

## What is ExSIRA?

- KMB-project funded by Gassnova (80%) & industrial partners Statoil, Shell and Vattenfall.
- Project period 2010-2014.
- Total budget 11'560 mill. NOK.
- 4 main tasks: Atmospheric chemistry modelling, aquatic ecotoxicology, terrestrial ecotoxicology and corrosion.
- Scientific partners: NILU, NIVA, NINA, UiO and UMB.

## What is this project's most important contribution to the realisation of CCS?

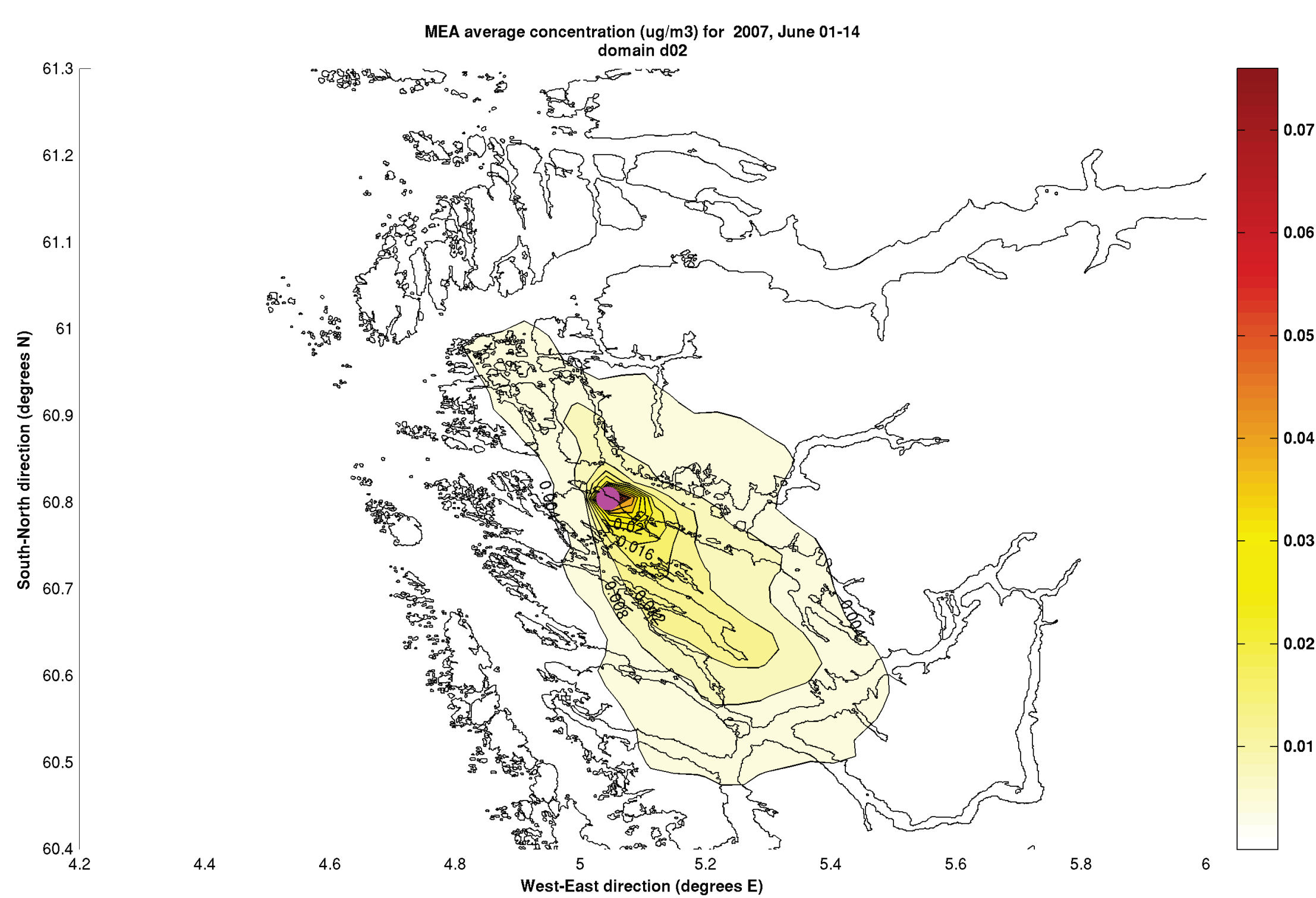
- The main objective of the project is to investigate the environmental effects of amines and amine degradation products.
- Further; identify general potential environmental impact of amines used for CCS.
- Investigate the environmental impact of specific amines.
- Both theoretical studies, modelling, laboratory experiments and field work.

## What is the most important outcome of this project?

- Contribute with a clear assessment of the environmental impacts related to amine based CCS.
- Ensure that amines chosen for CCS do not harm the environment or human health.

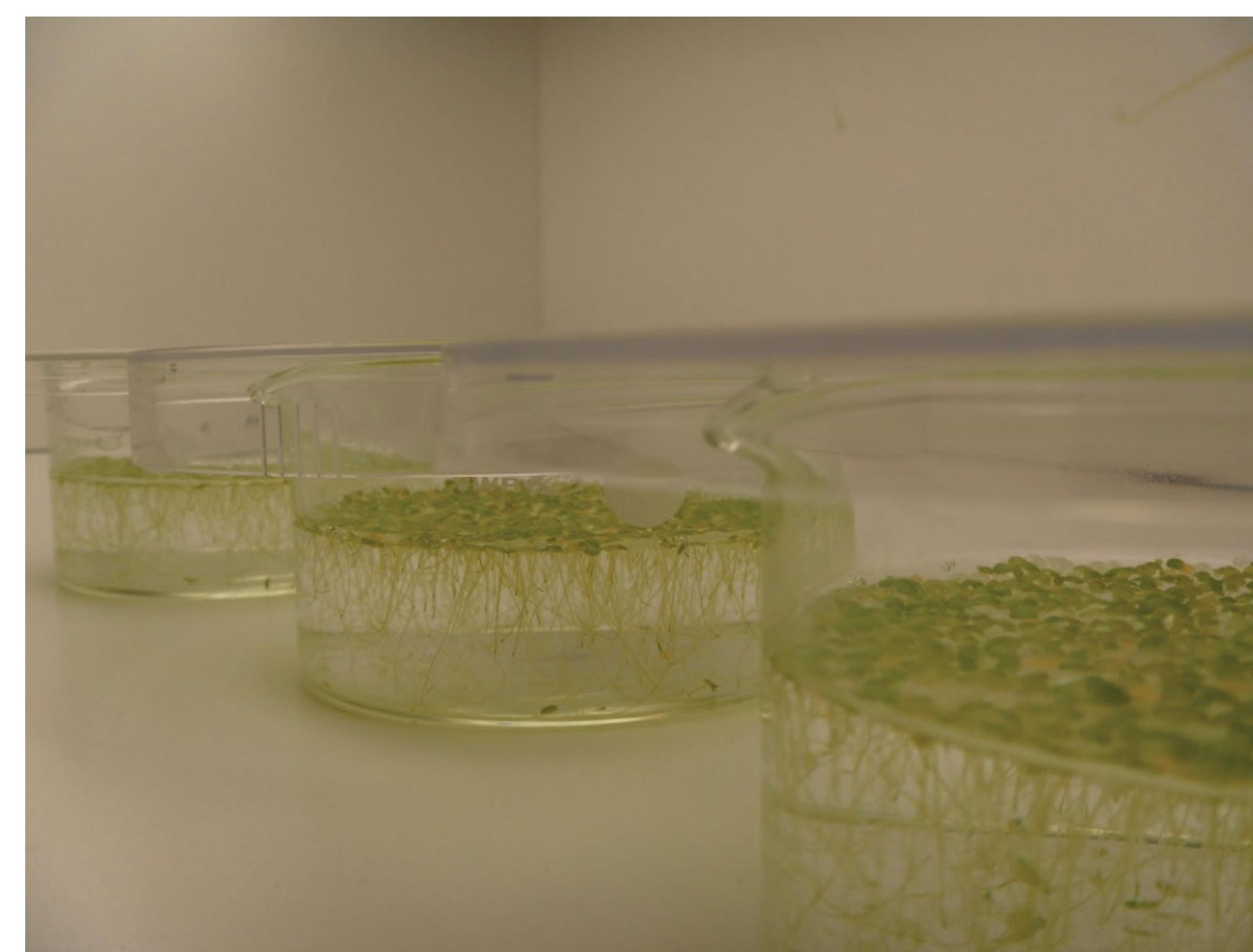
## Task 1: Atmospheric chemistry modelling

- Main objective: Model the atmospheric dispersion of MEA and degradation products to quantify air concentration, dry - and wet deposition of amines. WRF-Chem model (Weather Research and Forecast model online coupled with chemistry) is set up for Mongstad region. MEA gas-phase chemistry is included.



## Task 2: Aquatic ecotoxicology

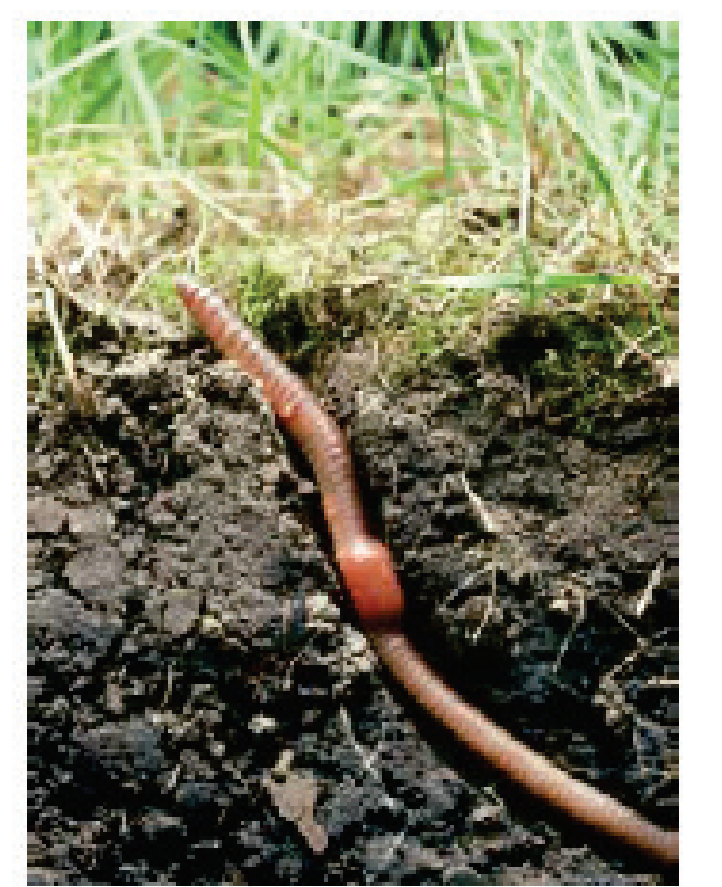
- Main objective: To determine the acute and chronic toxicity of two selected nitramines (dimethylnitramine and 2-(nitroamine) ethanol) to freshwater, marine and terrestrial organisms. Experiments and tests to be performed both on bacteria, algae, plants, fish and worms.



Lemna gibba



Earthworm



## Task 3: Terrestrial ecotoxicology

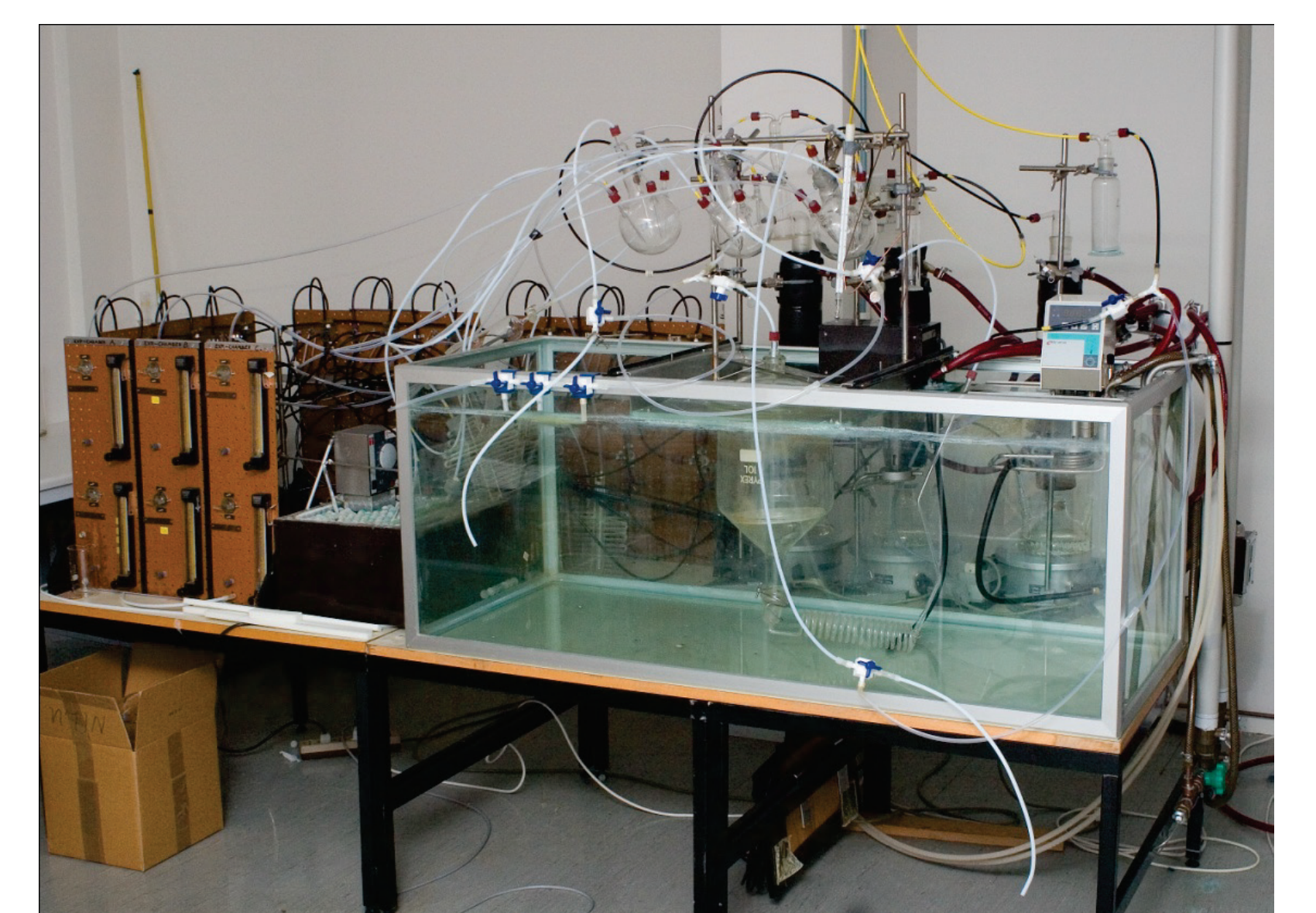
- Main objective: Investigate effects on vegetation, soil and soil fauna. Empirically assess the effects on the plant/soil ecosystem of different amines (MEA, DEA and AMP). Field experiments are carried out at Smøla, N-W Norway.



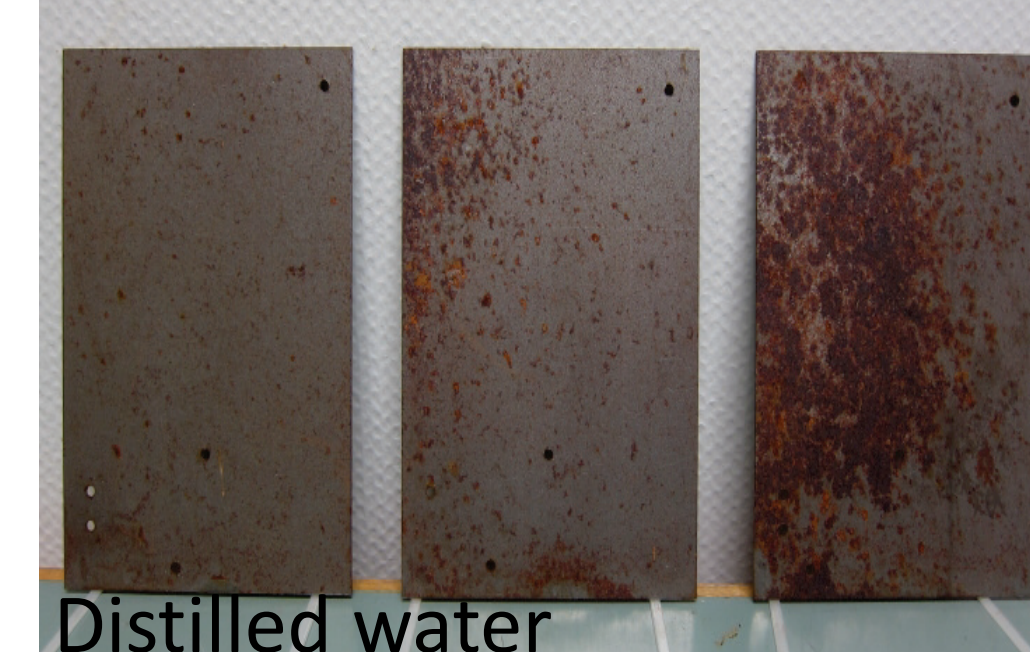
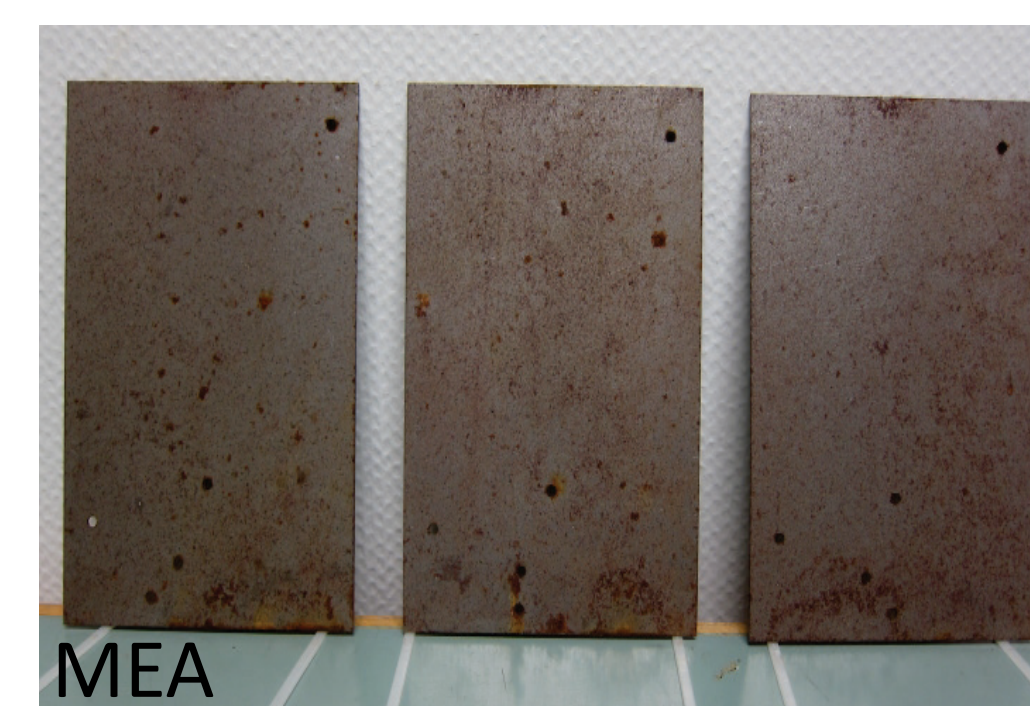
Spraying/watering with amines at Smøla

## Task 4: Corrosion

- Main objective: To determine atmospheric corrosion potential of amines and degradation products.
- Work include both field experiments (4 stations) and laboratory chamber experiments.



Chamber for laboratory tests



Field station at Skøyen (Oslo)