

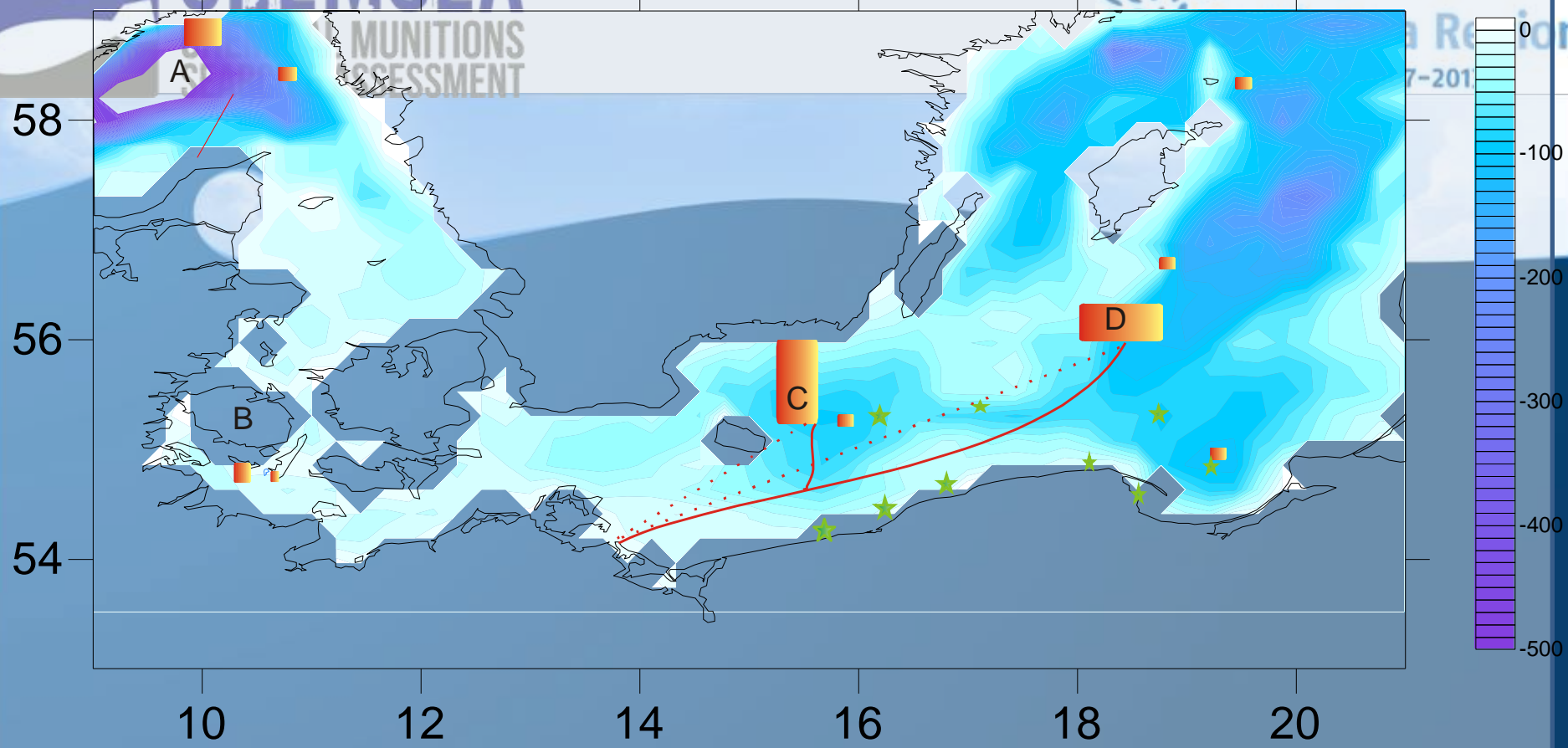
CHEMICAL MUNITIONS RISK ASSESSMENT – A COMPLEX APPROACH

J. Bełdowski, J. Fabisiak, S. Popiel, R. Berglind, P. Vanninen, A. Lastumaki, T. Lang, K. Broeg, U. Olsson, G. Garnaga and J. Baršienė.



CHEMSEA

MUNITIONS ASSESSMENT

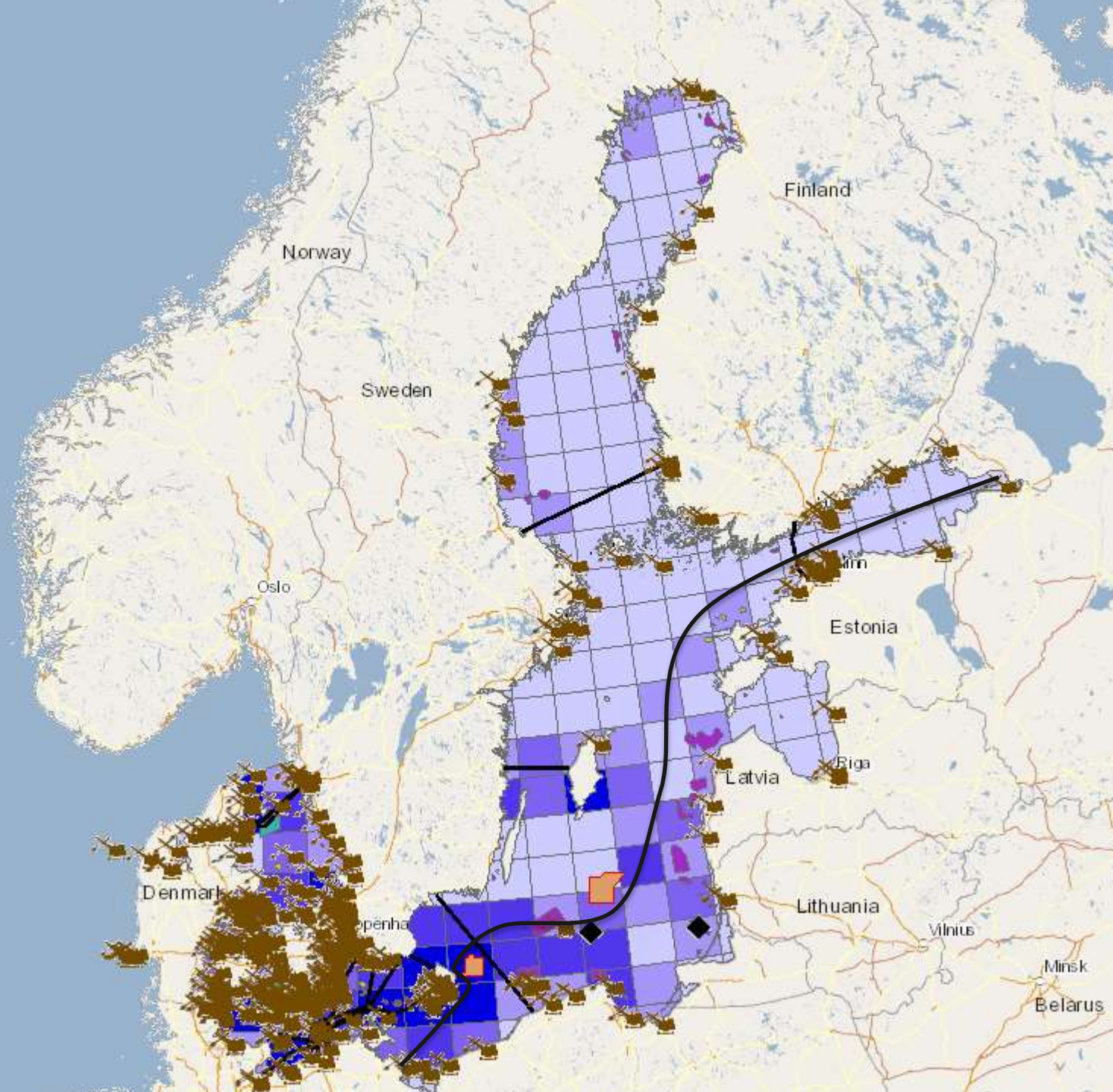


- Transport routes (official)
- - - Transport routes (shortcut)
- Orange rectangle Dumpsites
- Green star Shoring/fishing of CWA Munitions






- A. ~40 vessels (150 000t of Chemical warfare) at the depth of 200-700m
- B. 2 vessels with 69 000 tabun grenades (retrieved)
- C. 32 000 t at the depth of 70-100m
- D. 2000 t at the depth of 70 - 120m

Baltic Sea Region

Programme 2007-2013



Legend:

-  CWA Dumps
-  Dredge sites
-  Offshore wind farms (planned)
-  Bottom Trawling intensity
-  Pipelines and Cables

A need to clean up chemical weapons

- Priority Area in EU research
- Baltic Sea Region Program
- UMBRELLA Cluster project



*Underwater
Munitions Baltic
REmediation
cluster LeAgue*

Consortium

- Finland: SYKE; VERIFIN
- Sweden: FOI; SMA; CBRNE
- Germany: AWI; vTi FOE
- Lithuania: EPA;
- Poland: IOPAS; MUT; PNA

Associated

- HELCOM MUNI
- MA Gdynia
- Sea Fisheries Institute
- Swedish Coastguard
- Ministries of Environment:
Finland, Sweden
- GIOS
- SIPRI
- IDUM
- Shirshov Inst. Of Oceanology
- Pomorskie Voivodship
- NRC

HELCOM Environmental Ministries Maritime Authorities IMO Fishermen Baltic Sea Strategy NGOs





WP1
Coordination




WP2 Communication


WP 6 Guidelines


WP3 Analysis


WP4 Detection


WP5 Eco-Risk

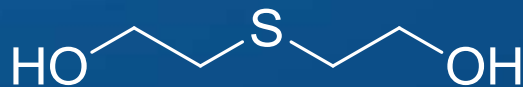
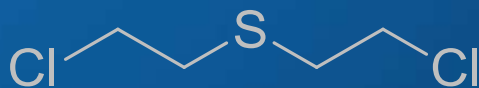


Target chemicals



WP3
Analysis

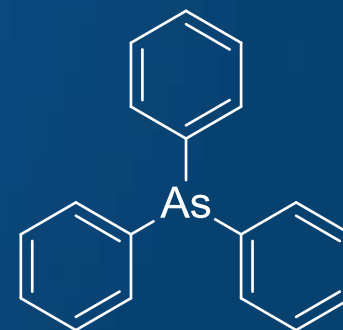
Mustard Gas



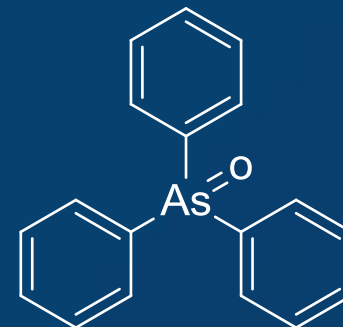
Thiodiglycol
(TDG)



1,4-Dithiane
(DT)



Triphenylarsine
(TPA)

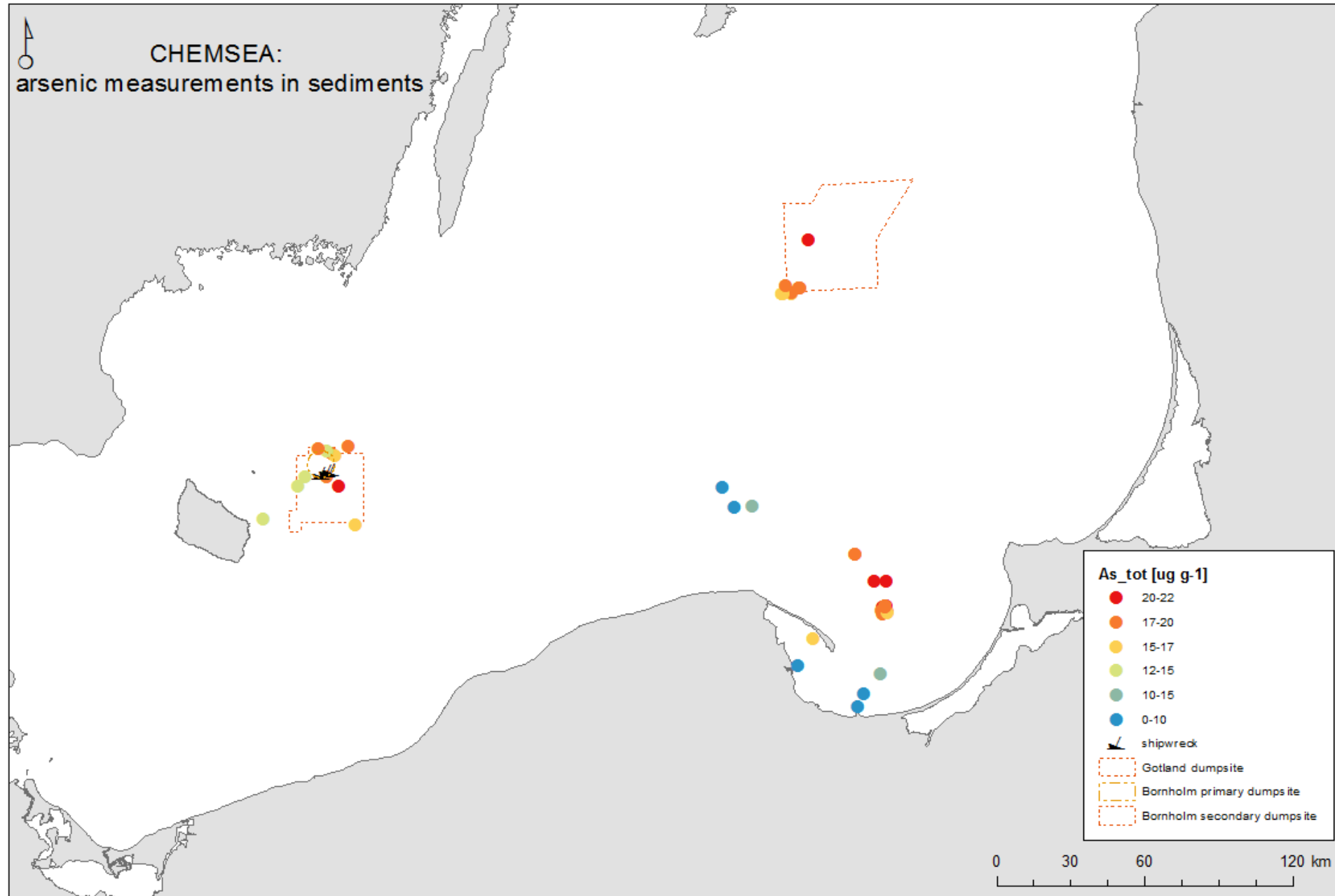


Triphenylarsine oxide (TPAO)

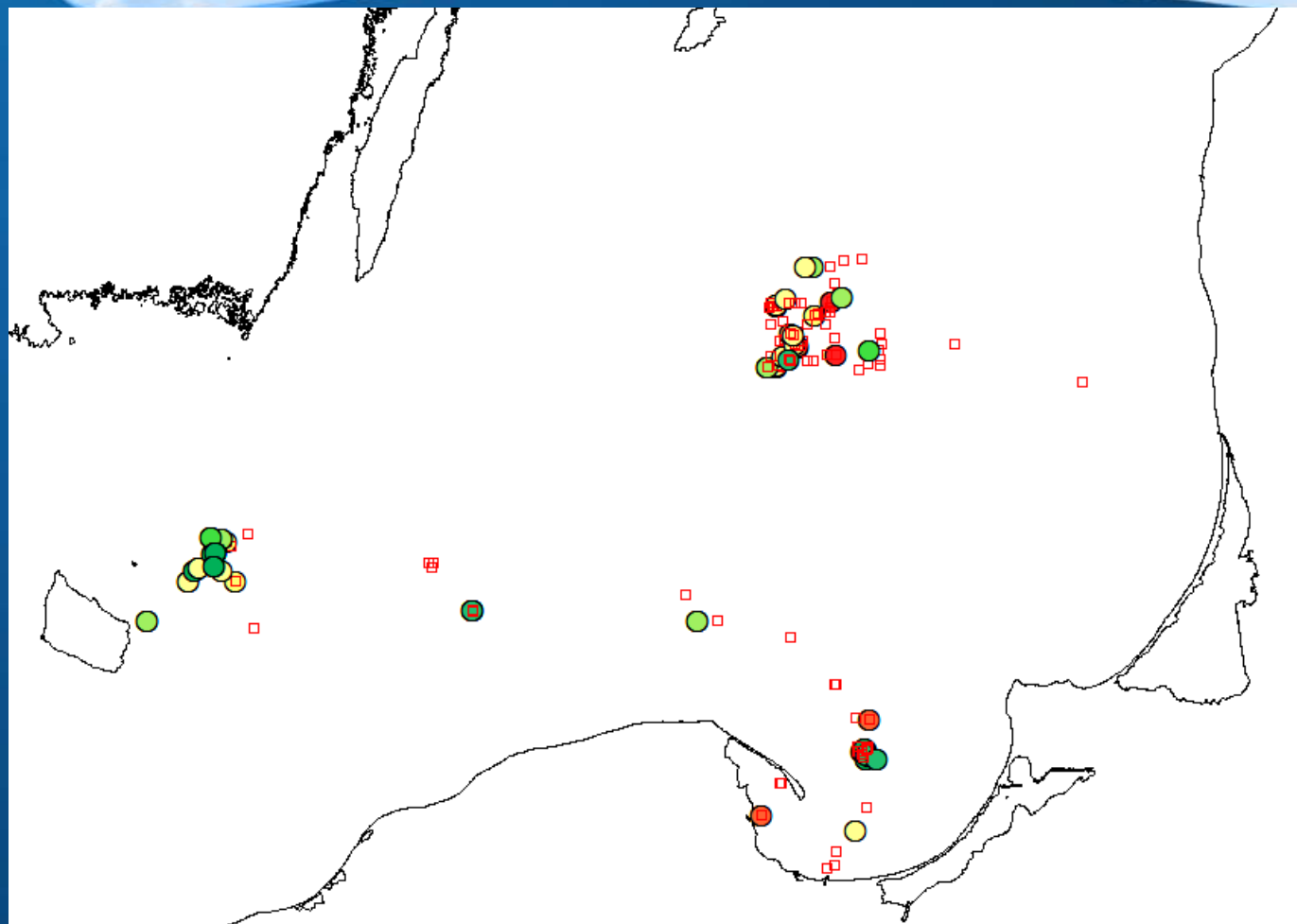


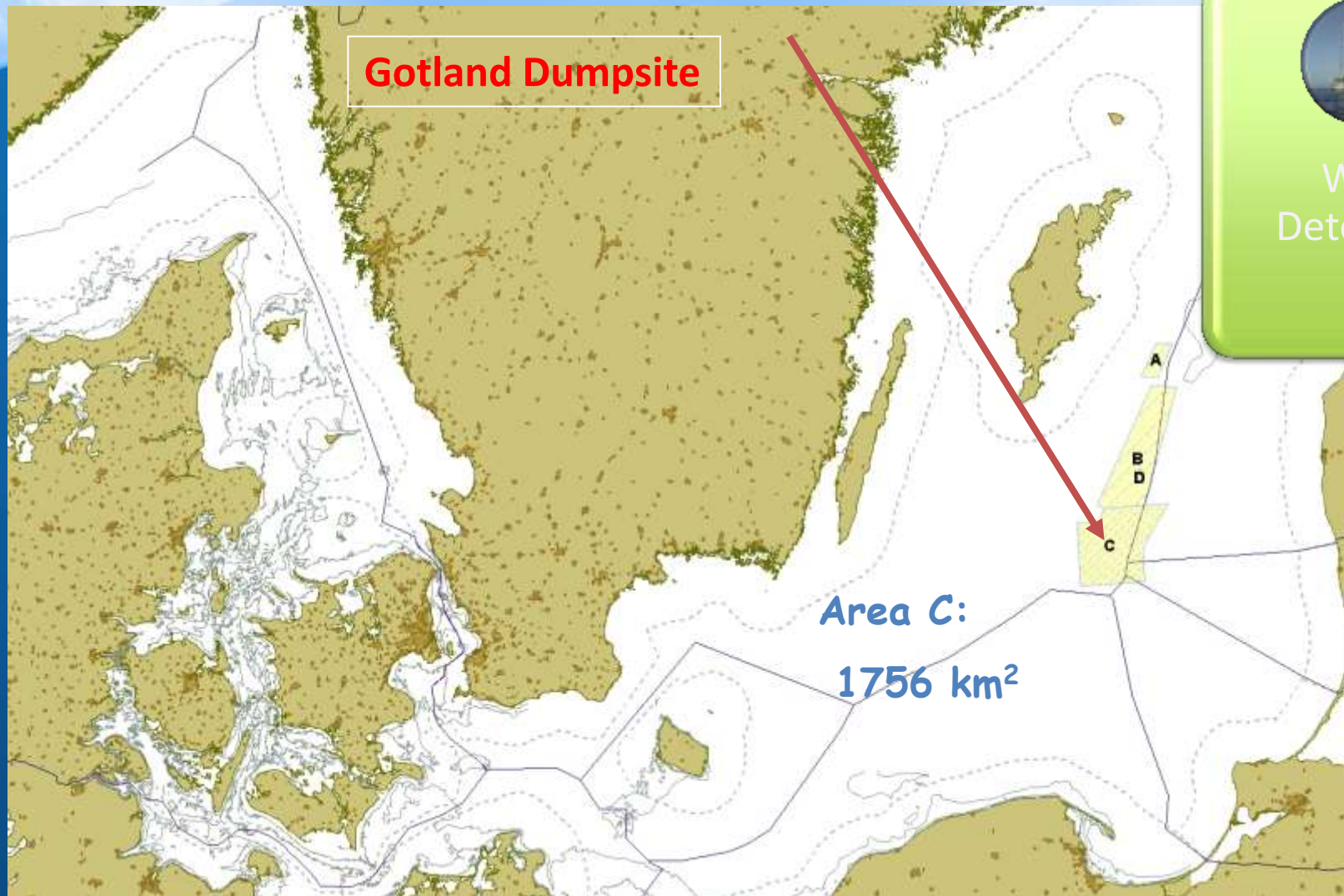
Samples





Degradation Products

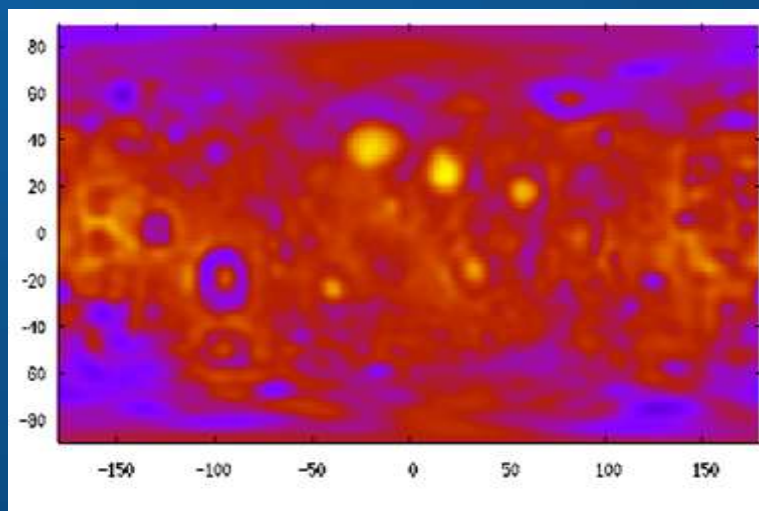
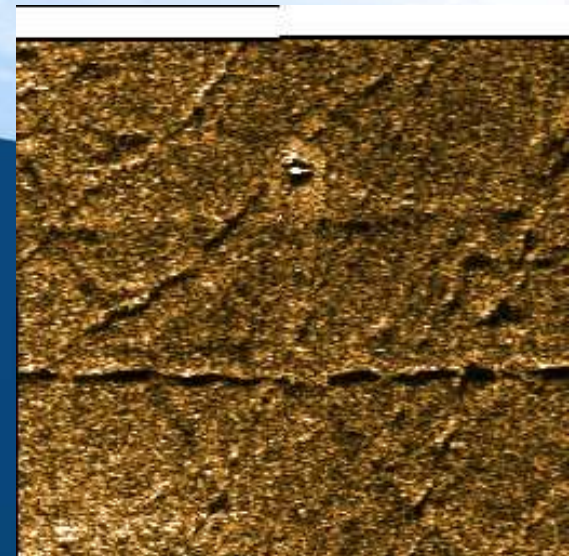




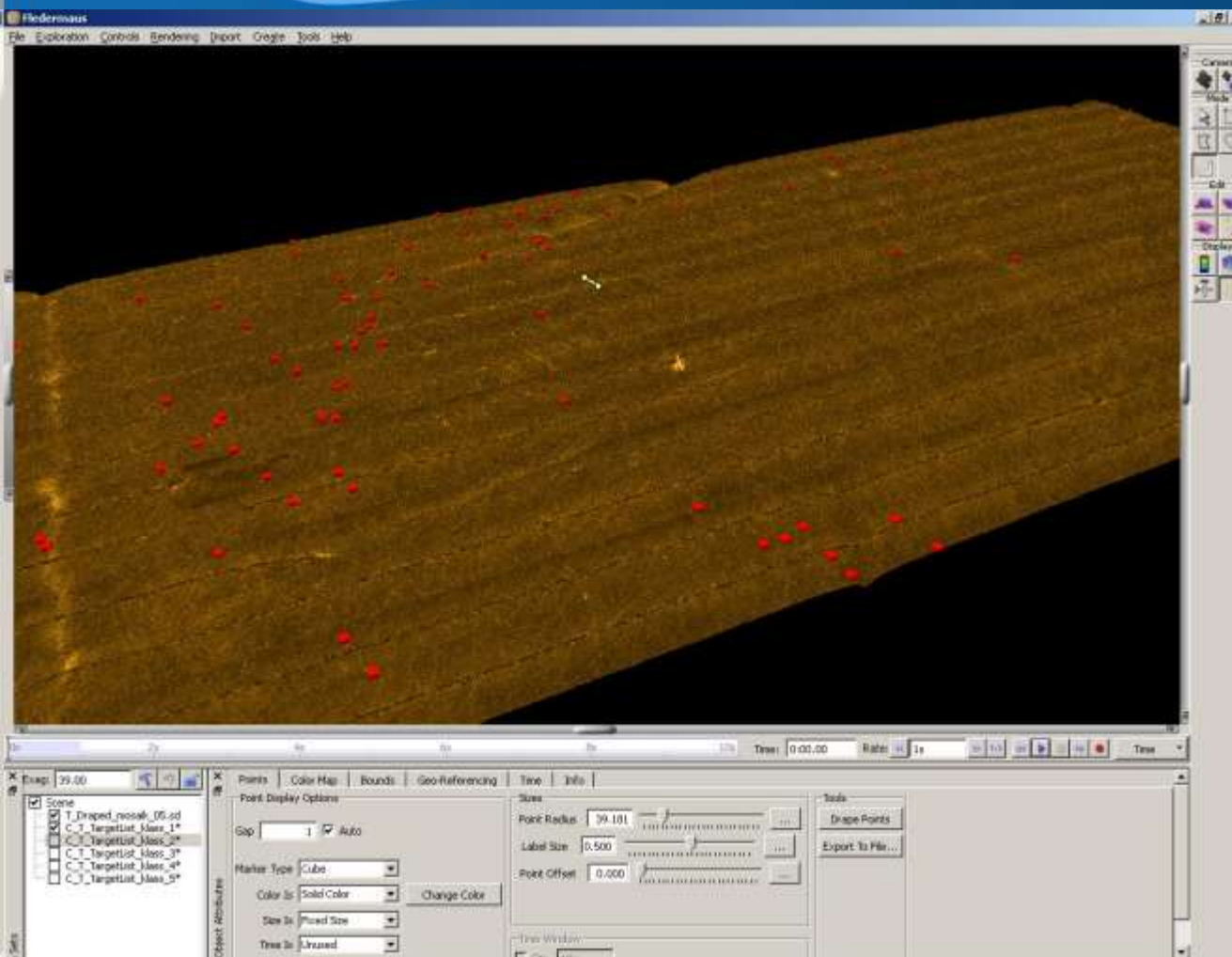
WP4
Detection

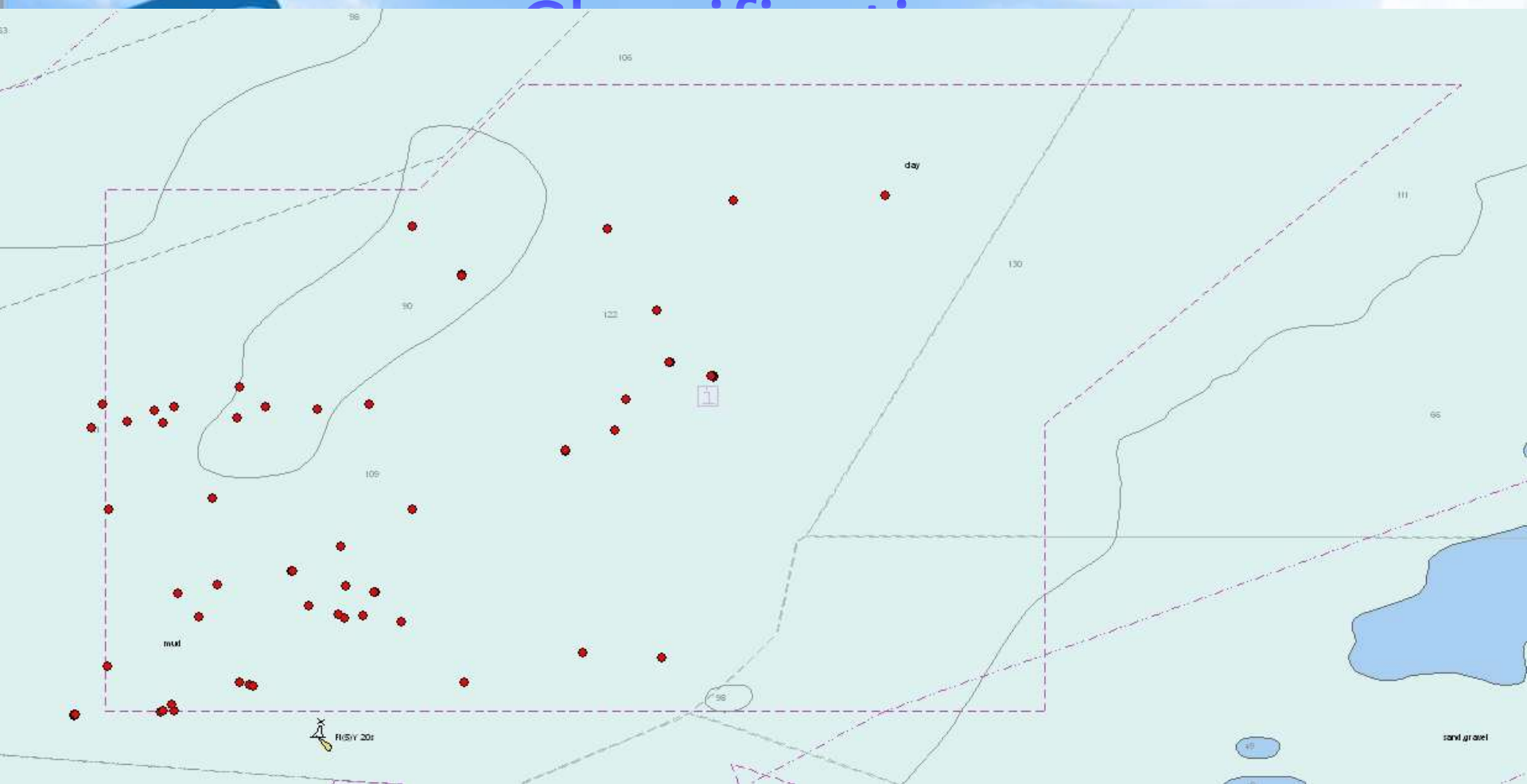
Detection

- Side Scan Sonar
- Magnetometers
- Sub-bottom profilers

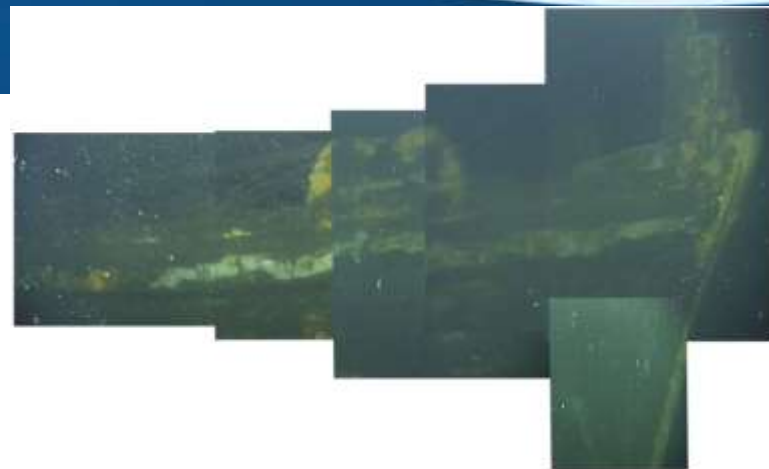
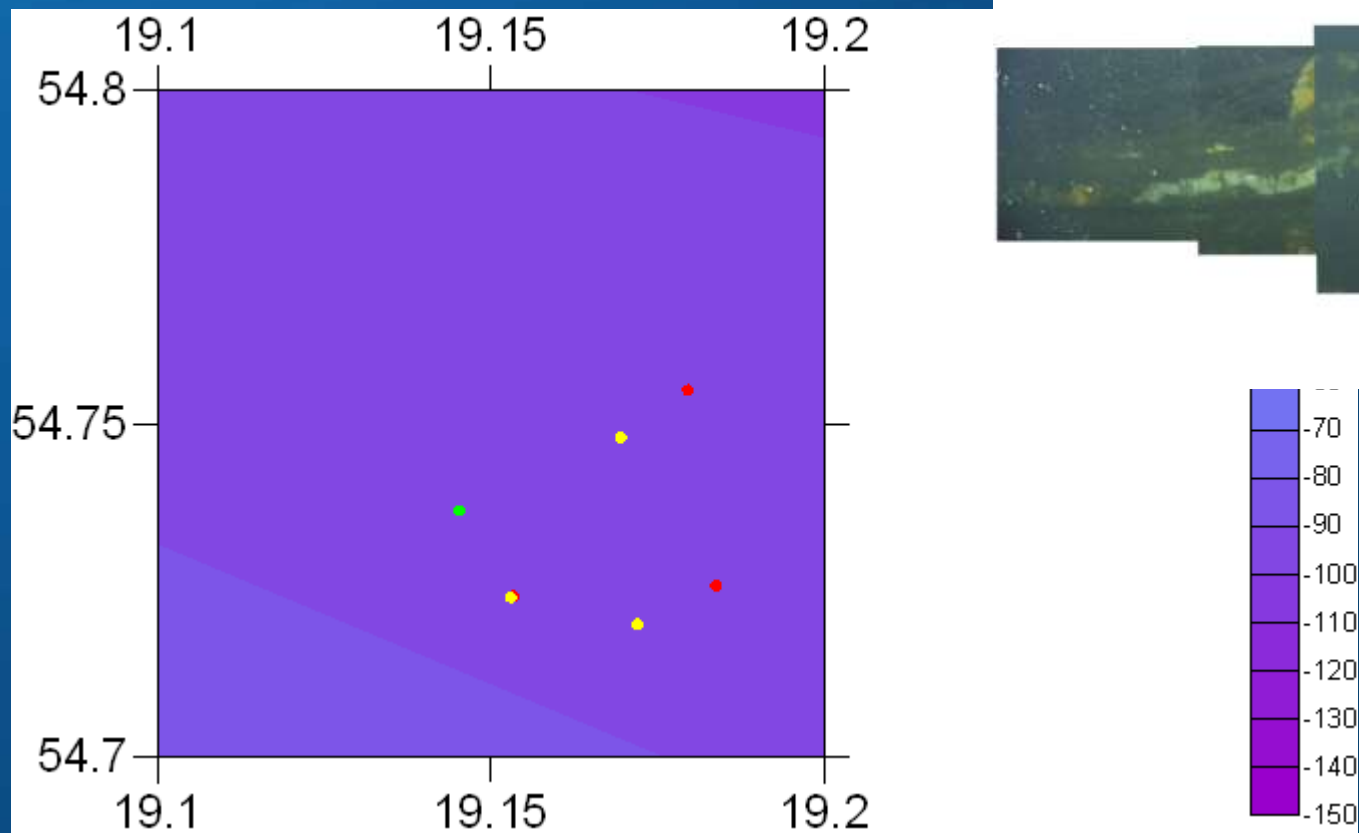


Classification

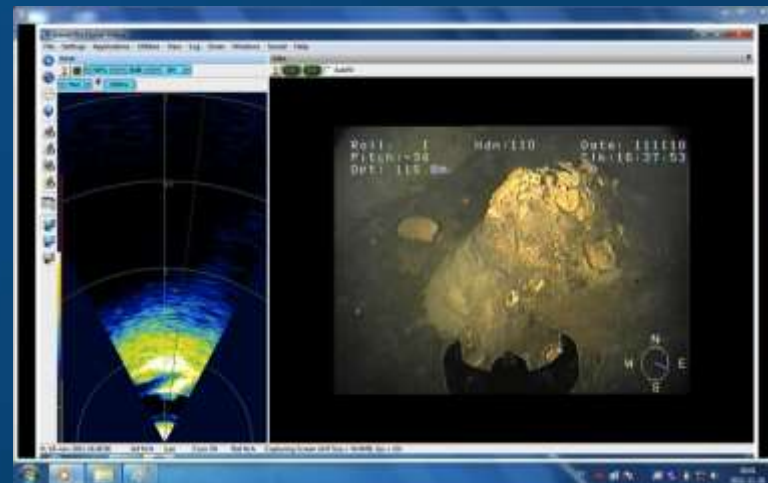
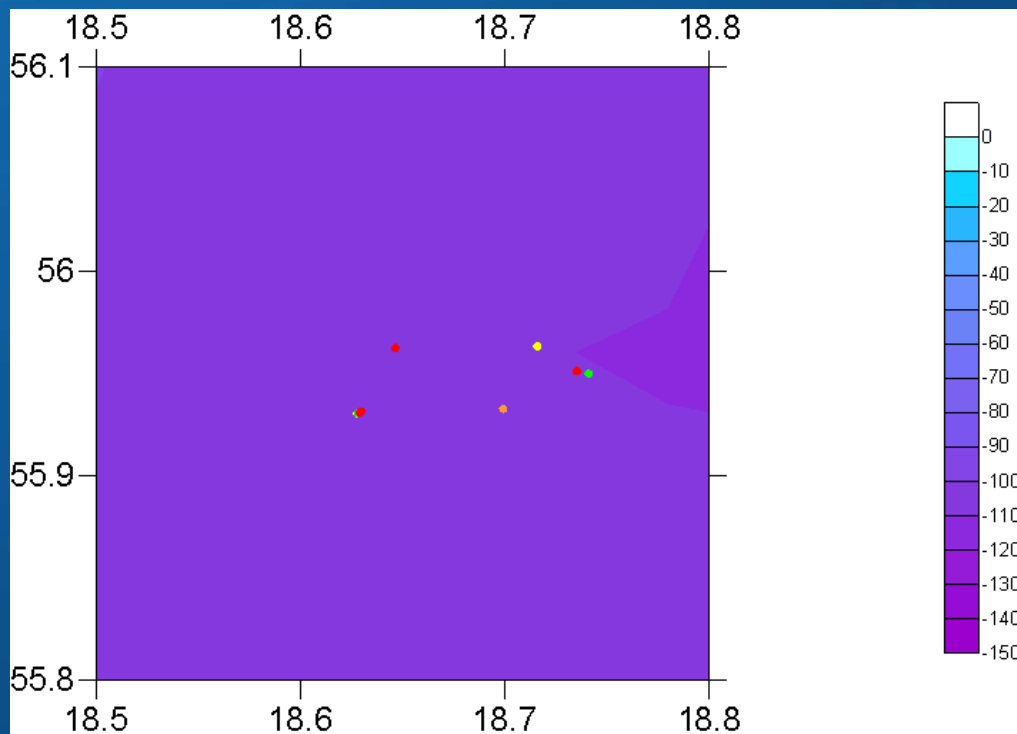


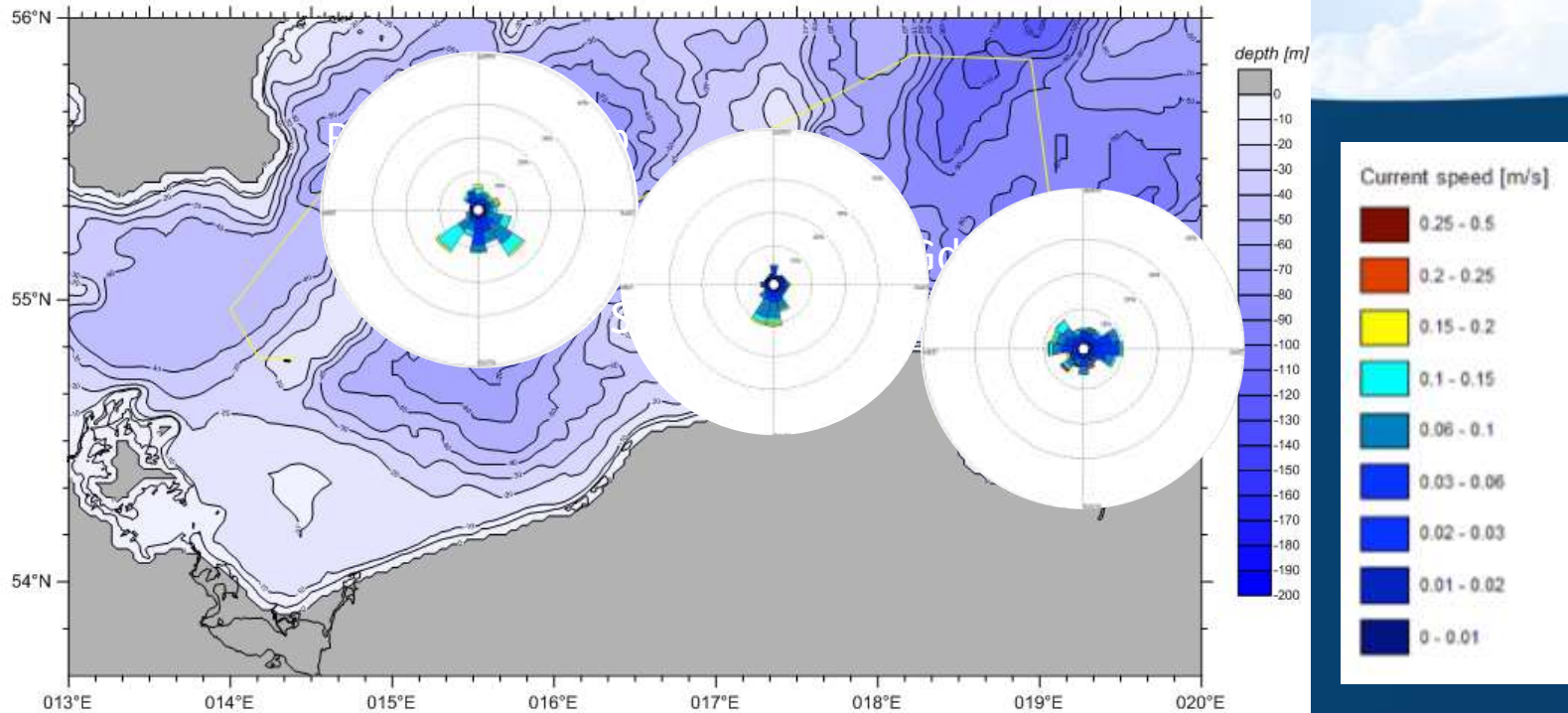


Gdańsk Deep



Gotland Deep





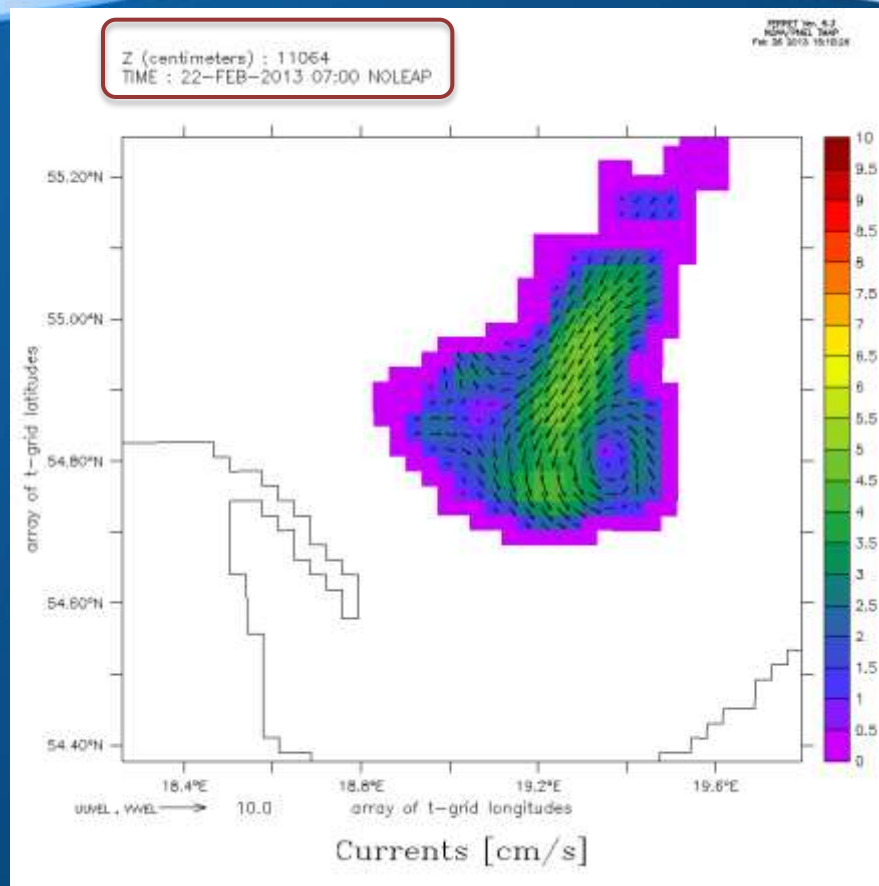
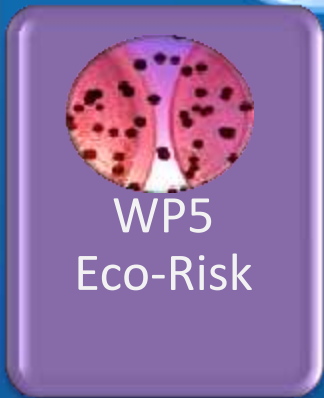
Deployed moorings:

Triangle – 27.04.2012 – 04.07.2012. Components: VALEPORT 308CTD, ADCP WH 300 Sentinel

Square – 29.04.2012 – still working. Components: Andera's RCM - Multiparameter measurement platform

Boxes – Vessel Mounted ADCP analysed data

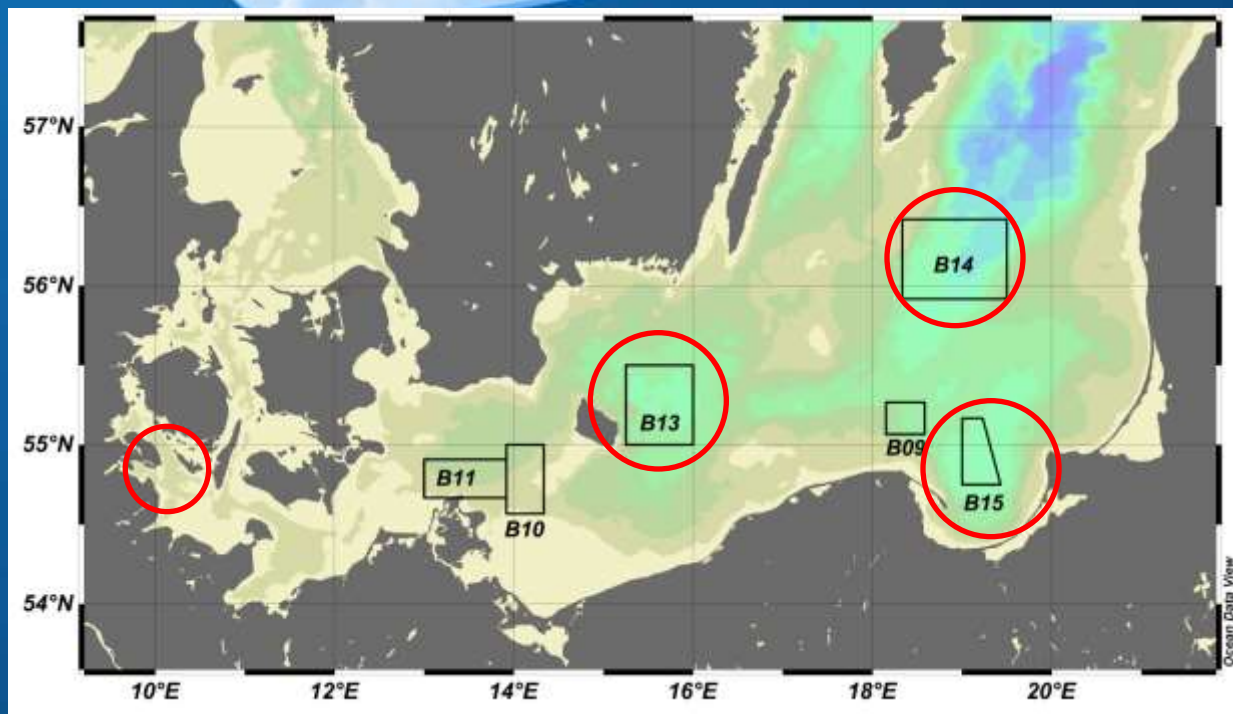
Example of 48 hours bottom currents forecast for Deep of Gdansk



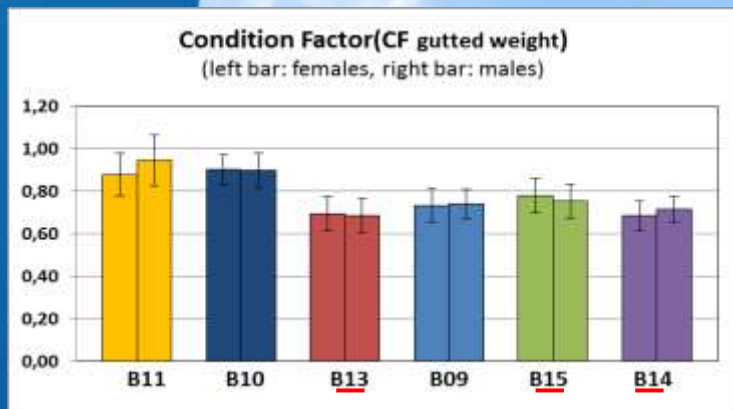
start: 22.02.2013 7.00 AM

CHEMSEA workshop, Hamburg 27-28 of February, 2013

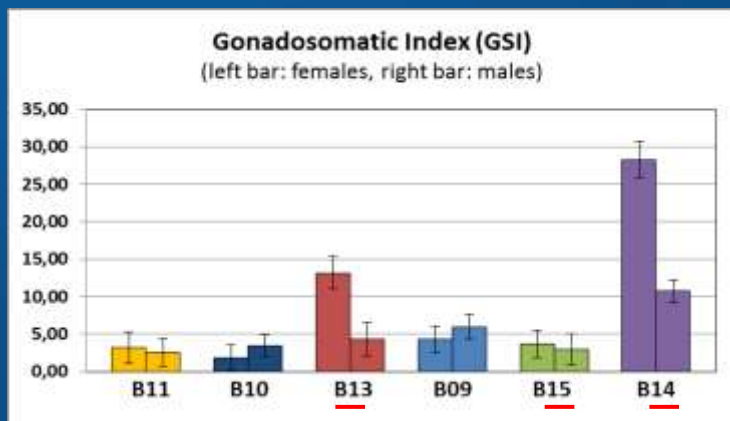
Sampling sites (Dec. 2011, May 2012, Dec 2012)



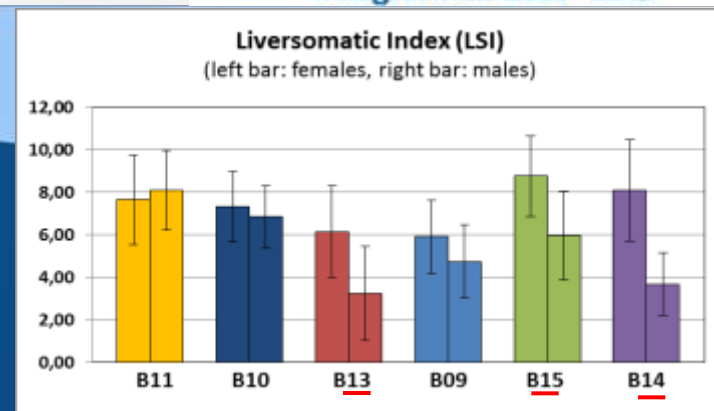
Fitness parameters:



CF: length/total weight



GSI: gonad weight/total weight

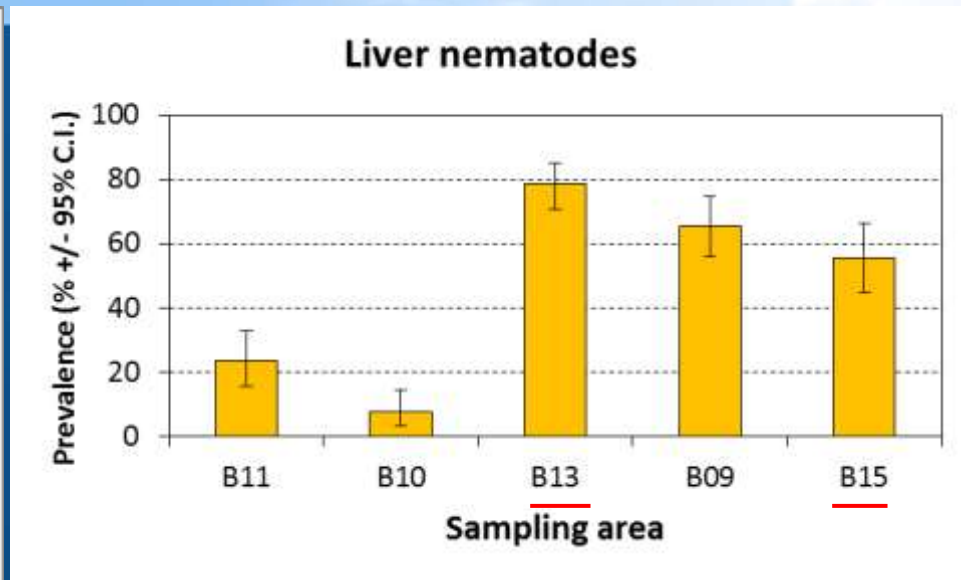
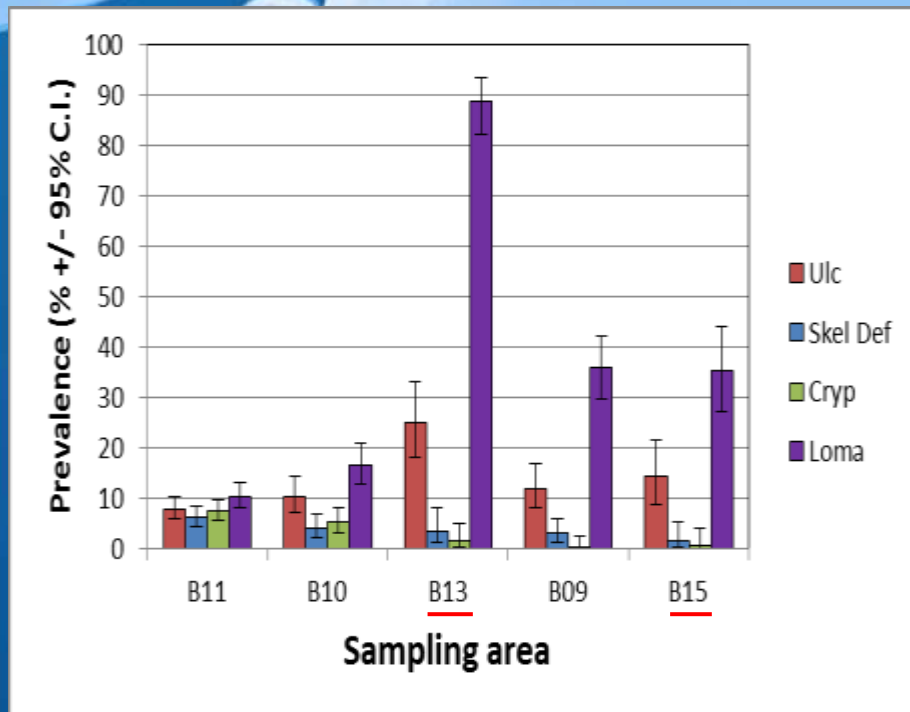


LSI: liver weight/total weight

Conclusions:

- some significant differences in fitness parameters between sampling sites

External diseases/parasites:



Conclusion:

- some significant differences in disease/parasite prevalence between sampling sites

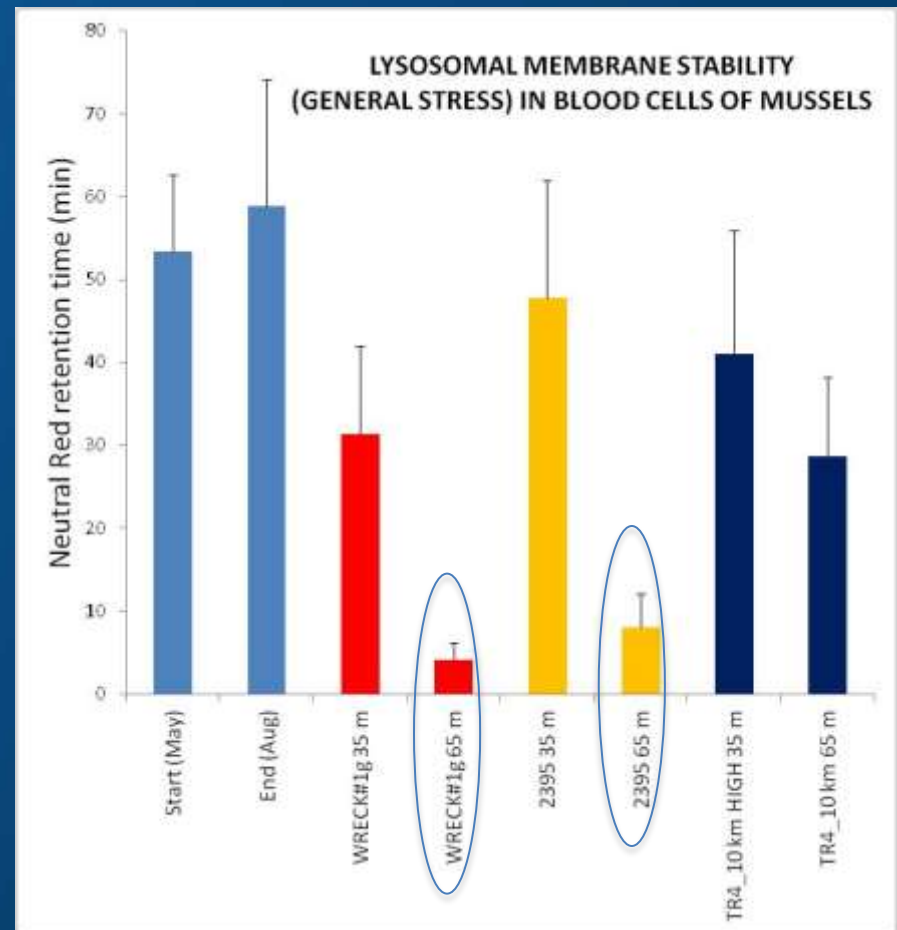




Mussel caging

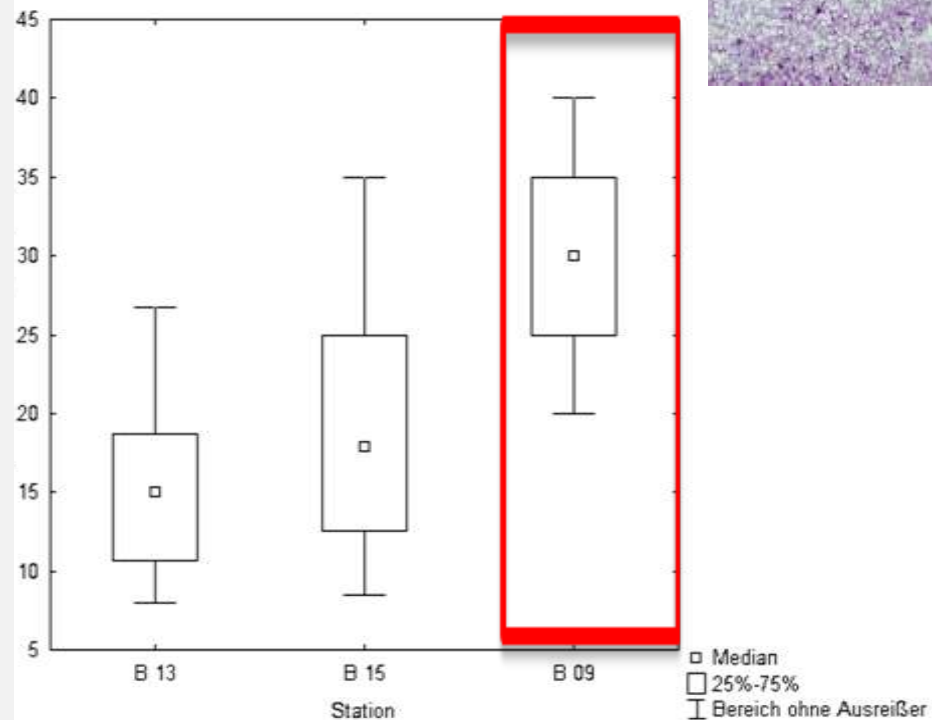
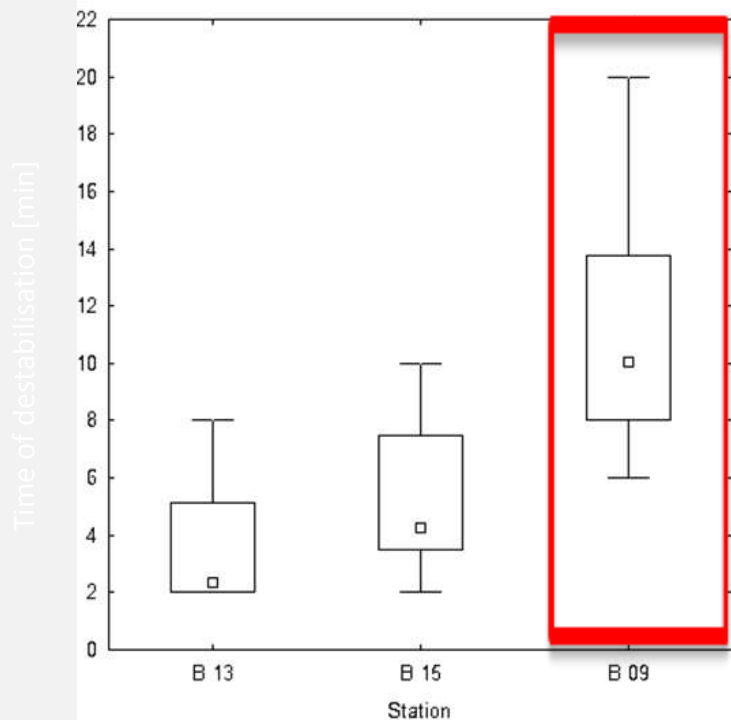
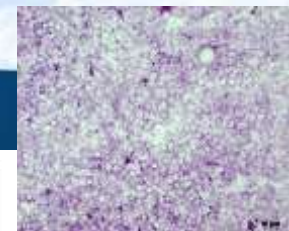
Mussel caging results:

- Lysosomal membrane stability (Neutral Red retention test) on blood cells
 - In the deeper cage (65m) a significantly lower dye retention time (=bad condition) in mussels caged at the „hot spot“ sites compared to the „reference“ site



Cod analysis- oxidative damage

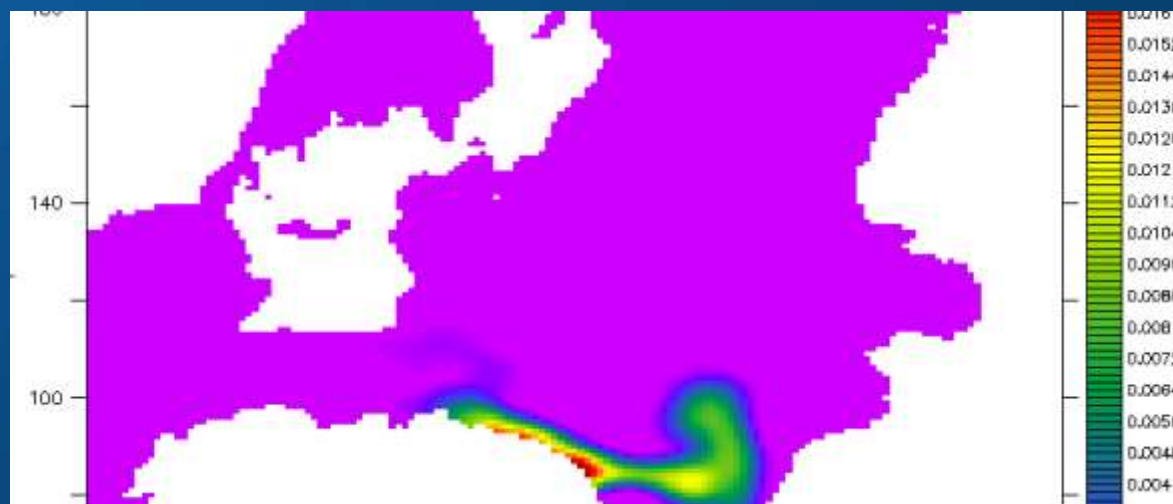
Lysosomal Membrane Stability



LMS-Test: Differences of the reference site (B09) are significant for both peak 1 and 2 (Kruskal-Wallis-Test, $p < 0.05$, $n = 60$)

WP6

- Contingency Plans
- Policy Paper
- Center of Excellence
- Operational models
- Guidelines fo contaminated sediments management
- CHEMSEA Handbook



THANK YOU FOR YOUR ATTENTION

