WP 9:
MetOcean services to the marine transport sector

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MetOcean services

- Improved surface currents (research)
- Improved ship arrival time estimates (with InterTransIS, iPort?)
- New: workability assessments (with Eko-vation)

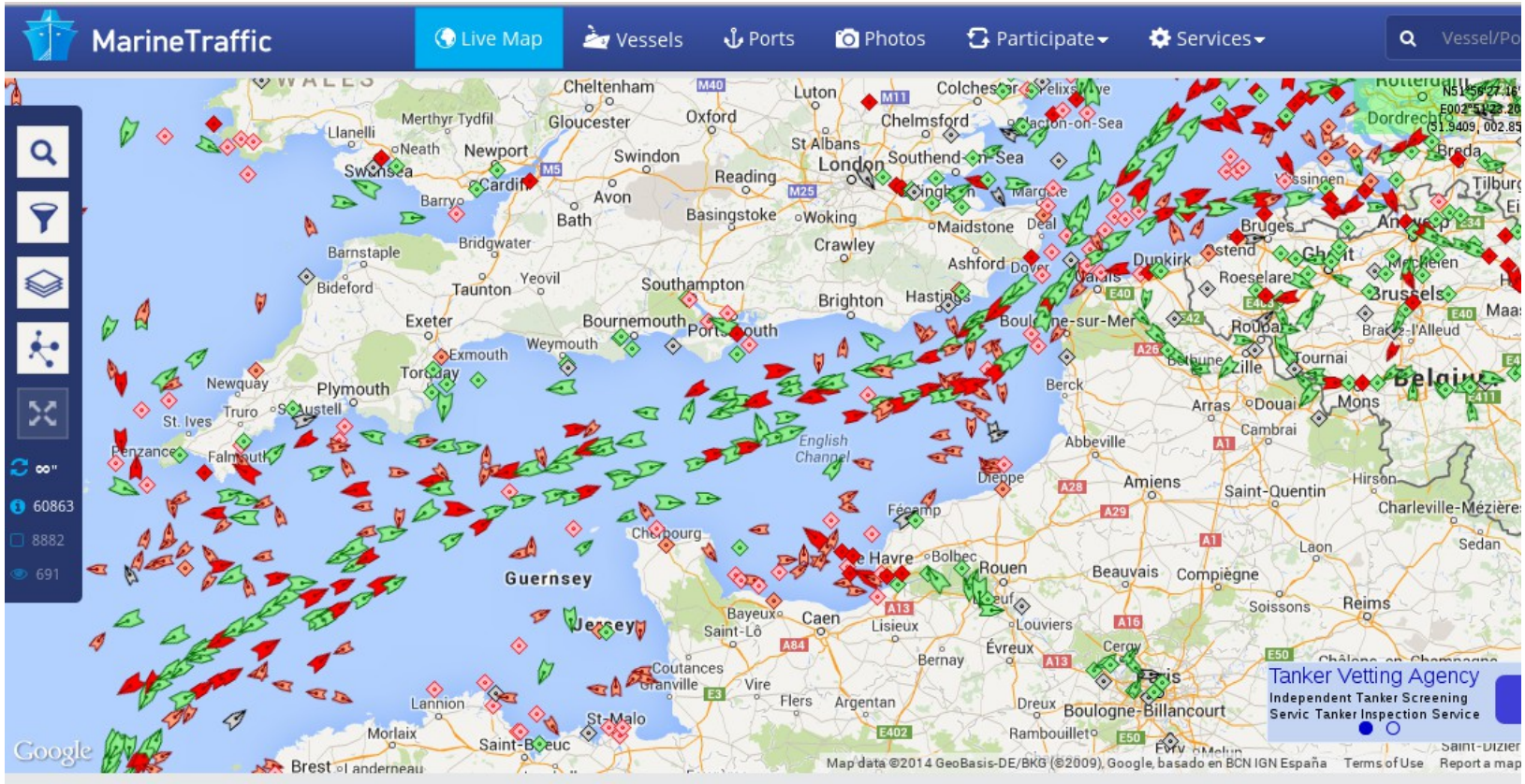
Data

- AIS (Automatic Identification System)
- Model forecasts/hindcasts
  - Wind (10 m speed, direction)
  - Waves (height, direction (,spectral))
  - Currents (surface speed, direction, tidal constants)
- Satellite altimeter (sea level anomalies)
- In situ (buoy/ADCP currents)

AIS data

- Broadcasted by almost all ships (every 6-10 sec)
- Picked up by satellites worldwide (expensive)
- Picked up by ground stations (coastal regions only)
  - Full data: commercial service
  - Summary: free (good enough)
- Will hopefully be free/open in a few years

Example: traffic snapshot



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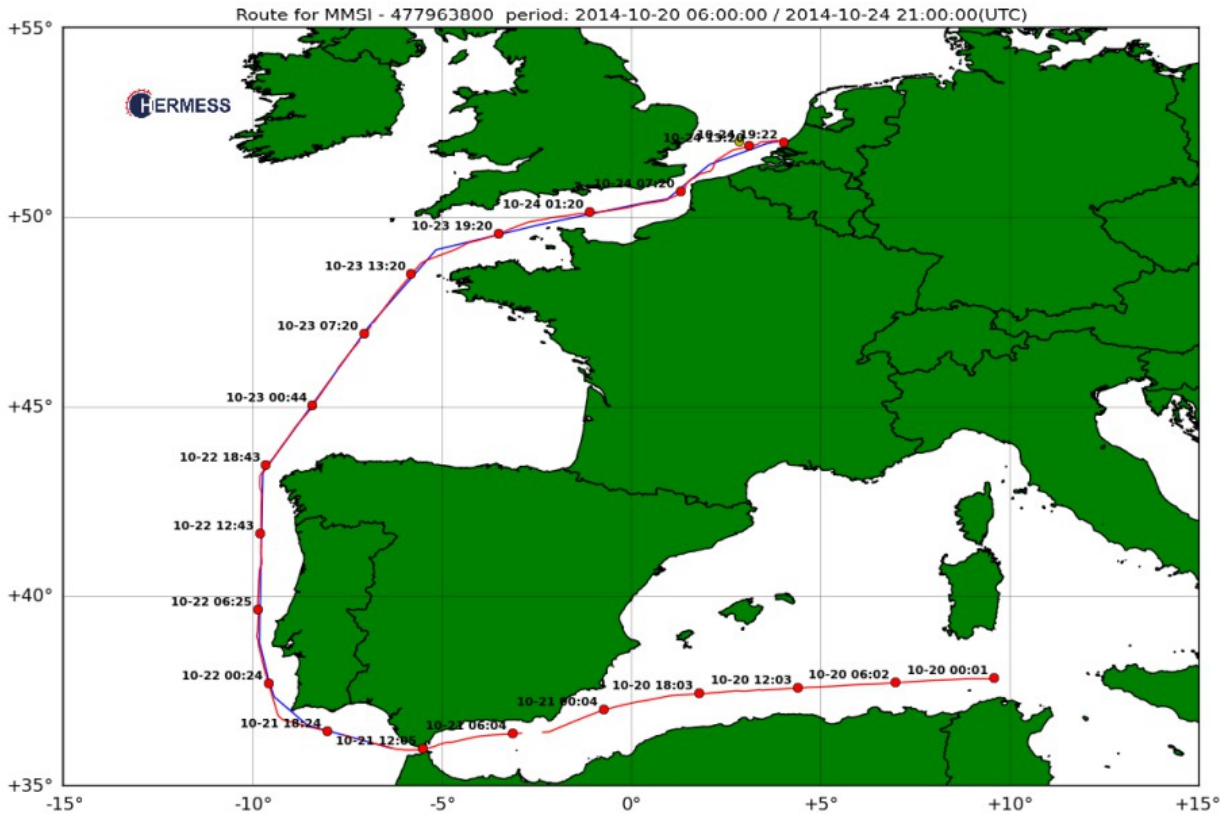
Example: track individual ship (CSCL STAR)



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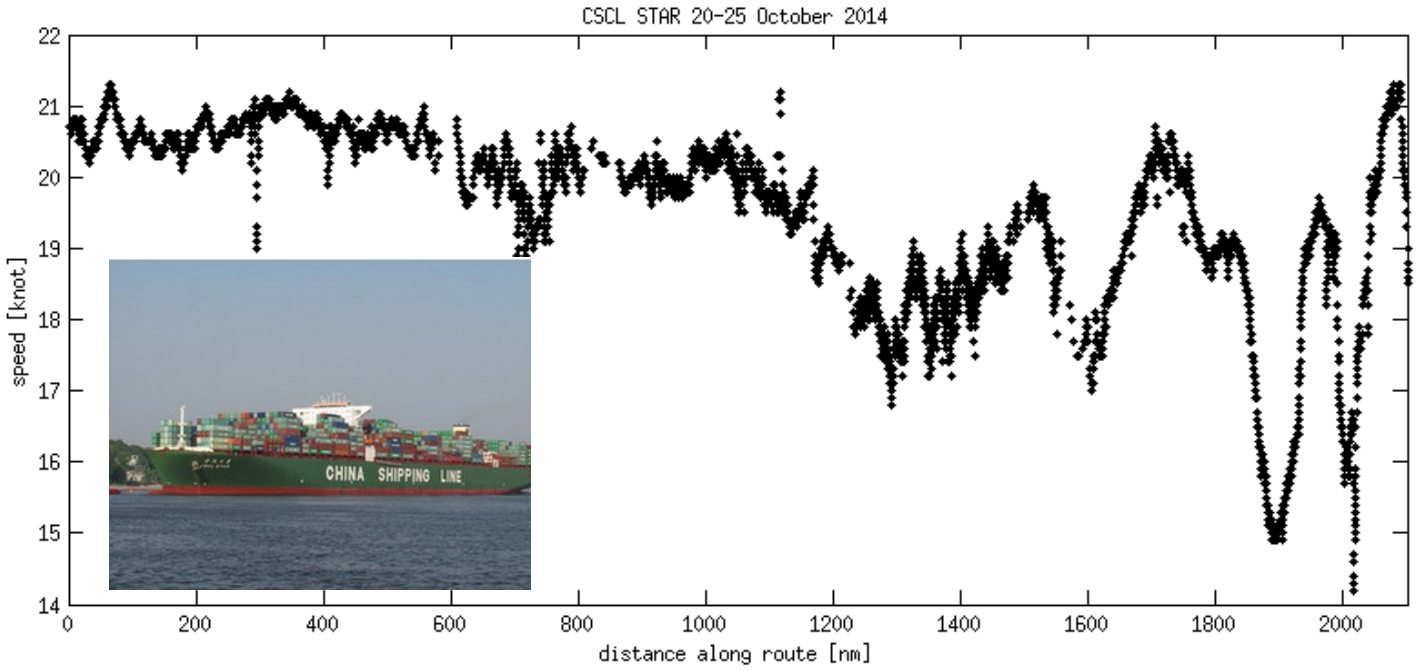
Ship speed along route



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Simple model for speed variations

- Apply model surface current corrections to ship speed variations
- Remove outliers (ship maneuvers)
- Tune ship response parameters using past wind/wave conditions
- Remove wind/wave effects
- Remaining speed variations are interpreted as surface current residuals

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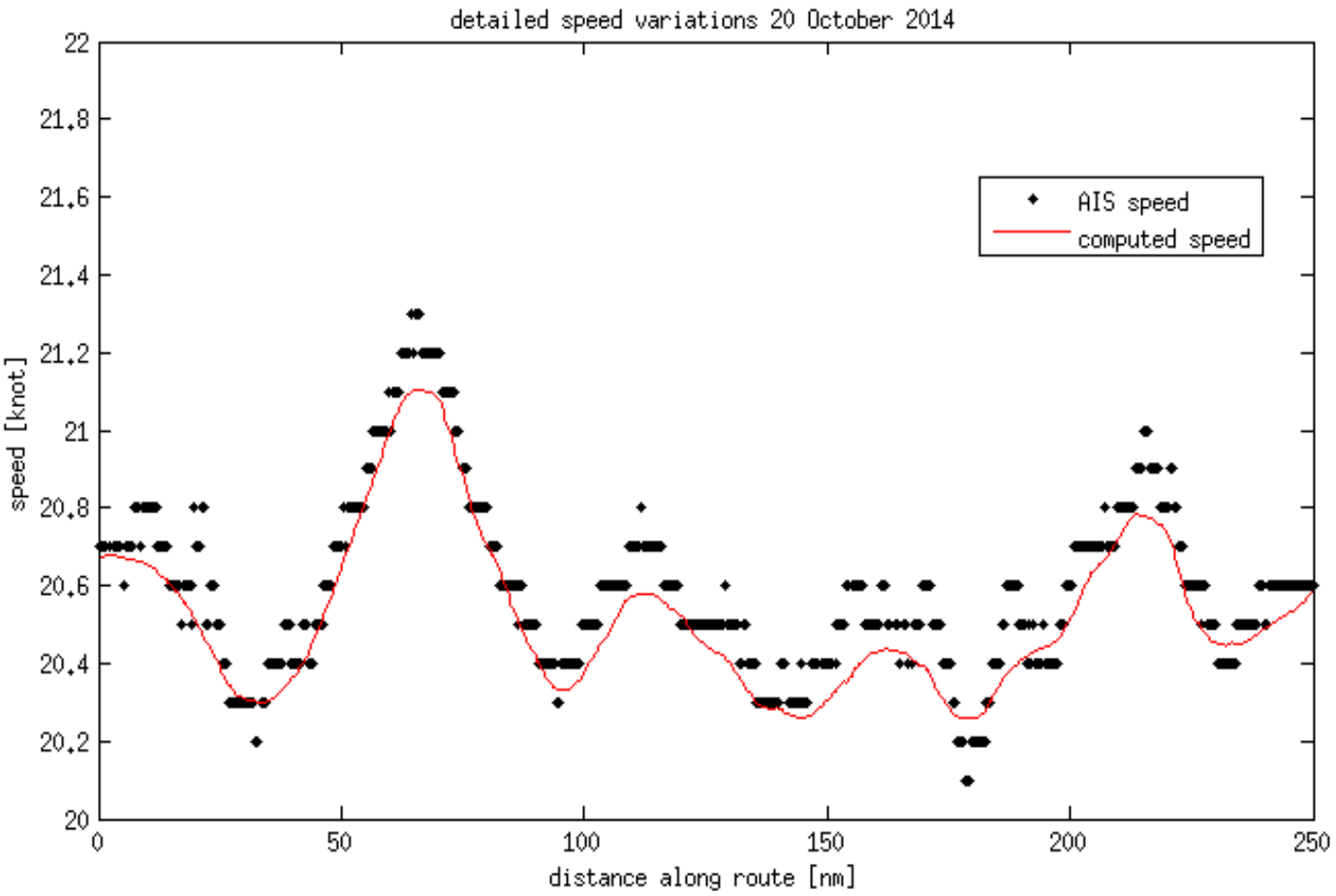
Ship speed (detail)



Assess residual current fields

- One measurement may look convincing but could be noise or a model error.
- Use many nearby (in space/time) measurements to produce residual current fields.
- Simplified hydrodynamic models provide consistency tests

Applications

- Assimilation in regional ocean circulation models
- Assimilation in tidal models (coastal regions)
- Detection (in combination with satellite images):
  - Internal waves (e.g. near Gibraltar)
  - Gyres (Brasil, south and east Africa)

Todo (short term)

Validation study:

- Find in-situ current measurements
- Collect large AIS data set
- Quantify reliability of AIS current assessments

Ship arrival time estimates

- Important for planning harbour activities (logistics)
  - Too early: ships have to wait
  - Too late: time slot expires, transshipment facilities wait
- Customers:
  - harbour authorities
  - Logistic service providers (InterTransIS)

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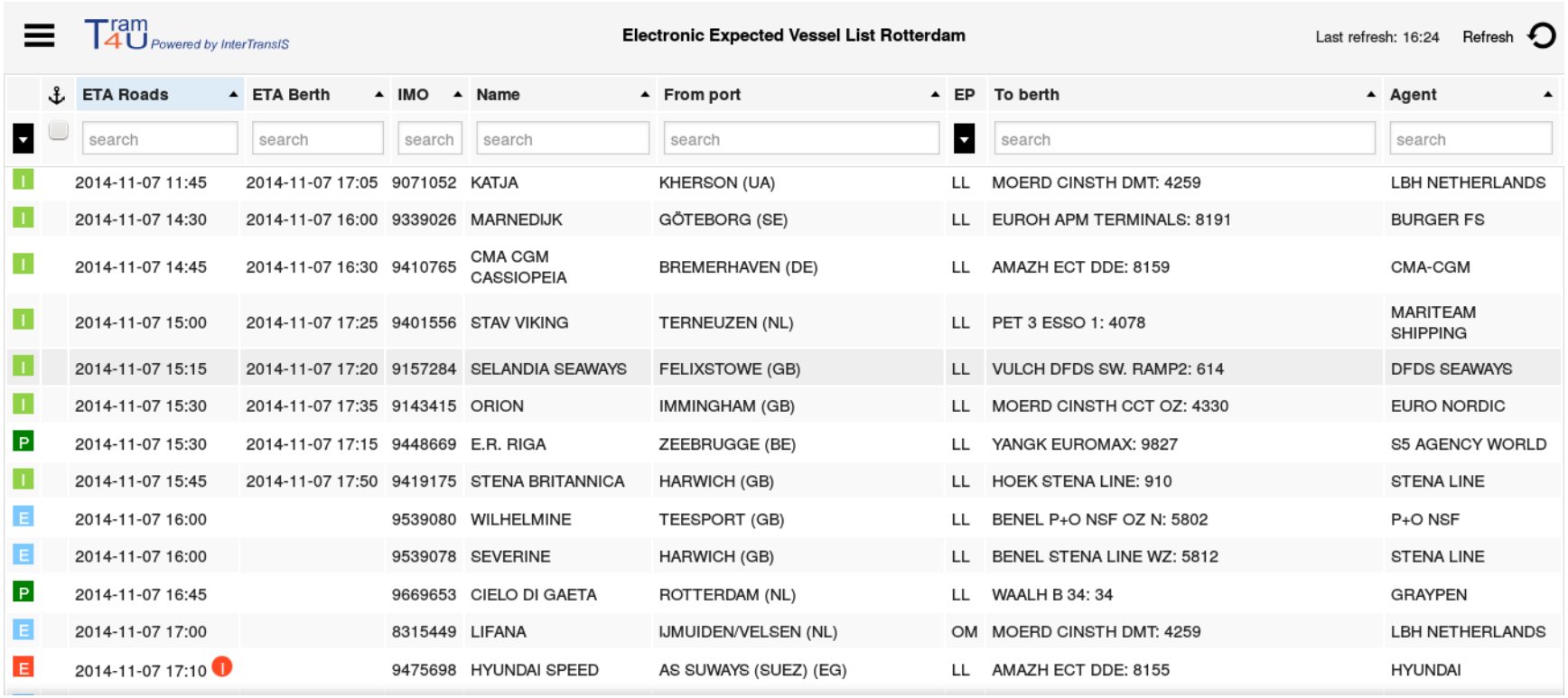
InterTransIS service



Tram4U Powered by InterTransIS

Electronic Expected Vessel List Rotterdam

Last refresh: 16:24 Refresh

	ETA Roads	ETA Berth	IMO	Name	From port	EP	To berth	Agent
	search	search	search	search	search		search	search
I	2014-11-07 11:45	2014-11-07 17:05	9071052	KATJA	KHERSON (UA)	LL	MOERD CINSTH DMT: 4259	LBH NETHERLANDS
I	2014-11-07 14:30	2014-11-07 16:00	9339026	MARNEDIJK	GÖTEBORG (SE)	LL	EUROH APM TERMINALS: 8191	BURGER FS
I	2014-11-07 14:45	2014-11-07 16:30	9410765	CMA CGM CASSIOPEIA	BREMERHAVEN (DE)	LL	AMAZH ECT DDE: 8159	CMA-CGM
I	2014-11-07 15:00	2014-11-07 17:25	9401556	STAV VIKING	TERNEUZEN (NL)	LL	PET 3 ESSO 1: 4078	MARITEAM SHIPPING
I	2014-11-07 15:15	2014-11-07 17:20	9157284	SELANDIA SEAWAYS	FELIXSTOWE (GB)	LL	VULCH DFDS SW. RAMP2: 614	DFDS SEAWAYS
I	2014-11-07 15:30	2014-11-07 17:35	9143415	ORION	IMMINGHAM (GB)	LL	MOERD CINSTH CCT OZ: 4330	EURO NORDIC
P	2014-11-07 15:30	2014-11-07 17:15	9448669	E.R. RIGA	ZEEBRUGGE (BE)	LL	YANGK EUROMAX: 9827	S5 AGENCY WORLD
I	2014-11-07 15:45	2014-11-07 17:50	9419175	STENA BRITANNICA	HARWICH (GB)	LL	HOEK STENA LINE: 910	STENA LINE
E	2014-11-07 16:00		9539080	WILHELMINE	TEESPORT (GB)	LL	BENEL P+O NSF OZ N: 5802	P+O NSF
E	2014-11-07 16:00		9539078	SEVERINE	HARWICH (GB)	LL	BENEL STENA LINE WZ: 5812	STENA LINE
P	2014-11-07 16:45		9669653	CIELO DI GAETA	ROTTERDAM (NL)	LL	WAALH B 34: 34	GRAYPEN
E	2014-11-07 17:00		8315449	LIFANA	IJMUIDEN/VELSEN (NL)	OM	MOERD CINSTH DMT: 4259	LBH NETHERLANDS
E	2014-11-07 17:10		9475698	HYUNDAI SPEED	AS SUWAYS (SUEZ) (EG)	LL	AMAZH ECT DDE: 8155	HYUNDAI

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ETA's

The InterTransIS website shows ships bound for Rotterdam harbour (mainly).

Two ETA's are shown:

- Captains estimate (based on experience)
- Agents estimate (based on planning)

HERMESS will add a third estimate, based on forecasted wind, wave, and current conditions.

Method

Arrival time estimation involves extrapolation.

Basic assumption: engine power is constant. The ship's speed can be estimated from (forecasted) environmental conditions.

The relation between speed and time/location can be formulated as an ordinary differential equation and solved numerically.

Arrival time service

- Client places ship identifiers on a request list
- For all ships on the lists hourly AIS data are collected
- For all ships a new arrival time is estimated every 3 hours
- Results are made available to the clients

Parts of this service are operational as prototype

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Todo (short term)

- Produce validation/reliability estimates
  - Collect AIS data for all ships going to Rotterdam harbour (from southern directions)
  - Analyse data to estimate ship response parameters per ship class
  - Produce arrival time estimates in hindcast mode
  - (from Feb 2015) produce arrival time estimates in forecast mode.
  - Analyse results