

## Newsletter Coastal and Port Engineering Alumni

No. 6, January 2018

### Introduction

From the not-so-cold winter in Delft we send you this update on our activities in the Coastal Engineering and Port Development specialization. It has been an interesting year, with lots of travel and projects in Vietnam, Sri Lanka, China, Ivory Coast, Sao Tomé, Indonesia, Australia and the USA, to name a few. More and more we are asked to apply not only our modelling expertise, which remains a core strength, but also our broader know-how on coastal erosion, climate adaptation and risk assessment, to pressing issues worldwide. We bring these experiences back to the classroom and find inspiration to improve our models, such as XBeach, now a world standard for storm impact assessment on dune coasts; to develop further the Probabilistic Coastline Recession (PCR) model; to help develop the Delft3D Flexible Mesh for barrier islands and coral coasts, and to develop new paradigms for coastline modelling, ShorelineS, and for climate change driven coastline change along inlet interrupted coasts, SMIC, both applicable to complex sandy coasts. More and more we develop an understanding of mangrove coasts, through coastal protection projects and fundamental PhD research. Last year, we led an ADB funded project on coastal risk assessment in Sri Lanka which resulted in the determination of economically optimal setback lines along a 200 km stretch of the coastline. Furthermore, we contributed heavily to the EU RISC-KIT project led by Deltares that aimed to quantify coastal risk and to design disaster risk reduction measures using techniques both from engineering and social sciences; based on this and other projects we have strengthened our portfolio in quantitative assessment of coastal vulnerability and development of Disaster Risk Reduction strategies and operational forecasting. Climate change and its impact on the coast challenges our and upcoming generations. In our education and research we have put more emphasis on assessing climate change impacts via developing coastal vulnerability, impact and risk assessment tools and modeling efforts on tidal flat survival under sea level rise scenarios. In light of the grave challenges that our coasts and coastal populations are facing this is an excellent time to deepen your knowledge and hone your coastal skills in an international setting where teachers and students from developing and developed countries meet and interact to work towards sustainable coasts and ports.



**Prof. Dano Roelvink,**

**Head, Coastal  
Systems &  
Engineering and Port  
Development.**

**ASCE/COPRI 2017  
International Coastal  
Engineering Award**



You, as proud alumni of IHE, can help us spread this word among your colleagues, friends and students, and to facilitate them where possible in finding the opportunity and funding to join us at:

<https://www.un-ihe.org/msc-programmes/specialization/coastal-engineering-and-port-development>

## Education

In the taught part of our 1.5 year MSc programme we are launching two new modules that reflect core strengths of our team:

- Climate change impacts and adaptation in coastal areas. In this new module we look at the climate system and climate change and its impacts on the coastal system; on the specific effects on ports and maritime operations, and ways to deal with them, e.g. through the *green port* concept; and on coastal hazards and risk assessment, including quantitative risk assessment and stakeholder engagement in decision making.
- Process-based coastal modelling. In this intensive, hands-on course you will be immersed in the Delft school of modelling coastal hydrodynamics and morphology, from setting up a regional model to simulating wave penetration in ports, storm impacts on dunes, complex morphodynamics on timescales of years and advanced shoreline modelling, taught by the developers and practitioners of world-leading systems such as Delft3D, XBeach and ShorelineS.

## International field trip and field work in Portugal

After last year's successful field work in the Ria Formosa in southern Portugal we will organize both the international fieldtrip and the CEPD fieldwork in Portugal, which offers stunning coastal features, a range of natural and engineered beaches, severe erosion problems, ports in extremely challenging places and a range of dams, irrigation works and other water-related infrastructure. The fieldwork takes place at Ancao Inlet, a small, highly mobile tidal inlet next to long sandy beaches and dunes, where it is easy to make observations of all the fascinating processes that shape our coasts. Keywords for this fieldwork are independence and improvisation; it covers the design of a measurement scheme, execution, data retrieval and a first analysis.



Fieldwork site at Praia de Faro, Algarve, Portugal

## Staff Information

Last year we welcomed Dr Alvaro Semedo as a full-time senior researcher in our group. Alvaro does research in meteorology, climatology and oceanography and is active in a number of international networks and projects, like the WRCP COWCLIP project, and most recently the ESA SKIM project. He works closely with other members in our group on downscaling wave climates and assessing climate change effects; he lectures in Waves and Tides. Also, two postdocs started working in our group: Dr Trang Duong, in numerical modelling of coastal sediment transport and climate change impacts on coasts, and Dr Aysun Köroglu – Dogan who works on developing a coastal vulnerability index. This brings our staff to ten people, approx. 6.fte. Throughout 2017 we also hosted Assoc. Prof Keiko Udo from Tohoku Univ, Japan which has led to a new strong professional link between CSEPD and The International Research Institute of Disaster Science at Tohoku University, Japan.

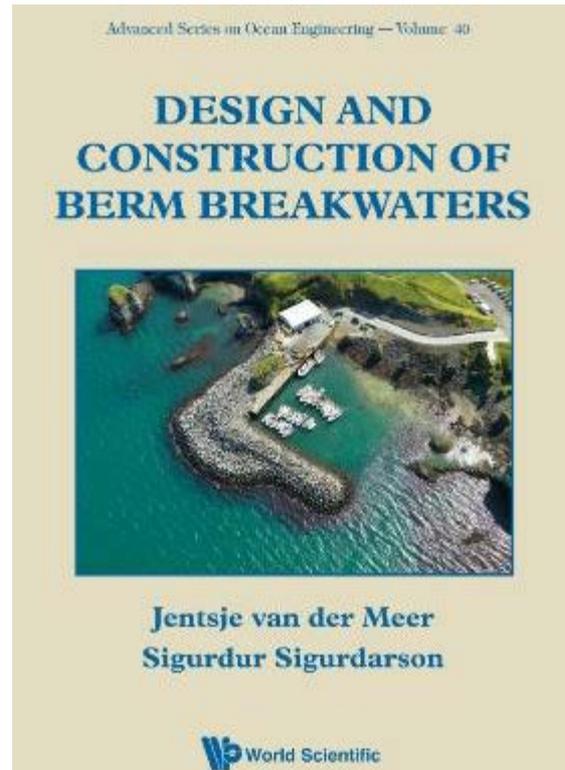
## Book: Design and Construction of Berm Breakwaters



Prof. Van der Meer, the successor of prof. Ligteringen, published a book in 2016 on Design and Construction of Berm Breakwaters, together with co-author Sigurdur Sigurdarson from Iceland. Berm breakwaters may be a useful

and economically attractive alternative if good quarries are present near the location of the project. By optimal blasting at quarries it is often possible to achieve rock well above 10 t and even 20 t, rock sizes that are hardly used in design of conventional rock structures. This book gives scientific background, but also practical design rules, application in examples and description of constructed breakwaters. The book is available at World Scientific and more information can be found at:

<http://www.worldscientific.com/worldscibooks/10.1142/9936>.



## MSc-research

In October 2017 students started the research phase of their studies in Coastal Systems, Engineering and Port Development. The projects include a very wide range of coastal and port topics. All the MSc topics this year are defined in relation with a research, development or design projects around the world. The students will present and defend their work in mid-April 2018. The list of students and their topics is as follows:



Name	Topic
Edgard Leal Padron	Wave Overtopping at Coastal Defences under Crossing Seas
Carlos Lu	Breakwaters in XBeach
Ahmed Elghandour	Efficient Modelling of coastal evolution
Miles Harris	Swell wave events in the Caribbean Sea and Gulf of Mexico
Bingying Ying	Wave Climate Impact on Mudflat Morphodynamics
Hector Manzo Salazar	Adaptive port planning for the Port of Valencia Spain,
Ayu Dwi Ningrum	Serious Gaming for Port Development: A case study of Port Constructor
Ahmed Shareef	Port Development in Small Island Developing States : A case study of the Maldives
Raul Vasquez Gianella	Assessing the generic applicability of the Probabilistic Coastal Recession model
Carolina Martinez Da Cruz	Stochastic projections of coastline variations. Case Study: HASAKI, Japan

## PhD-research

Our group typically (co-) hosts around ten PhD fellows,

**Chris Lashley** from Barbados received his MSc-degree at IHE Delft in April 2017 and started a PhD-research in September 2017. He is part of a large PhD-programme (20 PhD-students) in the Netherlands with the name All-Risk and his topic is wave propagation over shallow foreshores and impact on crest level design of dikes.

**Üwe Best** from Guyana also just received her MSc degree at IHE Delft and has embarked on a PhD at IHE, in collaboration with Deltares, looking at modelling morphodynamic development of mudflats including the vegetation development, for salt marshes and especially mangroves.

**Vo Quoc Thanh** from Vietnam is continuing his PhD on the development of morphodynamic models for the Mekong delta; in 2017 he published a paper in Continental Shelf Research and contributed to an article in Oceanography. His flexible-mesh model covers the entire delta up to Kratie in Cambodia, including the channel networks and floodplains, and the adjacent continental shelf.

**Tan Duoc Nguyen** from Vietnam has dived into the fundamentals of 3D wave-current interaction and has re-derived a set of equations that can be applied in models such as Delft3D; so far he has tested them in his own 2DV test model, with encouraging results.

**Jakia Akter** from Bangladesh has developed a morphodynamic model of the whole of Bangladesh that shows surprisingly realistic behavior, in terms of channel patterns and sedimentation trends, and is now busy validating and reporting it.

**Seyedabdolhossein (Abdi) Mehvar** from Iran is doing research on the value of coastal ecosystem services and has been doing field work in Sri Lanka and Bangladesh so far.

**Li Qin Zuo's** draft thesis has just been approved by his supervisors Dano Roelvink and Yongjun Lu of Nanjing Hydraulics Research Institute. It deals with the fundamentals of the bottom boundary layer for silty and sandy sediments, under combined action of currents and waves. He has developed a number of new formulations that can be implemented in models such as Delft3D and carried out an extensive validation against field and lab measurements.

**Johan Reynolds** combines his lecturer position with his own PhD research, carried out between IHE and Deltares. His focus is on understanding and modelling the morphodynamics of complex coasts, using a flexible-mesh approach; he is heavily involved in developing the Delft3D-FM model further to represent infragravity waves and coastal morphology.

**Maarten van Ormondt** is a coastal engineer at Deltares who has been partly freed up to carry out a PhD study with IHE, on storm impacts and their morphodynamic response. His study has two main parts: developing fast methods to predict waves, storm surges and the resulting inundation during hurricanes, and predicting the fate of breaches in barrier islands in the years after their generation; his work is partly funded by the US Geological Survey and the Office of Naval Research.

**Hesham Elmilady** is from Egypt. His topic is on long-term morphodynamic modeling of climate change in estuaries, with case studies in the Western Scheldt and San Francisco Bay. Special emphasis lies on sandy tidal flat morphodynamics.

**Bamunawala Rajapaksha Mudiyansele** from Sri Lanka is developing a holistic, generic modelling approach to simulate catchment-estuary-coastal system behaviour at macro time scales. His study sites are located in Sri Lanka, Vietnam and USA.

**Jeewa Thotapitiya Arachchilage**, also from Sri Lanka, and studies the modelling of changes in hydrological and coastal systems under climate change and human activities in data poor regions, focusing on Myanmar and Sri Lanka

## Ongoing projects

Our chairgroup is involved in a large number of research and capacity building projects worldwide, usually with local partners. Here we highlight a few important ones.

**HYDRALAB** is a EU funded project, where physical model research proposed by a consortium of universities will be performed in large facilities in Europe. The project CROSSOVER will measure wave overtopping at coastal structures caused by crossing seas, like sea en swell from different directions, in the large Deltabasin at Deltares. Universities of Edinburgh, Rome, Barcelona, Lisbon and IHE Delft are involved. IHE MSc-research is and will further be involved in performing tests and analysis. The tests are foreseen in the first half of 2018.

**RISC-KIT** is an EU-funded project developing risk management tools, with the help of End Users, to help deal with hazards and storm impacts in vulnerable coastal areas. This involved developing a chain of models from offshore conditions to damages on land, with XBeach as a vital link to simulate dune erosion and overtopping. Our role was to validate and develop XBeach further so that it would run smoothly for all 11 case studies, and to implement the chain of models for one of the cases studies, Kristianstad in Sweden. More info at [www.risckit.eu](http://www.risckit.eu).

**CRISP** Quantitative assessment of coastal risk under present and future climate change scenarios along the Trincomalee and Batticaloa district coastlines (Sri Lanka). This project applies the Delft developed coastal risk assessment and optimisation approach to calculate sea level rise induced coastline recession and storm erosion, to produce economic and environmental risk maps and to determine economically optimal coastal setback lines along these coastlines. The project is being undertaken in close cooperation with the Coast Conservation Dept of Sri Lanka and the Asian Development Bank.

**CASCADE** is a multi-disciplinary project led by the US Geological Survey to simulate the effects of various scenarios of climate change and human interference in the San Joaquin – Sacramento –San Francisco Bay area. Our role is to develop models of the 3D hydrodynamics, sediment transport and morphology in this complex areas based on the Delft3D-FM software, as a basis for water quality, ecology and risk assessments. This was a pilot application of the system and also serves as a pilot in providing it as a freely accessible community model on <http://www.d3d-baydelta.org/>.

**LOWER MEKONG DELTA COASTAL ZONES** is a project funded by the EU and the Agence Française de Developpement, led by the Southern Institute for Water Resources Research in Ho Chi Minh City. The project includes extensive field work, numerical and physical modelling and led to an improved understanding of the large-scale erosion processes and concrete recommendations for shore protection pilot projects in the Go Cong and Phu Tan areas. Dano Roelvink was involved as international expert and coordinator of the work package on protection measures, with an emphasis on Building with Nature approaches. More info on <http://lmdcz.siwrr.org.vn>

## 54th International Port Seminar

The 54th edition of the International Port Seminar (previously called “Port Management Seminar”) will be held at IHE –Delft from 23<sup>rd</sup> of April to 4<sup>th</sup> of May 2018. Since the 1st edition in 1965 more than 1000 participants have attended the IPS. They came (and still come) from all maritime countries in the world, from Port Authorities, Ministries, consulting companies and contractors. Throughout this period IHE Delft had the support from the Port Authority of Rotterdam, but also from the major ports in the neighbouring countries, in receiving the participants during field trips. The Seminar is aimed at professionals in (or on their way to) management positions in the fields of port and terminal management, port planning and development, port consultancy, construction and maintenance. A BSc level and working knowledge of English are required to benefit fully from the Seminar. A limited number of Fellowships for the seminar is available from the Dutch Government.



 IHE  
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### International Port Seminar

23 April – 4 May 2018  
IHE Delft, The Netherlands

Registration is now open for the 54th IHE Delft International Port Seminar which will take place in Delft from 23 April – 4 May 2018. IHE Delft Institute for Water Education is the largest graduate water education facility in the world. The Institute confers fully accredited MSc degrees and PhD degrees in collaboration with Dutch universities, as well as a large number of short courses.

This short course is run by world renowned experts from IHE Delft, Port Authorities, Universities and prestigious companies, who will give an insight into the latest port management and development trends and innovations. Topics included in the 2018 Seminar:

- Planning, design and management of modern sustainable ports
- Construction and maintenance of port infrastructure
- Port financing
- Economics of ports
- Port safety and security issues
- Stakeholdermanagement

Visits to the Port of Rotterdam and Belgian ports are included in the course fee of €1900.

For more information and application  
[www.un-ihe.org/international-port-seminar](http://www.un-ihe.org/international-port-seminar)