**9th International Conference on the Application of
Physical Modelling in Coastal and Port Engineering
and Science (Coastlab24)**

Delft, Netherlands, May 13-16, 2024

POST-CONFERENCE REPORT OF COASTLAB24

BAS HOFLAND, OCTOBER 2024

1   INTRODUCTION

The 9th International Conference on the Application of Physical Modelling in Coastal and Port Engineering and Science (Coastlab24), was held in Delft, the Netherlands, during May 13-16, 2024. Coastlab24 builds on the success of previous conferences in Porto (2006), Bari (2008), Barcelona (2010), Ghent (2012), Varna (2014), Ottawa (2016), Santander (2018) and Zhoushan (2020). Coastlab is organized under the auspices of the Coastal and Maritime Hydraulics Committee of IAHR.

The Coastlab conference series focuses on Physical Modelling in Coastal Engineering and Science. Three decades after a period in which it was widely thought that increasing computer capacity would cause physical modelling to soon become obsolete, the science and craft of physical modelling is still very much alive, and each year many coastal modelling facilities are either being newly built or renovated. The Coastlab conference series focusses on the physical modelling and measurement techniques themselves, and on their application in the field of coastal engineering. The use of novel techniques measurement techniques like laser scanners, digital cameras and miniature sensors is more and more being incorporated in the physical modelling practise. Moreover, the generation of realistic wave fields (including tsunamis and ship waves) remains a challenge. Many activities are ongoing in the coastal area that are required to tackle several major societal challenges like climate change adaptation, the energy transition, and loss of natural habitat.

Figure 1. Coastlab24 participants disembarking from the boat during the Technical Tour.

The Coastlab24 conference had three keynote lectures, 129 technical presentations in three parallel session, and 155 participants (see Figure 1) from 28 countries. This ideal medium size makes this conference attractive. It is large enough to have enough interesting and relevant content, and not overwhelming in terms of duration and amount of people and presentations.

The conference was organized by a committee consisting of Marcel van Gent (vice-chair), Maria Sklia, Su Kalloe, Davide Wüthrich, Dimitris Dermentzoglou, Alessandro Antonini, Matthieu de Schipper, Marion Tissier, Nicole Fontijn (Bluebox-events), and Bas Hofland (chair).

The main venue was Lijm&Cultuur, a 19th century glue factory, that is located very appropriately bordering the TU Delft campus, a water channel and a concrete factory. The professional management and technicians of the venue made the stay the participants very pleasant.

To improve the conference quality and make it more accessible we obtained contributions (ca. 50k€) from several sponsors. Gold sponsors: Deltares, Rijkswaterstaat and Van Halteren, Silver sponsors: Van Oord and Nortek, and Bronze sponsors: Uebertone, Infram-Hydren, XStone/XStream, and MadTTech.

During the closure of the conference the chair of the Maritime Committee of IAHR, Zhiguo He, presented the next location of the conference for 2026, as was selected by the committee during the committee meeting: IIT Madras in India.

2 PROGRAMME

The technical presentations were the main part of the conference on Tuesday to Thursday. Each of these days started with a plenary Keynote. Other events during the conference were the Pre-Conference Lectures and Lab Workshop, Icebreaker drinks, Technical Tour, Conference Diner, Podcast recordings, and Post Conference Tour. The general conference schedule is shown in Figure 2 below.

Figure 2. General programme of Coastlab24.

3   SCIENTIFIC TOPICS TREATED

First of all, studies into practical applications were a major part of the programme, treating the themes named Coastal Structures (16 presentations), Case Studies (12 presentations), Renewable Energy (5 presentations) and Flood Safety (4 presentations), which amounted to 37 presentations (29% of total). Most of these presentations were given by academics, but also several (mainly Dutch) participants from industry and government gave talks on actual projects/structures that are being developed. The main processes that are important for these applications also made up a large part of the presentations, with Wave Overtopping (12 presentations) and Wave-Structure Interaction (9 presentations), yielding a total of 21 presentations (16% of total).

Several Keynotes were also related to the practical application. Medina highlighted three major aspects of relevance for the construction of breakwaters: the changing climate, the ageing of infrastructure, and the inclusion of the nature in our designs. Kuiper and Boerma showcased a recent case study of a large aging structure, the Afsluitdijk, for which an upgrade was designed using much physical modelling, and which is aimed to be stable the coming century under a changing environment. Nepf discussed how much carbon sequestration we could attain by sea grass meadows, which are regularly being considered when coastal projects are being developed. In his pre-conference lecture Van Gent focused on the adaptation of coastal structures to climate change.

The techniques for physical modelling and measurements are specific interests of this conference. Relevant topics in this category were Lab. Technologies (12 presentations), Modelling Nature (12 presentations), Field Measurements (8 presentations), Wave Generation & Analysis (5 presentations), and Composite Modelling (7 presentations) totalling 44 presentations (25% of total). A topic that is becoming popular in the last two decades is 'Building with Nature'. Making this rather vague concept more concrete and more applicable in practical engineering also requires dedicated physical modelling techniques. In the Modelling Nature talks this was treated: what aspects of nature should be incorporated in physical models, and how this can be done? Some of these techniques were also discussed during the pre-conference lectures, on measuring damage to rubble mound breakwaters (Hofland) and modelling dambreak waves (Wüthrich & Nistor) and flexible vegetation (Nepf).

The processes just in front of the structures and coasts, which are important for a good determination of the hydraulic boundary conditions were treated under the themes Coastal Hydrodynamics (7 presentations), Tsunamis (5 presentations), Infragravity Waves (8 presentations) and sediment & scour (4 presentations), with in total 24 presentations (19% of total). Special attention was given to Infragravity Waves in two special sessions led by Marion Tissier and Peter Troch. These long period waves can occur on shallow foreshores. Much work has been done on the generation of these waves, but about their interaction with coastal structures much less is known. Also tsunamis remain an active area of research after the large 2004 and 2011 tsunamis.

The coastal engineers dealing with sediments and morphology form a slightly separate group from the coastal engineers dealing with structures. Where the latter group mainly uses physical modelling as a tool, the former group of morphologists mainly uses field measurements. The main focus of the conference has been and was on the structural part, but the interaction with sediments is important, as it forms an important boundary condition. So it is good that with sessions on sediment and on field measurements, some interaction between these groups was achieved.

4   DISSEMINATION

The main aim of the conference is to disseminate knowledge on the themes and within the community, and to promote interaction between the researchers. This has been achieved in the following fashion:

Presentations. As described is Section 2, many interesting presentations were provided. The wearable microphones and high quality venue gave the talks a TEDtalk-like professional feeling and enabled the presenters to convey their message well. As we did not want to have different classes of presenters (except for the keynote speakers) there were no poster presentations. Everyone could present their work in a 15 minute talk (including discussion) in the three parallel sessions.

Proceedings. All presenters either submitted a proceedings paper or an extended abstract along with their presentation. The Coastlab24 proceeding are placed under a fixed link website, with guaranteed access for (at least) 15 years by the inhouse publisher TUDelft OPEN. The proceeding can be found here: https://proceedings.open.tudelft.nl/coastlab24/.

Journal. Instead of a proceedings paper, participants can also submit a full paper to the *diamond open-access* Journal of Coastal and Hydraulic Structures (JCHS). Some 10 papers have been submitted for the Coastlab24 special issue (called *thematic series* in JCHS), but will only be published on the journal website after the ongoing review process has finished. The papers will then also be copied to the proceedings website. Two JCHS special issue papers that have already been published: paper1 and paper2.

Pre conference talks and lab workshop. The following pre-conference courses were given at the Faculty of Civil Engineering and Geosciences on Monday :
1) Novel Measurement Techniques In Coastal Modelling | Bas Hofland (link)
2) Physical Modelling of Coastal Vegetation To Improve Green Infrastructure Design | Heidi Nepf (link)

3) Dam-Break Waves: From Theory To Applications | Davide Wüthrich and Ioan Nistor (link)
4) Climate Adaptive Coastal Structures And The Role Of Wave Overtopping | Marcel Van Gent (link)

After a nice lunch at Café LABS, there was a pre-conference lab workshop in the Hydraulic Engineering Lab. of TU Delft, where the following setups were visited.

Demo 1: Wave field measurement and nature modelling in Wave Flume (Dimitris Dermentzoglou)
Laser scanner of wave field over >10 m, and demonstrations of flexible modelled vegetation placed on the flume floor

Demo 2: Unsteady flow in Tilting Flume (Davide Wüthrich and Ioan Nistor)
Dambreak setup and highspeed video camera of the dambreak bore/surge.

Demo 3: Motion sensors in Reefy blocks in Sediment Flume (Pieter Geenen)
Reefy blocks were placed in the flume, with the upper one instrumented with a motion sensor.

Demo 4: Scaling of Rock bag stability in Sediment Flume (Lukas Poutré).
Setup of then ongoing measurements on offshore rock-bag stability.

The setups were linked to the presentations in the morning and during the conference. Very intense knowledge exchange occurred, with some participants to the workshop working on similar topics using similar techniques.

Keynotes. Every day of the conference started with a 30 minute keynote lecture (see photos in Appendix C):

Heidi Nepf (MIT): *Vegetation hydrodynamics to inform climate mitigation and adaptation*. Prof. Nepf discussed a combination of modelling and field measurement that explores the influence of wave and current conditions on carbon accretion in seagrass meadows.

Josep R. Medina (Laboratory of Ports and Coasts of the Universitat Politècnica de València in Spain): *Breakwaters in a living environment*. Prof. Medina discussed the relevance of breakwaters in economic development as well as the environmental impacts and challenges of breakwater design in the 21st century. The dismantling or rehabilitation of many breakwaters in developed countries and the construction of new ones have to be adapted to the principles of sustainability and resilience. Any rehabilitation or new breakwater design will face climate change which affects the coastal environment and also questions the statistical methods widely used for the design of breakwaters in the 20th century.

Emiel Boerma (Rijkswaterstaat) and Coen Kuiper (Witteveen+Bos / Levvel joint venture): *The role of physical modelling in the rehabilitation works for the Afsluitdijk*. They discussed the importance of scale model tests in the design, verification and validation process of the large scale (~1B€) reconstruction works for the Afsluitdijk closure dam. The contractor used a combination of small- and large-scale model tests to optimize the stability of the innovative armour units and to verify the geometry with regard to stability and wave overtopping. The model test results have also been used to determine the construction tolerances and criteria for the 25 years maintenance period.

Podcast. The presenters had the possibility to discuss about their studies in a professional podcast. Eight researchers took up this challenge and were interviewed by LOC member Maria Sklia. The podcasts can be found here: https://www.mixcloud.com/coastlab24/. The recordings are also placed in the proceedings website next to the paper / extended abstract that was the topic of the respective podcast. See photo F6 in Appendix F.

Exhibition booths of sponsors were installed in the main room for socializing, coffee, and lunch. So constant interaction between the sponsors and participants was possible. The sponsors constituted institutes that operate in the field of coastal engineering and regularly require or perform physical modelling studies, and they were providers of measurement equipment and wavemakers. Several measurement techniques, construction materials were exhibited. So these stands were of interest to the conference participants. F2 in Appendix F.

Social events & networking. During the Icebreaker, Technical Tour, (optional) Conference Diner, (optional) Post-Conference Tour, and the time in between presentations the participants interacted a lot, and much knowledge was exchanged and connections were made. See Appendix F for photos.

Tours. During the tours some coastal engineering highlights of the Netherlands could be observed by the participants.

During the (included) Wednesday *Technical Tour* (photos in Appendix D) we visited the area just South of Delft. First the large wave flume, the Delta Flume at Deltares was visited. Unfortunately the waves (the Dela Flume can make the largest artificial waves in the world) had just demolished the barrier that was tested, so we could not observed the giant waves that it can make. But the large scale of the facility could be experienced. Then on a boat trip on the Nieuwe Waterweg – the entrance to Europe's largest port, the Rotterdam Port, the participants could see parts of the port, the Hook-of-Holland breakwater, and as a highlight the Nieuwe Waterweg Storm Surge Barrier with its two 300 m long sector gates – this all while enjoying a drink. Lastly we visited the large mega-nourishment, the Sand Motor. This nourishment made 13 years ago has been eroded (as intended), but still the size was still impressive. Due to the erosion the beaches neighbouring the nourishment site have been widenened, and the dunes have been heightened.

During the (optional) *Post-Conference tour* (see photos in Appendix E) on Friday, 30 participants visited several relatively recent coastal engineering projects North of Delft (in the province of North Holland) in a full programme. First the largest ship lock in the world at IJmuiden was visited. Next we visited the mega nourishment (30 Mm^3 of sand) at Petten, where the newly constructed dunes now form a hybrid defence together with the impressive coastal dike behind it. Next, after

a lunch in the small fishing port of Den Oever, we could view several of the new hydraulic structures in the Afsluitdijk, followed by a visit of the 30+ km long reconstructed and innovative outer armour layer of the Afsluitdijk (which was also the topic of the last Keynote). At last we visited the Zuiderzeemuseum, where it could be seen how a century ago people lived in several isolated coastal villages around the Southern Sea (which became the IJssel lake after construction of the Afsluitdijk).

Appendix A. Technical Programme Coastlab24

Tuesday 14-05-2024

		Room A: Centrale	Room B: Chemie	Room C: Chaos
08:00	09:00	**Registration**		
09:00	09:20	**Welcome**		
09:20	10:00	**Keynote 1: Heidi Nepf** Vegetation hydrodynamics to inform climate mitigation and adaptation		

Tue1 — 10:00 to 11:00

		Wave overtopping 1 chair: Corrado Altomare	**Modelling Nature 1** chair: Maria Maza	**Laboratory Technologies 1** chair: Davide Wuthrich
	10:00	8 - Marisol Irias Mata — Hybrid Modelling Of Wave Overtopping At Rubble Mound Breakwaters	50 - Arnold Van Rooijen — Physical Experiments Of Wave Attenuation Over Submerged Shellfish Reefs	2 - Manuel Corrales-Gonzalez — Novel Real-Time Data Acquisition System Of Hydrodynamic Signals Obtained In Laboratory
	10:15	9 - Marcel R.A. Van Gent — Low-Crested Structures In Front Of Rubble Mound Breakwaters	58 - Marco Ghisalberti — Reefense: Design Of A Porous Modular Hybrid Reef For Coastal Protection	24 - Maike Paul — Adapting Methods For Bed Level Assessment In And Around Submerged Vegetation
	10:30	19 - Jorge Molines — Individual Wave Overtopping Volumes On Mound Breakwaters	69 - Justin Geldard — Experimental Observations And Prediction Of Wave Attenuation Using A Coral Reef Restoration Approach	51 - Sarah Krogh Iversen — Directional Spectrum Estimation For Sea States Generated By The Single Summation Method
	10:45	15 - Vera Van Bergeijk — Overtopping Reduction By Artificial Reefs	11 - Aruna Nandasena — Small-Scale Experimental Evidence On The Use Of Date Palm Forest To Mitigate Tsunami In The Arabian Sea	38 - Christina Carstensen — Generation Of Scaled Long-Period Ship Waves In A Pump-Driven Flume

11:00	11:30	Coffee Break (Boiler Room)		

Tue2 — 11:30 to 12:30

		Wave overtopping 2 chair: Alessandro Romano	**Field Measurements 1** chair: Paul Bayle	**Case studies 1** chair: Ian Coghlan
	11:30	48 - Margaret Libby — Quantifying Overtopping Performance Of Green-Gray Hybrid Infrastructure	36 - Charlotte Dreger — Short-Term Coastal Impact Of Lakeshore For Natural Reserve Protection	92 - Dennis Van Kester — 2D Model For Addu City Project - Wave Transformation Over Reef Flat
	11:45	74 - Jordan Keck — The Effects Of Overtopping On Green/Grey Infrastructure	93 - Sara Russo — Marelab: The Lab Of The Mediterranean Sea For Marine Renewable Energy	10 - Carl Wehlitz — Hydraulic Stability Of The New Cubilok™ Armour Unit On A 3:4 Slope
	12:00	21 - Corrado Altomare — Overtopping Flow Velocity Characterisation Of Focused Waves On Promenades Using The Bubble Image Velocimetry Technique	130 - Ruurd Jaarsma — ADCP suspended sediment transport monitoring using acoustic particle radius	66 - Francois Flocard — 50 Years Of Hanbar Concrete Units In Australia And New-Zealand: Lessons Learned From Physical Modelling Studies And Recently Built Structures
	12:15	126 - Marc Willems — Performance Analysis Of An Innovative Field Measurement Setup For Wave Overtopping At A Dike On A Shallow Foreshore	85 - Yiqun Ye — Observation Of Ocean Wave Based On Binocular Vision In The Swash Zone Of Yazhou Bay	154 - Esteban Escobar Valencia — 2D And 3D Physical Model Testing For The Rehabilitation On The Frioul Port Breakwater (France)

12:30	13:45	Lunch break (Boiler Room)		

Tue3 — 13:45 to 14:45

		Wave overtopping 3 chair: Vera van Bergeijk	**Coastal hydrodynamics 1** chair: Ioan Nistor	**Composite Modelling 1** chair: Sang-Ho Oh
	13:45	122 - Fatemeh Hajivalie — Experimental Study On The Effect Of The Wavelength On Wave Overtopping Over Recurved Walls	40 - Amit Ravindra Patil — A Multiscale 1D-2D Coupled Model Of The Scheldt Estuary Rivers And The European Continental Shelf	37 - Joost Den Bieman — Validation Of An Efficient Non-Hydrostatic Wave Model As A Design Tool For Foreshores In Physical Models
	14:00	123 - Yuri Pepi — Effectiveness Of Stilling Wave Basins In Reducing Wave Overtopping On Dikes And Rubble Mound Breakwaters	65 - Kevin Bobiles — Advp Measurements Of Flow Over Low-Angle Bedforms In A Laboratory Flume Setup	134 - David Lucio — Enhancing Coastal Flooding Preparedness To Climate Change: An Experimental Analysis Of Urban-Integrated Non-Conventional Adaptation Solutions
	14:15	140 - Daniele Celli — Numerical Tools For Wave Overtopping At Rubble Mound Breakwaters With Submerged Berms	68 - Christine Baker — Wave Breaking Eddies And Transient Rip Current Dynamics In Large Scale Wave Basin Experiments	41 - Phan Khanh Linh — A Model Of Wave Attenuation In Vegetated Environments
	14:30	32 - Zhong Peng — Laboratory Study On Wave Overtopping Across Coastal Dikes With A Vegetated Foreshore	82 - Francisco Pinto — Scour Hole Evolution Near A Detached Low-Crested Rubble-Mound Breakwater	

14:45	15:05	Coffee Break (Boiler Room)		

Tue4 — 15:05 to 16:20

		Wave-structure interaction 1 chair: Phan Khanh Linh	**Wave generation & analysis** chair: Alessandro Antonini	**Tsunamis** chair: Nils Goseberg
	15:05	28 - Ermano De Almeida — Wave Loads On Hydraulic Structures	12 - Thomas Lykke Andersen — Applicability Of Reflection Separation Algorithms To Nonlinear Irregular Waves Over Sloping Foreshores	14 - Storm Roberts — Physical Modelling Of Boulder Transport Under The Influence Of Tsunami Waves
	15:20	30 - Jose Luis Galmes Giralt — Physical Modelling Of A Caisson Breakwater Under Impulsive Cyclonic Waves : Case Of Port East (Reunion Island)	25 - Mads Røge Eldrup — Generation Of Highly Nonlinear Waves In A Short Wave Flume	45 - Kellen Doyle — Tsunami Debris Damming Drag Forces And Associated Coefficients On Elevated Coastal Structure Columns
	15:35	84 - Maximilian Herbst — Full-Scale Experimental Study On Wave Impacts At Stepped Revetments	76 - Pedro Lomonaco — Performance Assessment Of Two Active Absorption Systems In A Large Wave Flume	77 - Maarten Buitelaar — Dam-Break Waves Over Rough Beds
	15:50	127 - ~~Matteo Centorami~~ Alessandro Romano — Parametric Analysis Of Wave-Induced Forces And Overtopping On Composite Vertical Breakwaters With Retreated Crown Wall	173 - Dennis Belleter — Considerations for designing a new wave generator system in an existing flume	87 - David McGovern — Tsunami Runup Attenuation By Onshore Obstacles
	16:05	135 - Georges Govaere — Run Up Reflection And Stability Coefficients For Ordered Cube Slopes With Energy Dissipation	42 - Menno De Ridder — Validation Of A Nonlinear Wave Decompistion Method Including Shoaling	157 - Erica Treflik-Body — Large-Scale Laboratory Experiments On The Wave Generation Due To The Collapse Of Partially And Fully Submerged Granular Columns

16:20	16:40	Coffee Break (Boiler Room)		

Tue5 — 16:40 to 17:40

		Highlighted talks chair: Vincent Gruwez	**Coastal Structures 1** chair: Mads Røge Eldrup	**Modelling Nature 2** chair: Maike Paul
	16:40	107 - Paulo Rosa Santos — Experimental study on wave damping potential of seaweed aquaculture systems on the Portuguese coast	4 - Prasanthi Ranasinghe — Adaptation Of Different Scales In The Same 3D Physical Model To Assess The Different Armour Sizes	111 - Barnapratim Sarma — Flow Structure Of A Heterogeneous Seagrass Canopy
	16:55	136 - Nils Goseberg — Arctic Coastline Erosion: Novel Experimental Avenues Help Understand Its Response To A Changing Climate	7 - Sergio Muñoz-Palao — Digital Profiler Based On A Low-Cost 3D-Scanner To Evaluate The Hydraulic Performance Of Homogeneous Low-Crested Structures	72 - Mitchel Provan — Large-Scale Experimental Model Of Edge Treatments For Constructed Salt Marshes
	17:10	141 - Ian Chandler — Tsunami Ping-Pong: Generating The Whole Tsunami Event	18 - Young-Taek Kim — Stability Of Concrete Armor Unit (Tetrapod) On Rear Side Of The Rubble Mound Structures With Rectangular Super Structure	115 - Garance Marlier — Determination Of Drag And Inertia Coefficients By An Analytical Model
	17:25	16 - Maarten Kleinhans — Turning The Tide: Live-Bed Scale Experiments Of Bar-Dominated Estuaries And Effects Of Dredging On Intertidal Habitat	44 - Mohammadkazem Imani — Experimental Study Of Parsian Port Breakwater Toe Stability	138 - Viktoria Kosmalla — Towards Accurate Modeling Of Aboveground Vegetation In White Dunes: Biomechanics Of Marram Grass (Ammophila Arenaria)

Meeting of the IAHR Maritime Committee

6

| 09:00 | 09:40 | **Keynote 2: Josep Medina**
Breakwaters in a living environment |

09:45	10:45 Wed1	**Modelling Nature 3** chair: Heidi Nepf	**Infragravity Waves 1** chair: Peter Troch	**Flood safety** chair: Vana Tsimopoulou
	09:45	**116 - Maria Maza** A New Formulation For Vegetation Induced Damping Under Waves And Currents Based On Their Standing Biomass	**54 - Gal Akrish** Unstructured swan modelling of free infragravity waves over the Southern North Sea	**70 - Daniel McMann** Small-Scale Experiments' Ability To Augment Large Lab Testing For Designing Nature-Based And Hybrid Solutions For Coastal Flood Hazard Mitigation
	10:00	**103 - Alessandro Antonini** Large-Scale Test Of Extreme Hydrodynamic Conditions Over Coastal Salt Marshes	**78 - Patrick Oosterlo** Wave And Wave Overtopping Measurements In A Complex Area And At A Real Dike	**137 - Mario Van Den Berg** Large-Scale Levee Breach Experiments With Foreshores
	10:15	**63 - Ganga Caldera** Seasonal Variation Of Wave Attenuation Capacity Of Canadian Saltmarsh Vegetation	**144 - Myriam Belkadi** Characterization Of Very Low Frequency Wave Energy Distribution In A Coral Reef-Lagoon System	**152 - Mariana Roldán Upegui** Analysis Of Hybrid Solutions For Coastal Protection Combining Physical And Numerical Cfd Modeling
	10:30	**23 - Su Kalloe** Physical Modelling Tests With Flexible Woody Vegetation Mimics	**158 - Damien Sous** Coupled Short-Ig Wave Dunamics Over A Shallow Barrier Reef	**118 - Fuyuan Chen** Study of the effect of spur dikes on beach protection based on physical model experiment

| 10:45 | 11:05 | Coffee Break (Boiler Room) |

11:05	12:05 Wed2	**Wave-structure int. 2** chair: Giorgio Bellotti	**Infragravity Waves 2** chair: Marion Tissier	**Case studies 2** chair: Jorge Molines
	11:05	**46 - Suzanna Zwanenburg** Large Scale Physical Model Study On Clay Erosion With Gras Cover On Primary Coastal Defence Structures	**142 - Lorenzo Melito** Lagrangian Measurements Of Surface Water Waves: Relation Between Drift Velocities And Set-Down	**27 - Elodie Baillit** Study Of The Hydraulic Response Of A High Permeable Breakwater Using Physical Modelling
	11:20	**6 - Pilar Díaz-Carrasco** Neural Network Calibration Method For Varans Models To Analyse Wave-Porous Structures Interaction	**125 - Vincent Gruwez** Field Observations Of The Influence Of Infragravity Waves On Wave Overtopping At A Dike On A Shallow Foreshore	**128 - Annelie Baines** Innovative Coastal Structure Solutions And The Role Of Physical Modelling In The Design Process (Dawlish Mog2 Casino)
	11:35	**143 - Bonaventura Tagliafierro** The Surviwec Project: An Open-Source Experimental Database For Extreme Loads On A Moored Cylinder Under Regular And Focused Waves	**98 - Henry Alfaro** Hybrid Forecast System Of Overtopping With Infragravity Wave Included	**155 - Wim Kortlever** Physical Model Study Of Standing Wave Impact Loads On Gates And Decks Of The Existing Discharge Sluices In The Afsluitdijk The Netherlands
	11:50	**73 - Sargol Memar** Stability Of Estuarine Groyne During Overflowing Long-Period Primary Ship-Induced Waves Based On Laboratory Experiments	**149 - Clara Ribeiro** Observing And Characterizing Infragravity Waves Through Different Sampling Devices: A Case-Study Off The Belgian Coast	**39 - Hong Son Truong** Flow Exchange In Vegetated Environments: Integrating Experimental Insights Into Practical Engineering

09:00	09:40	**Keynote 3: Coen Kuiper and Emiel Boerma**
		The role of physical modelling in the rehabilitation works for the
	40	Afsluitdijk

09:45	10:45	**Coastal Structures 2**	**Laboratory Technologies 2**	**Field Measurements 2**
	Thu1	chair: Patricia Mares Nasarre	chair: Maximilian Streicher	chair: Patrick Oosterlo
09:45		**49 - Ryan Lowe** Wave Basin Experiments Of Wave-Driven Hydrodynamics Over Submerged Coastal Structures And Artificial Reefs	**75 - Chi-Yu Li** Measurement Of Spatial-Temporal Waves In The Laboratory Using Computer Vision Technolog	**99 - Georges Govaere** Spectral Wave Characterization Of The Pacific Coast Of Costa Rica
10:00		**52 - Sang-Ho Oh** Wave Pressures Acting On The Pavement Behind The Sloping Revetment	**79 - Paul Bayle** The Delta Transport Processes Laboratory: Lab For Surface And Internal Wave-Induced Currents Under Rotation	**114 - Jim Tukker** Decay Of Bow Thruster Induced Near-Bed Flow Velocities At A Vertical Quay Wall: A Field Measurement
10:15		**61 - Beatriz Rodriguez** A New Wave Breaking Benchmark On Rubble Mound Breakwaters	**90 - Dorette Regout** Air-Water Flow Properties In Highly Unsteady Flows	**64 - Marta Alvir** Application Of Remote Sensing Technologies On Industrial Outfalls
10:30		**105 - Sungwon Shin** Experimental And Numerical Inter-Comparison On Green And Gray Mitigation Alternatives In Flooding Reduction In Coastal Region	**100 - Ronald Viquez Acosta** Design Of Passive Energy Absorbers For The Imares-Ucr Wave Tank.	**101 - XiaoLin Han** Coastal Tidal Flat And Tidal Current Observation Based On Satellite Remote Sensing

| 10:45 | 11:15 | Coffee Break (Boiler Room) |

| 11:15	12:15	**Coastal Structures 3**	**Coastal hydrodynamics 2**	**Renewable energy**
	Thu2	chair: Josep Medina	chair: Ryan Lowe	chair: Francisco Taveiro-Pinto
11:15		**59 - Mireille Escudero** Sustainable And Bioengineered Concrete For Armor Units Of Low-Crested Structures	**94 - Yaxiong Shen** Wave Impacts On Cliffs: From The Field To The Laboratory	**96 - Myrta Castellino** Experimental Test Bench In A Wave Flume For The Development Of A New Mini Morphable Wells Turbine
11:30		**110 - Serim Dogac Sayar** Integration Of Eco-Friendly Armour Units Into Coastal Structures	**109 - Ioannis Karmpadakis** Breaking Wave Statistics In Short-Crested Seas	**20 - Timothy Vervaet** Physical Modelling Of A Centralized Controlled Array Of Five Wecfarm Wave Energy Converters
11:45		**147 - Aron Lawniczak** Investigation Of Coastalock Performance On A Breakwater With Porous Core	**119 - Jos Muller** Quantifying Wave-Induced Hydrodynamics Near A Saltmarsh Cliff: An Experimental Piv Study	**81 - Mario Lopez Gallego** Wave Tank Experiments Of A Novel Floating Photovoltaic System
12:00		**130 - Tim Ruwiel** The application of flexible and porous concrete structures in training works and scour protection		**83 - Laurens Cromheeke** Physical Modelling Of The Wave Field Around An Array Of Centrally Controlled Wave Energy Converters

| 12:15 | 13:45 | Lunch break (Boiler Room) |

13:45	14:45	**Laboratory Technologies 3**	**Composite Modelling 2**	**Sediment and Scour**
	Thu3	chair: Prasanthi Ranasinghe	chair: Thomas Lykke Andersen	chair: Marcel van Gent
13:45		**113 - Dimitrios Dermentzoglou** Wave Reflection Analyses On Laser Scan Data From A Model Salt Marsh	**62 - Antonio Tomas** Local Head Losses And Drag Coefficients Characterization In Coastal Infrastructures	**22 - Eise Nota** A Morphological Assessment On The Effects Of Embankments On Sediment Transport In Sandy Estuaries
14:00		**129 - Bas Hofland** Rocking Of Single Layer Armour Units Measured By Embedded Sensors	**26 - Pauline Berte** Assessment Of Wave Loads On Bridge Piers Using Physical And Numerical Modelling	**132 - Björn Mehrtens** Experimental Investigation Of Coastal Foredune Erosion
14:15		**131 - Maximilian Streicher** Evaluation Of The Accuracy Of The Generated Wave Fields In The Coastal & Ocean Basin (Cob)	**117 - Maria Gkougkoudi-Papaioannou** Numerical And Physical Modelling Of The Pore Pressure Development Around A Monopile Foundation	**139 - Thomas Van Veelen** How Artificial Salt Marsh Vegetation Reduces The Threshold For Sediment Resuspension In Wave-Current Flows
14:30		**148 - Steven Le Bars** Concrete Armour Unit Breakwater Physical Model Monitoring With 3D Modeling Tools	**124 - Joe El Rahi** Exploring Wave-Vegetation Interaction At Blade Scale: A Comprehensive Analysis Of A Flexible Cylinder Through Experimental Data And A Direct Numerical Simulation	**145 - Lukas Ahrenbeck** Exploring The Influence Of Artificial Root Systems Modeled After Marram Grass (Ammophila Arenaria) On Dune Erosion

| 14:45 | 15:15 | Coffee Break (Boiler Room) |

15:15	16:15	**Coastal Structures 4**	**Case studies 3**
	Thu4	chair: Pedro Lomonaco	chair Myrta Castellino
15:15		**133 - Patricia Mares-Nasarre** Armor Damage On Groins Under Ship Wave Attack Using Field Data	**17 - Ivandito Herdayanditya** Experimental Study Of The Wave Field Around A Monopile Due To Moderate Steepness Irregular Incident Waves
15:30		**97 - Nasrin Hassanpour** Analisis Of Upgrading Low-Crested Structures As An Adaptation Measure To Climate Change For Coastal Protection: A Hybrid Approach	**56 - Rens Van Der Meijden** Combined Pullout Tests And Wave Overtopping Simulations On Three Species-Rich Grass Covered Dikes In The Netherlands
15:45		**121 - Ian Coghlan** Physical Modelling Of Rock Bags Under Wave Attack	**156 - Vana Tsimopoulou** Geophysical Monitoring Of Large-Scale Levee Overflow Experiments With Electric Resistivity Tomography
16:00		**159 - Johan Kieviet** Verification Of New Double Suspension Keofloat To Minimise Wave Height Inaccuracies In A Physical Model Resulting From Rotation In A 3D Wave Agitataion Study	**57 - Christian Van Nieuwenhuizen** Physical Modelling Of Propeller Jet Induced Scour Near Quay Walls

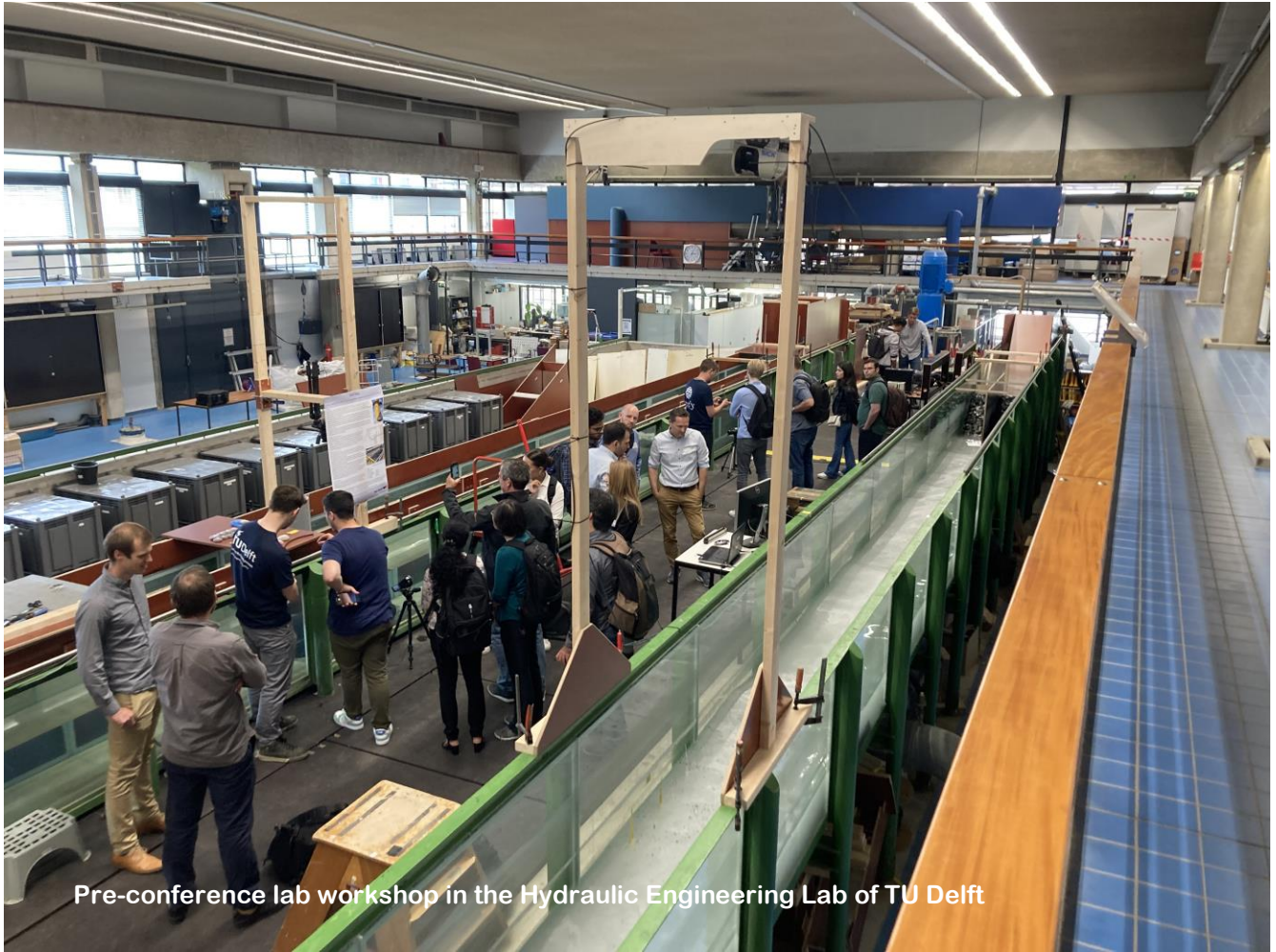| 16:15 | 16:45 | **Closing Ceremony** |

Appendix B. Pre-conference workshop photos
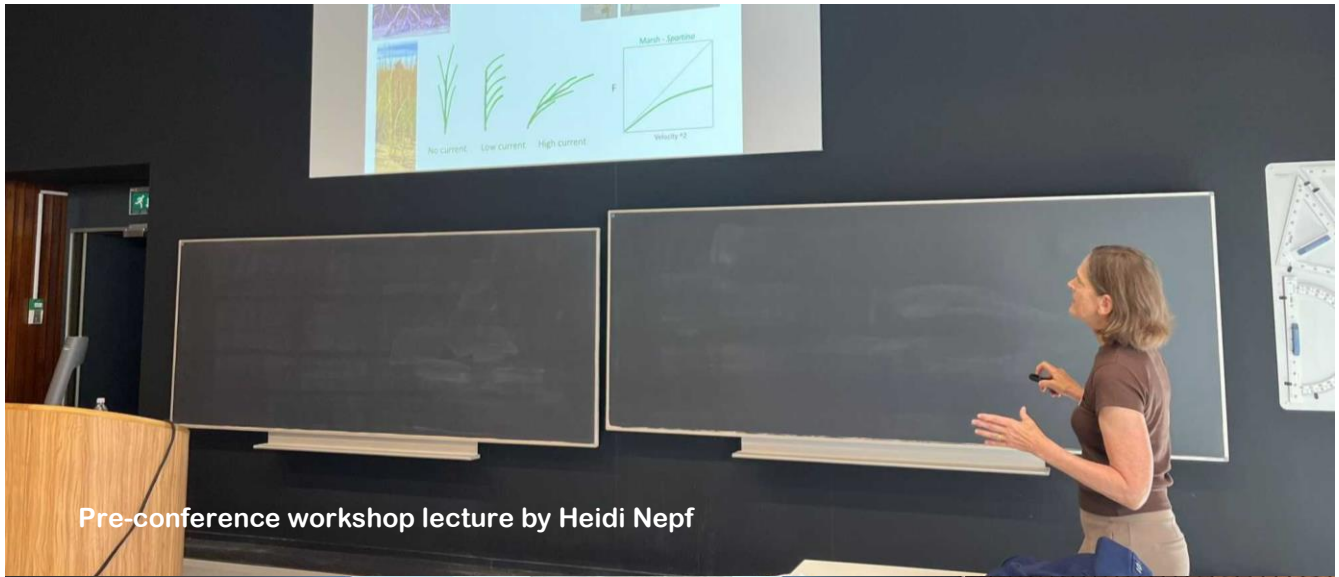
Pre-conference workshop lecture by Heidi Nepf

Pre-conference workshop lecture by Davide Wüthrich and Ioan Nistor
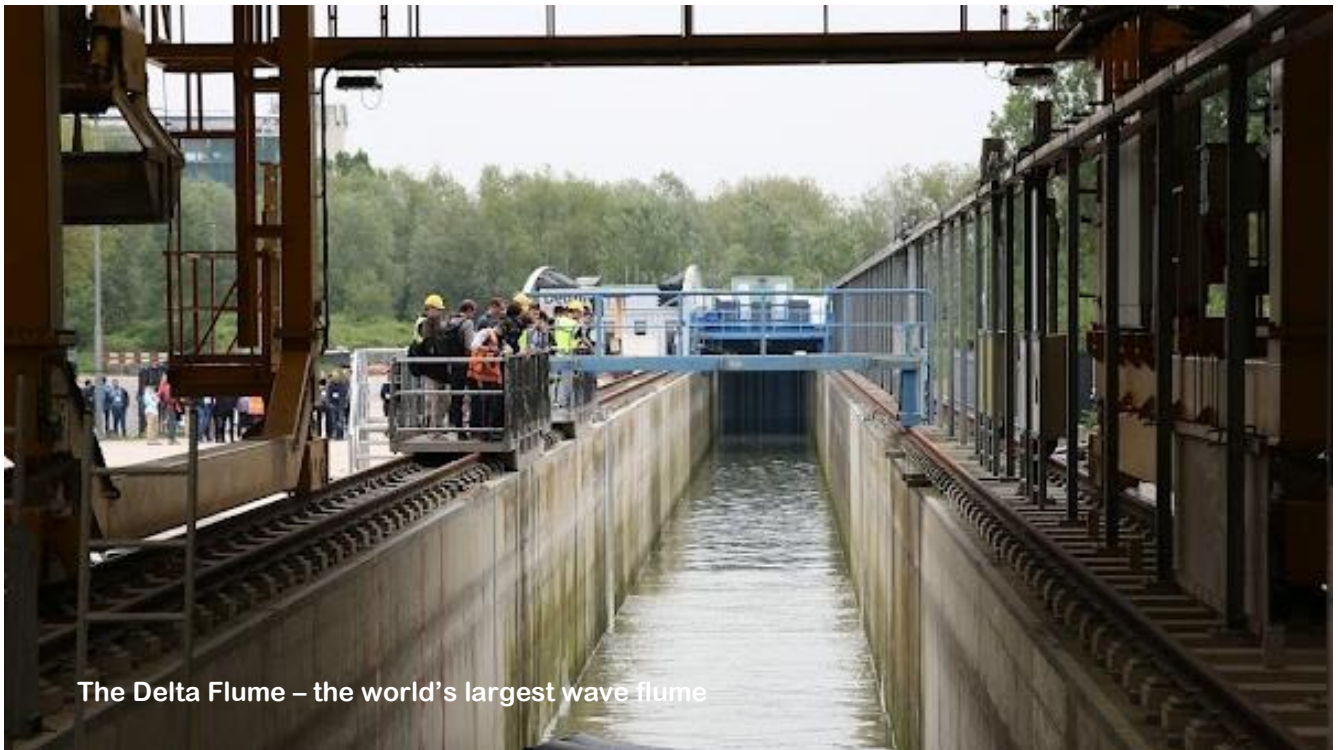
Pre-conference workshop lecture by Marcel van Gent

Pre-conference lab workshop in the Hydraulic Engineering Lab of TU Delft

Appendix C. Keynote presentations photos

Tuesday Keynote Lecture by Heidi Nepf:
Vegetation hydrodynamics to inform climate mitigation and adaptation.

Wednesday Keynote Lecture by Josep Medina:
Breakwaters in a living environment.

Thursday Keynote Lecture by Emiel Boerma and Coen Kuiper:
The role of physical modelling in the rehabilitation works for the Afsluitdijk.

Appendix D. Technical Tour

The Delta Flume – the world's largest wave flume

Passing the Maeslant Storm Surge Barrier during the boat trip on the Nieuwe Waterweg

The Hook-of-Holland breakwater

Tour over the (20Mm³) Sand Motor – a different kind of coastal structure
(as viewed by the part of the group that remained in the beach house)

Appendix E. Post-Conference Tour

The Hondbossche Dunes – 30 Mm3 of sand placed in front of the now redundant Petten sea dike (the dike's upper slope is visible in the background).

The newly refurbished outer slope of the 30+ km long Afsluitdijk – also the topic of the Thursday Keynote lecture.

Appendix F. Other events

F1. Monday Pre-conference Icebreaker at old town hall

F2. Boiler Room with participants (and sponsors) interacting between presentations
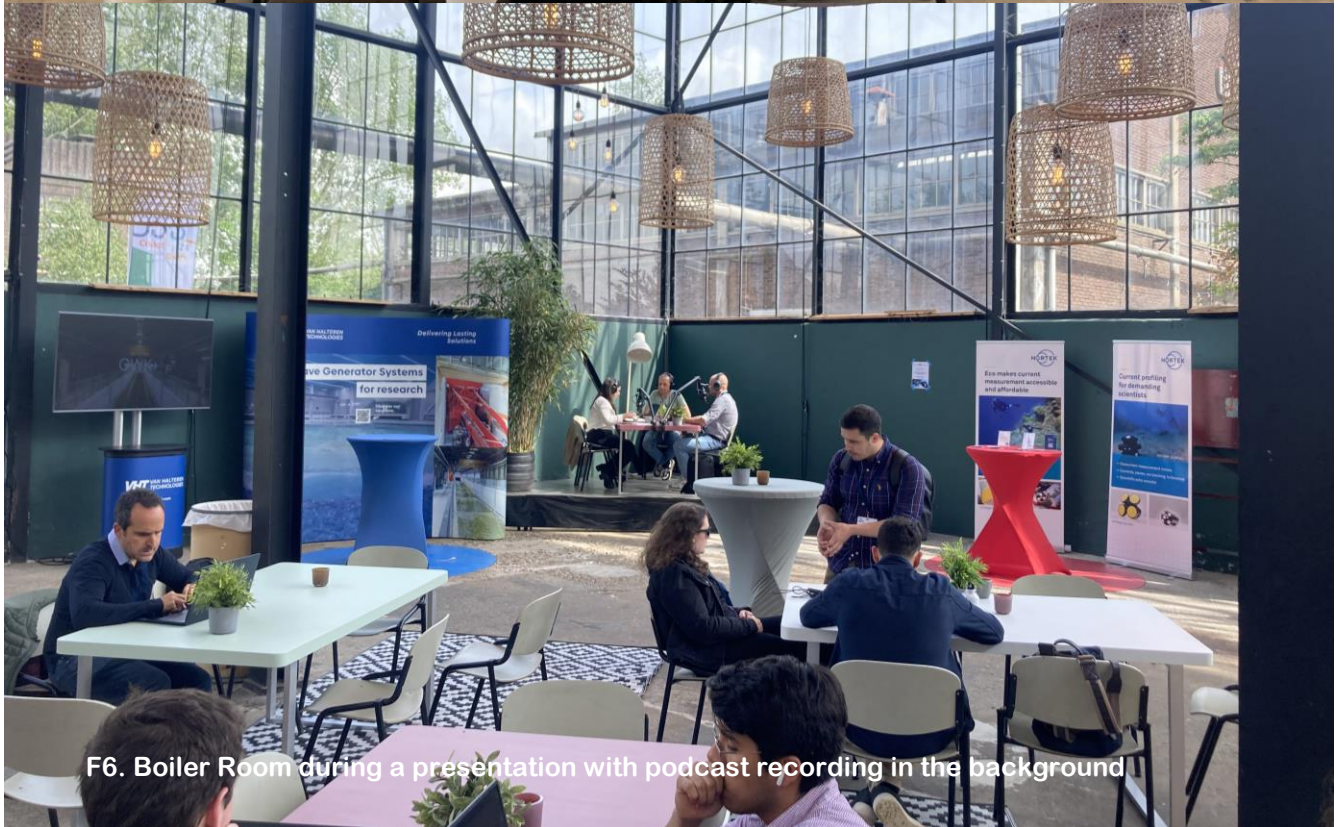
F3. Opening of the conference in the plenary room

F4. Boat for commute from city centre to conference venue

F5. Conference Diner on the (rainy) Sand Motor

F6. Boiler Room during a presentation with podcast recording in the background

Appendix G. Sponsors and other organizations involved