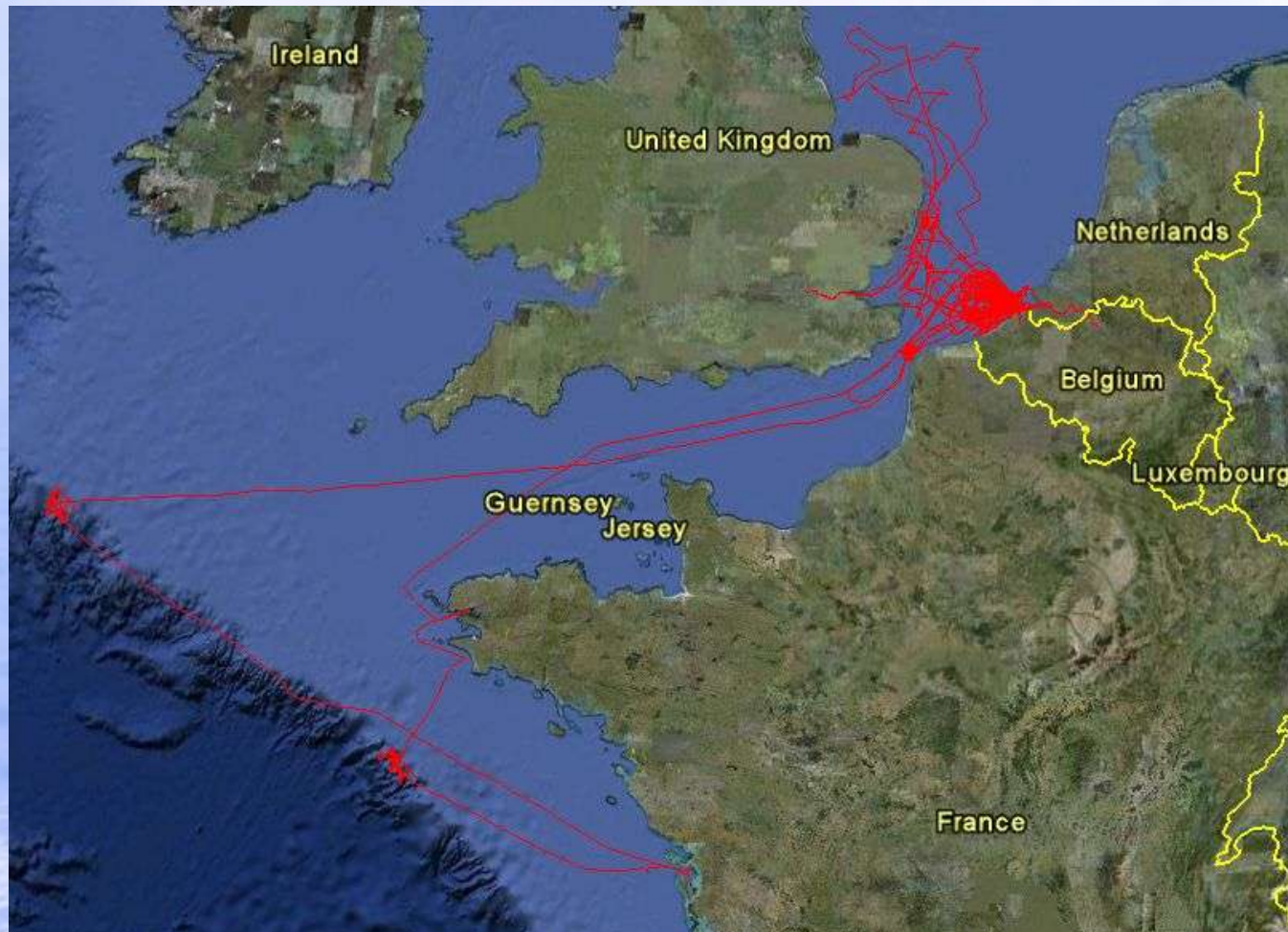


# AUMS project RV Belgica

# MUMM has installed a autonomous underway measurement system or “Ferrybox” on board the RV Belgica

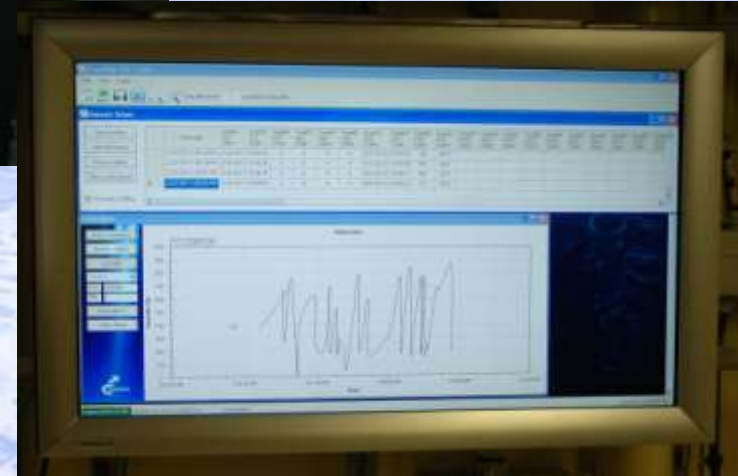


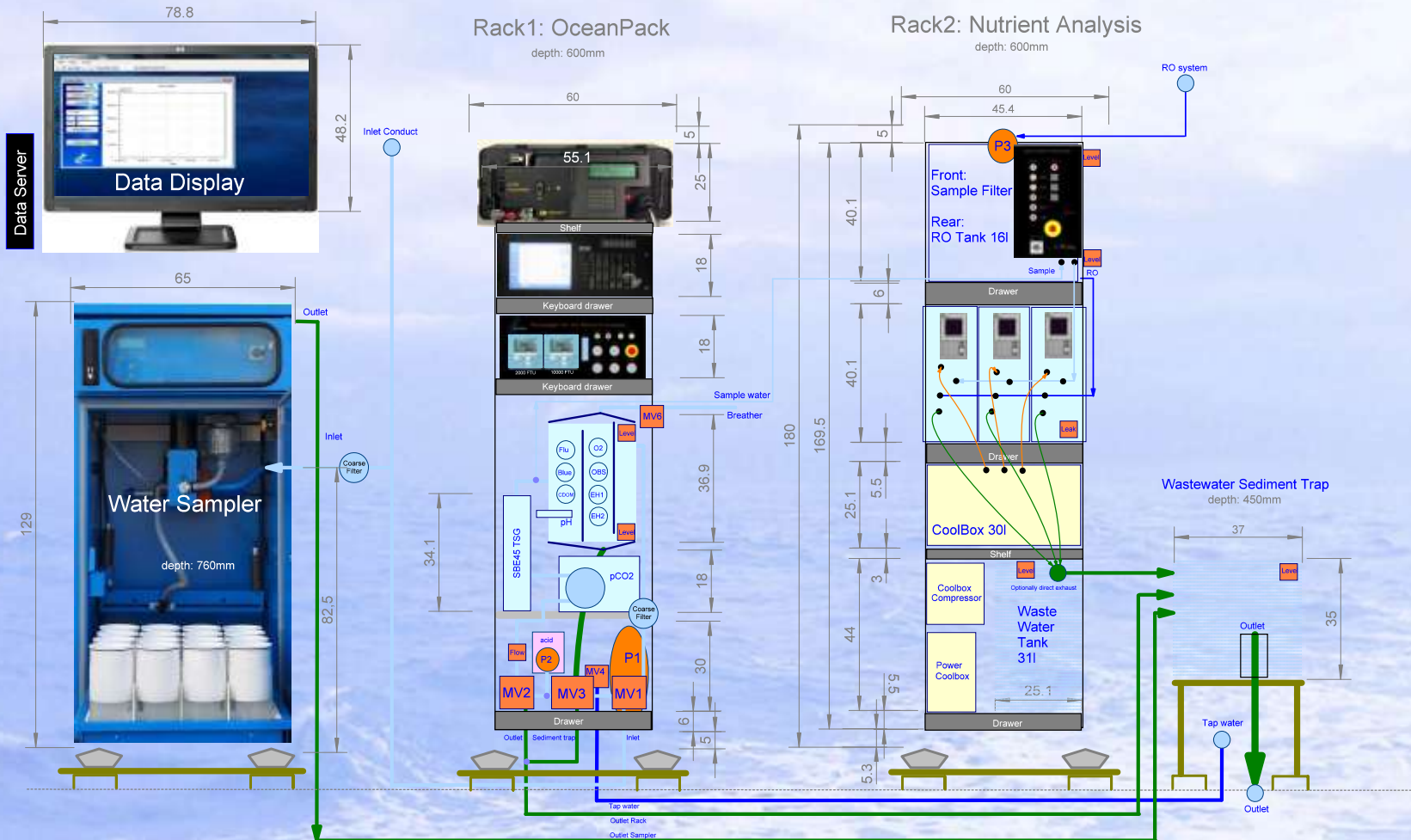
## Ship Track in 2010



# Aquisition

- Call for tenders 2010
- SubCtech GmbH obtained the contract
- Installation February 2011
- HAT and SAT February-June 2011
- Declared operational en of June 2011





Not shown in the drawing:

- Data interface to ODAS III
- Data interface to Turner 10AU
- Data interface to the Tap-Box (PAR)
- Data interface to the RAMSES fluorometer
- Video output to the 2nd Monitor
- Aux. and all other data cables

Changes		Date	Name	Description	Pages
Date	Name	sign.	30.04.2010	Marx	1
 SubCtech GmbH Gettorfer Str. 1 D-24251 Osdorf Germany T +49 4346-6014-551 F +49 4346-6014-551 info@subctech.eu				RV Belgica 19" Rack system Dimensions + Arrangements	Page no.
				Drawing no. <b>Preliminary design</b> V 3.4 29.12.2010	1

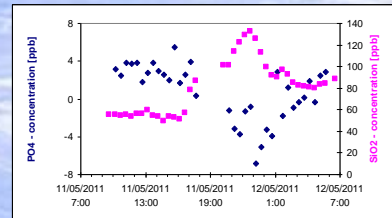
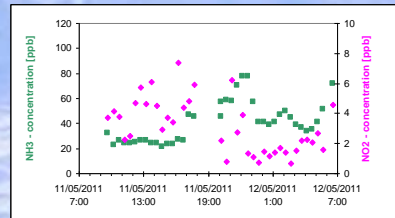
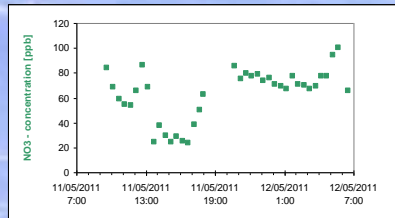
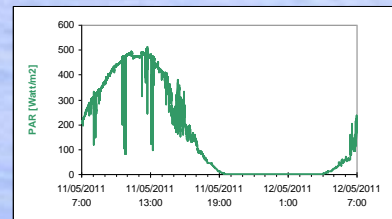
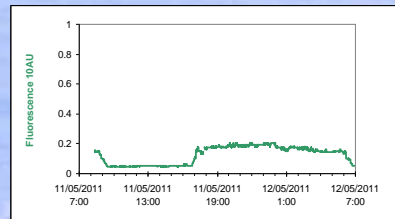
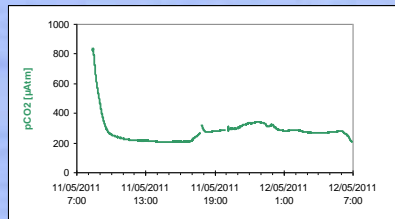
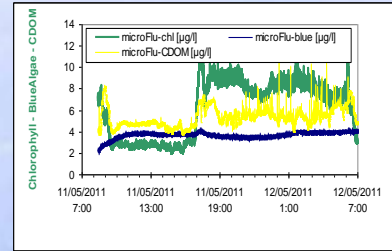
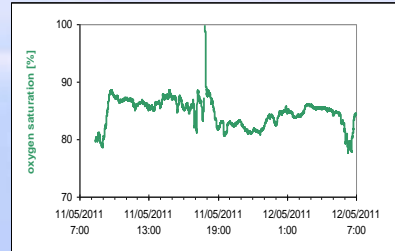
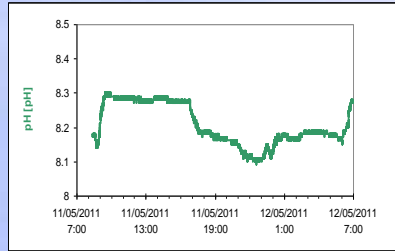
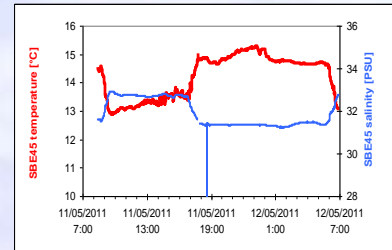
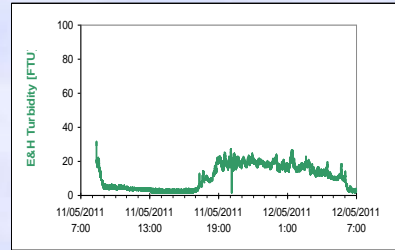
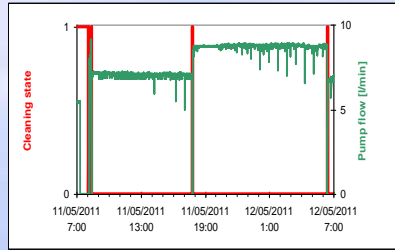
Parameter	Brand	Model	Range	Time interval
Turbidity	Endress + Hauser	2 *	0 - 2000 FTU	1 s
		CUS 41	0 - 10000 FTU	1 s
Turbidity	Campbell	OBS3+	0 - 4000 FTU	1 s
Oxygen	Aanderaa	3835 optode	0 - 30 mg/l	2 s
pH	Meinsberg	AGA 140	0 - 12 pH	1 s
Chlorophyll	Trios	MicroFlu-chl	0 - 100 µg/l	1 s
Blue Algae	Trios	MicroFlu-blue	0 - 100 µg/l	1 s
CDOM	Trios	MicroFlu-CDOM	0 - 200 µg/l	1 s
Salinity	Sea-Bird	SBE45	0 - 40 PSU	1 s
pCO2	SubCtech	MK2	0 - 20000 µAtm	1 s
Fluorescence	Turner Designs	10AU	0 - 500	1 s
PAR	Li-Cor	LI-190	0 - 2000 Watt/m2	1 s
Hyperspectral irradiance	Trios	ACC-VIS	320 - 950 nm	8 s
NO3, NH3, PO4, SiO2, NO2	Systea	3 * MicroMac1000	0 - 500 ppb 0 - 8000 ppb 0 - 150 ppb	20 min. *

## Some special features of the AUMS:

- Anti-flooding system with leak detection and alarm unit,
- Programmable periodic cleaning cycle,
- Auto shutdown system including full cleaning cycle (harbour approach),
- Position controlled seawater sampling (16 1l bottles),

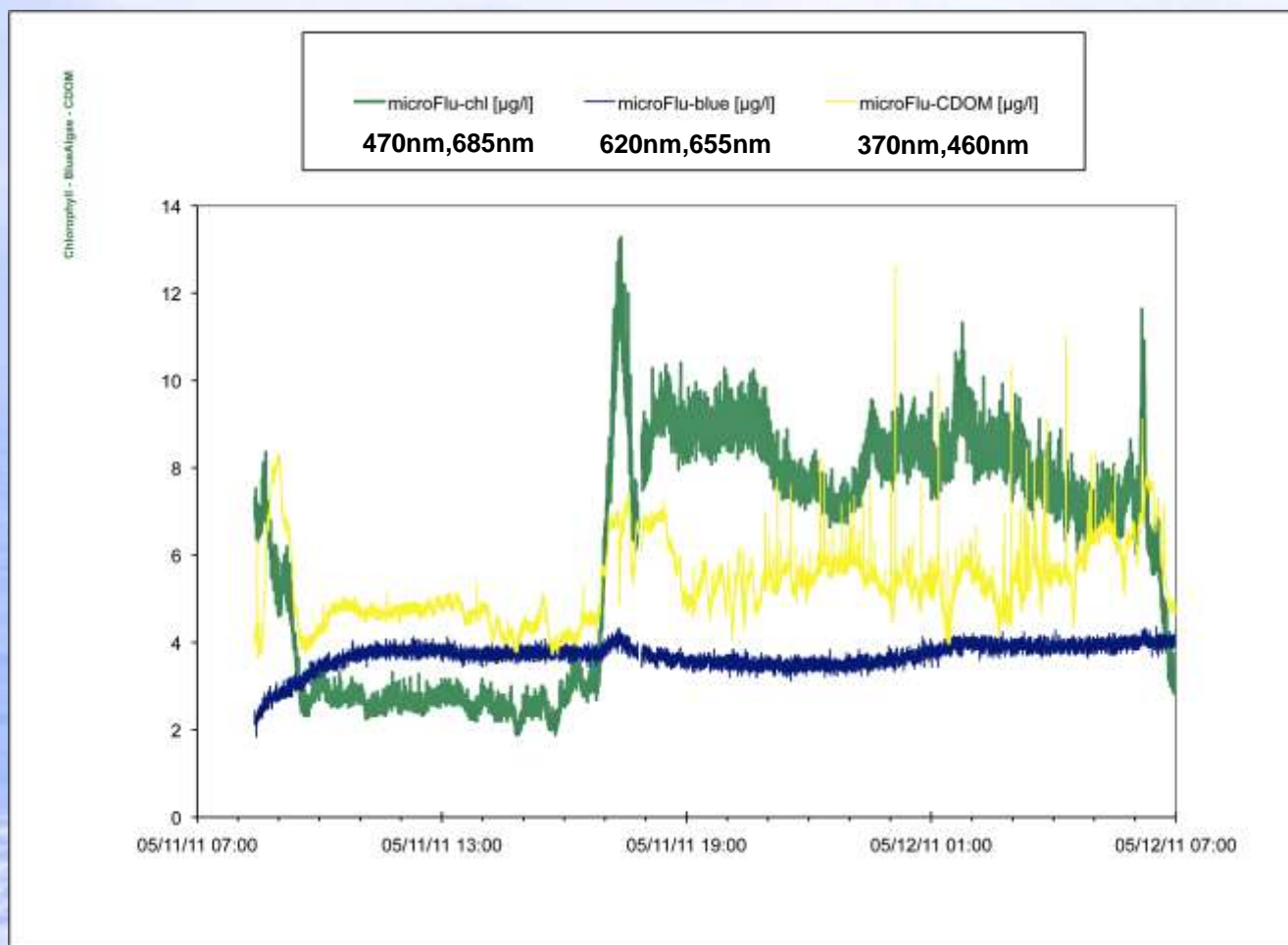






## AUMS data

# Fluorescence data



# Operational issues

- **Problems with water inlet**
  - Insufficient flow into the AUMS
- **Problems with cleaning cycle**
  - Biological growth despite the cleaning cycle
- **Problems with drainage system**
  - Insufficient removal of water from the drainage tank resulting in shutdowns
- **Problems with excessive amounts of suspended solids**
  - Filter system for the Systeas becomes rapidly overloaded
- **Problems with the Systeas**
  - Differences between lab measurements and underway measurements
  - Insufficient rinsing of tubing during shutdowns

## Best practices-QA

- **Frequent ( $\pm$  weekly), checks of the system by MUMM personnel recorded in log**
- **Frequent, ( $\pm$  weekly) calibration of the Systeas and the pH electrode recorded in log**
- **Planned monthly QA-QC checks by independent sampling and analysis (Chl a, salinity, O<sub>2</sub>, nutrients, pH)**
  - E.g. comparison of Chla data with the results of HPLC analysis
- **Currently validation of the Systeas**
  - Analysis of reference samples with the Systeas under lab conditions
  - Stability test of the Systeas under lab conditions

## Best practices-QA

Object	Interval	Responsible
Clean turner fluorometer	1/2 Year	Meetdienst
Clean OBS3+ sensor	1/2 Year	Meetdienst
Calibrate + service pCO2 analyzer	Yearly	SubCtech
Empty CO2 analyzer CF card	1/2 Year	Meetdienst
Calibrate + service SBE45 probe	Yearly	Meetdienst
Service Systea analyzer	Yearly	Elscolab
Check top-box	1/2 year	Meetdienst
Cleanup Dataserver harddisk	1/2 Year	Meetdienst
Check all connectors outside	Yearly	Meetdienst
Empty reagent tank	Weekly	Marchem
Empty and clean watersampler	Weekly	Marchem
Check rack damper and holder	Weekly	All
Check sensor holder	Monthly	Meetdienst
Check all manual valves	Weekly	Meetdienst
Clean Systea automatic filter	Weekly	Marchem
Check Systea air cleaning	Weekly	Marchem
Clean Systea sample tank	Weekly	Marchem
Exchange sample + RO tubes	Monthly	Marchem
Clean outlet tank	Weekly	Belgica

## Best practices-QA

Object	Interval	Responsible
Check coarse filter	Weekly, Friday	Belgica
Check fittings for leaks	Weekly	Belgica
Test level switches	Monthly	Marchem/Meetdienst
Test Systea sample pump tube	Weekly	Marchem
Check acid pump head	Weekly	<i>Under evaluation</i>
Replace acid pump head	1/2 Year	<i>Under evaluation</i>
Test motor driven valves	1/2 Year	Meetdienst
Check RO tank	Weekly, Monday	Marchem
Test RO pump	1/2 Year	Marchem
Test refrigerator	Weekly	Marchem
Test Water sampler function	1/2 Year	Marchem
Test Leak sensors	1/2 Year	Meetdienst
Clean debubbler	1/2 Year	Meetdienst
Replace old tubes	Yearly	<b>ALL</b>
Empty datalogger CF card	Monthly	Meetdienst
Empty DL system CF card	1/2 Year	Meetdienst
Calibrate pH probe	Weekly	Marchem
Clean oxygen sensor	1/2 Year	Meetdienst
Clean E&H turbidity sensors	1/2 Year	Meetdienst