

INTRODUCTION TO GRACE

Kirsten Jørgensen, SYKE
GRACE Final Conference Tallinn 23.-24.5.201



OBJECTIVES

- Improve the observation and predictions of oil movements in the sea using **novel on-line sensors** on vessels, fixed structures, smart buoys or gliders, and smart data transfer to operational awareness systems;
- Explore the true environmental impacts and benefits of a suite of marine **oil spill response technologies** in the cold climate and ice-infested areas in the northern Atlantic Ocean and the Baltic Sea. Methods included are:
 - **mechanical collection** in water and below ice,
 - **in situ burning**,
 - use of **chemical dispersants**,
 - natural **biodegradation**
 - and combinations of these;
- Assess in particular the **impacts on fish, invertebrates** (e.g., mussels, crustaceans) and macro algae of naturally and chemically dispersed oil, in situ burning residues and non-collected oil using highly sensitive biomarker methods, and to develop specific methods for the rapid detection of the effects of oil pollution on biota
- Develop a **strategic Net Environmental Benefit Analysis tool (sNEBA)** for oil spill response strategy decision making in cold climate and ice-infested areas.

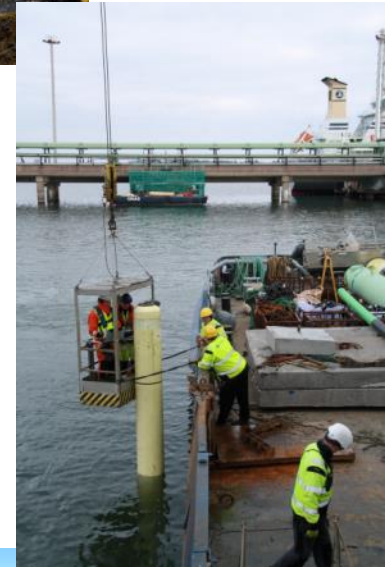
PARTNERS

Participant No	Participant organisation name	Country
1 Kirsten Jørgensen	Finnish Environment Institute SYKE	Finland
2 Susse Wegeberg	Aarhus University	Denmark
3 Jaak Truu	University of Tartu	Estonia
4 Tarmo Kõuts	Tallinn University of Technology	Estonia
5 Thomas Benjamin-Seiler	RWTH Aachen University	Germany
6 Ionan Marigomez	University of the Basque Country	Spain
7 Bjørn Munro Jenssen	Norwegian University of Science and Technology	Norway
8 Lonnie Bogø Wilms	Greenland Oil Spill Response A/S	Greenland
9 Rune Högström	Lamor Oy	Finland
10 Seppo Virtanen	Meritaito Oy	Finland
11 Björn Forsman	SSPA Sweden AB	Sweden
12 Christian Petrich	Norut	Norway
13 Feiyue Wang	University of Manitoba (no EU funding)	Canada

Total costs 5.5 mill €, total grant 5.3 mill €, 1.3.2016-31.8.2019

GRACE ACTIONS SO FAR

- Much field and laboratory work performed
- Unique possibilities to perform field tests e.g with in situ burning in Greenland, oil sensor trials with Smart buoy in oil harbour, oil sensor in FerryBox on passenger ship, electrokinetic treatment in the heart of Helsinki for oil-polluted sediment cleaning
- Successful communication of the project to the right end users



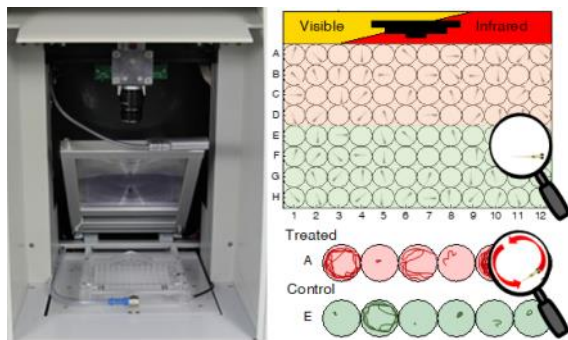


WP1 Oil spill detection, monitoring, fate and distribution

Lead:
Tarmo Kõuts

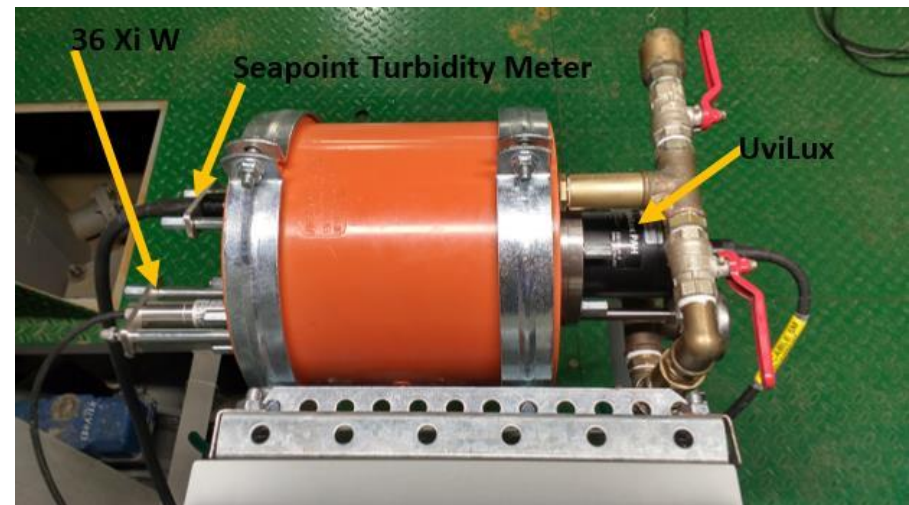


Schematic diagram of the SmartBuoy concept



Zebrafish larvae behaviour assessment scheme: DanioVision observing system and trajectories

MS Baltic Queen FerryBox data is available on <http://online.msi.ttu.ee/GRACEerry>



On-line sensors in FerryBox on board MS Baltic Queen



Slocum G2 Glider of TUT





Oil in seawater

Dispersed oil in seawater



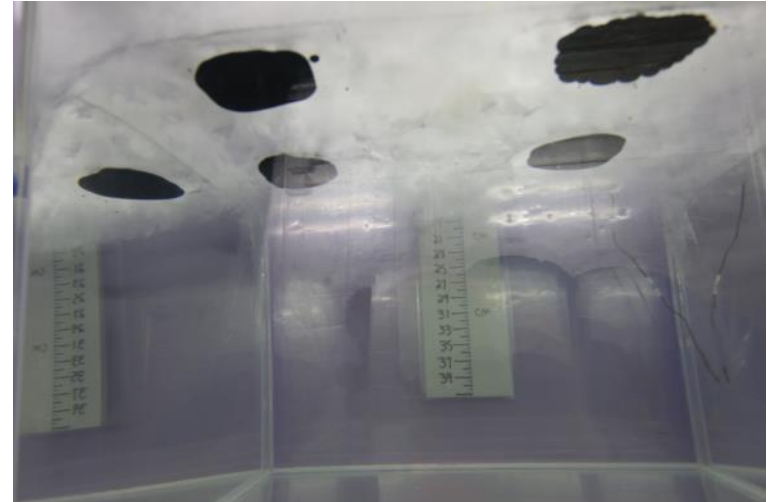
Biodegradation tests at 4 °C



Töölö Bay, Helsinki, site for electrokinetic treatment of sediment

WP2 Oil biodegradation and bioremediation

Lead: Jaak Truu



Oil under ice biodegradation experiment, Seawater from Svalbard



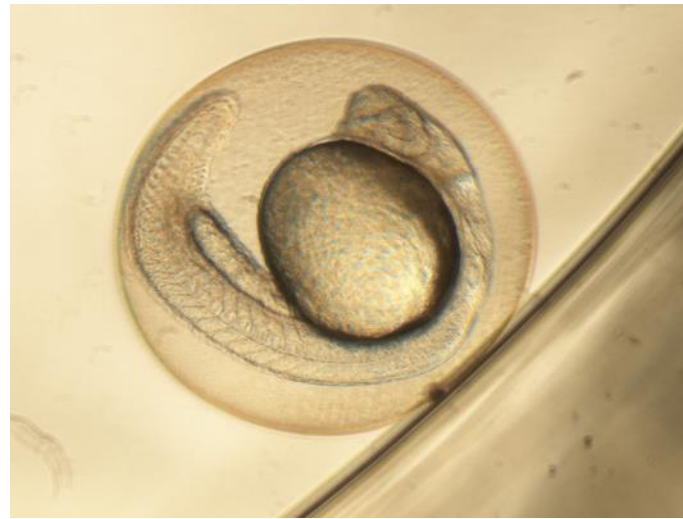
Electrodes for electrokinetic treatment of sediment

WP3 Oil impacts on biota using biomarkers and ecological risks assessment

Lead:
Thomas-Benjamin Seiler



Preparing to sample mussels by scuba diving in the Baltic Sea in -20C temperature



Zebrafish embryo at well wall, normal development (no effects), 24 h post fertilization



Sampling Limnocalanus



Preparation of WAF (water accommodated phase)



Oil exposure experiments with blue mussels in aquaria

WP4 Combat of oil spill in coastal arctic water - effectiveness and environmental effects

Lead: Kim Gustavson



Baseline study of shoreline before experiments
(Ole Geertz-Hansen)



Under ice removal
unit - Prototype



Test tank in Porvoo for testing oil collection



Shoreline experimental in situ burning

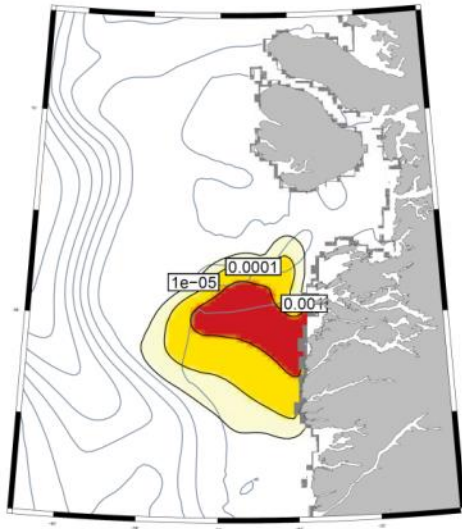


Collecting burning residue with Bucket Skimmer, Greenland



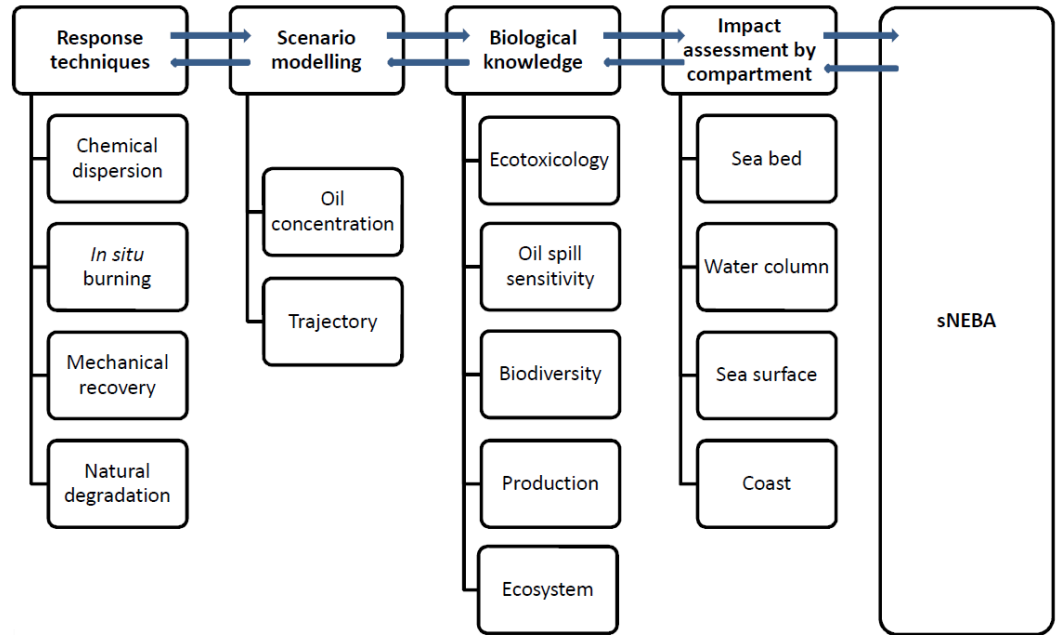
WP5 Strategic Net Environmental Benefit Analysis (sNEBA)

Lead:
Susse Wegeberg



Oil dispersion simulation from scenario in Greenland

Flow chart for the Environment & Oil Spill Response (EOS) analytical tool





WP6 Management, dissemination and communication

Lead: Kirsten Jørgensen



Further information:

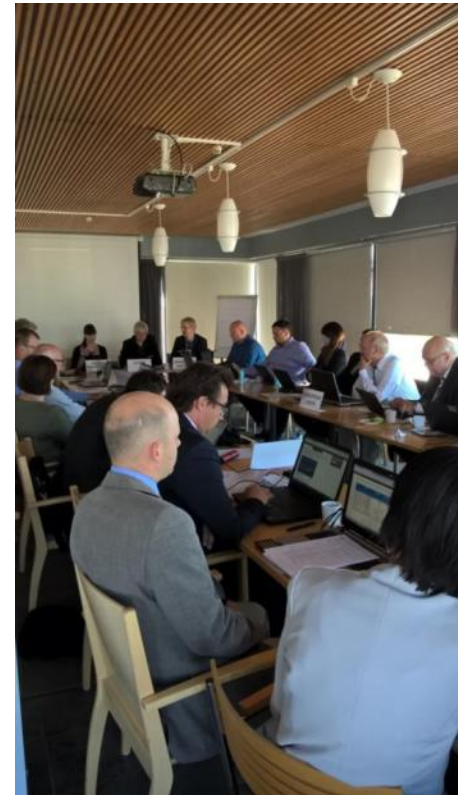
GRACE web site: <http://www.grace-oil-project.eu>

GRACE final conference Tallinn, Estonia May 23-24, 2019



GRACE video stand at the MOSPA conference Oulu, 2018

GRACE presentation at HELCOM response meeting June 2017, Helsinki



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 679266.



S Y K E