



NAV08

Wednesday 29th October 2008

Session 9A

Marine Navigation –
Evolving techniques and technology

POADSS

POADSS – latest concept of a PPU



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POADSS



A new concept of a Portable Pilot Unit (PPU)

**Portable Operational Approach and
Decking Support System**

(POADSS)



Stages of the project

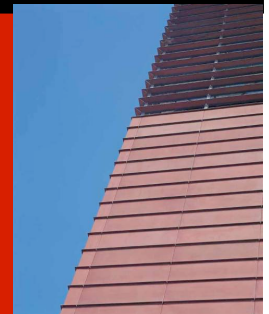


1. State of the Art PPU's
2. Definition of User Requirements
3. Development of a POADSS
4. Testing
5. End Result/Report

POADSS



MarNIS – Sixth Framework
Programme





POADSS



Evolution of PPU's

Current PPU's—

- Laptop, Chart Software + GPS = real time position!
- + DGPS = better accuracy
- + RTK = centimetric accuracy (2D - horizontally)
- + AIS = decision support

MarNIS PPU's -

- Vertical position - (3D)
- Integrate an IMU – dynamic motions - roll, pitch, heave
- Broadband – real time info - tide, weather, traffic, WMS
- High density bathymetric data – up to date detailed info
- Dynamic Under Keel Clearance software (DUKC)

= POADSS



In the next decade an increase in traffic is expected in European Ports, which will result in:

- complex traffic patterns within ports, fairways and their approaches
- ever larger ships using the same infrastructure

These expectations require the latest information technology aboard and ashore to improve:

- the overall safety and efficiency of all vessel movements
- better decision support (both ways between the ship and shore)

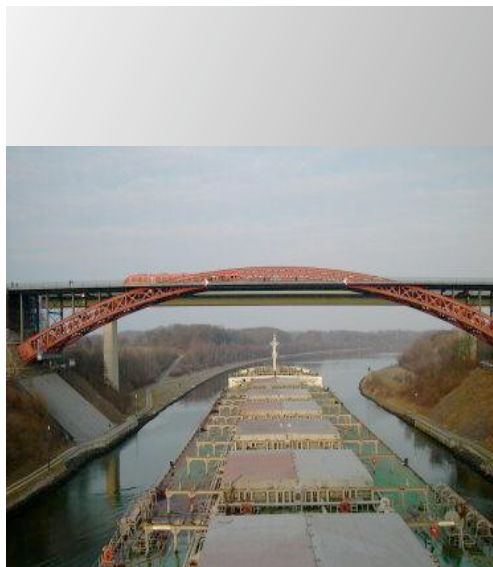
POADSS





Objectives

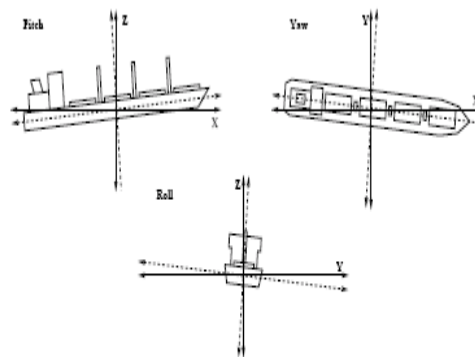
- Make better use of the fairway
- Engage the Bridge team with the Dynamic Passage Plan, as well as the VTM
- As well as a Dynamic Passage Plan, also with real time data.



POADSS

The MarNIS project has addressed these challenges through the development of the POADSS.



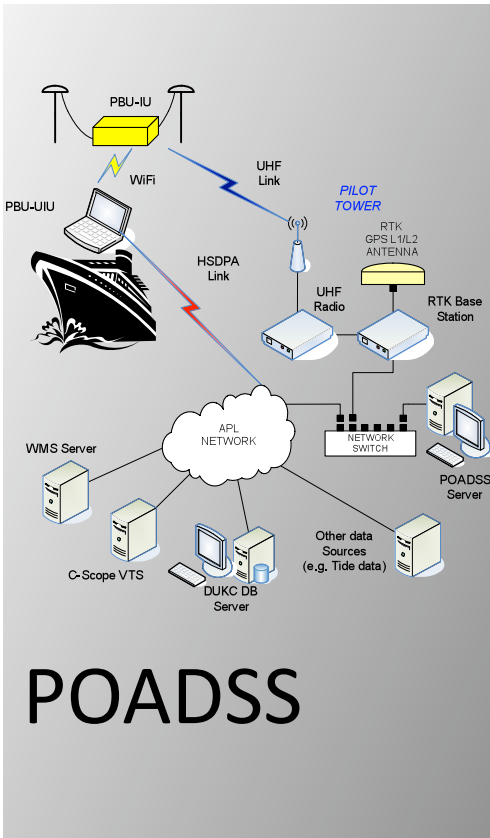


POADSS

- Integration of an Inertial Measurement Unit (IMU) with Global Navigation Satellite Systems (GNSS) to determine all dynamic movement of the vessel
- Wireless broadband to exchange information in real time (WMS)
- Presentation of dynamic high density bathymetric data displayed on an electronic chart (dynamic safety contour)
- Dynamic Under Keel Clearance (DUKC)
(actual and predicted UKC)



New Applications



- **onboard unit** – onboard data collection and the User Interface functionalities for the pilot, consisting of :

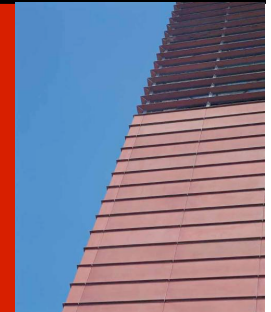
- 

- **wireless networks**

- UHF radio band (RTK correction signal)
- HSDPA (commercial broadband)
- WiFi (between laptop and Instrument Unit)

- **shore server** – provides the centralised data base and information channel management functions

- shore front-end – UIU functionalities for the management of the system acting as client of the server





POADSS

POADSS onboard unit

- **instrument unit (IU)**
integrated GPS receiver/ inertial measurement unit
(Coda Octopus F185+ with NovAtel antennae)
RTK receiver, AIS receiver
Motherboard, battery pack
- **user interface unit (UIU) - (Laptop)**
compaq 2710 P
windows XP
dedicated POADSS software
- **connection between IU and the UIU by LAN (WiFi)**
- **onboard unit has battery capacity for 6 hours and a connecton for an external power supply**





Accuracy

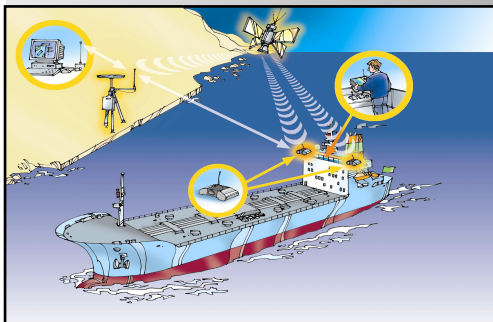
position: 50 cm horizontal stand alone (EGNOS)
2 cm horizontal (RTK)
5 cm vertical (RTK)

speed: 0.03 cm/s

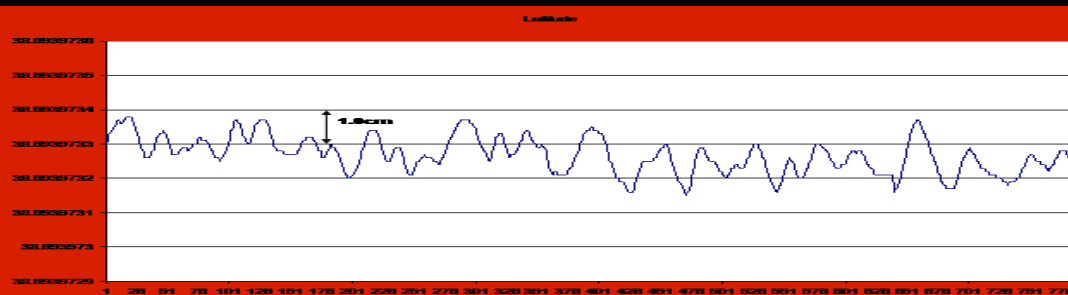
roll/pitch: < 0.025 deg

Heading: 0.025 deg (antenna distance 4m apart)

heave: < 5 cm



POADSS





POADSS software modes

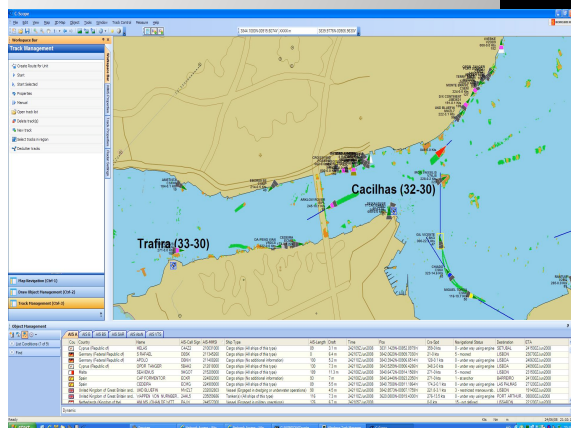
1. information mode
2. planning mode
3. navigation mode
4. docking mode

POADSS





Web Map Services (WMS)



1. Tactical Traffic Image from VTS (AIS, Pseudo AIS/ Radar tracks, Radar video)
2. Wind - direction and speed
3. Current - direction and speed
4. Wave - significant height, direction and period
5. Meteorological/hydrographical warnings
6. Berth/Terminal information
7. Temporary/restricted/closed areas etc.

WMS



New Applications



Selected Standards

WMS – Web Map Service

- Widely used in the world of GIS – Geographical Information Systems
- Established by OGC – Open Geospatial Consortium
- Consists of 3 requests/responses: GetCapabilities, GetMap and GetFeatureInfo
- Based on HTTP, i.e. the World Wide Web protocol

WMS

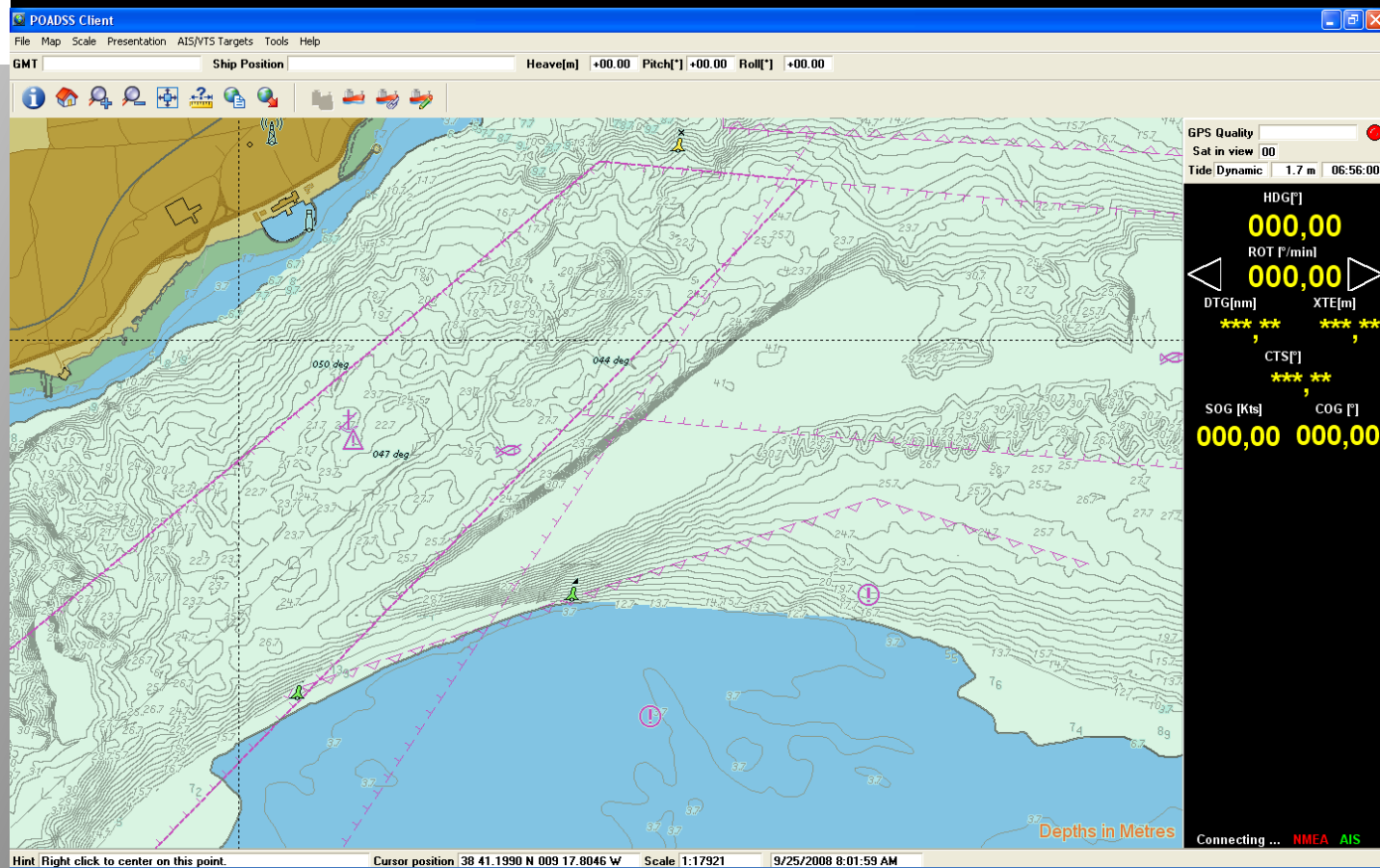


Sharing VTS Information

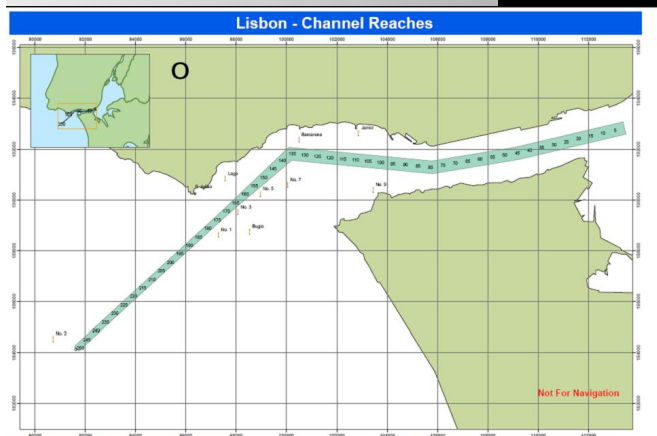


High Density Charts

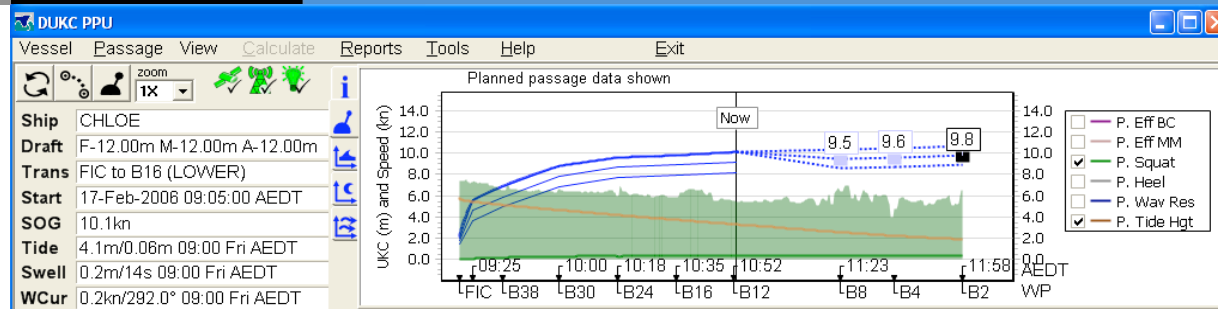
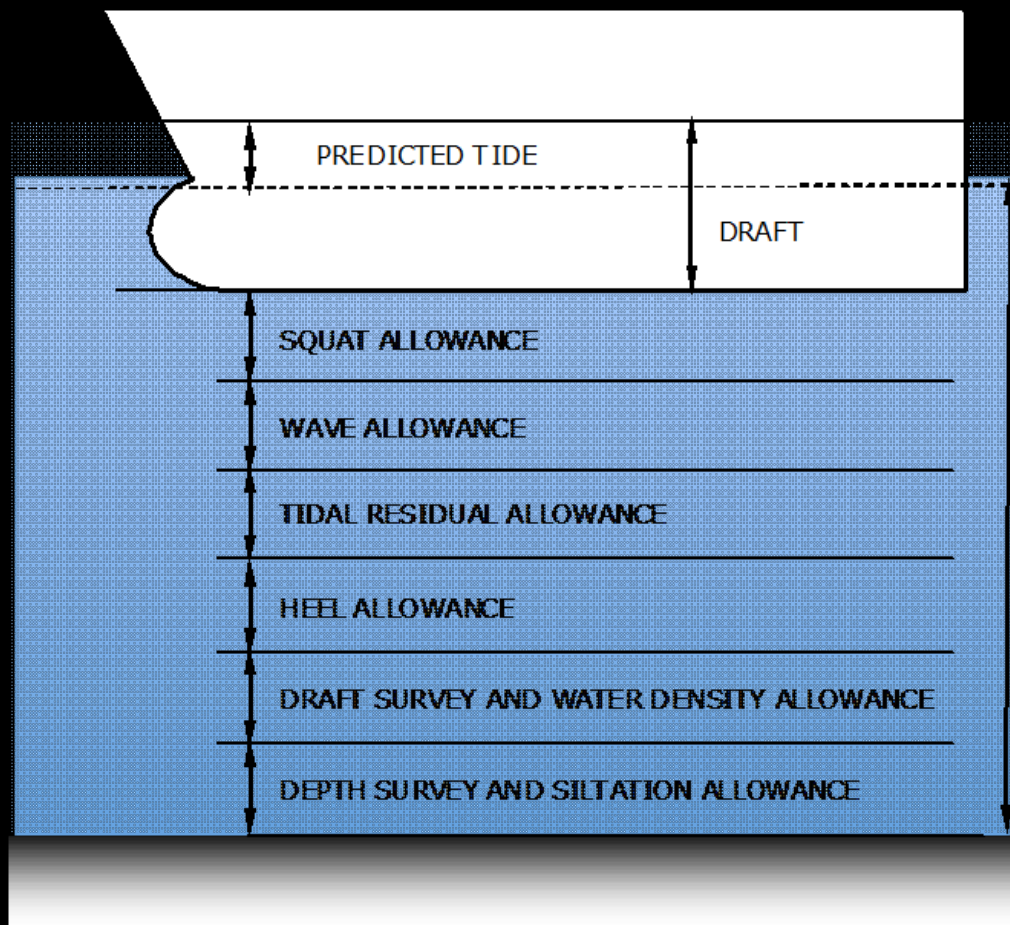
POADSS



Dynamic Charts with Tide input



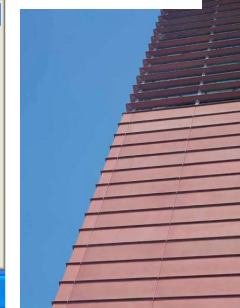
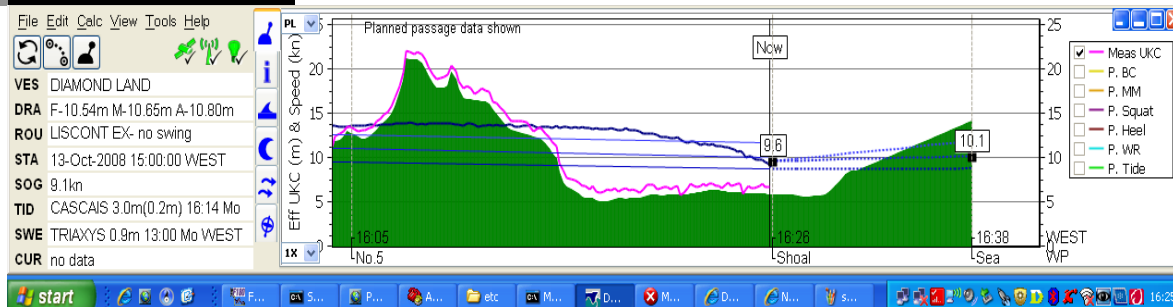
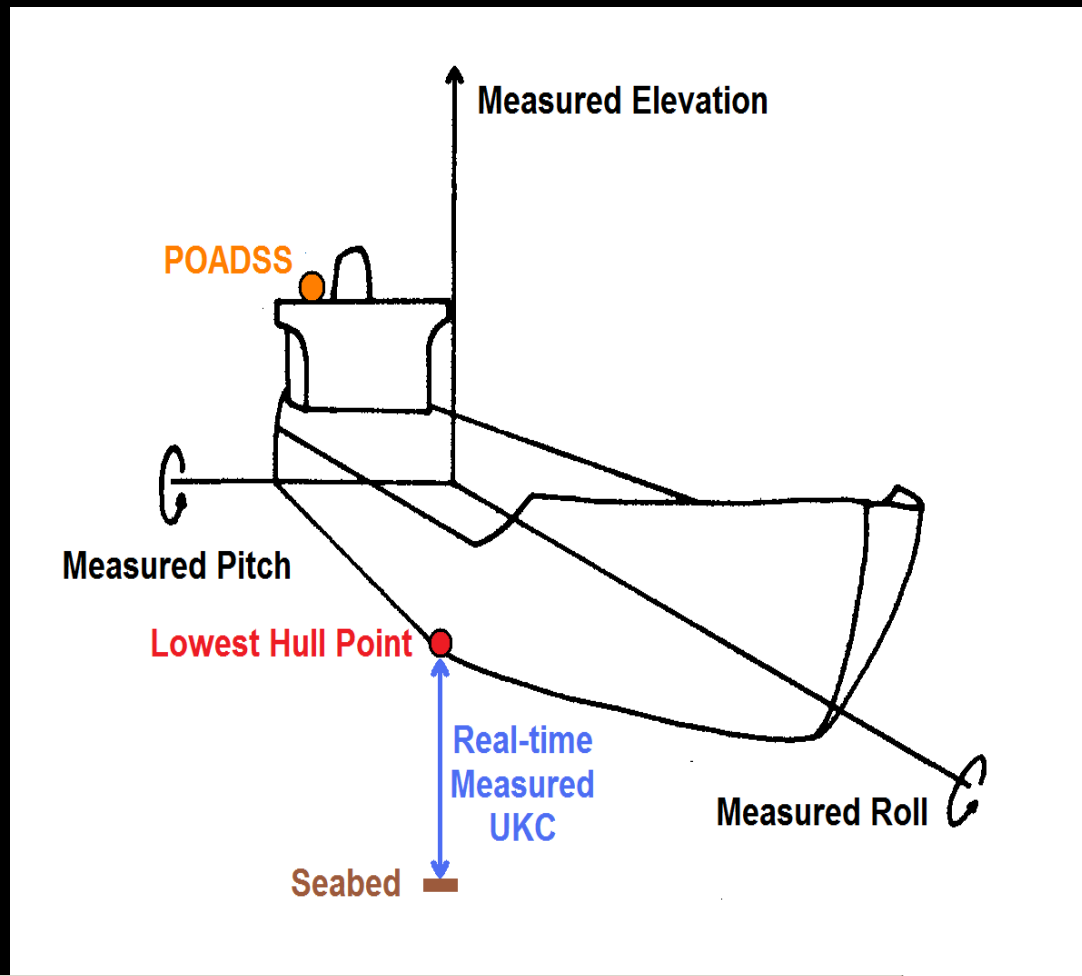
DUKC





DUKC - Actual

DUKC





POADSS

Software easy to use

- In Europe, most PPU's have ship 'type tested' software, slightly modified for a Pilot to use
- POADSS has Port specific software
- Lisbon Pilots have determined the POADSS laptop presentation, specific for their needs





POADSS Training

Proposed PPU Training Standards

ECDIS IMO Model Course 1.27

AIS IMO Model Course 1.34

Manufacturers Type specific training

Familiarization trips accompanying another Pilot
Assessment

Meets IMO A960 requirements (23) 6.2

Apart from 'assessment' – Lisbon Pilots received the above



POADSS





WMS

POADSS



‘Lisbon Live’

via Port of Lisbon VPN
to POADSS Server in VTS

Broadband WMS

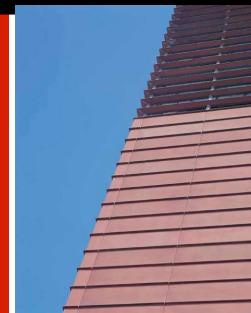




Image of Planning Mode

POADSS

Ship Settings

Detail List

Ship Geometrical Parameters

Side view: Length BPP, Length o/a

Front view: Beam

Aft, Mid, Forward

Star Board, Port side

Metacentre, KM, GM, KG, Centre of gravity, LGC

-LOA / 2, LOA / 2

Xp, Yp, X, Y

Zp, LGC, Centre of gravity, X, Z

Ship Name: KURMEZE

Ship ID (IMO Code): 9133094

Ship MMSI Code: 275291000

Hull Type: Container

Length OverAll (o/a) [m]: 160.00

Length BPP [m]: 0.00

Beam (b) [m]: 26.00

Draft:

Forward [m]: 7.00

Mid Ship Starboard side [m]: 7.00

Mid Ship Port side [m]: 7.00

Aft [m]: 7.00

Dead Weight [ton]: 0

Total Displacement [ton]: 0

GMf [m] free surface corrected: 0.00

GMs [m] solid: 0.00

KGs [m] keel to centre gravity: 0.00

KM [m] keel to metacentre: 0.00

Long Gravity Centre LCG [m]: 0.00

Safety ratio (R) [nm]: 0

Forward ratio (RF) [nm]: 0

Amplitud [deg]: 0

Minimal depth [m]: 0.00

Minimal UKC [m]: 0.00

Draught, Underkeel clearance, Depth underkeel

Xp [m]: 32.00

Yp [m]: 1.00

Zp [m]: 15.00

Note: GM = Centre of gravity to metacentre

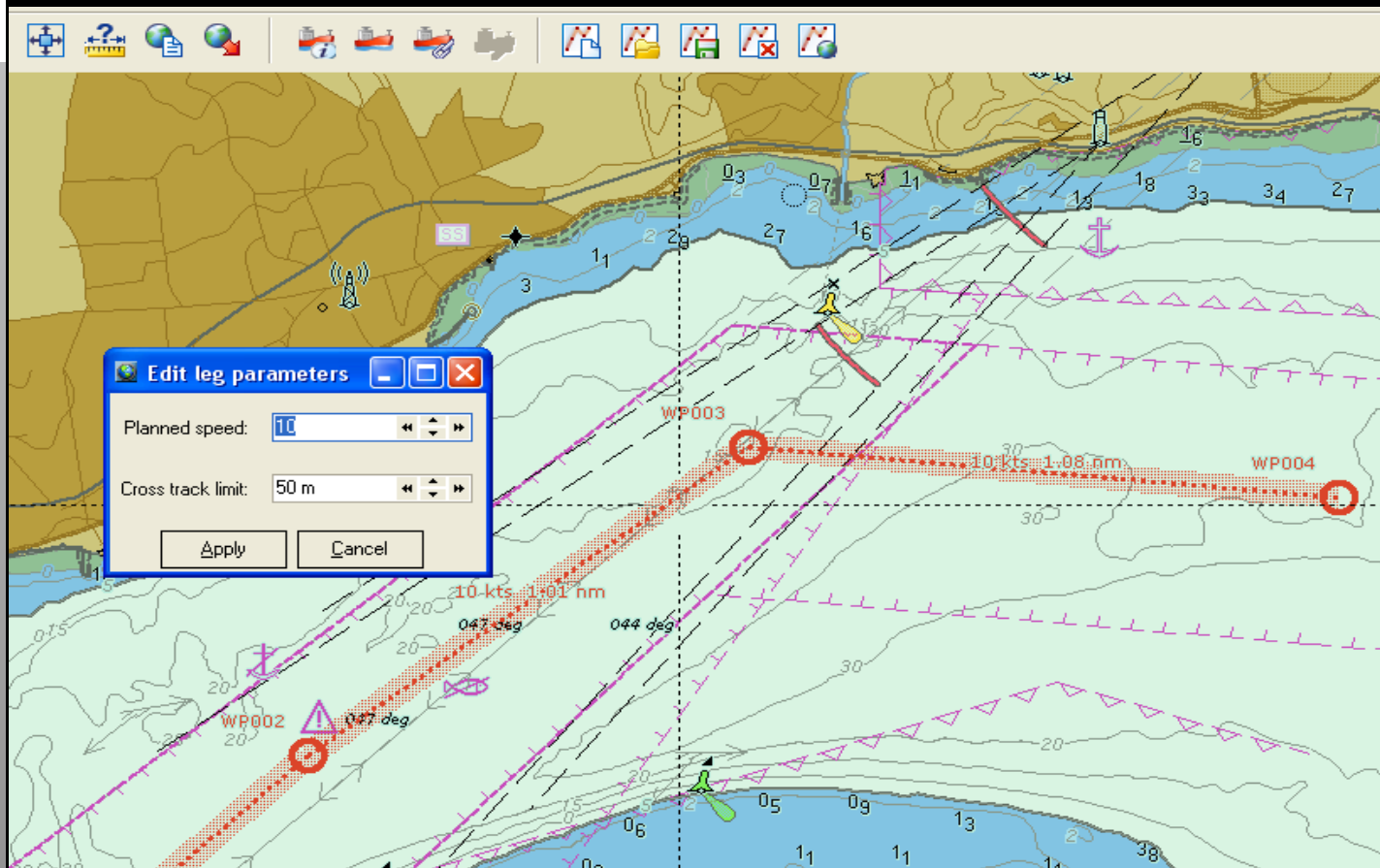
Set Default Close



Ship data settings



Image of Planning Mode



POADSS



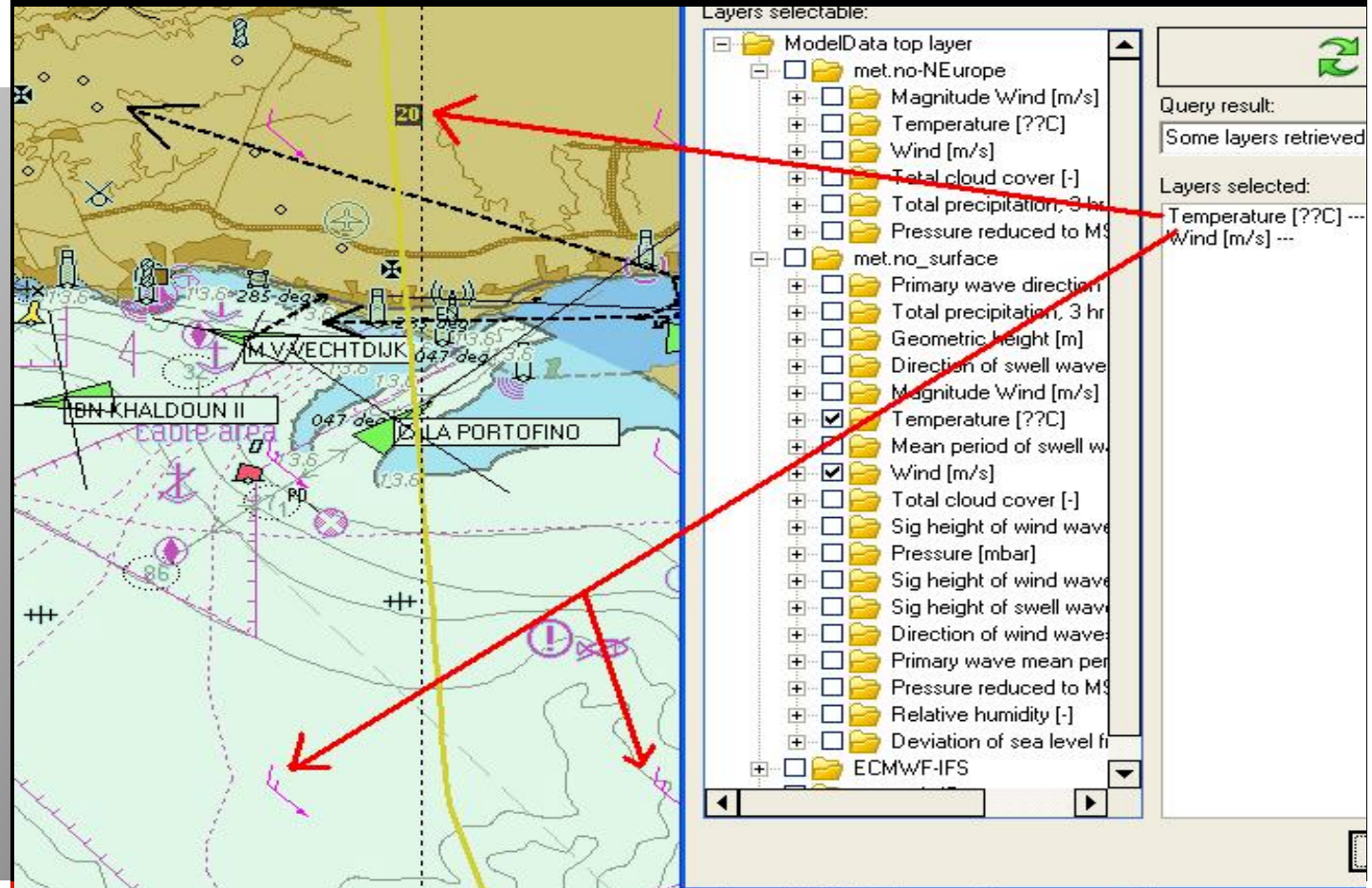
Route selection/edit



Image of Information Mode

WMS

POADSS



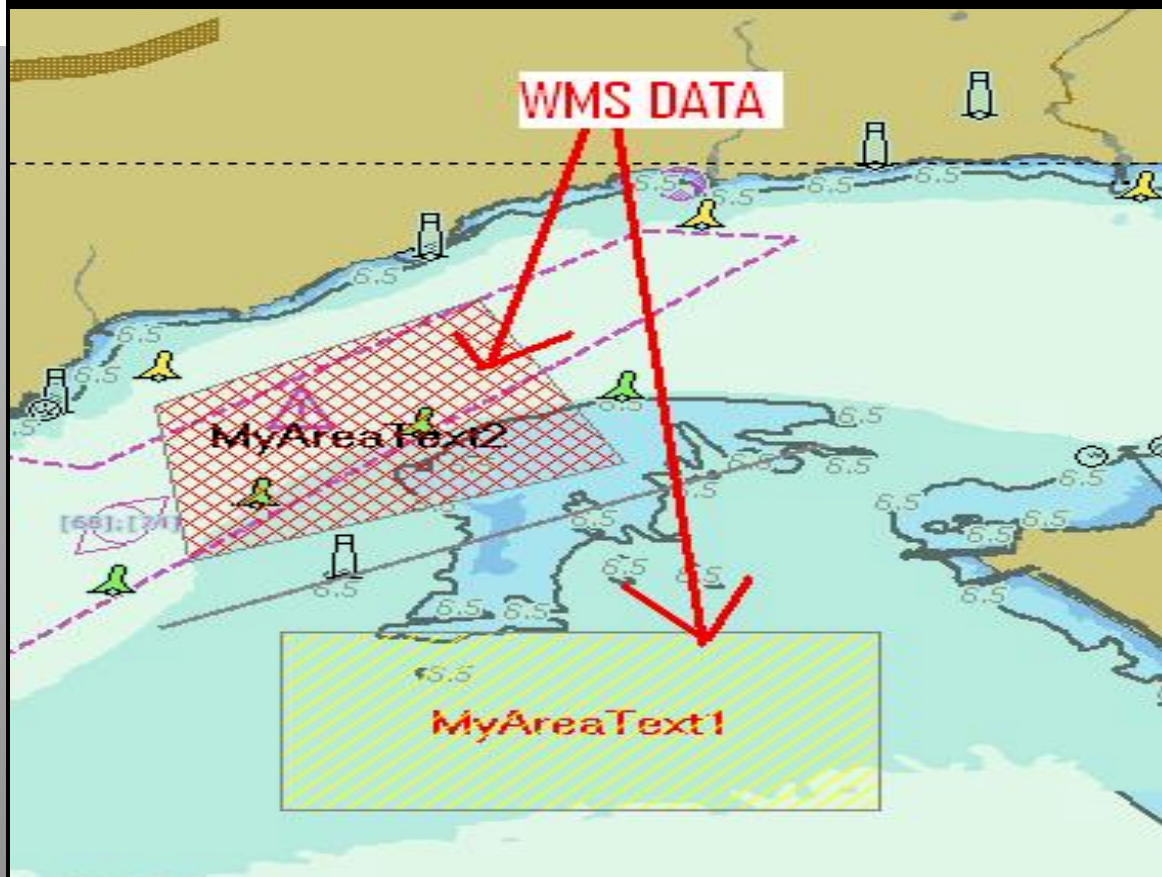
Wind and Temperature



Image of Information Mode

WMS

POADSS



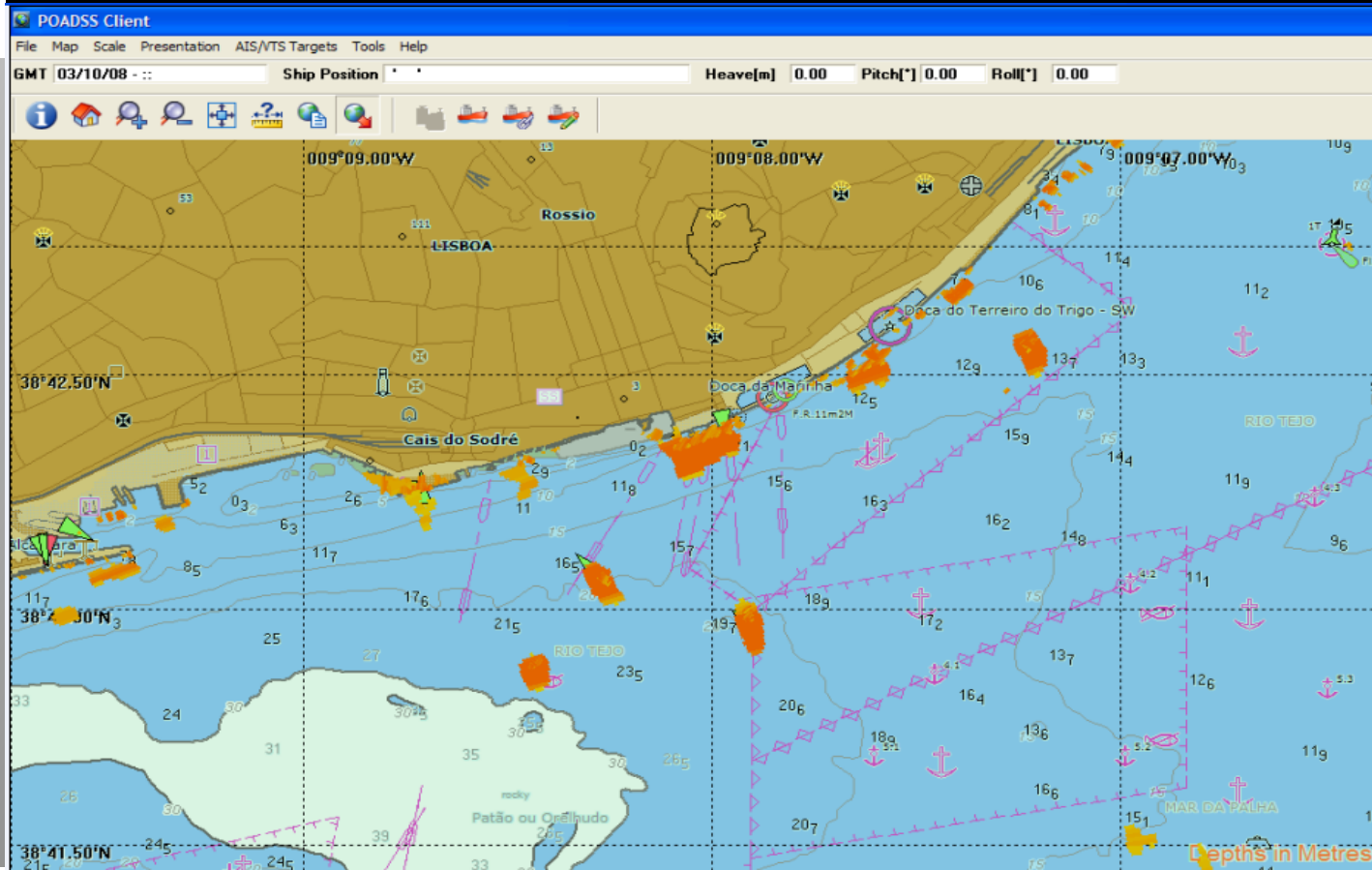
Special Areas - regatta



Image of Information Mode

WMS

POADSS

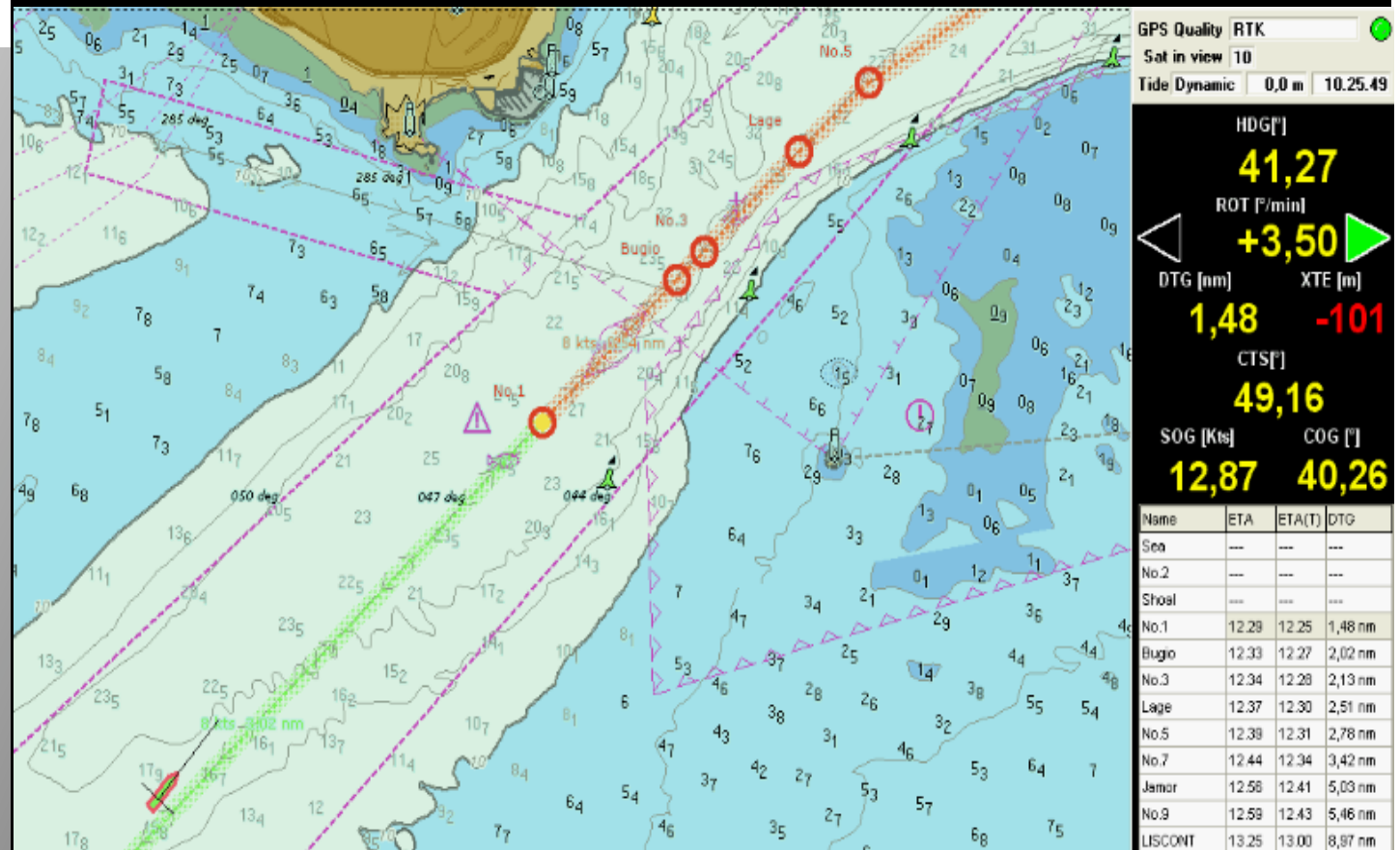


Raw Radar



Image of Navigation Mode

POADSS

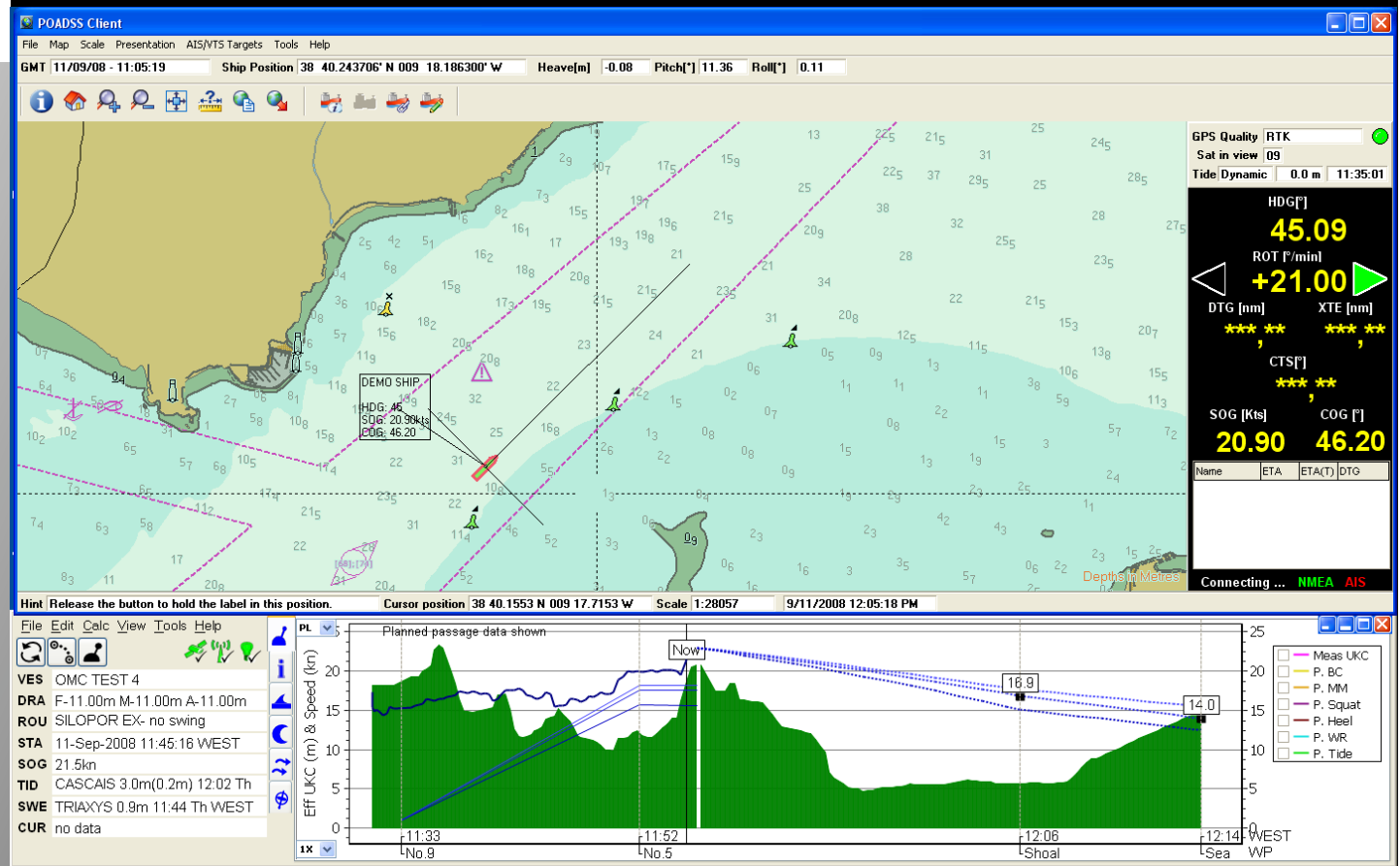


Routes



Image of Navigation Mode

POADSS

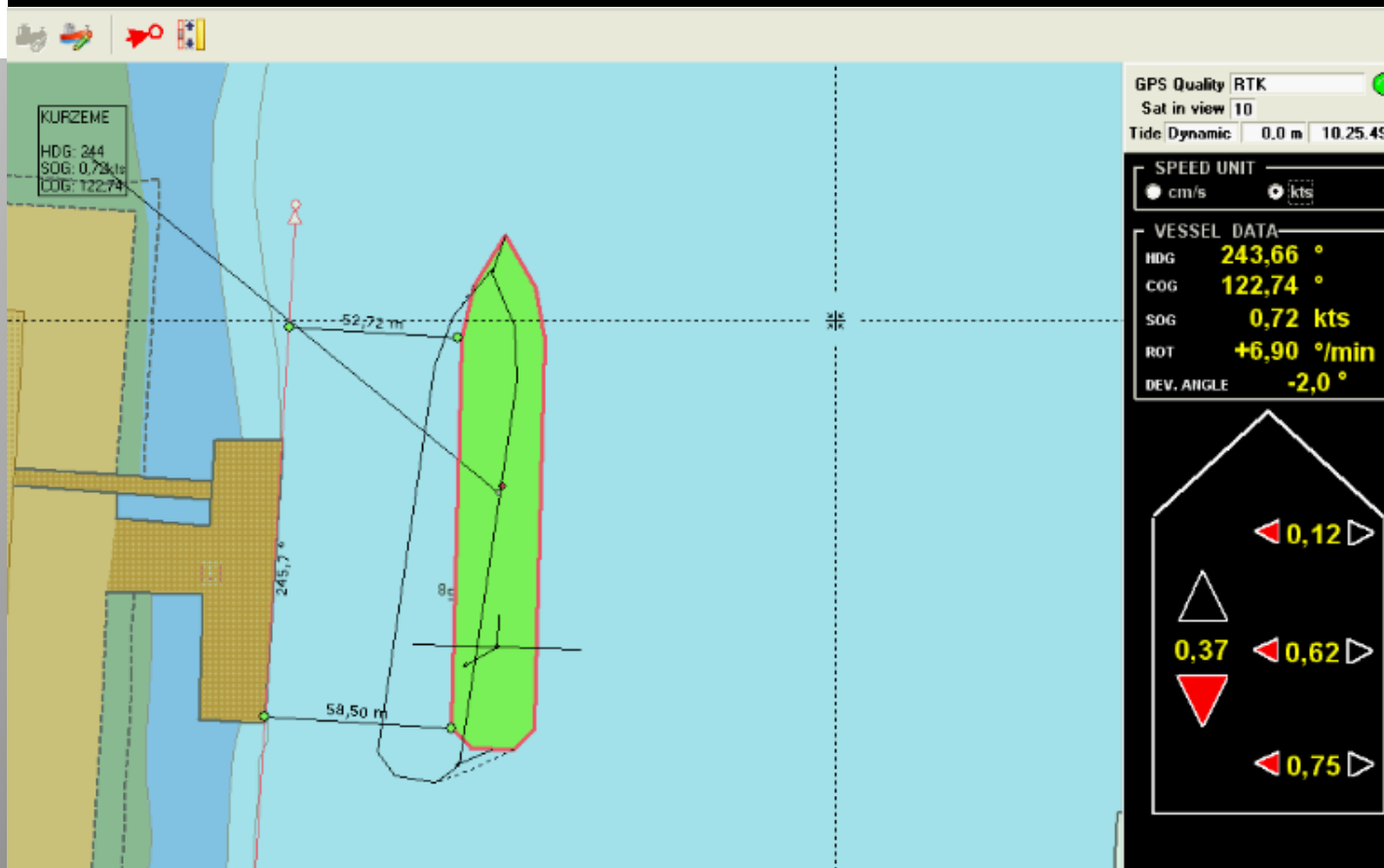


DUKC Panel



Image of Docking Mode

POADSS



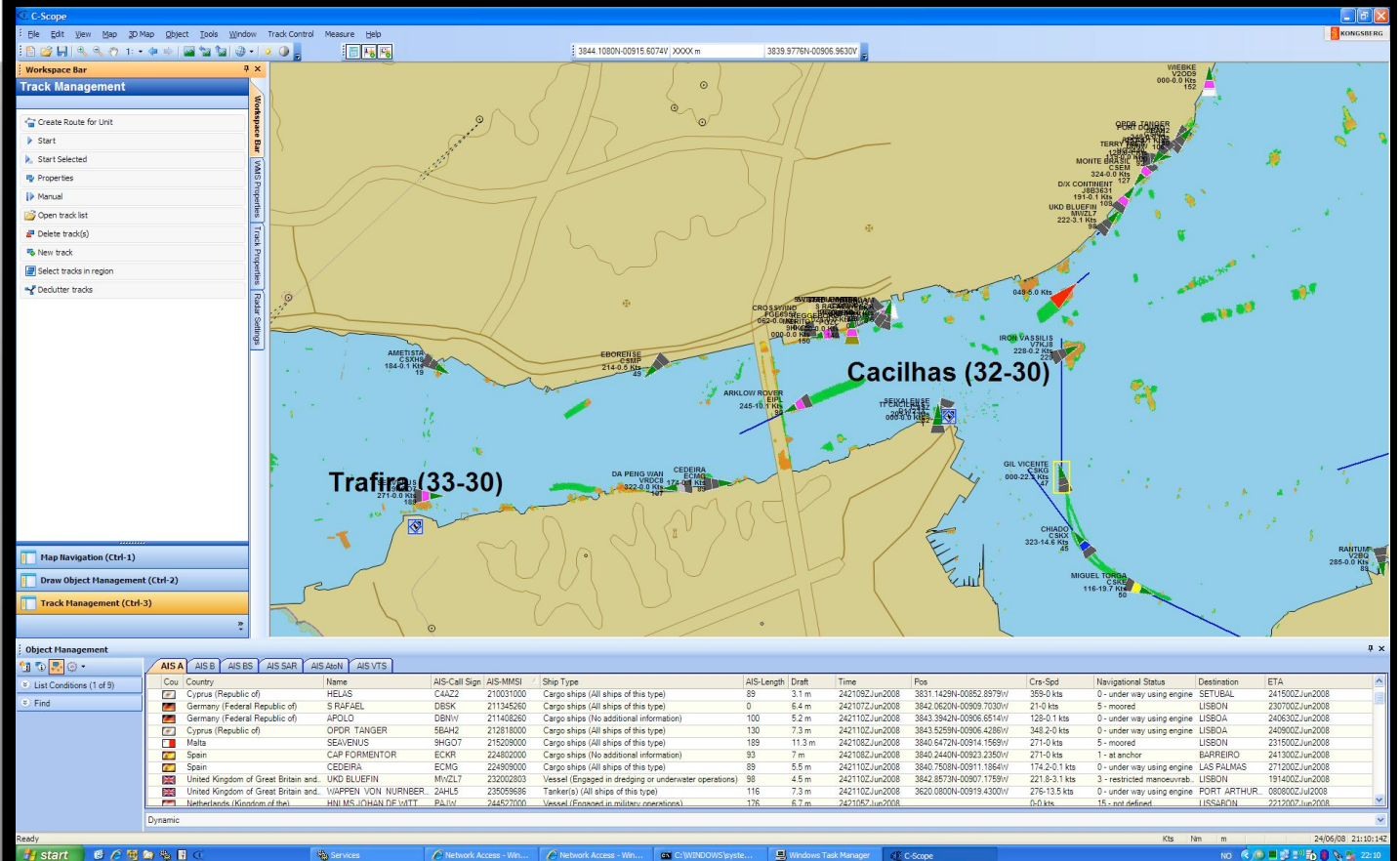
Berthing Line/Distance off Prediction



Radar video, radar/AIS tracks

AIS

WMS



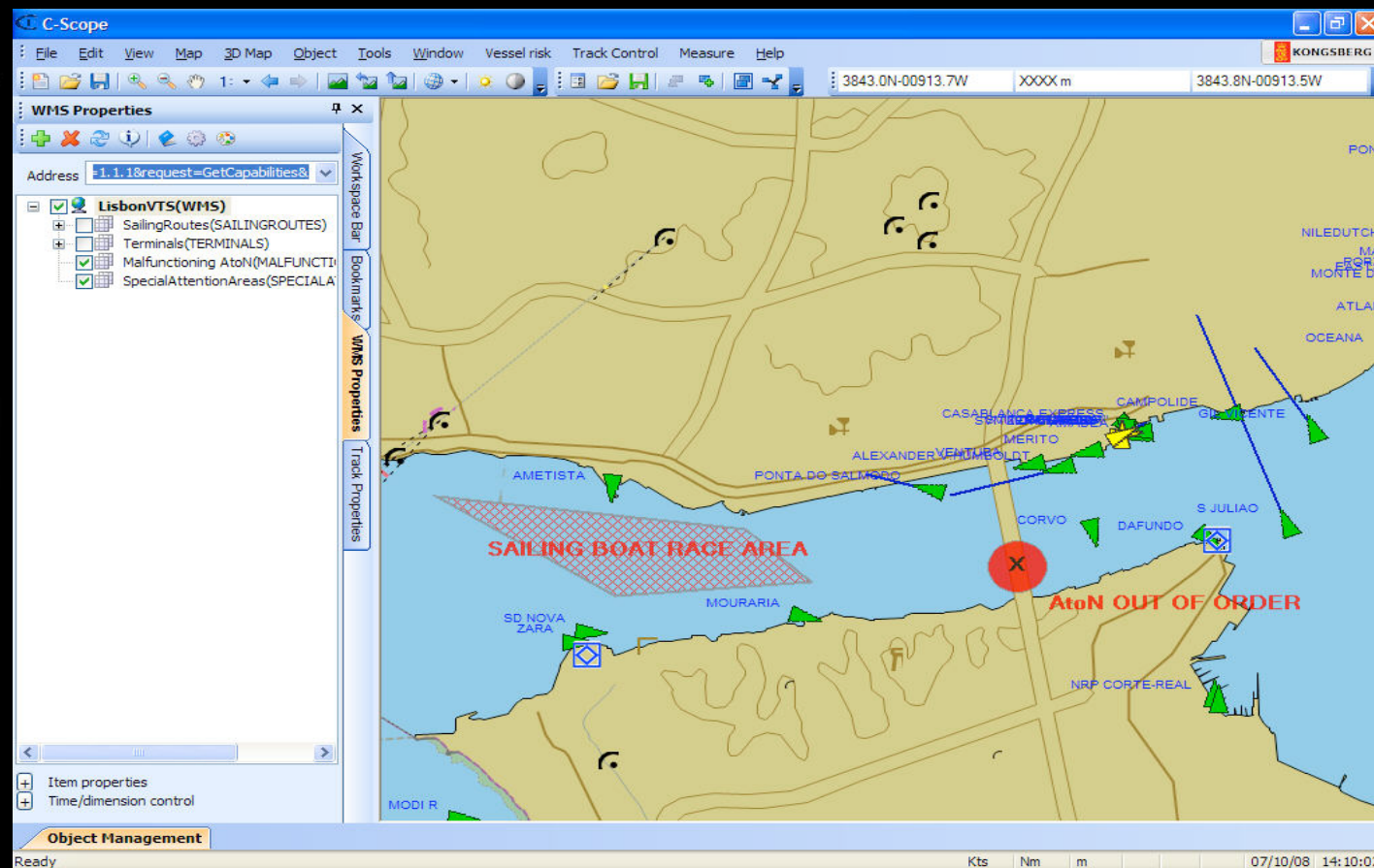
Sharing VTS Information



Attention Areas / Points

AIS

WMS



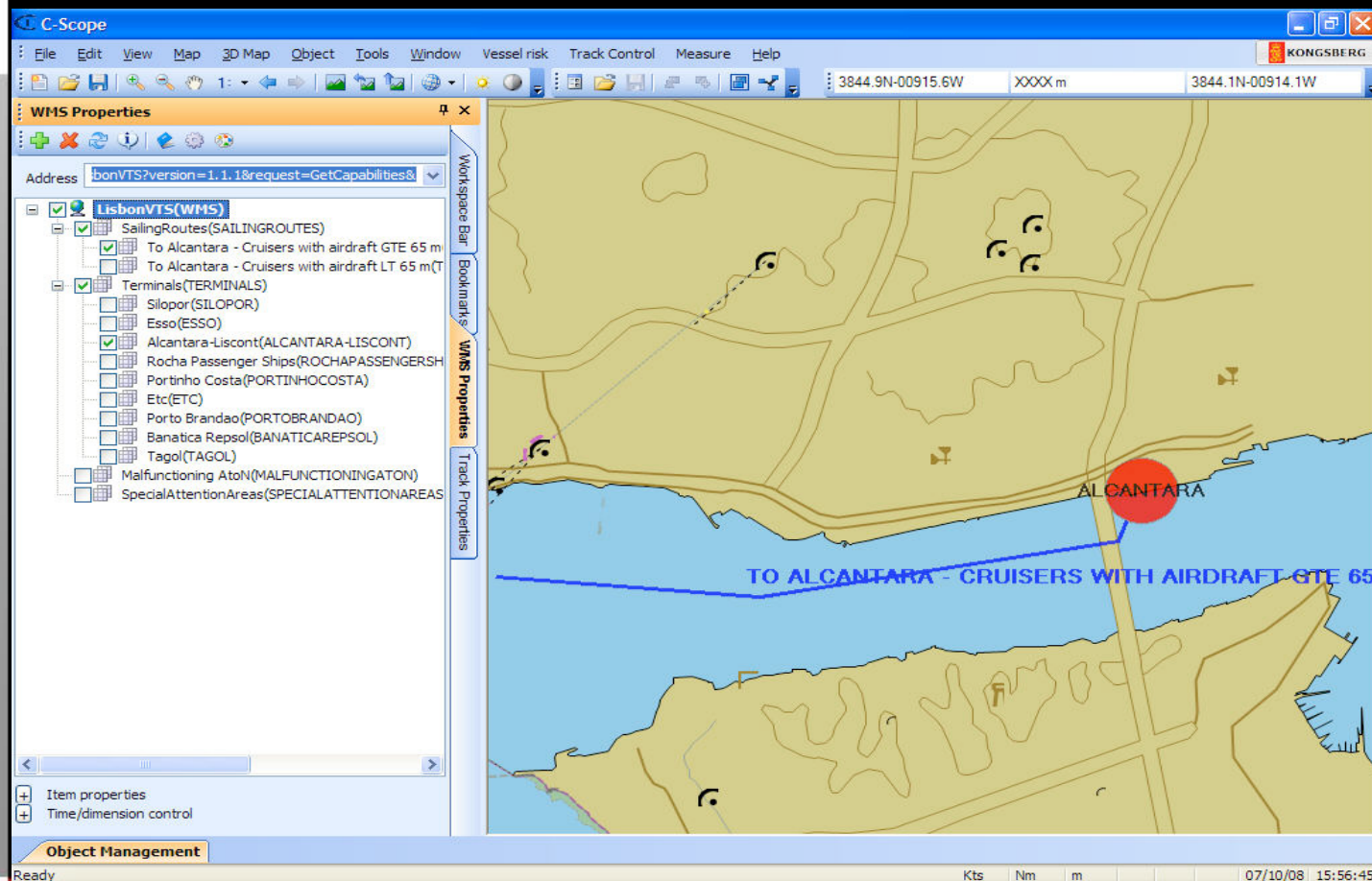
Sharing VTS Information



Proposed Approach Route

AIS

WMS



Sharing VTS Information



Terminal Information

AIS

WMS

C-Scope

File Edit View Map 3D Map Object Tools Window Vessel risk Track Control Measure Help

3841.8N-00910.4W XXXX m 3841.8N-00910.4W

KONGSBERG

WMS Properties

Address <http://172.21.6.30:3345/LisbonVTS?version=1.1>

LisbonVTS(WMS)

- ☒ SailingRoutes(SAILINGROUTES)
- ☒ Terminals(TERMINALS)
 - ☐ Silopor(SILOPOR)
 - ☐ Esso(ESSO)
 - ☒ Alcantara-Liscont(ALCANTARA-LISCONT)

Service log

File

<?xml version="1.0" encoding="ISO-8859-1" standalone="no"?><html><body><p><!--

- Distance between bollards: 24 m
- Bollard pull: 150 tons
- Fender type: fentec (frontal, double cone absorption)
- Cranes: 1 mobile gowatld 100 tons, 3 gantry cranes
- Gantry cranes air draft (over peer): min. 26 m with 45 tons capacity under spreader
- Fresh water not available from ashore
- Bunkering possible depending on authorization from harbour master and/or peer
- Access to the peer for people: ISPS code restriction and immigration
- Peer height from the Zo: 5.8 m

Time	Description	Type	Pri
13:58:19	Bitmap build co...	Info	Low
13:58:22	GetMap	Info	Low
13:58:23	GetMap finished	Info	Low
13:58:23	Building bitmaps...	Info	Low
13:58:23	Bitmap build co...	Info	Low
13:58:25	GetMap	Info	Low
13:58:25	GetMap finished	Info	Low
13:58:25	Building bitmaps...	Info	Low
13:58:25	Bitmap build co...	Info	Low
13:58:40	GetFeatureInfo	Info	Low
13:58:40	GetFeatureInfo	Info	Low
14:00:51	GetFeatureInfo	Info	Low
14:00:51	GetFeatureInfo	Info	Low

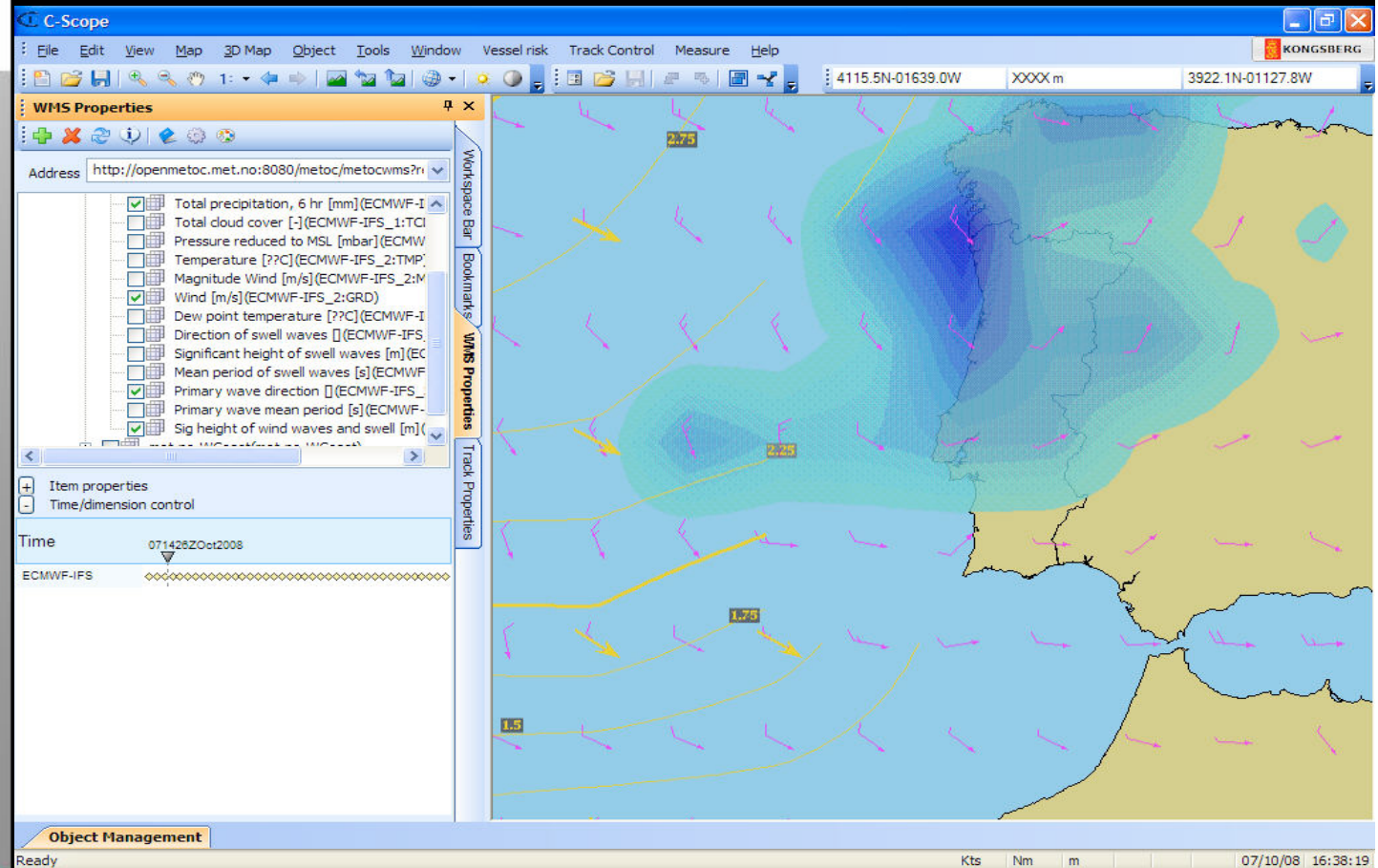
Ready Kts Nm m 07/10/08 14:05:13



Sharing VTS Information



Weather information Meteo/Hydro Forecasts



AIS

WMS

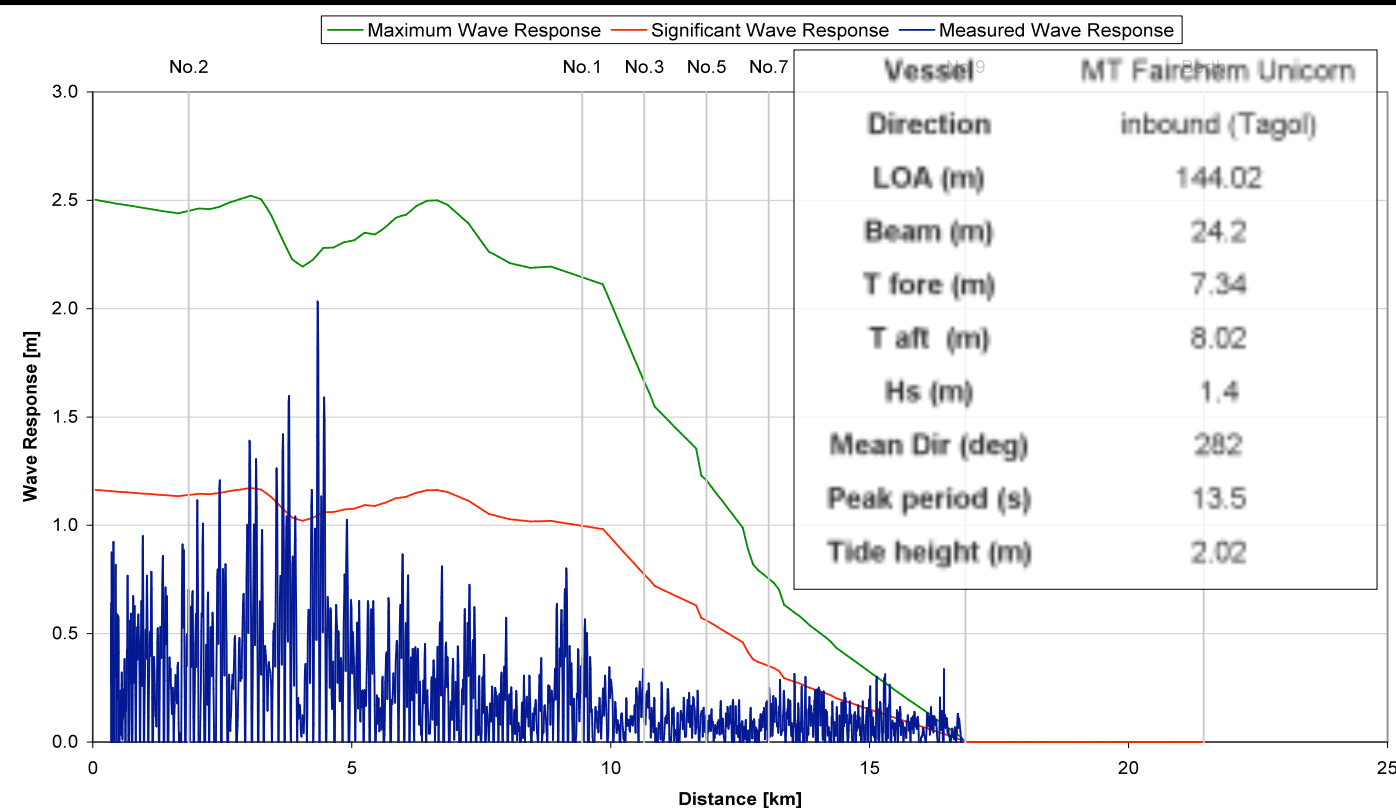


Sharing VTS Information



Wave Response

DUKC

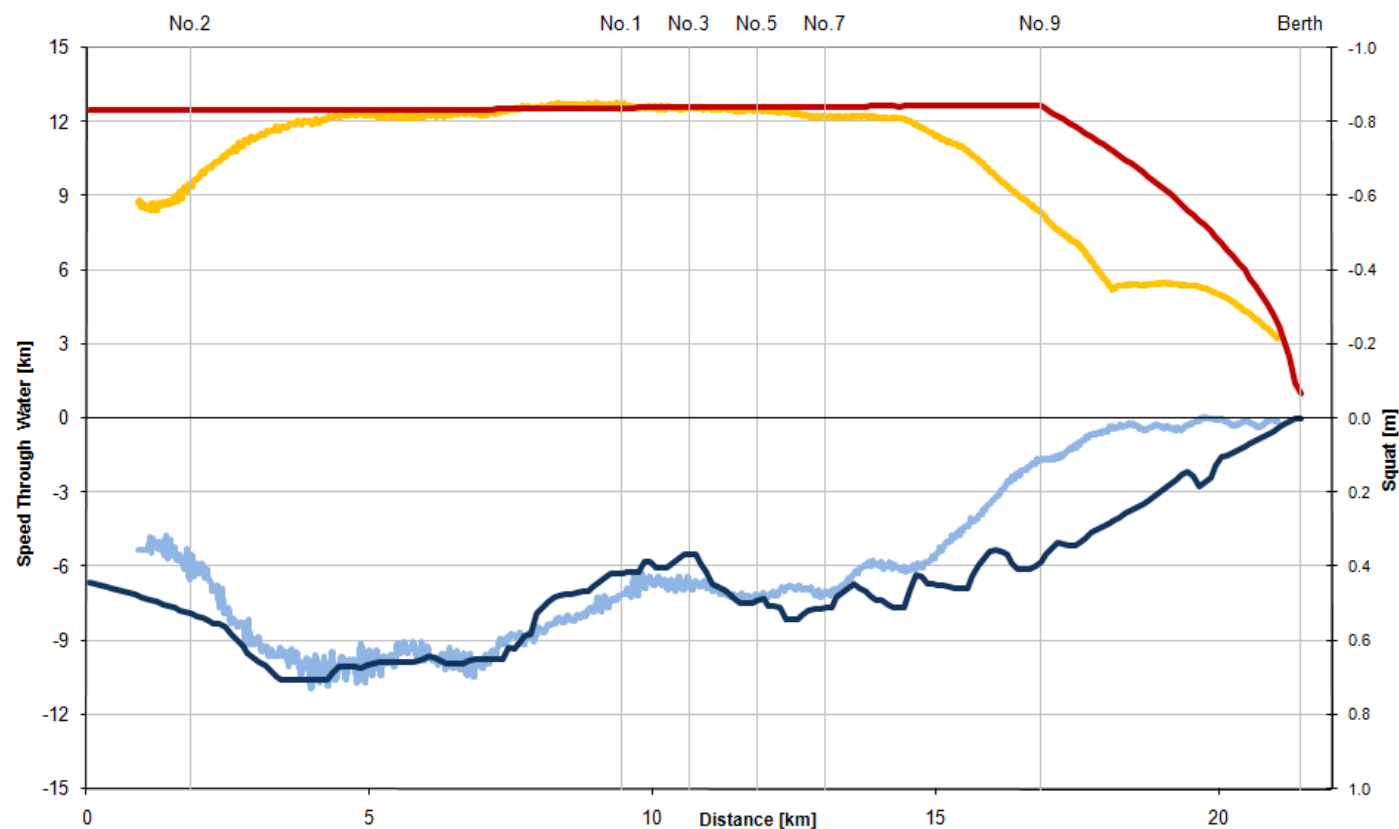


Measured vs Modelled at Lisbon

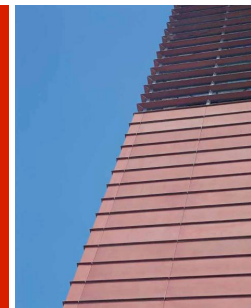


Squat

DUKC



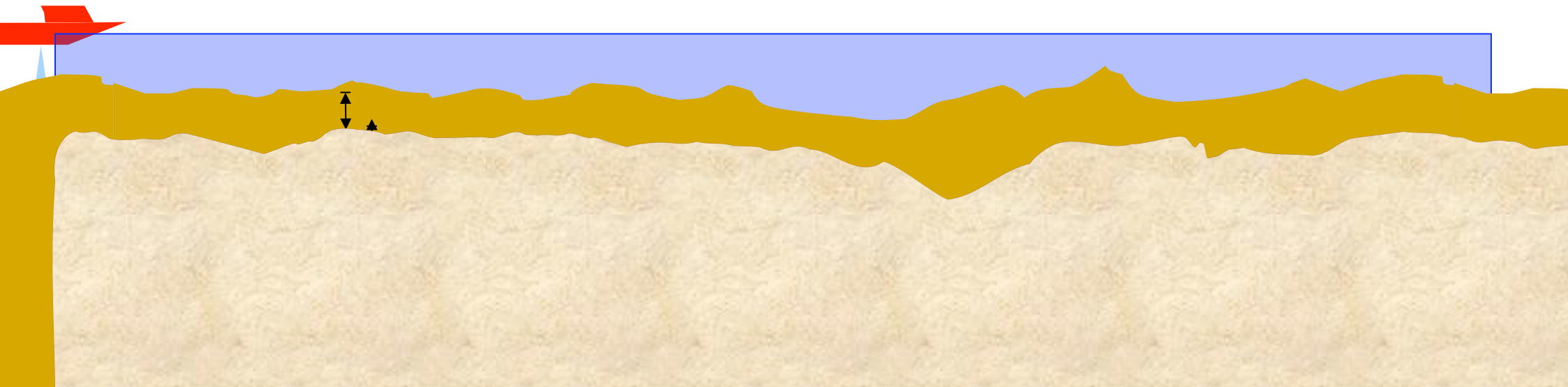
Measured vs Modelled at Lisbon





Underkeel Clearance =

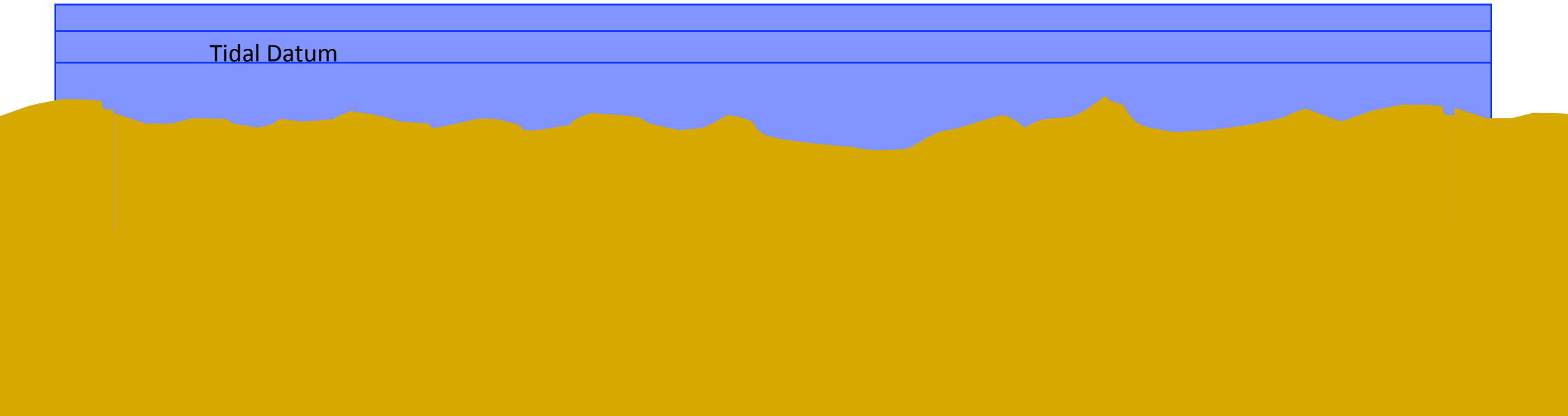
- + sounded depth**
- survey tolerance**
- siltation**





Underkeel Clearance =

- + sounded depth**
- survey tolerance**
- siltation**
- + astronomical tide**
- + tidal residual**



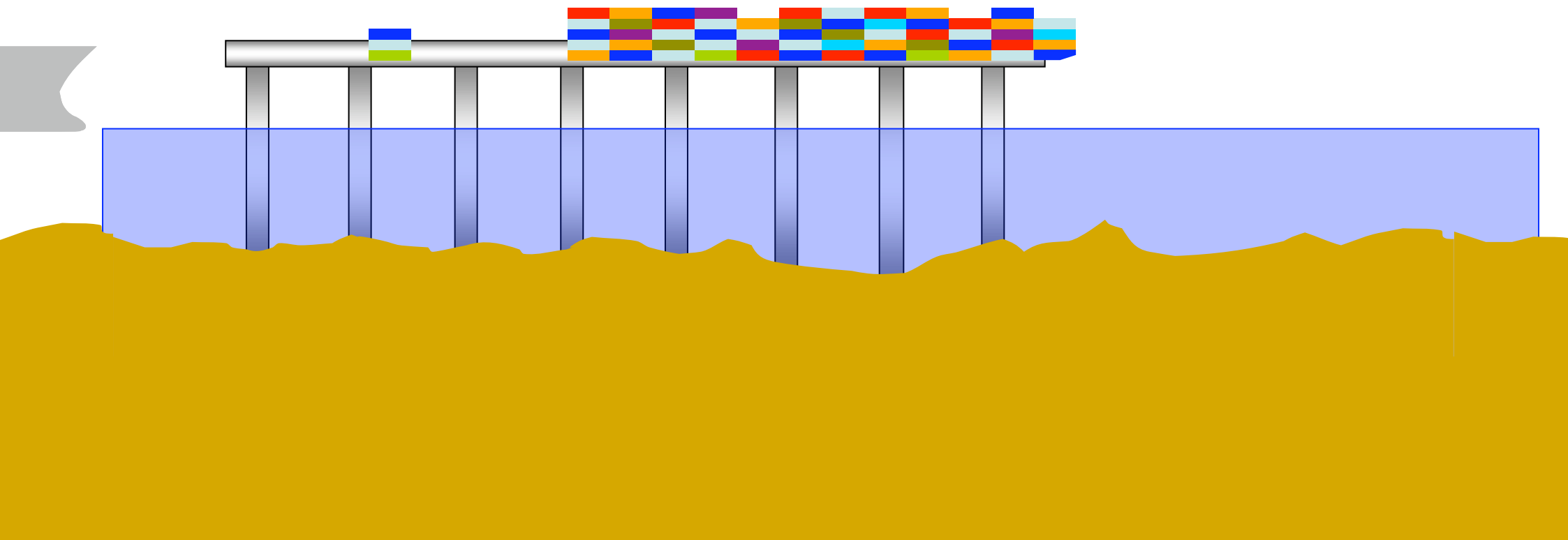
The diagram shows a cross-section of the ocean floor and water level. A horizontal blue line represents the "Tidal Datum". Below this line is a wavy yellow line representing the seabed. The area between the datum and the seabed is shaded light blue. The area above the datum is white.

Tidal Datum



Underkeel Clearance =

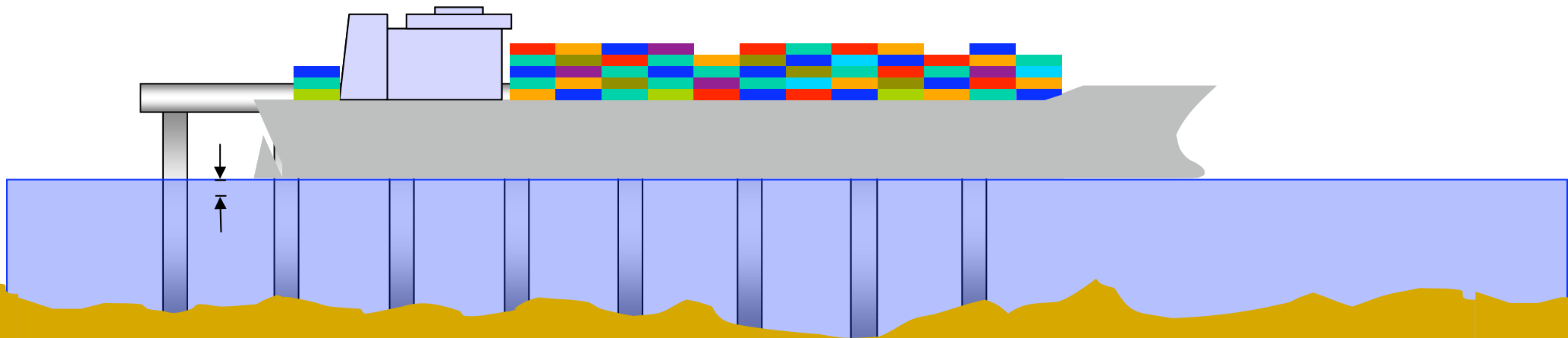
- + sounded depth**
- survey tolerance**
- siltation**
- + astronomical tide**
- + tidal residual**





Underkeel Clearance =

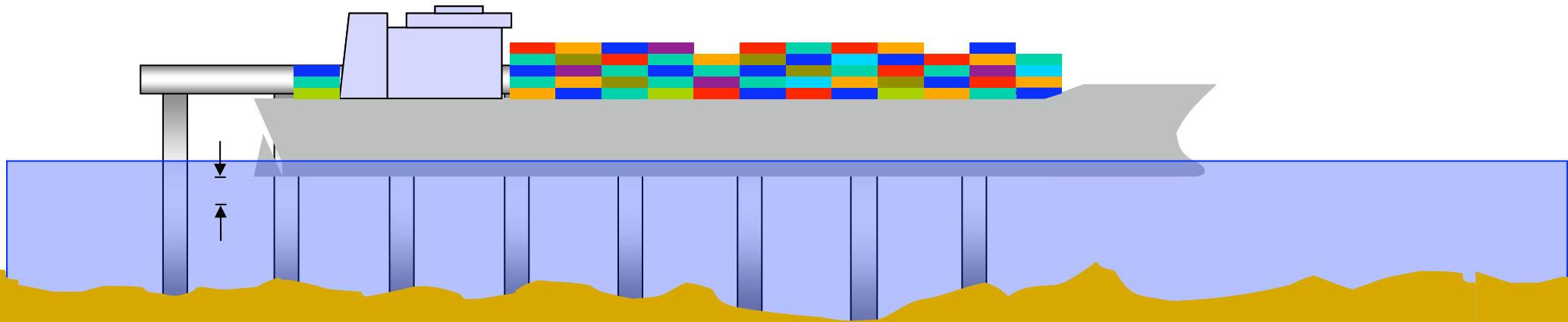
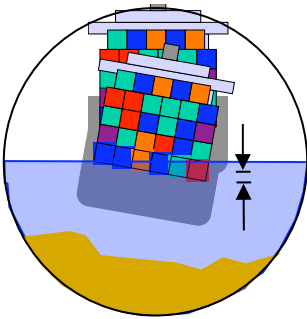
- + sounded depth**
- survey tolerance**
- siltation**
- + astronomical tide**
- + tidal residual**
- draft**





Underkeel Clearance =

- + sounded depth**
- survey tolerance**
- siltation**
- + astronomical tide**
- + tidal residual**
- draft**
- squat**
- heel**





Underkeel Clearance =

- + sounded depth**
- survey tolerance**
- siltation**
- + astronomical tide**
- + tidal residual**
- draft**
- squat**
- heel**
- wave response**

