MUDNET
Book of Abstracts
29-30 of March 2021
Delft, The Netherlands

MUDNET Foundation

Dear participant,

Welcome to the first MUDNET conference!
In this booklet, you will find the abstracts of the research keynotes and information regarding the poster presentations: each poster is assigned a room, named after a general topic (BIOMUD, RHEOMUD, NAUTIMUD, 4DMUD, FLOCMUD, SONIMUD). The numbers (1 or 2) at the left of the poster indicate that the presenters will be next to their posters during Research presentation I or Research presentation II.

Spatial Chat main features

- to contact a person : this is done by clicking on the name of that person; you will then appear next to that person
- to zoom in/out : this is done by clicking on the zoom button (in %) at the bottom right of the screen
- to move around in a room : this is done by displacing one's circle with embedded video with the mouse
- to see a different part of the room : this is done by clicking outside one's circle and move the mouse (the background will be moving around you)
- to change room : this is done by clicking the room one wants to be in

If you experience any problem during the conference, please send an email to mudnet@tuldelft.nl or use the chat function of ZOOM. These will be monitored at all times.

The MUDNET organization committee

MUDNET 2021 Conference programme

Day 1: The port perspective				
29-03-2021			**Chair: Kirichek**	
Begin	**End**	**Presentation**	**Speaker**	**Environment**
12:30	13:00	**Welcome and ice-breaker**		Spatial Chat
13:00	13:30	Opening & Introduction to MUDNET	Alex Kirichek	ZOOM
13:30	14:15	**Port of Rotterdam** PRISMA: program innovation sediment management	Edwin Hupkes, Joop Smits, Menno Buisman	ZOOM
14:15	15:00	**Port of Antwerp** Challenges related to mud	Stefaan Ides Wim Defevere	ZOOM
15:00	15:15	Coffee break		
15:15	16:00	**Port of Emden** Maintenance Dredging in Emden Harbour Port of Emden pilot in INTERREG NON-STOP: intelligent sediment & water management	Bärbel Amman Janis Habdank	ZOOM
16:00	16:45	**Port of Hamburg** The Nautical Depth project in the Port of Hamburg	Nino Ohle	ZOOM
16:45	17:15	**Plenary discussion** What are the research needs from the ports' perspective?	Stoffel Rockx (moderator)	ZOOM
17:15	?	**MUD Bar** (bring your rheological drinks!) and networking		Spatial Chat

Day 2: The research perspective				
30-03-2021			**Chair: Chassagne**	
Begin	**End**	**Presentation**	**Speaker**	**Environment**
09:00	09:40	**RHEOMUD + FLOCMUD** Yield stress and liquefaction of muds	Philippe Coussot	ZOOM
09:40	10:20	**BIOMUD** Long-term SPM dynamics in the Elbe Estuary and adjacent coastal zone: interactions with phytoplankton underestimated?	Justus van Beusekom	ZOOM
10:20	11:00	**SONIMUD** Mapping Harbor Basins	Johannes Singer	ZOOM
11:00	12:30	Research presentations I		Spatial Chat
12:30	13:00	Lunch break		
			Chair: Gebert	
Begin	**End**	**Presentation**	**Speaker**	**Environment**
13:00	13:40	**NAUTIMUD** Manoeuvring behaviour of vessels in muddy waters	Mark Vantorre Guillaume Delefortrie	ZOOM
13:40	14:20	**4DMUD** Fluid Mud Modelling in the Ems Estuary	Andreas Wurpts	ZOOM
14:20	14:35	Coffee break		
14:35	15:15	**4DMUD** On the simulation of muddy waters	Andreas Malcherek	ZOOM
15:15	16:45	Research presentations II		Spatial Chat
16:45	17:15	**Plenary discussion** Making ports' needs and researchers' efforts meet	MUDNET team (moderator)	ZOOM
END MUDNET conference				

KEYNOTE RHEOMUD + FLOCMUD

Philippe Coussot, Laboratoire Navier, Université Gustave Eiffel, Champs sur Marne

Yield stress and liquefaction of muds

Muds are generally suspensions in water of colloidal particles which can form a network of (colloidal) interactions at the origin of a yield stress. Depending on the characteristics of these interactions the rheological behavior of the material may range from simple viscoplastic (steric interactions, e.g. kaolin pastes) to strongly thixotropic yield stress fluids (flocculation, e.g. bentonite suspensions) which restructure at rest but somewhat liquefy beyond the yield stress, so that the apparent behavior during flow is that of a yield stress fluid with a lower yield stress than at rest. Even more surprising behavior can be obtained in some cases, for examples a wax suspension in oil or a phosphate mud with a flocculant are brittle yield stress fluids which, when yielding, become a simple Newtonian liquid with a low apparent viscosity.

KEYNOTE BIOMUD

Justus van Beusekom, Helmholtz-Zentrum Geesthacht

Long-term SPM dynamics in the Elbe Estuary and adjacent coastal zone: interactions with phytoplankton underestimated?

The Elbe Estuary is experiencing manifold human induced changes including increased eutrophication, dredging activities superimposed on climate change. Based on long-term data we will show that SPM-dynamics in the Hamburg Harbour region changed over time from background riverine levels of about 20 mg/l to up to 5-fold higher present levels observed during low freshwater discharge. These changes were paralleled by dredging activities. The source of SPM in the harbour region changed toward a dominance of marine SPM. Interactions of eutrophication-induced massive riverine phytoplankton blooms and marine SPM lead to the deposition and degradation of organic-rich material in the harbour region, now being a hotspot of among others coupled nitrification - denitrification, O_2 consumption and N_2O release. Given the importance of marine SPM in the Elbe estuary and its deposition in the Hamburg Harbour area, we will discuss the interactions between eutrophication and SPM dynamics in the coastal North Sea.

KEYNOTE SONIMUD

Johannes M Singer, Fugro NV, Chief Scientist, Fugro Nootdorp Research Center

Mapping Harbor Basins

A fundamental question for this meeting is: “Where is what, and how can we map it quickly and efficiently?”

I would like to provide in this keynote talk an overview on techniques used for mapping Harbor basins, the seafloor and the different layers where water gradually changes to solid, and the boundaries of the harbor basin including key walls. I will attempt an overview of techniques already applied in the

industry (including but not restricted to Fugro), examples and case studies from literature, as well as an outlook how more recent techniques could contribute to this. These recent techniques focus on ideas and experiments, both in TU Delft and Fugro, on using seismic techniques to map the interface layers between water, mud and solid seafloor. Tools of choice include passive and active seismic investigating interface and surface waves with a high content of shear waves probing specifically the geotechnically relevant soil and mud parameters.

KEYNOTE NAUTIMUD

Mark Vantorre & Guillaume Delefortrie, Ghent University

Manoeuvring behaviour of vessels in muddy waters

The manoeuvring behaviour of vessels is highly affected by their small under keel clearance in access channels and harbours. If sedimentation and the formation of mud layers occur in these areas the manoeuvring behaviour becomes even more challenged, especially because the exact location of the bottom is not unequivocally determined. In such areas the nautical bottom definition, as stated by PIANC, should be applied. Over the past decades research at Flanders Hydraulics Research and Ghent University has been focussing on both the determination of the physical characteristics of the mud and the manoeuvring behaviour in such areas. The keynote will give an overview of this research.

KEYNOTE 4DMUD

Andreas Wurpts, NLWKN Norden

Fluid Mud Modelling in the Ems Estuary

Lower Ems is a hyper-turbid estuary with severe ecological problems like anoxic conditions during the low discharge summer season.

In order to prepare and optimize remediation options, NLWKN Coastal Research Station has developed a coupled hydro-morphodynamical numerical model, which is capable of seamless transition between turbulent free flow and non-Newtonian fluid mud flow. The presentation covers the model description, its application to the Ems estuary, and some validation against measured data.

KEYNOTE 4DMUD

Andreas Malcherek, Universität der Bundeswehr, München

On the simulation of muddy waters

A conceptual approach will be presented which is able to simulate the movement of muddy waters over the full range of clear, turbulent waters to suspensions to fluid mud as well as consolidating beds. It will be shown that this approach implemented in a 1DV model is capable to reproduce the complex tidal cycle of settling, stratification and resuspension measured in the Ems estuary.

RHEOMUD I		
1	Rheological behaviour of marine sediments for assessing nautical depth	A. Benamar A. Pantet M-T Ammami
1	Rheological measurements to improve the understanding of suspended sediment dynamics in the Ems estuary	C. Borgsmüller
1	IHC Deltares online pipe rheometer (IDRM)	J. van Wijk A. Talmon W. Boomsma E. Meshkati
1	Rheological analysis of a model mud for laboratory erosion experiment	P. Lecostey G. Gomit S. Jarny L. Thomas

RHEOMUD II		
1	Rheology of mud from the Port of Hamburg	A. Shakeel A. Kirichek C. Chassagne
1	A rheological model for mud which avioids the use of a yield stress	J. Schmidt A. Malcherek
1	Rheology of cohesive suspensions: a preliminary approach towards the sediment transport	A. Bougouin A. Jarno A. Benamar F. Marin A. Pantet
1	Rheology in polymer-clay suspensions	E. Eiser

BIOMUD		
1	Organic matter in river sediments	F. Zander J. Gebert
1	Using Oligochaete worms for dewatering of soft fine grained sediment: an overview of progress	M. de Lucas, A. Kirichek M. Kox F. van Rees R. de Sutter
1	BESMART Technologies: Bio-engineering and sediment management and removal of turbidity technologies	M. de Lucas, A. Kirichek M. Kox F. van Rees
1	Swelling clays detection in mud sediments	F. Deon F. Zander C. Chassagne J. Gebert

FLOCMUD		
1	Potential of bio flocculant for flocculating deep sea mining plumes	W. Ali A. Kirichek C. Chassagne
1	Quantifying Flocculation ettling Dynamics of Natural Fine-Grained Suspended Sediments : “Floccin’Across the USA!”	A. Manning
1	Dynamics of cohesive sediments	C. Chassagne Z. Safar A. Manning
1	Iron rich micelles at the continental shelf after iron ore tailing input	C. Grilo
1	Examining the erosional and depositional behaviour of cohesive sediments: Flocculation in an estuary	J. Rounce A. Manning

NAUTIMUD & SONIMUD		
2	A turbulence model for Herschel-Bulkley flows	S. Lovato G.H. Keetels J.W. Settels S.L. Toxopeus
2	Simulation of a steady turning circle manoeuvre in contact with fluid mud	I. Shevchuk M. Abdel-Maksoud
2	Experimental and numerical study of a cylinder passing through fluidized natural mud	M. S. Sotelo D. Boucetta B. Brouwers G. Delefortrie
2	Investigation of Fluid Mud using seismic measurements	X. Ma A. Kirichek D. Draganov

4DMUD I		
2	Far-field dispersion of dredged material in the Port of Rotterdam area	T. van Kessel K. Cronin D. van Keulen
2	Detailed near field modelling of mud dredge plumes	L. de Wit
2	Protocol to prepare the FHR’s consolidation set-up in the context of navigability through mud	M. Ibanez D. Meire
2	Towards a generalized circular use of salty dredged sediments	M. Barciela-Rial B. Felix C. Vaz-Perez W. van der Star F. Haarman E. Besseling L. Sittoni

4DMUD II		
2	Modelling of deep sea mining generated plumes	M. Elerian R. Helmons C. van Rhee
2	Grain-resolved simulations of cohesive sediment dynamics	B. Vowinckel K. Zhao T. Hsu B. Bai E.Meiburg
2	Beneficial use of dredged marine mud – from fresh mud to dike: implementation, monitoring and modeling	E. Meshkati T. van Kessel D. van Keulen A. Talmon G. Dupuits P. Vardon M. van den Heuvel N. Nijborg L. Sittoni W. van der Star