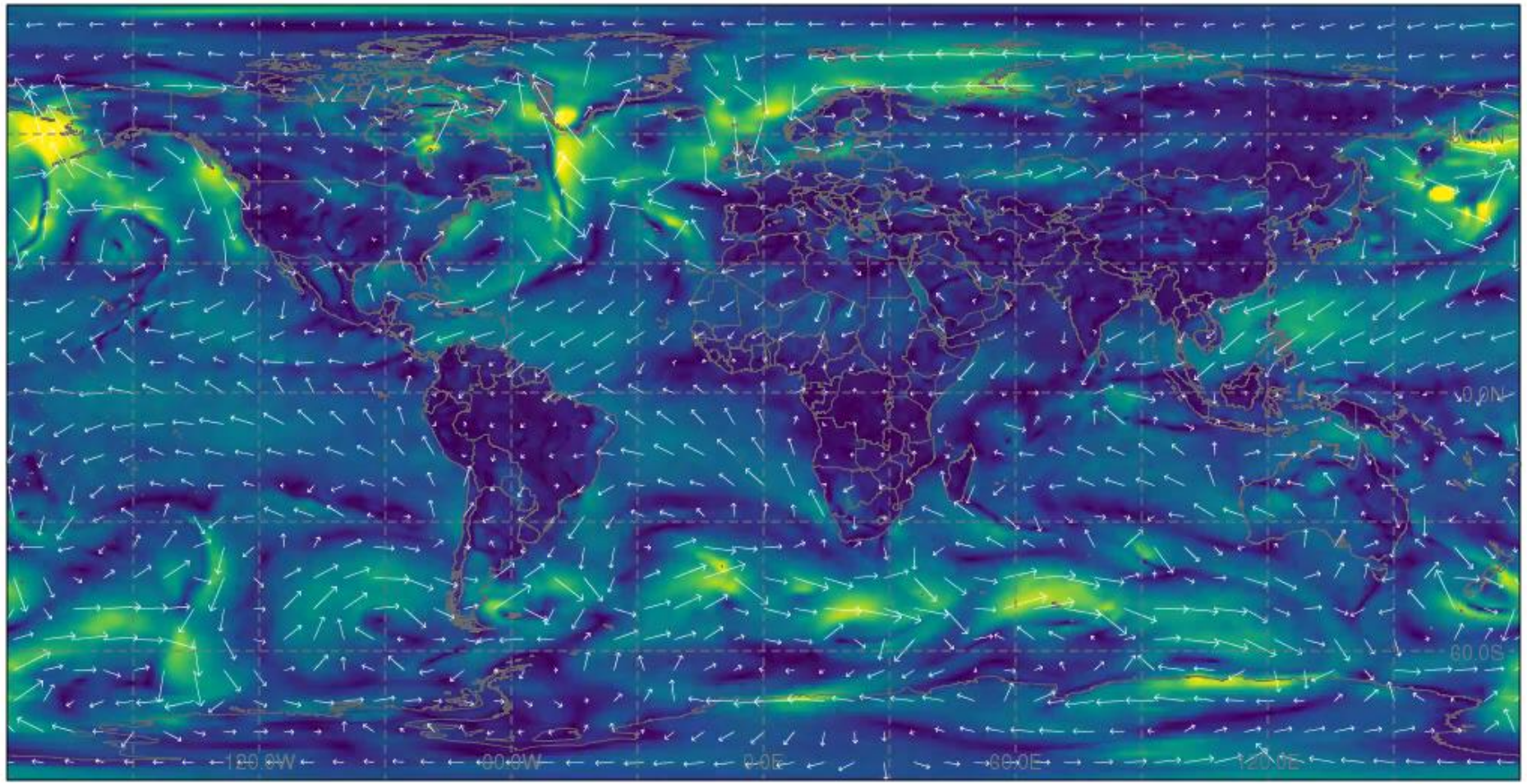


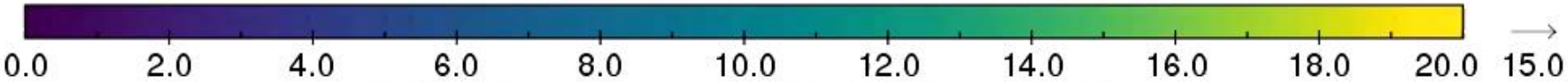
completed messages for container ships



10 metre wind

Time: 2017-01-01 00:00 : Time: 2017-01-01 00:00

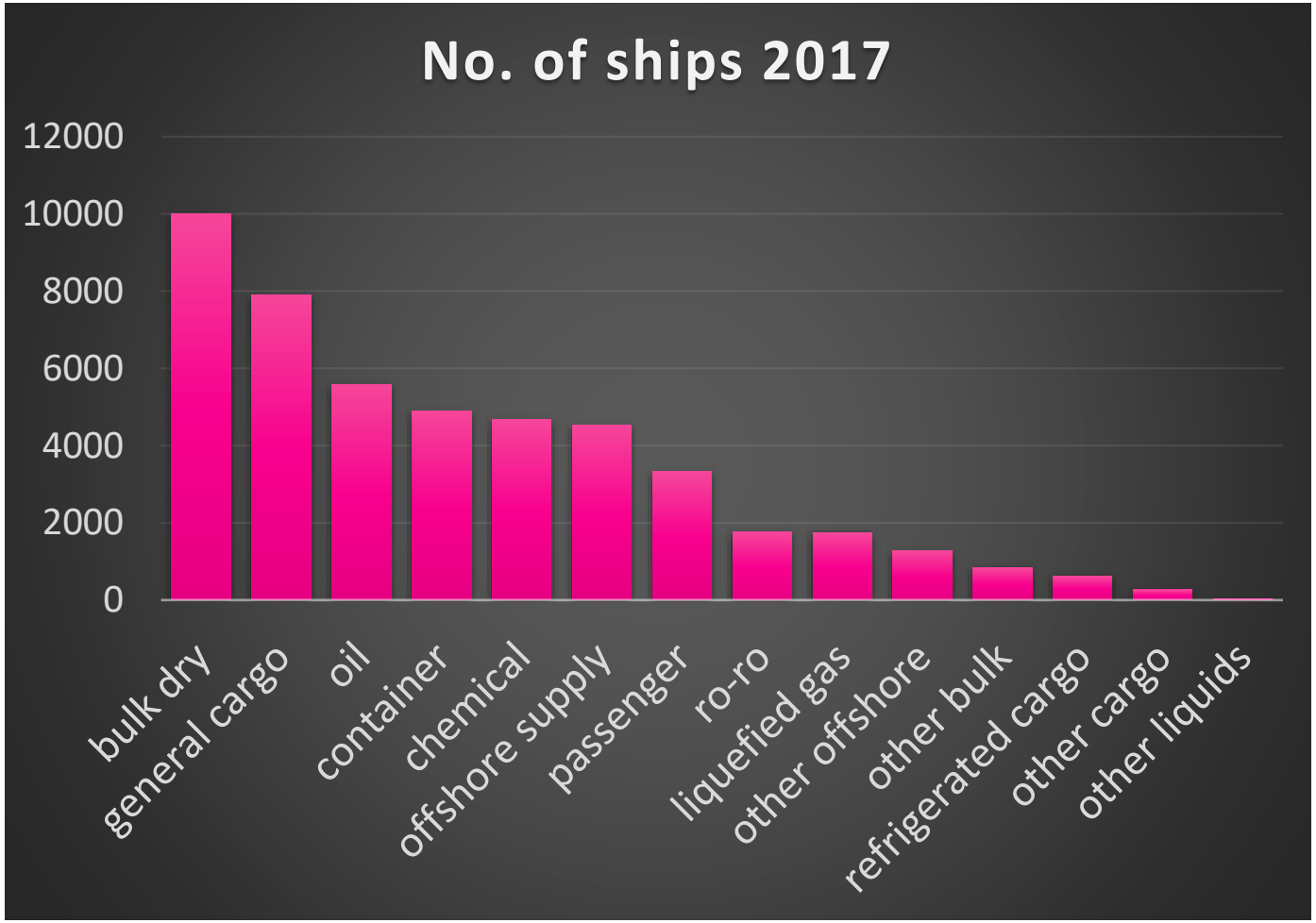


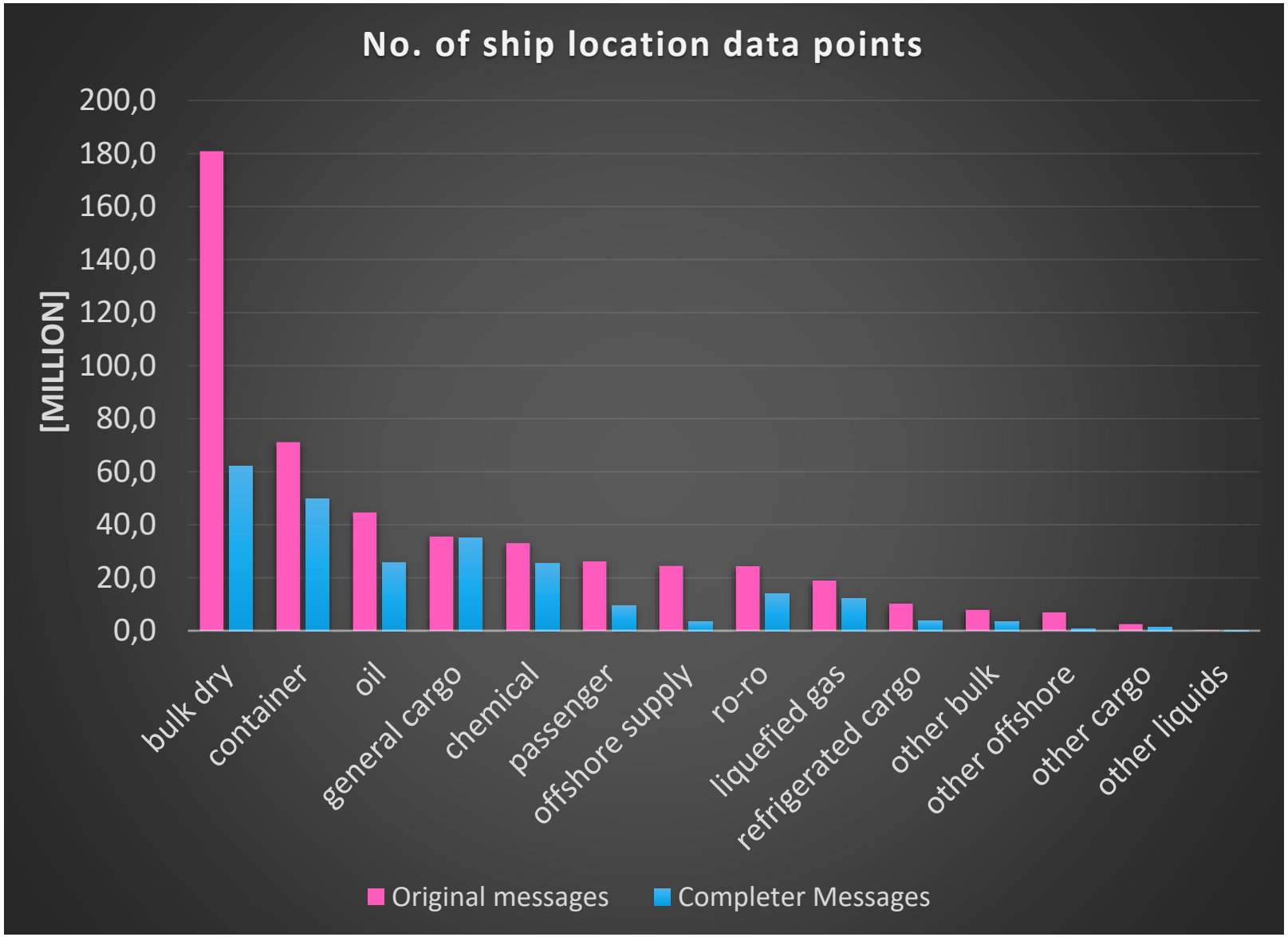


Sqrt[(10 metre U wind component)² + (10 metre V wind component)²]

Data Min = 0.0, Max = 44.3, Mean = 6.2

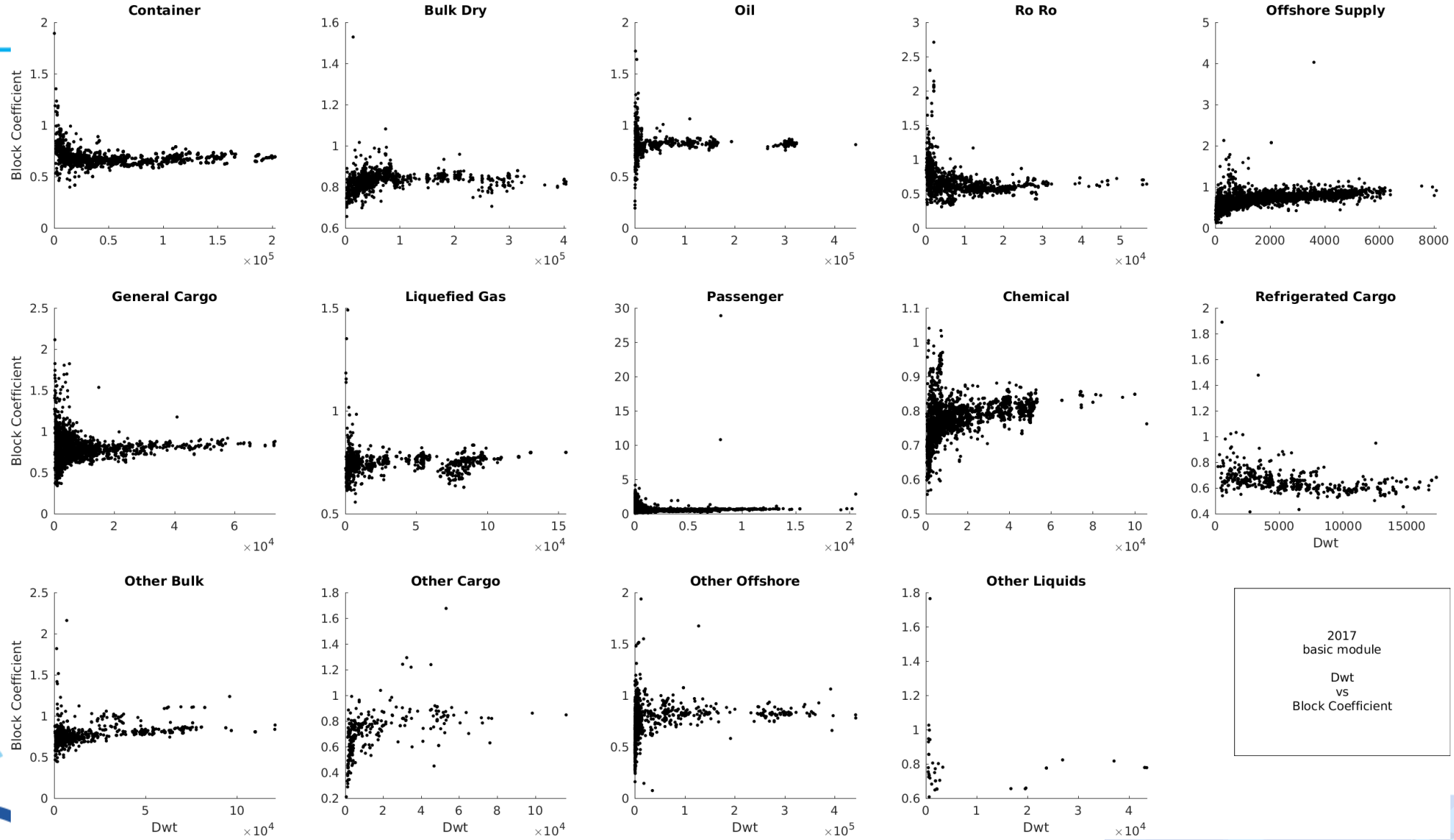
47478 ships included



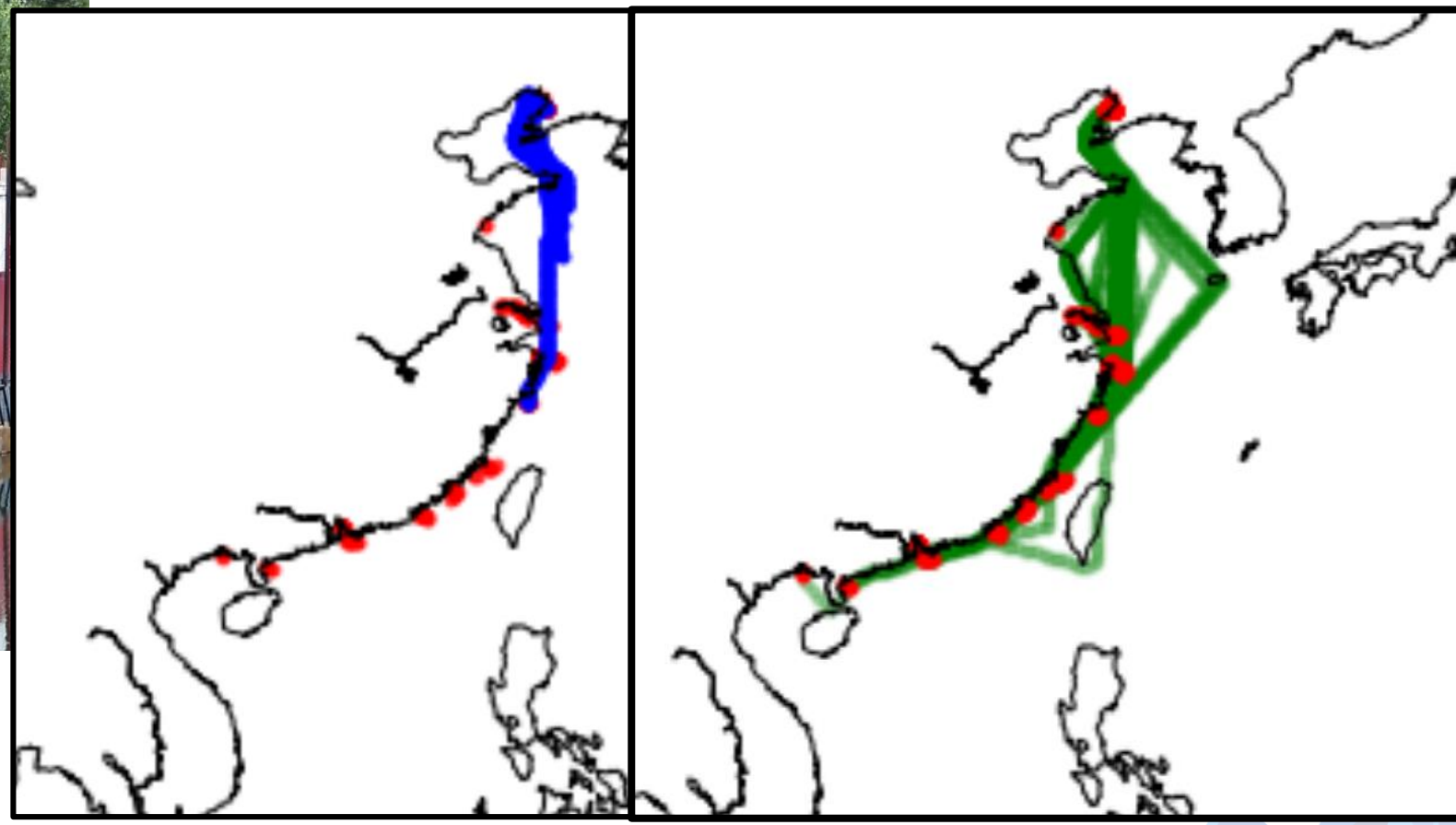


Ship location data: original AIS vs. generated by MariTEAM algorithm.

DWT vs Block coefficients

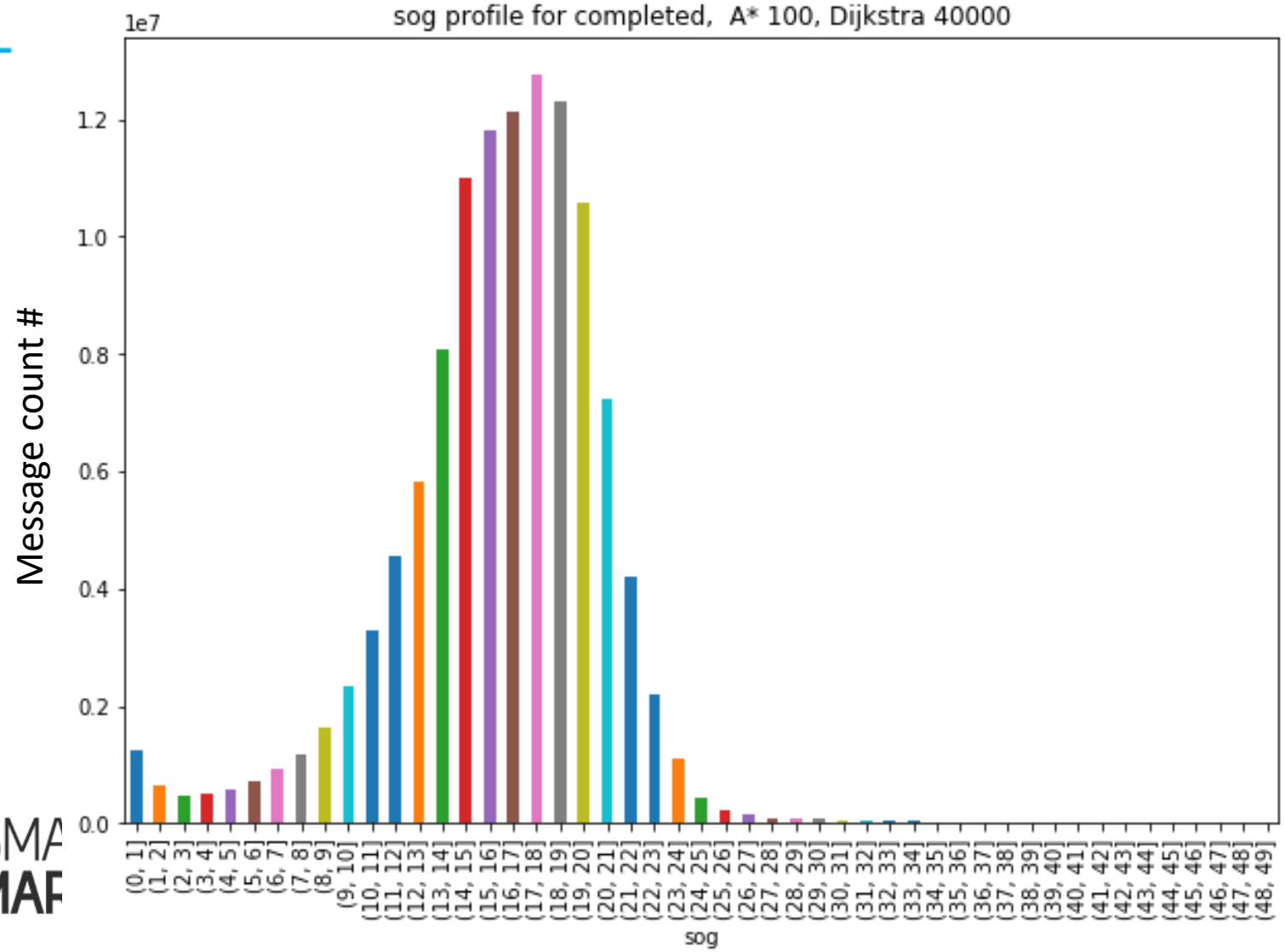


Data cleaning, examples

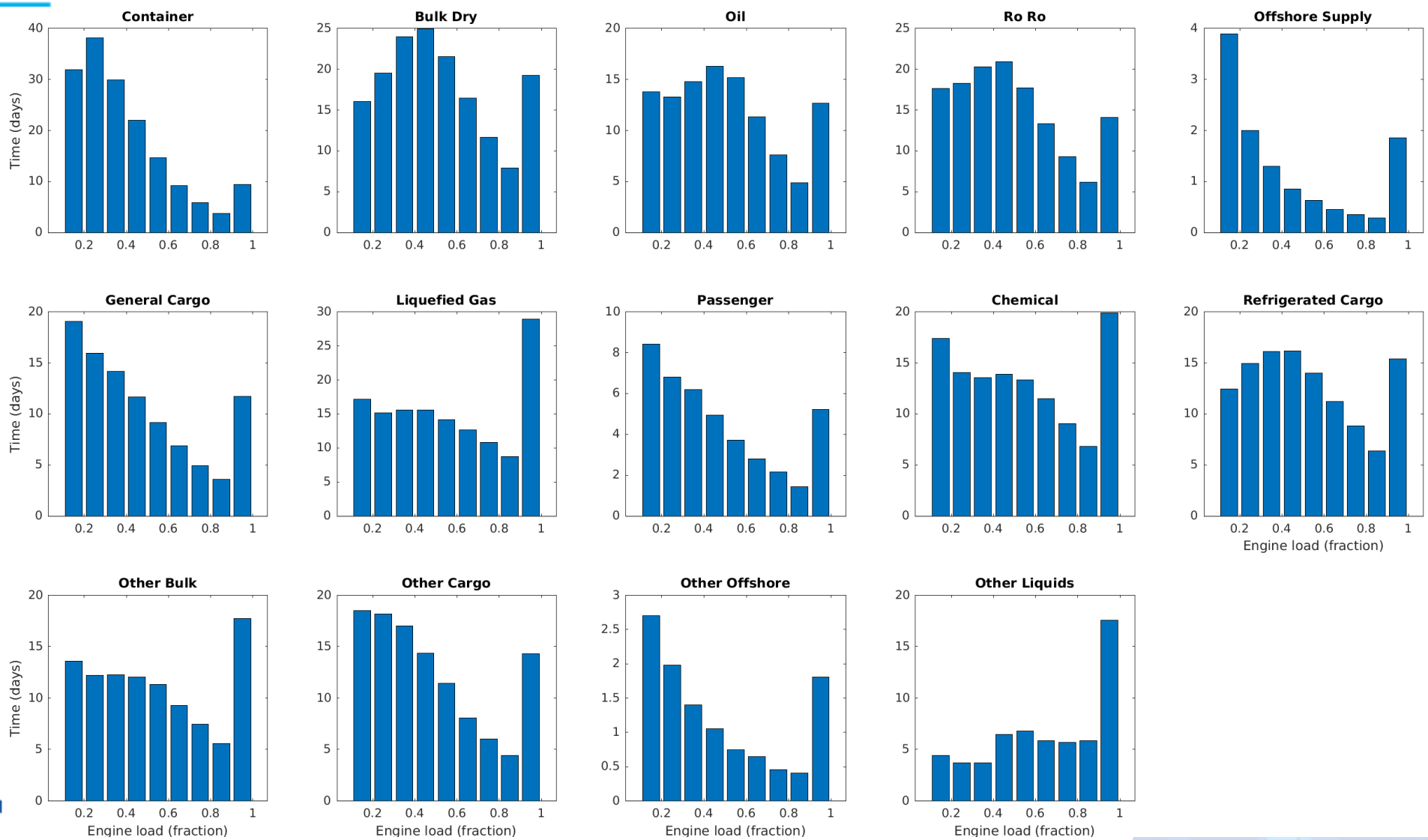


Bad News

Speed over ground [knots], all container ships



Load distributions



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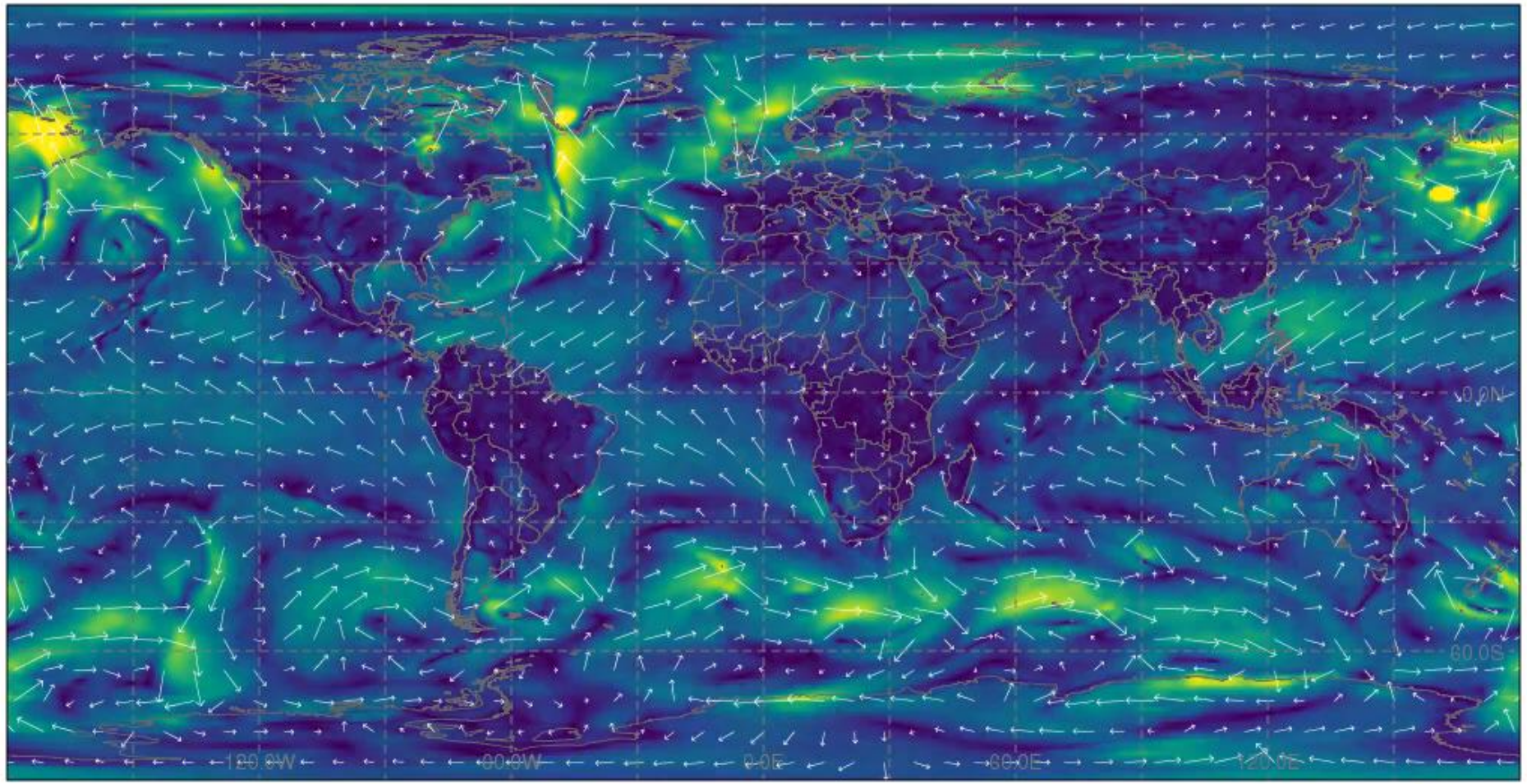
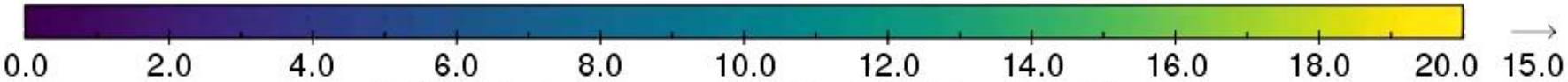


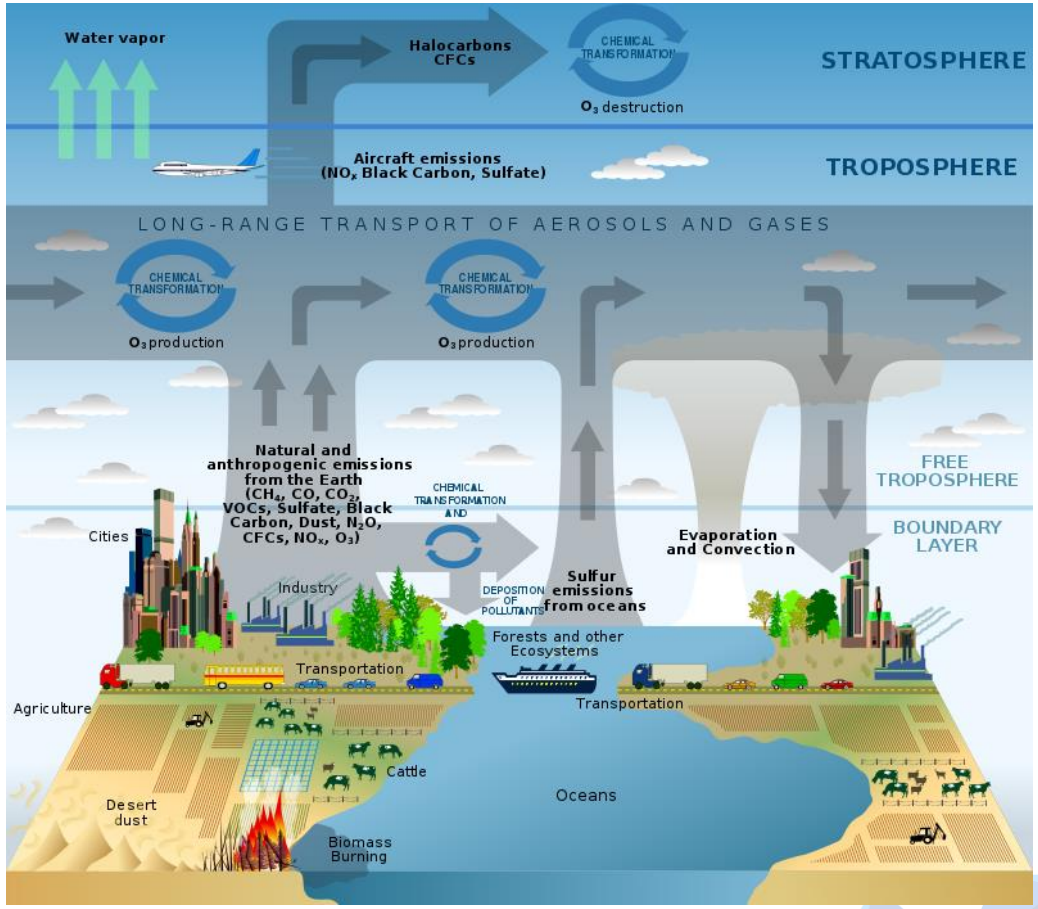


Sqrt[(10 metre U wind component)² + (10 metre V wind component)²]

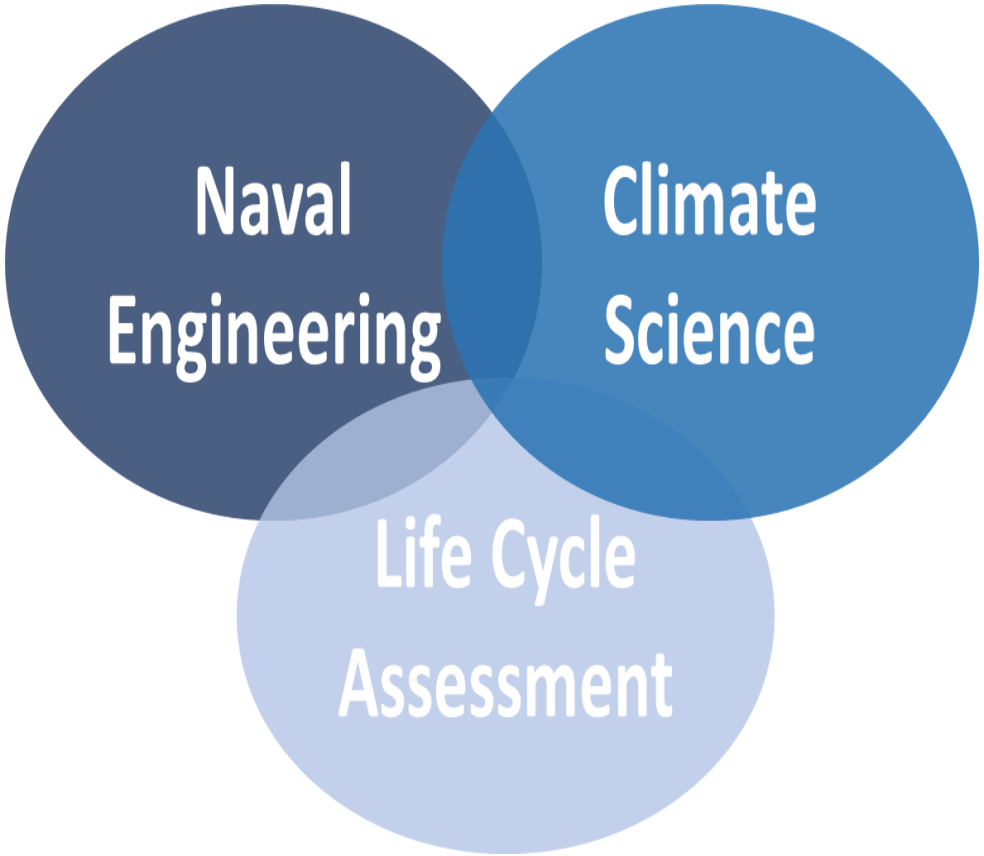
Data Min = 0.0, Max = 44.3, Mean = 6.2

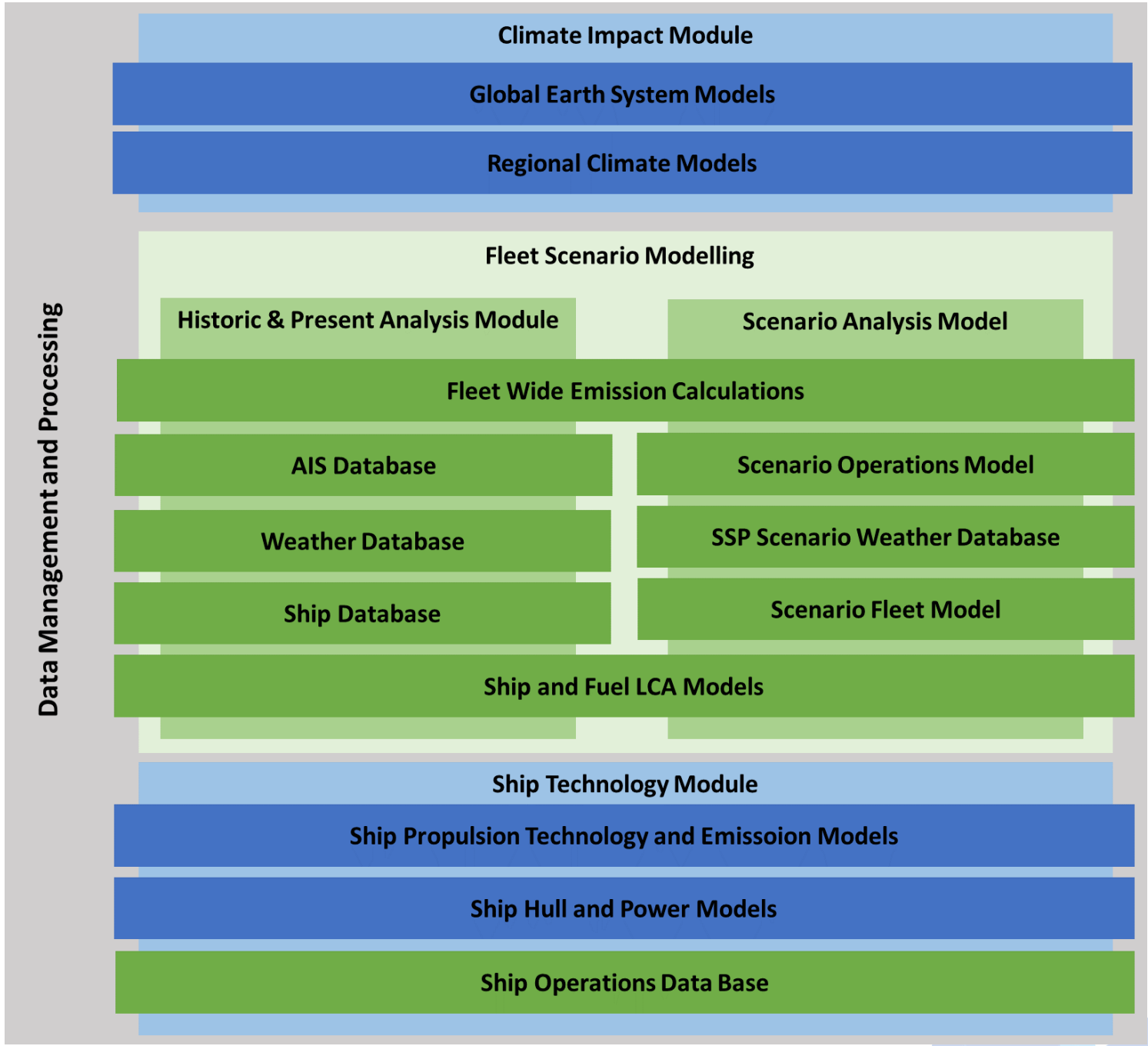

Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image Landsat / Copernicus
Image IBCAO
Google ear

Climate Modelling:
Norwegian Earth System Model



Interdiciplinary Approach

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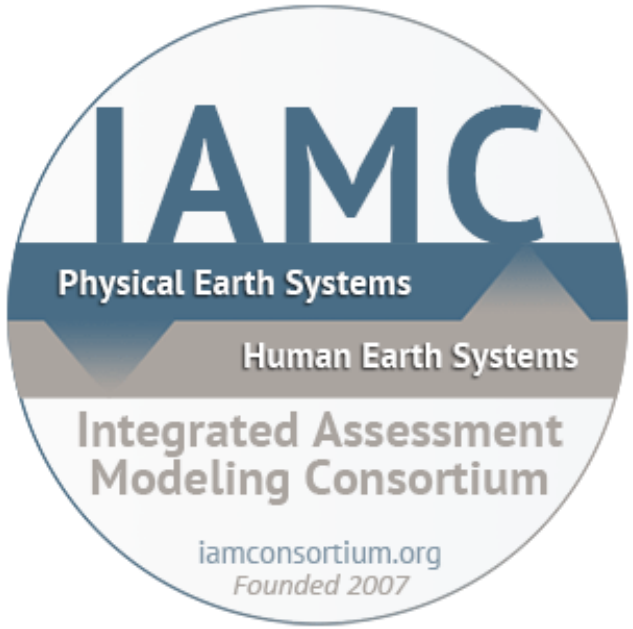
Model Intercomparison activities



EMF 27: Global Energy Model Comparison Exercise

High confidence and high agreement requires broad efforts

High agreement Limited evidence	*High agreement Medium evidence*	*High agreement Robust evidence*
Medium agreement Limited evidence	*Medium agreement Medium evidence*	*Medium agreement Robust evidence*
Low agreement Limited evidence	*Low agreement Medium evidence*	*Low agreement Robust evidence*

Agreement →

Evidence (type, amount, quality, consistency) →

Confidence Scale

The transport sector accounted for 27 % of final energy use and 6.7 $GtCO_2$ direct emissions in 2010, with baseline CO_2 emissions projected to approximately double by 2050 (*medium evidence, medium agreement*). This growth in CO_2 emissions from increasing global passenger and freight activity could partly offset future mitigation measures that include fuel carbon and energy intensity improvements, infrastructure development, behavioural change and comprehensive policy implementation (*high confidence*). Overall, reductions in total transport CO_2 emissions of 15–40 % compared to baseline growth could be achieved in 2050 (*medium evidence, medium agreement*). (Figure SPM.7) [6.8, 8.1, 8.2, 8.9, 8.10]

Senter for forskningsdrevet innovasjon

Norges forskningsråd

SMART MARITIME