Chemical Munitions Search and Assessment (CHEMSEA)

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After World War II

~40 vessels (150 000 t of chemical warfare) at the depth 200-700 m

32 000 t at the depth of 70-105 m

2000 t at depth of 70-120 m

2 vessels with 69 000 tabun grenades at the depth 30 m (retrieved)

Chemical munitions dumped in Skagerrak:

(Duursma, 1999; Glasby, 1997; HELCOM CHEMU, 1994; Tørnes et al., 2002)

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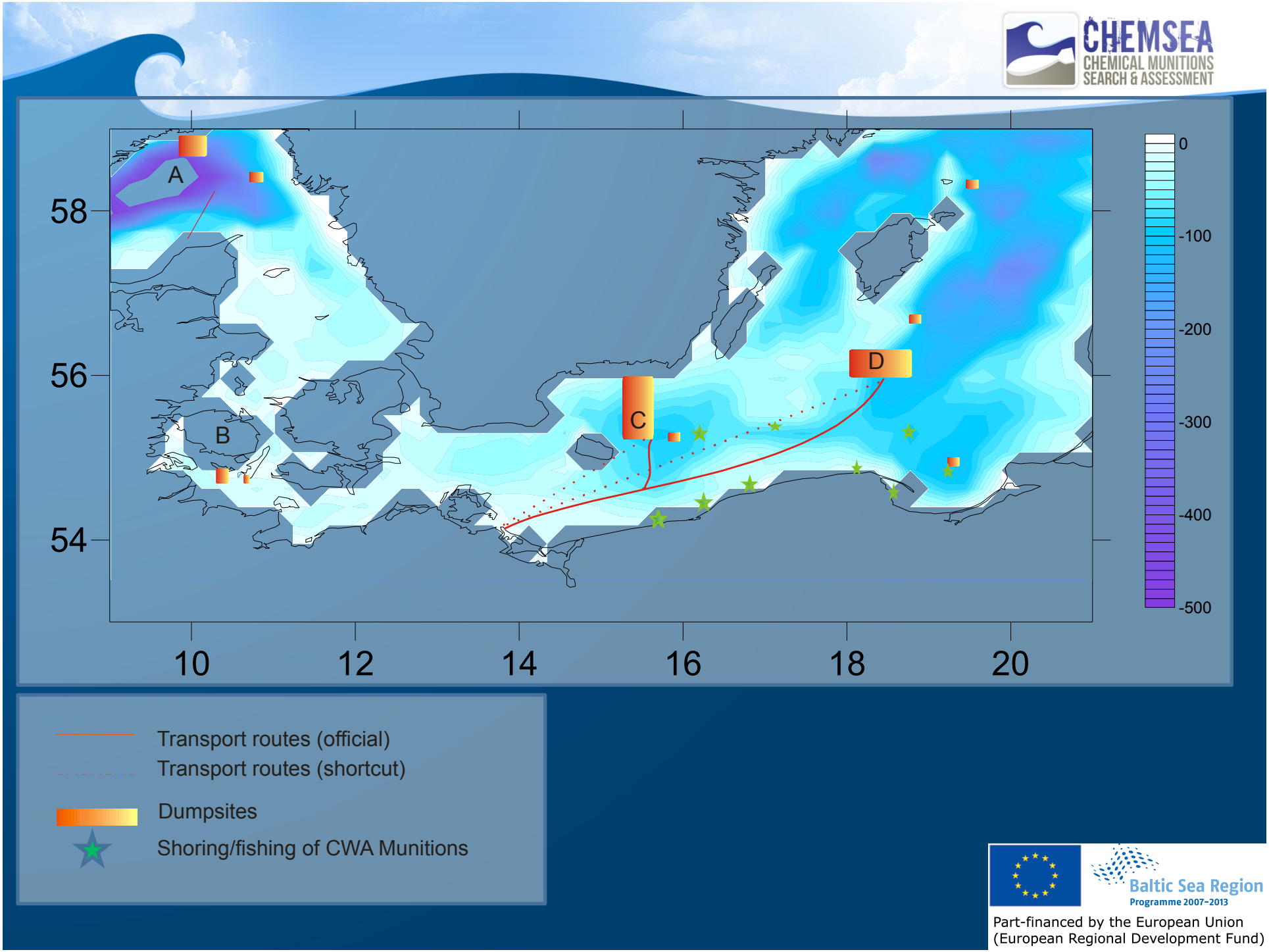
CHEMSEA
CHEMICAL MUNITIONS
SEARCH & ASSESSMENT
A
B
C
D
58
56
54
10
12
14
16
18
20
0
-100
-200
-300
-400
-500
Transport routes (official)
Transport routes (shortcut)
Dumpsites
Shoring/fishing of CWA Munitions
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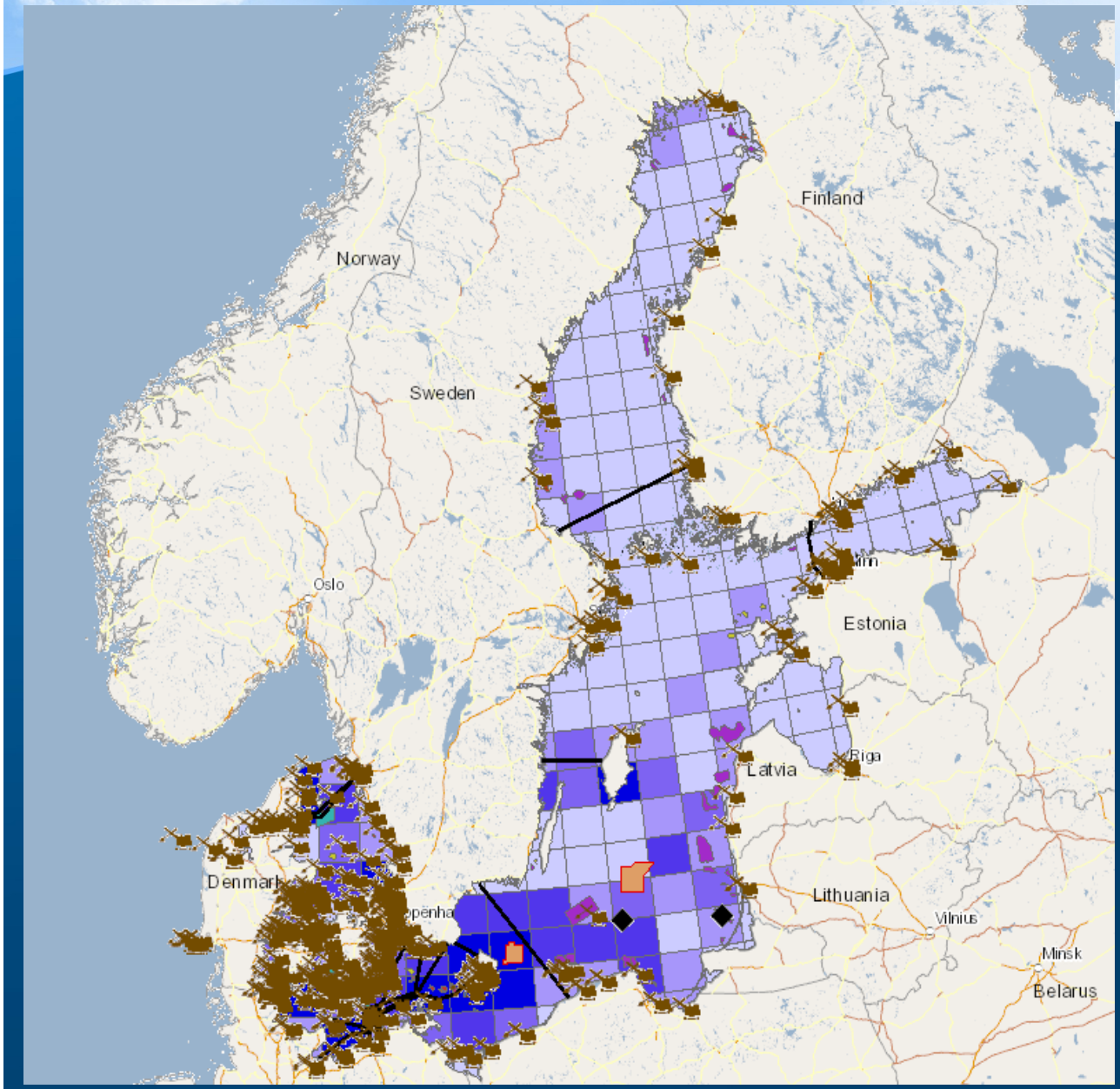

Legend:

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

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Project Team

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

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Associated

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

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Lifetime

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	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2011						Project Contracting		Project implementation				
						1	2	1	2	3	4	5
			submission					Survey SMA	Survey SMA/IO	Survey SMA/IO		Fishing WHIII
		Workshop in Helsinki							Kick-off (Sopot)			
2012	… implementation											
	6	7	8	9	10	11	12	13	14	15	16	17
					Sampling Oceania 150 surface benthos	Caging start Aranda benthos		Caging end Aranda Fishing WHIII				
		3rd Meeting (Umeå?)							4th Meeting (Helsinki)			
2013	… implementation											
	18	19	20	21	22	23	24	25	26	27	28	29
			Sampling Aranda 6 cores 10 surface	Sampling Vėjūnas 6 surface sediments								
		5th Meeting (Germany)							Final Meeting (Poland)			
2014	… implem.	Project closure										
	30	1	2	3								

gion

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Project fleet

Oceania (IO PAS)

Aranda (SYKE)

Vėjūnas (LEPA)

Baltica (SMA)

Walther Herwig III (vTI FOE)

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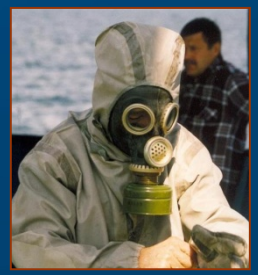
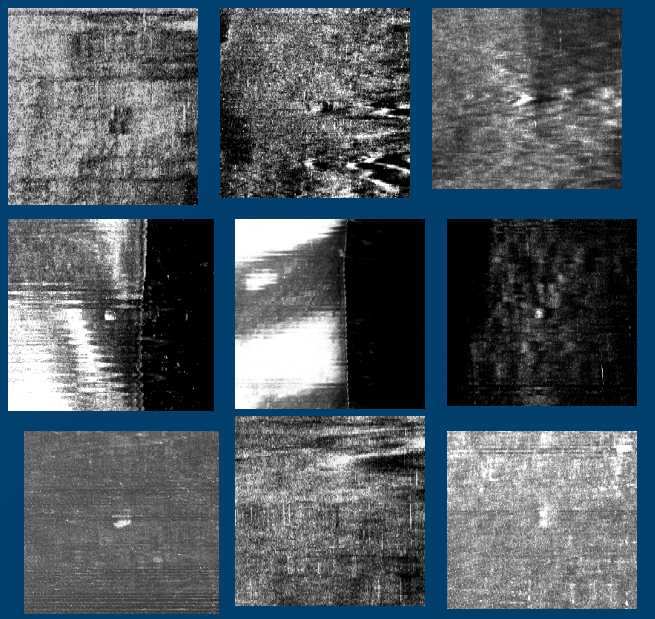
Chemical munitions investigations (Lithuanian experience)

- October, 2002 (scanning of the dumpsite bottom)
- June, 2003 (CW dumpsite)
- August, 2004 (national monitoring stations)

Scientific research vessel “Vėjas”





Totally 39 objects: 13 bombs, 2 barrels

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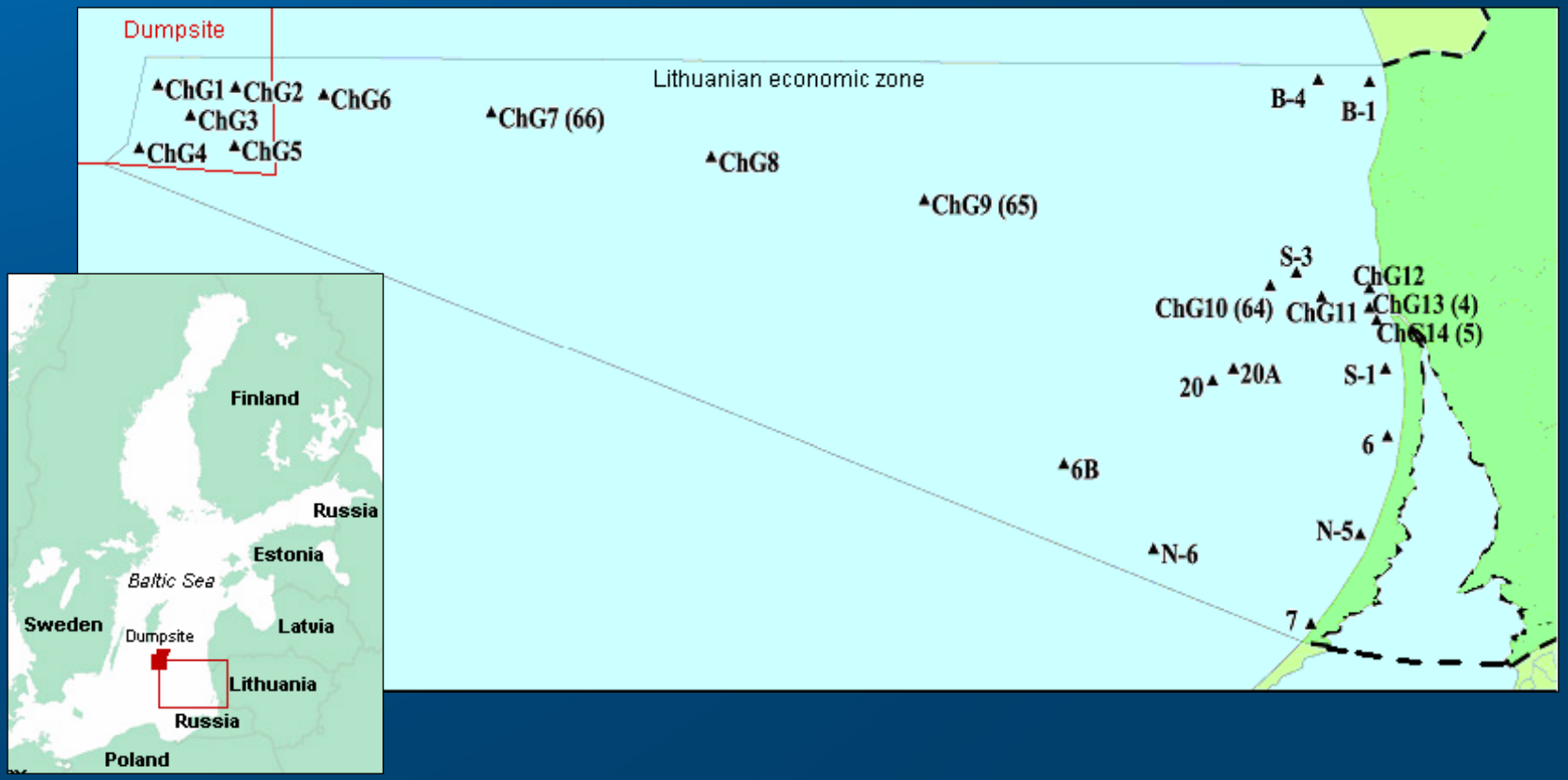
Chemical munitions investigations (Lithuanian experience)



Sampling stations in the Lithuanian economic zone (prefix ChG mark stations from the mission in June, 2003)

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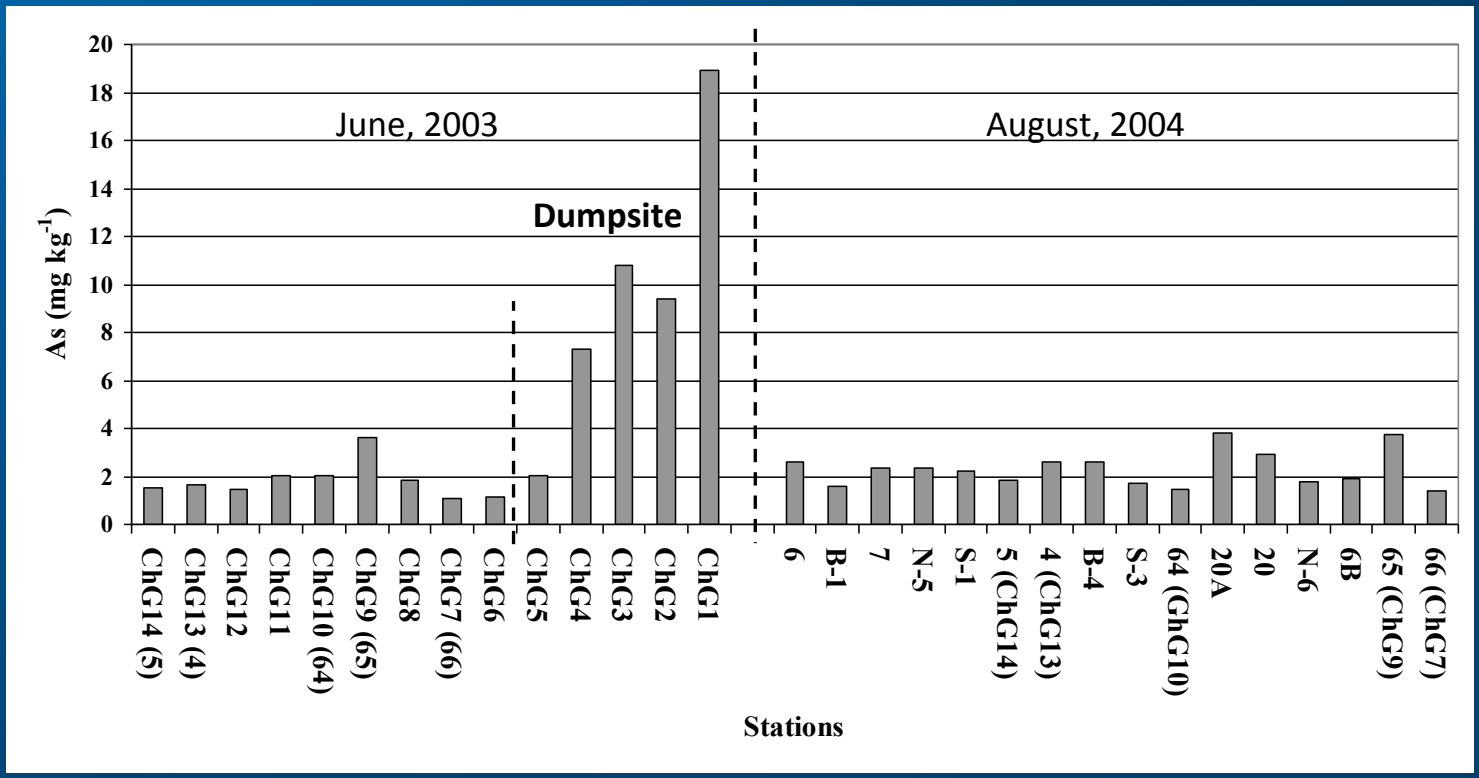
Chemical munitions investigations (Lithuanian experience)



As range from 1.1 to 19.0 mg/kg

- 9.7 mg/kg at dumpsite

-2.1 mg/kg in other samples

As concentrations in the surface sediments in the Southeastern Baltic

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Chemical munitions investigations (Lithuanian experience)

Conclusions

- Water depth, north direction bottom water currents, bottom currents velocities and bottom relief prevent chemical munitions from reaching the Lithuanian coast

- Studied parameters did not show any changes of the environment at the chemical munitions dumpsite

- Higher As concentrations were found at the chemical munitions dumpsite, compared to other sites. However As concentrations were low relative to other investigations

- Chemical munitions - subject for future investigations

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Lithuanian partner for CHEMSEA:

- Experience

- New research vessel (Vėjūnas)

- New equipment

ADCP

ROV

Side scan sonar

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Workpackages

- WP0 Preparation
- WP1 Management
- WP2 Information
- WP3. Invention of detection methods of CWA's and their degradation products **METHODS**
- WP4. Detection and characterization of dumpsites **DETECTION**
- WP5 Ecological consequences of CWA & Risk Assessment **ECO-RISK**
- WP6 Guidelines and contingency plans **GUIDELINES**

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HELCOM | Environmental Ministries | Maritime Authorities | IMO | Fishermen | Baltic Sea Strategy | NGOs

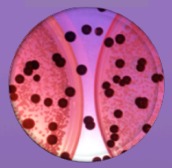
WP1 Coordination

WP2 Communication

WP 6 Guidelines

WP3 Analysis

WP4 Detection



WP5 Eco-Risk

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WP3. METHODS

- Review of analytical methods for CWA and their degradation products - done
- Transnational inter-calibration in progress
- Analysis of environmental samples for CWAs & their degradation products - September
- Merging of analytical data of environmental samples with hydrographical data - 2013

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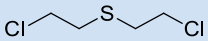
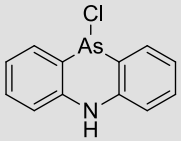
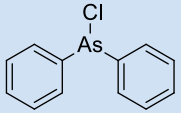
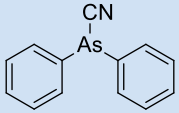
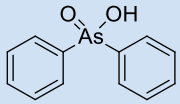
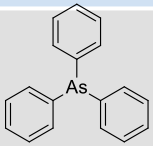
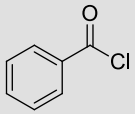
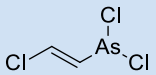
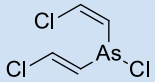
Target chemicals (30)

Sulphur mustard		*Dumped CW agent*
Adamsite		*Dumped CW agent*
Clark I and II	 	*Dumped CW agent. Also component in dumped arsine oil (Clark I)*
Diphenylarsinic acid		*Oxidation product of Clark I and II and all of their degradation products*
Triphenylarsine		*Component in dumped arsine oil*
α-Chloroacetophenone		*Dumped CW agent*
Lewisite I and II	 	*Dumped CW agent*

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WP4. Detection

Official CWA duming sites:

Area A:

140 km²

Area B:

1450 km²

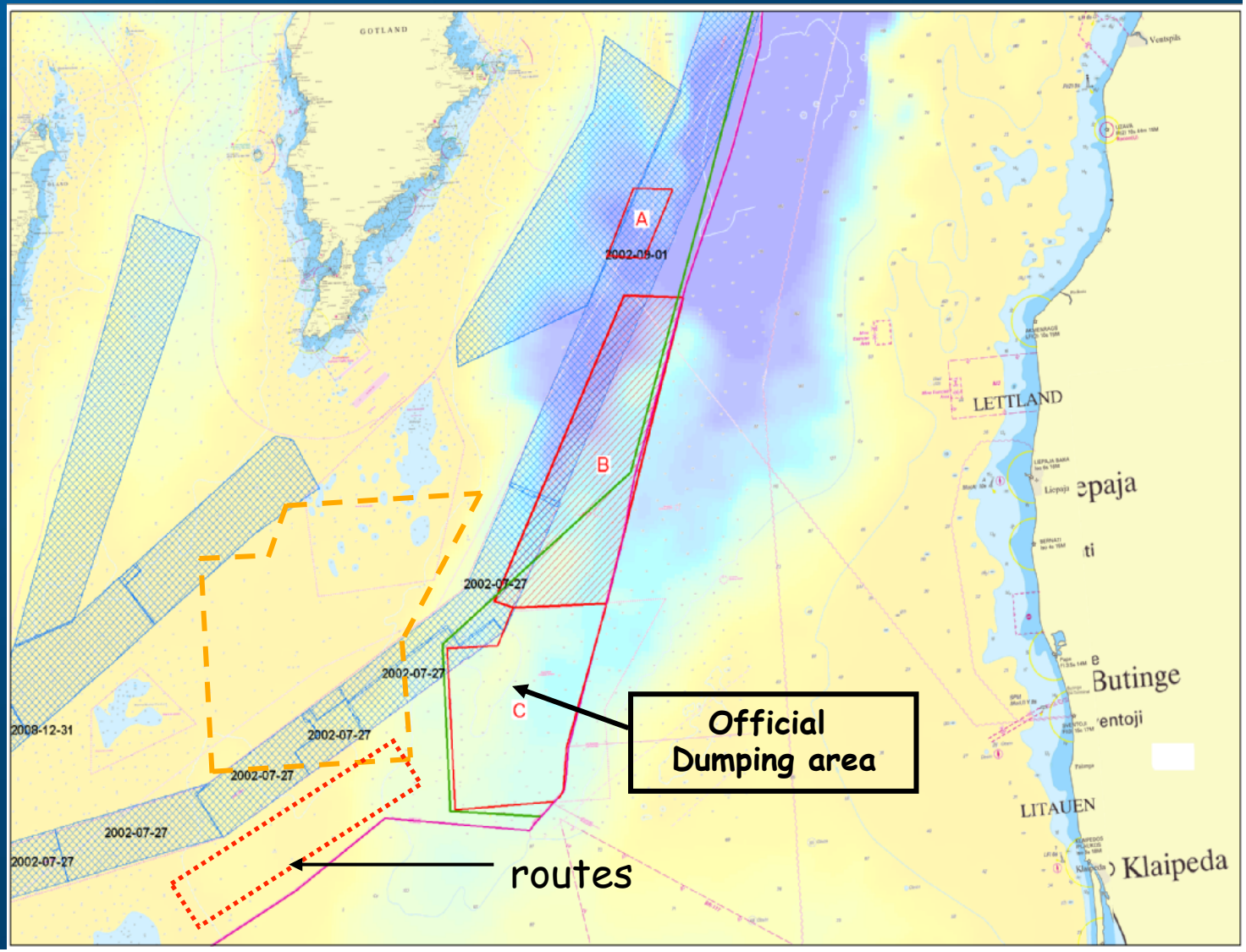
Area C:

1756 km²

Unoficial dumping along the route to C

Not on the picture:

unofficial dumping site Gdansk Deep 340 km²



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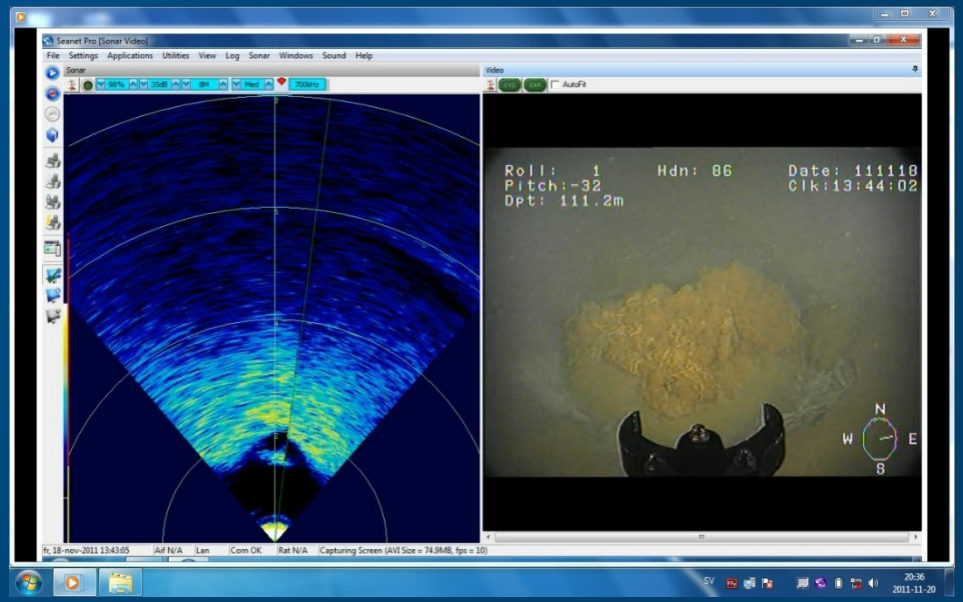
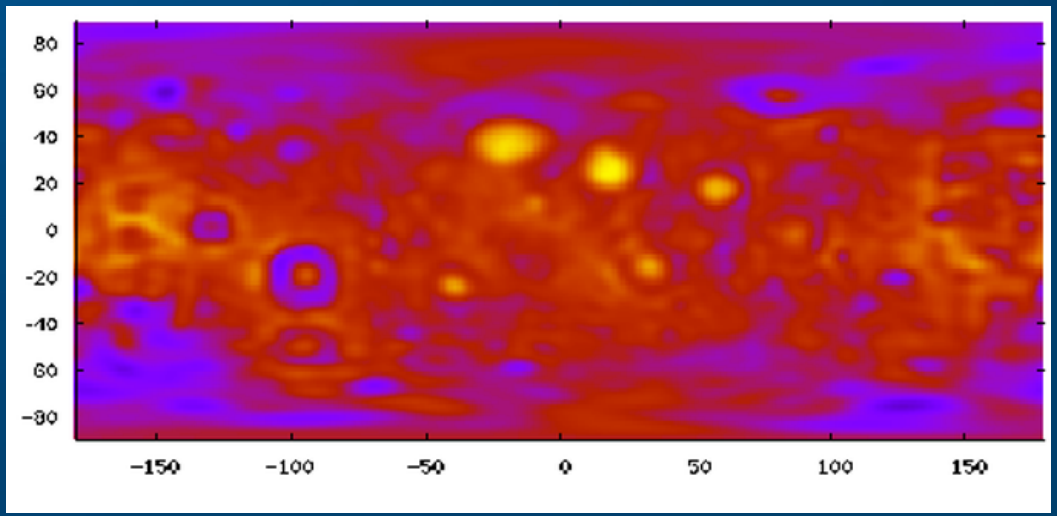
WP4. Detection

- Side Scan Sonar
- Magnetometers
- ROV





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WP4. GOALS Detection and characterization of dumpsites

- Inventory of available data
- Characterisation of dumping sites
- Detection of CWA objects in the official & unofficial dumping site and along the transport routes to dumping sites.
- Review of detection methods
- GIS maps

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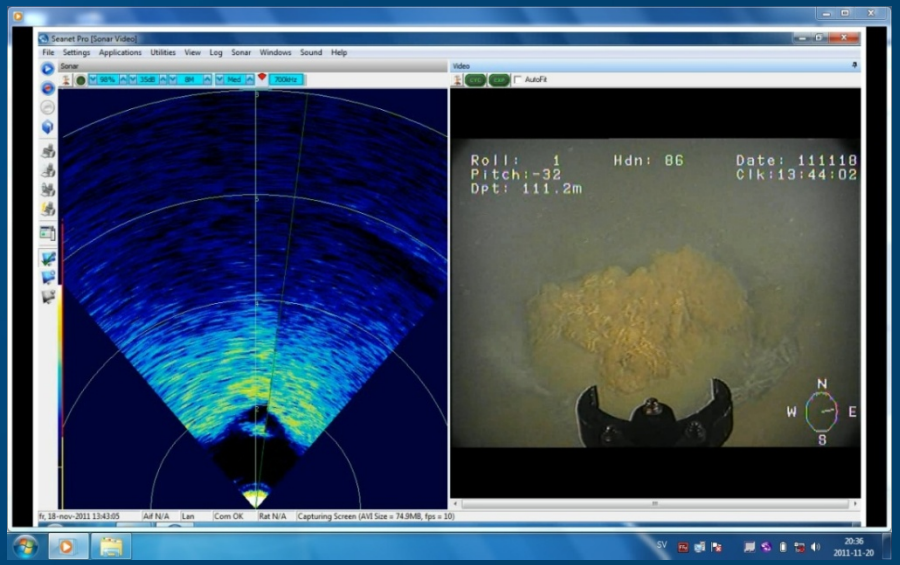
Status

- 2 cruises by SMA
- 1 cruise by vTi
- 2 cruises by IOPAS
- 46% of GotDeep Surveyed
- 100% Gdansk Deep
- 10% Transport routes



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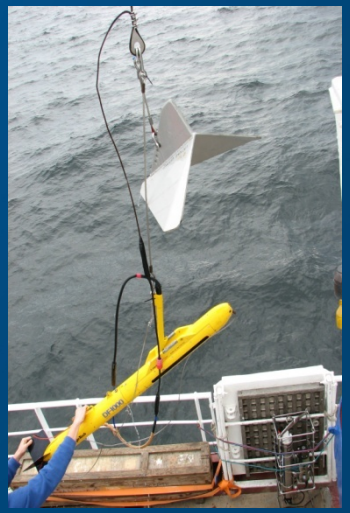
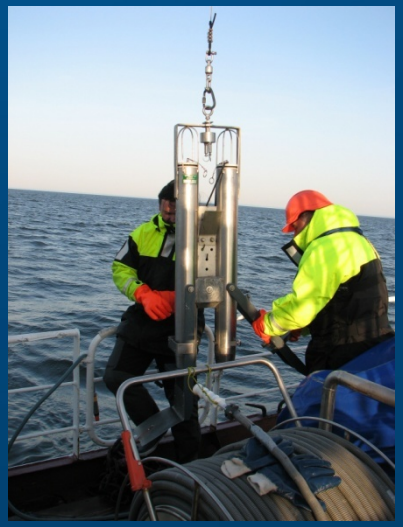
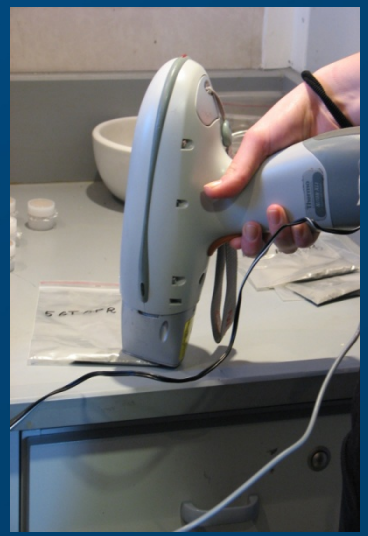
Cruise by IO PAS (Oceania)







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WP5. ECO-risk

- Environmental effects & fate of contaminants
  - Exposure experiments
  - Biomarker analyses
  - Bioindicator based ecosystem state
- Ecological risk assessment and development of a leakage model

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WP6. Guidelines

- Transnational Meetings
- Guidelines on Chemical Munitions in the Baltic Sea
  - Fished munitions
  - Waste management (sediments)
  - Contaminated areas
- CWA Contingency plan
- CWA Advisory body

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Outputs

- Recommendations on Operating Procedures for analysis of environmental samples
- Complete characterisation of Baltic CWA sites
- Recommendations on Operating Procedures for detection of underwater CWA objects and sampling in contaminated areas
- Predictive tool of ammunition detection
- Stationary leakage model
- Calculation of costs of different leakage events

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Outputs – cont.

- Guidelines and procedures for fished munitions
- Guidelines for safe disposal of CWA contaminated sediments
- Designation and guidelines for CWA contaminated areas
- Permanent, transnational Baltic CWA-advisory body
- Contingency plan

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- Verification of dumping areas
- Risk assessment on case-by-case basis
- Recovery options
- Guidelines for affected groups
- Improved models

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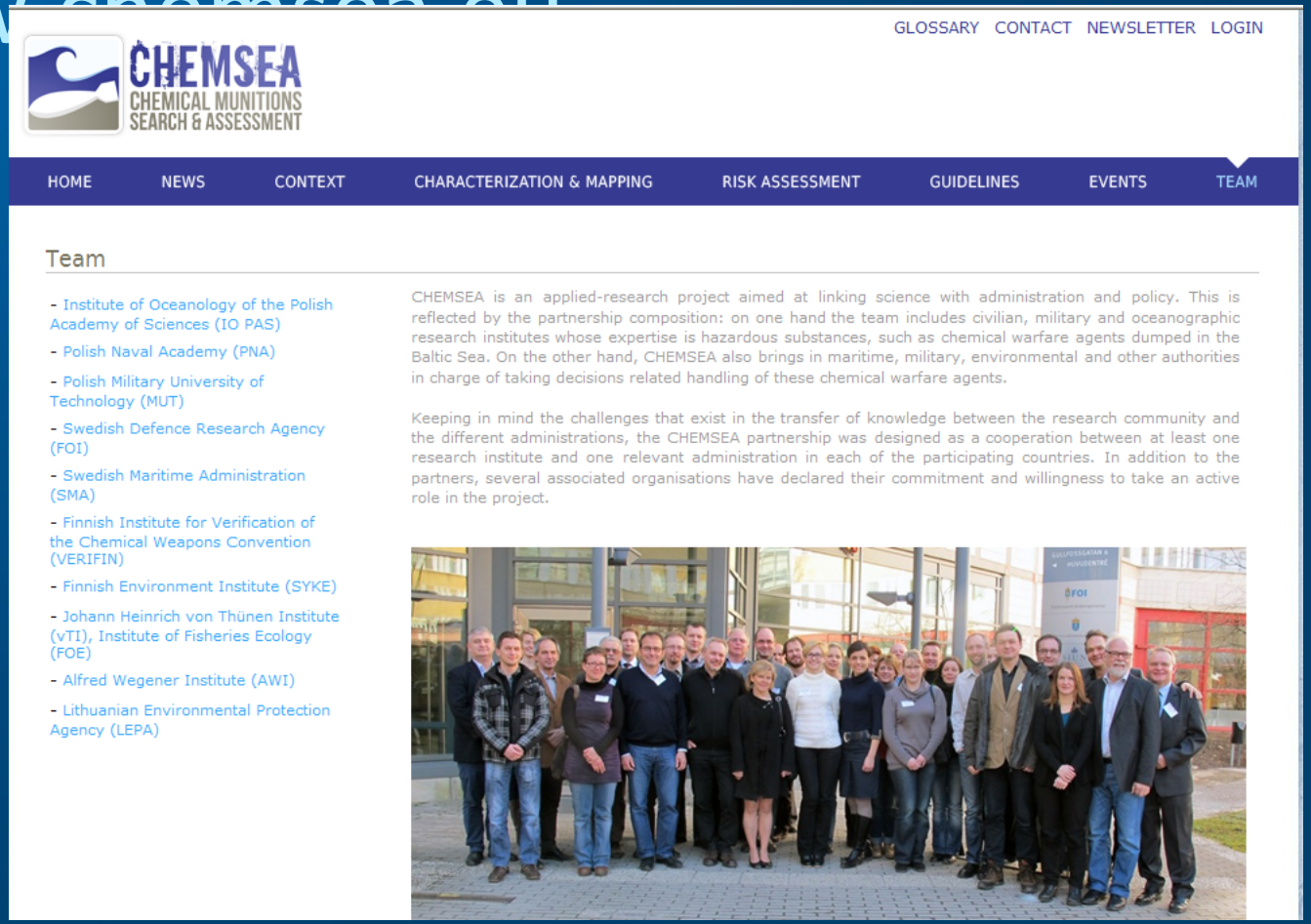
Project Internet page:

www.chemsea.eu



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THANK YOU FOR YOUR ATTENTION

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