

Understanding ripening of mud: from laboratory scale to pilot scale

M.Sc. Graduation project

Background

Too much mud in harbors and coastal area causes navigational problems as well as environmental issues. Conventionally, dredging and disposing the excess mud is practiced, but it's costly and may not be very effective. We believe mud from harbors and coastal area thanks to their high clay content may be suitable for other use for instance: clay for dike reinforcement. However, for such applications the water content of mud should be remarkably reduced and its strength increased. The process of transform fluid like mud to suitable soil for construction work is called ripening.



Cracks at the Kleirijperij Delfzijl; 26 days after filling.

Kleirijperij

In April 2018 under the umbrella of Eco-Shape the Pilot Kleirijperij started (see <https://nos.nl/artikel/2225959-kleirijperij-maakt-van-zout-slib-zoete-klei.html>). In this pilot, fluid mud from the harbor of Delfzijl is distributed over 15 cells of 10 000 m² each on land. In these cells, various natural and mechanical treatments (different initial salt contents, heights, densities, adding seeds from different species, plowing and digging ditches etc.) are applied aiming to find the most (cost)effective ripening strategy. In parallel to the pilot, laboratory study will be carried out aiming to increase the understanding of the ripening process. The laboratory study and field work are strongly linked, so that what have been learned from the laboratory study will be used to optimize the pilot study.



a) dredged fluid mud being discharged into one of the cells (cell 9) at Kleirijperij site, Delfzijl, the Netherlands; b) top view of the Kleirijperij site, Delfzijl (not all cells can be seen here).

The MSc research project involves both field work at the pilot (characterization of the mud through profiles of pore pressure, water content and strength) and experimental work in the laboratory (small scale ripening tests): in this experimental work, effect time, temperature, humidity, and number of dry-wet cycle on mud properties such as salt content, organic matter content, plasticity limits etc. will be studied. Small scale tests on pore water transport speed (permeability) in ripening mud as a function of water content will be performed.

The work will be done in strong collaboration with a team of scientists from the research institute Deltares. Starting date: Mid-summer 2018

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