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**Publication date**

2016

**Document Version**

Final published version

**Citation (APA)**

Barciela Rial, M., Winterwerp, H., Griffioen, J., van Paassen, L. A., & van Kessel, T. (2016). *The effect of organic matter oxidation and drying on the geomechanical behaviour of anoxic mud*. Poster session presented at American Geophysical Fall Meeting 2016, .

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# The effect of organic matter oxidation and drying on the geomechanical behaviour of anoxic mud

Maria Barciela Rial<sup>\*1</sup>, Johan C. Winterwerp<sup>1,2</sup>, Jasper Griffioen<sup>3,4</sup>, Leon A. van Paassen<sup>1</sup> and Thijs van Kessel<sup>2</sup>

<sup>1</sup>Delft University of Technology, Faculty of Civil Engineering and Geosciences, The Netherlands

<sup>2</sup>Deltares, The Netherlands

<sup>3</sup>Utrecht University, Faculty of Geosciences, The Netherlands

<sup>4</sup>TNO, The Netherlands

\* Corresponding author: [m.barcielarial@tudelft.nl](mailto:m.barcielarial@tudelft.nl)

Soft sediments are progressively used for nature building. In contact with air, drying and rewetting occurs and the organic matter oxidation accelerates. Subsequently, the composition and behaviour of the sediment change.

In this research, the undrained shear strength and plasticity of natural, dry-rewetted and oxidised mud from Lake Markermeer, The Netherlands were studied. The soil was oxidised with hydrogen peroxide, for being a standard pre-treatment procedure for soils.

After treatment, the content of organic matter (loss on ignition) decreased from 3.4 to 2.1% and the organic carbon from 1.7 to 0.5%. Two drying (50°C) rewetting cycles and the chemical oxidation decreased the liquid limit from 82 to 33% and the plastic limit from 42 to 23%. Consequently, the soil lost ability to bind water and the undrained shear strength for the same water content decreased dramatically (see figure 1, a). To get insight into the factors causing the large change in behaviour, the Atterberg limits and the undrained shear strength were also determined after each step of the pre-treatment: drying, addition of demi water and oxidation.

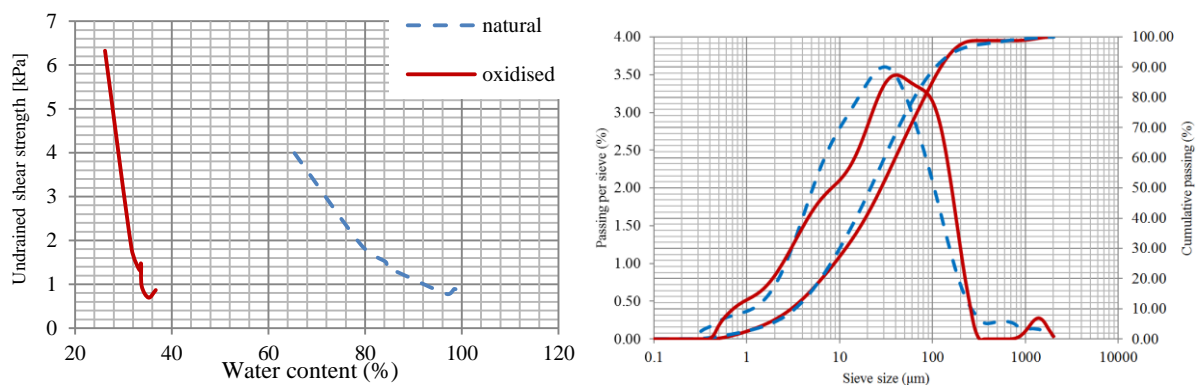


Figure 1. a) Undrained shear strength b) Particle size distribution

Particle size distribution and mineralogy were analysed, showing the former that some aggregation occurred due to the treatment (see figure). The pH remained neutral owing to the carbonates present in the mud.

The results may be indicative for natural processes, as drying, wetting and oxidation occur in nature; although under milder conditions. Moreover, the outcome provides insight into the effect of standardised treatments, highlighting the variability of these effects depending on the sediment composition.