



ICUA2022

International Conference on Underwater Acoustics

Conference Programme

Sunday 19th - Thursday 23rd June 2022

Sunday 19th June

15:00 – 17:00	Conference Registration	Mayflower Foyer
15:00 – 17:00	Welcome Reception	Restaurant

Monday 20th June

08:00 – 08:45	Conference Registration & Speaker Preview	Mayflower Foyer
08:45 – 09:45	Opening Plenary Mapping marine habitats – Exploring and monitoring, from human impacts to climate change <i>Dr Philippe Blondel, Senior Lecturer, University of Bath</i>	Mayflower 1 & 2
09:45 – 10:15	Refreshments	Mayflower Lounge
10:15 – 12:15	PARALLEL SESSION 1	
10:15 – 10:35	Polar Acoustics O-001: OPUS - The Open Portal to Underwater Soundscapes to explore sound in the global ocean <i>Dr Karolin Thomisch, Alfred Wegener Institute Helmholtz Centre for Polar and Marine Research</i>	Mayflower 1
10:35 – 10:55	O-035: Eavesdropping on the northward range expansion of subarctic marine mammals into the Arctic with underwater gliders <i>Dr Kate Stafford, Oregon State University</i>	

10:55 – 11:15 O-004: Acoustic measurements in an environment of high frequency hydrological dynamics: NARVAL2021 in the Iceland Faroe Ridge
Dr G Bazile Kinda, Shom

11:15 – 11:35 O-034: Analysis of acoustic data collected under sea ice during the Useful Arctic Knowledge 2021 arctic cruise
William Jenkins, Scripps Institution of Oceanography

Ambient noise and ambient sound measurement and modelling

Mayflower 2

10:15 – 10:35 O-006: Coherent processing of broad band dynamic ambient marine noise through remote optoelectronic interrogation of legacy seafloor cabled infrastructure
Dr Mohammad Belal, National Oceanography Centre Southampton

10:35 – 10:55 O-007: Ambient noise measurements during REP(MUS) NATO exercise
Erica Cruz, Blueoasis

10:55 – 11:15 O-008: The Global Ocean Sound Atlas
Dr Michael Porter, Heat, Light, And Sound Research, Inc.

11:15 – 11:35 O-009: Soundscapes in the German Baltic Sea before and during the Covid-19 pandemic
Fritjof Basan, Federal Maritime and Hydrographic Agency of Germany (BSH)

11:35 – 11:55 O-010: Development of an international standard to measure underwater ambient sound
Dr Michael Ainslie, JASCO Applied Sciences (Germany)

Seabed and sediment acoustics

Mayflower 3

10:15 – 10:35 O-011: Force chains, creep, grain shearing and variability in the seabed
Dr Nicholas Chotiros, The University of Texas at Austin

10:35 – 10:55 O-012: A Comparison Between the Bayes Acoustic Sediment Classification Technique and Angular Response Analysis Method
Dr Tannaz Haji Mohammadloo, Delft University of Technology

10:55 – 11:15 O-013: Correlations between sound speed and density in sediment cores collected in Norwegian waters
Ellen Johanne, Eidem Norwegian Defence Research (FFI) Establishment

11:15 – 11:35	O-014: Using marine seismic reflection data to study sound-seabed interaction <i>Dr Alexander Douglass, University of Washington</i>	
11:35 – 11:55	O-015: Determining optimal total time and frequency band of ship spectrograms for seabed classification <i>Stephen M Amos, Brigham Young University</i>	
11:55 – 12:15	O-016: Approaches for determining acoustically distinct seabed classes for deep learning classification <i>Dr Tracianne Neilsen, Brigham Young University</i>	
12:15 – 13:15	Lunch	Mayflower Lounge
13:15 – 15:15	PARALLEL SESSION 2	
	Polar acoustics	Mayflower 1
13:15 – 13:35	O-003: Acoustic properties of Arctic sea ice, from year-long underwater measurements in Cambridge Bay, Canada <i>Dr Philippe Blondel, University of Bath</i>	
13:35 – 13:55	O-017: Acoustic reflection and backscatter from arctic ice <i>Dr Nicholas Chotiros, The University of Texas at Austin</i>	
13:55 – 14:15	O-005: Travel-time variability during the 2016–2017 deep-water Canada Basin Acoustic Propagation Experiment (CANAPE) <i>Dr Peter Worcester, University of California San Diego</i>	
14:15 – 14:35	O-018: Measurements and Models of Ocean Sound Speed and Acoustic Propagation in the Beaufort Duct <i>Prof Lora Van Uffelen, University of Rhode Island</i>	
14:35 – 14:55	O-036: Ocean Acoustic Tomography in the Beaufort gyre <i>Dr Heriberto Vazquez, University of California San Diego</i>	
	Ambient noise and ambient sound measurement and modelling	Mayflower 2
13:15 – 13:35	O-022: A fast computation approach for shallow water propagation: Its application to ambient sound calculations before and during the covid-19 pandemic <i>Dr Özkan Sertlek, Delft University of Technology</i>	
13:35 – 13:55	O-023: Low-cost Ocean Acoustic Ambient Noise Recording System <i>James Theriault, Ocean Environmental Consulting</i>	
13:55 – 14:15	O-024: Modelling of ship’s contribution to underwater noise in the North Sea and assessment of masking potential for fish and marine mammals <i>Dr Jakob Tougaard, Aarhus University</i>	

14:15 – 14:35	O-027: Investigation of trends in deep ocean noise including during the 2020 COVID lockdown period <i>Steve Robinson, NPL</i>	
	Seabed and sediment acoustics	Mayflower 3
13:15 – 13:35	O-028: Impacts of sediment properties on 3D sound propagation in submarine canyons <i>Dr Tzu-ting Chen, Woods Hole Oceanographic Institution</i>	
13:35 – 13:55	O-029: Parameterization of Continental Shelf and Upper Slope Sediments in Support of Ocean Acoustics Experiments Offshore Southern New England, USA <i>Dr Megan Ballard, Applied Research Laboratories, University of Texas</i>	
13:55 – 14:15	O-030: Monogenic signal study for seabed classification <i>Coraline Delblond, ECA Robotics and LabStiCC</i>	
14:15 – 14:35	O-031: Observations of compressional, shear and interface waves in the New England Mudpatch <i>Dr Ying-Tsong Lin, Woods Hole Oceanographic Institution</i>	
14:35 – 14:55	O-032: Acoustical effects due to the spatial variability of sediment geoacoustic properties from coarse to fine-grained sediments at mid-frequencies <i>Dr Jie Yang, Applied Physics Lab, University of Washington</i>	
14:55 – 15:15	O-033: Acoustic Attenuation of Cohesive Sediments (mud) at High Ultrasound Frequencies <i>Bart Brouwers, Flanders Hydraulics Research</i>	
15:15 – 15:45	Refreshments	Mayflower Lounge
15:45 – 17:45	PARALLEL SESSION 3	
	Polar acoustics	Mayflower 1
15:45 – 16:05	O-002: Data assimilation of ocean sound speed in Fram Strait <i>Florian Geyer, Nansen Environmental and Remote Sensing Center</i>	
16:05 – 16:25	O-037: The 2019–2020 Coordinated Arctic Acoustic Thermometry Experiment (CAATEX): An overview <i>Dr Hanne Sagen, Nansen Environmental and Remote Sensing Center</i>	
16:25 – 16:45	O-021: Travel times and transmission loss in the 2019-2020 Coordinated Arctic Acoustic Thermometry Experiment (CAATEX) <i>Dr Matthew Dzieciuch, IGPP-0225</i>	
16:45 – 17:05	O-019: Modelling of sound propagation across the Arctic Ocean using oceanographic fields from an ice-ocean reanalysis <i>Dr Espen Storheim, Nansen Environmental and Remote Sensing Center</i>	

Ambient noise and ambient sound measurement and modelling

Mayflower 2

- 15:45 – 16:05 O-038: Defining optimal recording cycle to monitor shipping contribution to ambient noise
Dr Benjamin Ollivier, Shom
- 16:05 – 16:25 O-039: Measurements of shipping, fin whales, earthquakes and other soundscape components at the Lofoten-Vesterålen Observatory, Norway (2018-2019)
Shaula Garibbo, University of Bath
- 16:25 – 16:45 O-040: Acoustic long-range monitoring of tropical cyclones at low frequencies
 Gianluca Audone, University of Bath

Seabed and sediment acoustics

Mayflower 3

- 15:45 – 16:05 O-041: A unified semantic segmentation and object detection framework for synthetic aperture sonar imagery
Shannon-Morgan Steele, Kraken Robotics
- 16:05 – 16:25 O-042: Application of seafloor backscattering strength estimators to echosounder measurements at sea
Irène Mopin, Ensta Bretagne
- 16:25 – 16:45 O-043: Temporal variability of high-frequency acoustic scattering from the seafloor
Dr Anthony Lyons, University of New Hampshire
- 16:45 – 17:05 O-044: Underwater pipeline detection and localisation using multibeam echo sounder in a resolution limited case
Gábor Geréb, University of Oslo
- 17:05 – 17:25 O-045: Adaptive Beamforming and Autocalibration for Swath Sonars
Tor Inge Lønmo, Kongsberg Maritime
- 17:25 – 17:45 O-046: Using bistatic Doppler sonar to measure sediment transport in the bottom boundary layer: a direct measurement of bedload transport
Prof Len Zedel, Memorial University

18:00-20:00 **Early Career Event**

Winslow & Standish

Tuesday 21st June

08:00 – 08:45	Conference Registration & Speaker Preview	Mayflower Foyer
08:45 – 09:45	Plenary Session 3D Shelf Break Acoustics <i>Dr Ying-Tsong Ling, Associate Scientist with Tenure, Woods Hole Oceanographic Institution</i>	Mayflower 1 & 2
09:45 – 10:15	Refreshments	Mayflower Lounge
10:15 – 12:15	PARALLEL SESSION 4	
	Signal processing	Mayflower 1
10:15 – 10:35	O-047: Analysis of Hydroacoustic Time Series by Predictive Modelling <i>Dr Andreas Galka, Bundeswehr Technical Center For Ships and Naval Weapons, Maritime Technology and Research (WTD 71)</i>	
10:35 – 10:55	O-048: Sonar array beampattern bounds: tolerance analysis using interval arithmetic <i>Håvard Kjellmo Arnestad, University of Oslo</i>	
10:55 – 11:15	O-049: Positioning Error Correction in Underwater Acoustic Sensor Network with Embedded Sound Speed Inversion <i>Dr Wen Xu, Zhejiang University</i>	
11:15 – 11:35	O-050: Single snapshot signal-to-noise ratio improvement using the cubic autoprodut <i>Nicholas Joslyn, University of Michigan</i>	
11:35 – 11:55	O-051: Remote Detection of Ocean Sound Speed Profile Using Acoustic Profiling Techniques <i>Seyed Mohammad Reza Mousavi, Memorial University of Newfoundland</i>	
	Marine renewables	Mayflower 2
10:15 – 10:35	O-052: Characterisation of underwater acoustic fields generated by disposal of unexploded ordnance during construction of offshore windfarms <i>Sei-Him Cheong, NPL</i>	
10:35 – 10:55	O-053: Underwater sound generated by the wind park construction, the ten years Belgian North Sea experience <i>Dr Alain Norro, Rbins</i>	
10:55 – 11:15	O-054: Reducing conservatism in underwater noise assessments <i>Dr Michael Bellmann, Itap GmbH</i>	
11:15 – 11:35	O-055: Autonomous Subsea Cable Survey using Wideband Sonar <i>Dr Chris Capus, Hydrason Solutions Limited</i>	

11:35 – 11:55	O-057: Scaling offshore pile driving noise: A case study for scenarios with and without noise mitigation <i>Jonas Von Pein, Hamburg University of Technology</i>	
	Target Echo Strength - Measurements and Modelling	Mayflower 3
10:15 – 10:35	O-058: Elastic Phenomena in Thin-Walled Acoustic Scatterers: Measurements and Simulations <i>Prof Amir Boag, Tel Aviv University</i>	
10:35 – 10:55	O-059: Photogrammetry as a FE Modelling Geometry Builder <i>Jake Kent, Atlas Elektronik UK</i>	
10:55 – 11:15	O-060: Wideband target echo strength measurements at Wraysbury Reservoir, UK <i>Dr Zuhayr Rymansaib, University of Bath</i>	
11:15 – 11:35	O-061: Understanding acoustic-structure interaction using efficient finite-element modelling with Pogo: application to underwater acoustics <i>Dr Oliver Sanford, Dstl</i>	
11:35 – 11:55	O-062: On target excitation by modulated radiation pressure <i>Dr Ahmad Abawi, Hls Research</i>	
12:15 – 13:15	Lunch	Mayflower Lounge
13:15 – 14:55	PARALLEL SESSION 5	
	Sonar performance measurement and modelling	Mayflower 1
13:15 – 13:35	O-064: Two methods to include a beam pattern in parabolic equation models <i>Jan Ehrlich, Bundeswehr Technical Centre for Ships, Naval Weapons, Maritime Technology and Research</i>	
13:35 – 13:55	O-065: Distributed multistatic sonar performance prediction demonstrator tool <i>Jan Ehrlich, Bundeswehr Technical Centre for Ships, Naval Weapons, Maritime Technology and Research</i>	
13:55 – 14:15	O-066: Standard Scenarios For Verification of Passive-Sonar-Performance Models <i>Dr Mark Prior, TNO</i>	
14:15 – 14:35	O-067: Modelling Split-Beam Sonar <i>Axel Belgarde, Memorial University of Newfoundland</i>	
14:35 – 14:55	O-068: Modelled sonar and target depth distributions for active sonar operations in realistic environments <i>Kristoffer Engedal Andreassen, Norwegian Defence Research Establishment (FFI)</i>	

Measurement and modelling of acoustic particle Motion

Mayflower 2

- 13:15 – 13:35 O-069: Benchmark scenarios for underwater acoustic particle motion verification
Victor Oppeneer, TNO
- 13:35 – 13:55 O-071: A best practice guide for measurement of underwater particle motion for biological applications
Dr Sophie Nedelec, University of Exeter
- 13:55 – 14:15 O-072: A Comparison of methods for modelling acoustic particle Velocity
Dr Alec Duncan, Curtin University

Sonars and transducers

Mayflower 3

- 13:15 – 13:35 O-073: Near field self-reciprocity at 500 kHz using water to air interface
Jay Abel, Sensor Technology Ltd
- 13:35 – 13:55 O-074: Primary pressure calibration of hydrophones using a laser pistonphone
Ben Ford, National Physical Laboratory
- 13:55 – 14:15 O-075: Performance Modelling of Acoustic Wedges for Underwater Test Facilities
Prof Victor Humphrey, University of Southampton
- 14:15 – 14:35 O-076: Experimental investigation of a virtual planar array for MIMO sonar systems
Sven Schröder, German Aerospace Center (DLR)

14:55 – 15:30

Refreshments

Mayflower Lounge

15:30 – 18:00

Tours – NOC and ISVR

Wednesday 22nd June

08:00 – 08:40

Conference Registration & Speaker Preview

Mayflower Foyer

08:40 – 10:20

PARALLEL SESSION 6

Underwater propagation

Mayflower 1

08:40 – 09:00

O-077: Interaction of acoustic and gravity waves as a source of abyssal T-waves
Dr Oleg A Godin, Naval Postgraduate School

- 09:00 – 09:20 O-078: High order isogeometric analysis for ocean acoustics
Dr Ganesh Diwan, Prescient Computing
- 09:20 – 09:40 O-079: Acoustic source localization in underwater environment using interval analysis
Quentin Bateau, Ensta Bretagne
- 09:40 – 10:00 O-080: Using neural networks to estimate acoustic transmission loss uncertainty due to seabed uncertainty in shallow water environments
Brandon Lee, University of Michigan
- 10:00 – 10:20 O-081: Sound Propagation Experiments in a Fjord Environment
Dr Jan Abshagen, Bundeswehr Technical Center For Ships And Naval Weapons, Maritime Technology And Research – WTD 71

General underwater acoustics

Mayflower 2

- 08:40 – 09:00 O-082: Exploring the use of AI in marine acoustic sensor Management
Edward Clark, University of Bath
- 09:00 – 09:20 O-083: Developing a fluid-structure interaction finite element formulation for GPU calculations with Pogo: Application to underwater acoustics
Yiannis Simillides, Imperial College London
- 09:20 – 09:40 O-084: Acoustic Bearing Estimation from an AutoNaut USV using Spline Array Shape Estimation
Alfie Anthony Treloar, University of Bath
- 09:40 – 10:00 O-085: Exploring Soundscapes as a Tool for Automated Vessel Identification
Ellen White, BAE Systems
- 10:00 – 10:20 O-086: Wideband Acoustic Detector for Insulated Subsea Pipelines
Dr Chris Capus, Hydrason Solutions Limited

Underwater acoustic detection and classification and clearance of unexploded ordnance

Mayflower 3

- 08:40 – 09:00 O-087: Reducing the false alarm rate of a simple sidescan sonar change detection system using deep learning
Yannik Steiniger, German Aerospace Center (DLR)
- 09:00 – 09:20 O-088: Utilizing imaging geometry meta-data in classification of synthetic aperture sonar images with deep learning
Dr Narada Warakagoda, Norwegian Defence Research Establishment (FFI)

09:20 – 09:40 O-89: Improving the realistic rendering of artificial sonar images using Cycle Generative Adversarial Networks
Zamirddine Mari, Dga Techniques Navales

09:40 – 10:00 O-090: Utilising multiple sonar views for object classification in historic chemical munitions dumpsites
Oscar Bryan, University of Bath

10:20 – 10:50 Refreshments

10:50 – 12:30 **PARALLEL SESSION 7**

Underwater propagation

Mayflower 1

10:50 – 11:10 O-091: Mode coupling and Landau-Zener transitions in slowly changing underwater waveguide
Prof Boris Katsnelson, University of Haifa

11:10 – 11:30 O-093: Pseudo-differential mode parabolic equations with mode coupling and their applications in shallow-water acoustics
Prof Pavel Petrov, Il'ichev Pacific Oceanological Institute

General underwater acoustics

Mayflower 2

10:50 – 11:10 O-095: Acoustic Cloning
Dr Dirk-Jan van Manen, ETH Zurich

11:10 – 11:30 O-096: Sonarbell Autodetection
Dr Chris Capus, Hydrason Solutions Limited

11:30 – 11:50 O-097: A Proposed Definition of “Clutter” in the Context of Active Sonar
Adrian Brown, Atlas Elektronik UK

11:50 – 12:10 O-098: Experimental characterisation of a panel with periodic macro-voided inclusions in a water tank
Dr Laetitia Roux, Naval Group France

12:10 – 12:30 O-099: Coherence recovery in acoustic scattering from the sea Surface
Prof David Dowling, University of Michigan

Underwater acoustic detection and classification and clearance of unexploded ordnance

Mayflower 3

10:50 – 11:10 O-100: SERDP/ESTCP Munitions Response Program: An update on underwater remediation of unexploded ordnance (UXO)
Michael Richardson, Institute for Defense Analyses IDA

11:10 – 11:30 O-101: Applying Mask R-CNN to detect and classify sea-mines from SSS and SAS data
Dr Olga Lopera Tellez, Royal Military Academy

11:30 – 11:50	O-102: SERDP/ESTCP Munitions Response DCL Demonstration Sites and Some Recent Test Results <i>Dr David Bradley, US Department of Defence</i>	
12:30 – 13:30	Lunch	
13:30 – 15:30	AB Wood Medal Presentations <i>Dr Megan Ballard, Applied Research Laboratories, University of Texas</i> <i>Dr Sophie Nedelec, University of Exeter</i>	Mayflower 1 & 2
15:30 – 16:30	PARALLEL SESSION 8	
	Underwater communications	Mayflower 1
15:30 – 15:50	O-103: Introducing Phorcys: Secure, Adaptable and Interoperable Acoustics for Generation-After-Next Underwater Networks <i>Amy-Mae Hobbs, Defence Science & Technology Laboratory</i>	
15:50 – 16:10	O-104: Extremely High Data Rate (EHDR) Underwater Acoustic Communication <i>George Masters, Newcastle University</i>	
16:10 – 16:30	O-105: Venilia: Enabling Command and Control Using JANUS in Networked Underwater Environments <i>Amy-Mae Hobbs, Defence Science & Technology Laboratory</i>	
	Fluctuations and scattering	Mayflower 3
15:30 – 15:50	O-106: Sound field fluctuations in the presence of internal Kelvin waves <i>Ernst Uzhansky, University of Haifa</i>	
18:30 – 23:00	Conference Dinner	The HMS Warrior

Thursday 23rd June

08:00 – 08:40	Conference Registration & Speaker Preview	Mayflower Foyer
08:40 – 10:40	PARALLEL SESSION 9	
	Synthetic aperture sonar	Mayflower 1
08:40 – 09:00	O-108: Quantifying and modeling the effects of internal waves on synthetic aperture sonar <i>Dr Anthony Lyons, University of New Hampshire</i>	

- 09:00 – 09:20 O-109: Geometrical corrections for improved trajectory estimation based on DPCA results
Dr Holger Schmaljohann, WTD 71
- 09:20 – 09:40 O-110: Circular synthetic aperture acoustic imaging of spherical target in cylindrical rod clutter
Tiara Bixler, United States Naval Academy
- 09:40 – 10:00 O-111: Calibration mission for improved synthetic aperture sonar imagery
Dr Blair Bonnett, Helmut-Schmidt-Universität
- 10:00 – 10:20 O-112: Investigation of layover in interferometry
Dr Stig A V Synnes, Ffi
- 10:20 – 10:40 O-113: Hypothesis Testing of 3D Object Shapes for Synthetic Aperture Sonar Interferometry
Ole Lorentzen, University of Oslo

Bioacoustics and biosonar

Mayflower 2

- 08:40 – 09:00 O-114: Optimization of the Underwater Acoustic detection of Marine Mammals and Ships using CNNs
Bénédicte Dommergues, Blueoasis
- 09:00 – 09:20 O-115: Key Techniques for Continuous Development of Mammal Mitigation in SONAR Applications
Chloe Chilver, Ultra Sonar Systems
- 09:20 – 09:40 O-116: More than a whistle: automated classification of marine sound sources with convolutional neural networks
Ellen White, University of Southampton

Radiated noise from ships

Mayflower 3

- 08:40 – 09:00 O-118: Accuracy of numerically predicted underwater sound of a ship-like structure
Tjakko Keizer, Damen Shipyards
- 09:00 – 09:20 O-119: On empirical formulae to assess the source level of ships in shallow water with different hydrophone configurations
Dr Valentin Meyer, Naval Group
- 09:20 – 09:40 O-120: Emergence of broadband, coherent modal arrivals on two vertical line arrays from ship noise
Marina Yarina, University of Haifa
- 09:40 – 10:00 O-121: Full-field underwater vibration measurement using digital image correlation
Dr Geir Olafsson, University of Southampton
- 10:00 – 10:20 O-122: The SOUNDS project: towards effective mitigation of underwater noise from shipping in Europe
Erica Cruz, Blueoasis

10:40 – 11:00	Refreshments	
11:00 – 13:00	PARALLEL SESSION 10	
	Synthetic aperture sonar	Mayflower 1
11:00 – 11:20	O-123: Bias reduction in synthetic aperture sonar along-track micronavigation <i>Dr Benjamin Thomas, University of Bath</i>	
11:20 – 11:40	O-124: Interpretation of scattering from small aluminium cylinders on the seabed from dual-frequency SAS images <i>Dr Richard Brothers, Atlas Elektronik UK</i>	
11:40 – 12:00	O-125: Spatial Aperture Coherence with Synthetic Transmit Focusing in SAS <i>Prof Andreas Austeng, University of Oslo</i>	
12:00 – 12:20	O-126: Image Enhancement Using Capon Minimum Variance Adaptive Beamforming in Synthetic Aperture Sonar <i>Ole Marius Hoel Rindal, University of Oslo</i>	
12:20 – 12:40	O-127: Compensating Dynamic Range Alterations from Adaptive Beamforming using Histogram Matching <i>Dr Ole Marius Hoel Rindal, University of Oslo</i>	
12:40 – 13:00	O-128: Benefits and Limitations in MIMO Synthetic Aperture Sonar <i>Dr Roy Edgar Hansen, Norwegian Defence Research Establishment (FFI)</i>	
	Bubble acoustics	Mayflower 2
11:00 – 11:20	O-129: Determining the sound of gas percolating through marine sediments <i>Dr Ben Roche, University of Southampton</i>	
11:20 – 11:40	O-130: The invention of a flat-surface cleaner, with application for hull biofouling and hospital decontamination <i>Prof Timothy Leighton, University of Southampton</i>	
	Radiated noise from ships	Mayflower 3
11:00 – 11:20	O-131 SATURN: Developing Solutions to Underwater Noise <i>Dr Michael Ainslie, JASCO Applied Sciences (Germany)</i>	
11:20 – 11:40	O-132: Image method to determine vessel source level from a measurement of sound pressure level in shallow water <i>Dr Michael Ainslie, JASCO Applied Sciences (Germany)</i>	
11:40 – 12:00	O-133: Experimental assessment of uncertainties in underwater sound measurements of ships <i>Tjakko Keizer, Damen Shipyards</i>	

12:00 – 12:20	O-134: Adapted Image Source Modelling of the Acoustics of Ship Towing Tanks <i>Prof Victor Humphrey, University of Southampton</i>	
12:20 – 12:40	O-135: A methodology to define underwater acoustic radiated noise norms for small commercial vessel classes using neural networks <i>Dr Amy Deeb, Dalhousie University and Lloyd's Register Applied Technology Group</i>	
12:40 – 13:00	O-136: Development of techniques for observing propeller cavitation on ships and measuring URN <i>Prof Patrick Fitzsimmons, Strathclyde</i>	
13:00 – 13:15	Student Prizes and Closing Remarks	Mayflower 1