

THE 5th INTERNATIONAL CONFERENCE ON:

SYNTHETIC APERTURE IN SONAR AND RADAR 2023

6-8 September 2023

Villa Marigola, Lerici, Italy

 Institute of
Acoustics
Sound • Noise • Vibration

TUESDAY 5 SEPTEMBER 2023

1800 Meet & Greet- Doria Park Hotel

WEDNESDAY 6 SEPTEMBER 2023

0815 Registration and refreshments

0845 Welcome: Gary Heald,
Conference Chair, Dstl & Heriot Watt University

Session 1

0900 Keynote Lecture - Radar

Maritime Applications of Synthetic Aperture Radar; Recap, Advances, Future Directions and a Shallow Water Case Study

Neil Stapleton, Dstl, UK

0940 **Quantifying variability in maximum repeat-pass times for incoherent and coherent synthetic aperture sonar change detection via long-term measurements of high frequency seafloor scatter**

Anthony Lyons, Gabriel Venegas, Jenna Hare, University of New Hampshire, USA

1000 **Reverse-path multi-static SAR for moving target detection in clutter**

Daniel Andre, University of Cranfield, UK; Francis Watson, University of Manchester, UK

1020 Coffee

1040 **Sea-bottom type characterization from ultra-wideband backscatter**

Angeliki Xenaki, Alessandro Mondì, Yan Pailhas, CMRE, Italy

1100 **Improving SAS CCD change maps via data-driven re-navigation and sub-aperture coherence masking**

Abigail Keith, Kevin Bongiovanni, Andrew Wilby, Raytheon Technologies, USA; Jonathan King, Daniel Sternlicht, US Naval Surface Warfare Center, USA

1120 **Comparison of model selection techniques for seafloor scattering**

Derek Olson, Naval Postgraduate School, USA; Marc Geilhufe, FFI Norwegian Defence Research Establishment, Norway

1140 **Quantification of the environmental effects on synthetic aperture imagery**

Nicholas La Manna, University of New Hampshire, USA

1200 Lunch

Session 2

1245 **Laboratory multistatic SAR CCD investigation**

Alexander Hagelberg, Daniel Andre, Mark Finnis, Cranfield University, UK

1305 **Intensive resolution measurements with the SAMDIS multi-aspect synthetic aperture sonar**

Nicolas Bulet, Yann Le Gall, Sebastien Delays, Thales DMS, France; Samantha Dugelay Thales, UK; Fabien Novella, DGA TN, France

1325 **Large aperture, sparse MIMO pulse-coded sonars: principles, feasibility and imaging**

Oleksander Malyskin, Adrian McKernan, David Cooper, Alex Noel Raj, Queen's University Belfast, UK

1345 **Laboratory multistatic sparse 3D SAR investigation**

Richard Welsh, Daniel Andre, Mark Finnis, University of Cranfield, UK

1405 Coffee

Session 3

1425 Interoperable image-based change detection

Rolf Klemm, Johannes Groen, Atlas Elektronik, Germany; Holger Schmaljohann, Bundeswehr Technical Center for Ships and Naval Weapons, Germany

1445 Drone-borne SAR change detection techniques

Alli Bekar, Michail Antoniou, Christopher Baker, University of Birmingham, UK

1505 Challenges of automated change detection in repeat-pass SAS imagery

Øivind Midtgaard, Torstein Sæbø, Narada Warakagoda, FFI Norwegian Defence Research Establishment, Norway

1525 Study of spatial coherence from a 2D Rx antenna of a LF wideband side looking sonar

Fabien Novella, DGA Naval Techniques, France; Isabelle Quidu, Gilles Le Chenadec, Lab-STICC UMR CNRS, France; Yan Pailhas, NATO STO CMRE, Italy

1545 Impacts of scene stability and backscatter coherence on automated seabed change detection

Emma Shouldice, Anna Crawford, Defence Research and Development Canada Atlantic Research Center, Canada; Sonja Smith, Daniel Sternlicht, Jonathan King, Naval Surface Warfare Center, USA; Torstein Sæbø, Roy Hansen, Øivind Midtgaard, Norwegian Defence Research Establishment, Norway; Shawn Johnson, Pennsylvania State University, USA; Allison Penko, US Naval Research Laboratory, USA; Anthony Lyons, University of New Hampshire, USA

1605 Questions and discussion

1615 Close

THURSDAY 7 SEPTEMBER 2023

0800 Coffee

Session 4

0830 Keynote Lecture - Sonar Synthetic aperture sonar simulation: History and Future Directions

Alan Hunter, University of Bath, UK

0910 Model validation for simulated synthetic aperture sonar time series data

Brian Rheinhardt, Joonho Park, Thomas Blanford, Pennsylvania State University, USA

0930 SeaSAR: A high-fidelity simulation of maritime SAR images

David Pate, Georgia Tech Research Institute, USA

0950 3D reconstruction from synthetic aperture sonar images using deep learning: a simulation study

Oscar Bryan, Tom Fincham Haines, Alan Hunter, Narada Warakagoda, Roy Hansen, University of Bath, UK

1010 Coffee

1040 GPU ray tracing for high-fidelity acoustic simulation

David Pate, Georgia Tech Research Institute, USA

Session 5

1100 Long range interferometric synthetic aperture sonar

Torstein Sæbø, Roy Hansen, Ole Lorentzen, FFI Norwegian Defence Research Establishment, Norway

1120 Centimetric resolution interferometric synthetic aperture sonar bathymetry maps using ensembles

Shannon-Morgan Steele, Richard Charron, Krackan Robotics, Canada

1140 Separation of layover in synthetic aperture interferometry

Stig Synnes, Marc Geilhufe, FFI Norwegian Defence Research Establishment, Norway

1200 Lunch

Session 6

1245 Deep learning based SAS image classification with supplementary information of imaging geometry

Narada Warakagoda, Øivind Midtgaard, FFI Norwegian Defence Research Establishment, Norway

1305 Proxy-label semi-supervised deep learning for object detection and mapping in synthetic aperture sonar imagery

Shannon-Morgan Steele, Krackan Robotics, Canada

1325 Deep-learning-based focus improvement metric for synthetic aperture sonar auto-focus algorithms

Jeffrey Dale, Matthew Emigh, James Prater, Naval Surface Warfare Center, USA

1345 Deep transfer learning across targets and sensors with synthetic aperture sonar data

David Williams, Pennsylvania State Applied Research Laboratory, USA

1405 Coffee

Session 7

1425 The effect of label corruption on synthetic aperture sonar object recognition

Issac Gerg, Benjamin Cowen, Penn State Applied Research Lab, USA

1445 Weakly supervised automatic target masking for synthetic aperture sonar

Matthew Emigh, NSWC PCD, USA; Carlos Mendoz-Cardenas, Austin Brockmeier, University of Delaware, USA

1505 Using shadows in circular synthetic aperture sonar imaging for target analysis

Yann Le Gall, Bulet Nicolas, Mathieu Simon, Jean-Philippe Malkasse, Thales DMA, France; Fabien Novella, DGA Naval Techniques, France; Samantha Dugelay, Thales UK

1525 Self-supervised learning for improved SAS target recognition

Brandon Sheffield, NSWC, USA

1545 Advanced autonomy for UUV-based synthetic aperture sonar

Bryan Todd, Ivan Rodriguez-Pinto, Joshua Weaver, Daniel Sternlicht, US Naval Surface Warfare Center, USA

1605 Questions and discussion

1615 Close

1900 Drinks Reception and Buffet Dinner – Villa Marigola



FRIDAY 8 SEPTEMBER 2023

0800 Coffee

Session 8

0830 Shadow based phase gradient autofocus for synthetic aperture sonar

James Prater, Darshan Bryner, Naval Surface Warfare Centre, USA; Stig Synnes, FFI Norwegian Defence Research Establishment, Norway

0850 Advanced phase-based algorithms in SAR data for maritime surveillance

Andrea Radius, Leszek Lamentowski, Risto Vehmas, Ozan Dogan, Vladimir Igantenko, Darren Muff, Pierre Leprovost, Mattew Nottingham, Patrik Vilja, Tino Seilonen, ICEYE, Finland

0920 Passive synthetic aperture sonar processing with a thin towed array

Agni Mantouka, Giles Verwey, Chris Tucker, SEA Ltd, UK

0940 Target recognition in SAR images with low-SWAP processing hardware

Richard Lane, Wendy Holmes, Tim Lamont-Smith, QinetiQ, UK

1000 Coffee

Session 9

1020 Improved platform trajectories and consistent imaging based on DPCA estimates

Holger Schmaljohann, Bundeswehr Technical Center for Ships and Naval Weapons, Germany; Blair Bonnett, Thomas Fickenscher, Helmut Schmidt University, Germany

1040 Adding SAS image processing capability to SAR image processing software

Anna Crawford, Emma Shouldice, Defence Research and Development (DRDC), Atlantic Research Centre (ARC); Jeff Secker, Defence Research and Development (DRDC), Ottawa Research Centre (ORC); Shawn Gong, MDA Systems Ltd, Canada

1120 A wavelet shrinkage approach to detect candidate point scatterers in synthetic aperture sonar images for resolution estimation

Marc Geilhufe, Roy E. Hanson Stig Synnes, FFI Norwegian Defence Research Establishment, Norway; Derek Olson, Naval Postgraduate School, USA

1140 Isolation of resonant wave features in low-frequency wideband SAS data products from cylindrical shells

Alan Hunter, Zuhayr Rymansaib, Benjamin Thomas, Aiden Burt, Richard Brothers, University of Bath, UK

1200 Augmentation of down-looking 3D SAS data with a high frequency multibeam sonar

Timothy Marston, University of Washington, USA

1220 Questions and discussion

1230 Chairs Closing Comments

1240 Lunch and close