

Organised by the Underwater Acoustics Group of the Institute of Acoustics

The 4<sup>th</sup> International Conference on Synthetic Aperture Sonar  
and Synthetic Aperture Radar  
5-7 September 2018  
Villa Marigola, Lerici, Italy

## PROGRAMME

### Tuesday 4 September 2018

19.00 Meet & Greet at The Doria Park Hotel

### Wednesday 5 September 2018

0945 Registration and coffee

1015 Welcome Prof Gary Heald

#### SESSION 1

1030 Keynote Paper

##### **Historical development of seabed mapping synthetic aperture sonar**

Daniel D. Sternlicht<sup>1</sup>, Michael P. Hayes<sup>2</sup>, Roy E. Hansen<sup>3</sup>

1 NSWC PCD, USA, 2 University of Canterbury, New Zealand, 3 FFI, Norway

##### **1110 Multi-look performance assessment using high resolution SAR**

Malcolm Stevens, Richard Stroud

Thales, UK

##### **1130 Comparison of co-registration techniques for synthetic aperture sonar images from repeated passes**

Torstein O. Sæbø<sup>1</sup>, Roy E. Hansen<sup>1</sup>, Vincent Myers<sup>2</sup>,

1 Norwegian Defence Research Establishment (FFI), Norway

2 Defence Research and Development Canada (DRDC), Canada

##### **1150 Repeat-pass micro-navigation and bathymetry estimation using interferometric synthetic aperture sonar**

Benjamin Thomas<sup>(1)</sup>, Alan Hunter<sup>(1)</sup>, Samantha Dugelay<sup>(2)</sup>

1 University of Bath, UK, 2 NATO STO CMRE, Italy

1210 Lunch

#### SESSION 2

##### **1255 Residual risk maps for performance assessment of autonomous mine countermeasures using synthetic aperture sonar**

Bart Gips, Christopher Strode, Samantha Dugelay

NATO STO-CMRE, Italy

##### **1315 In-mission MCM performance evaluation for AUV-mounted sonar**

Marc Geilhufe, Thomas R. Krogstad, Øivind Midtgaard, Martin S. Wiig, Else-Line M. Ruud,  
Norwegian Defence Research Establishment (FFI), Norway

**1335 The high resolution low frequency synthetic aperture sonar (HR-LFSAS) project**

Yan Pailhas, Stefano Fioravanti, Samantha Dugelay  
NATO STO-CMRE, Italy

**1355 Operator tools and performance assessment for automated seabed change detection**

Daniel D. Sternlicht,<sup>1</sup> Tesfaye G-Michael<sup>1</sup>, Jeannine Abiva<sup>1</sup>, Anna M. Crawford<sup>2</sup>, Shawn F. Johnson<sup>3</sup>,  
Torstein Sæbø, Ø. Midtgaard<sup>4</sup>

1 NSWC PCD, USA, 2 DRDC, Canada, 3 ARL PSU, USA, 4 FFI, Norway

1415 Coffee

**SESSION 3**

**1435 Quantifying the negative impact of breaking internal waves on interferometric synthetic aperture sonar**

Roy E. Hansen<sup>1</sup>, Anthony P. Lyons<sup>2</sup>, Daniel A. Cook<sup>3</sup>, Torstein Ø. Sæbø<sup>1</sup>

1 Norwegian Defence Research Establishment (FFI), Norway, 2 University of New Hampshire, USA,  
3 Georgia Tech Research Institute, USA

**1455 Effects of reverberation and noise on the estimation of synthetic aperture sonar multi-look coherence**

Anthony P. Lyons<sup>1</sup>, Jonathan L. King<sup>2</sup>, Daniel C. Brown<sup>3</sup>,

1 University of New Hampshire, USA, 2 Naval Surface Warfare Center, USA, 3 Pennsylvania State University, USA

**1515 Increasing navigation effectiveness in GPS denied environments using through-the-sensor SAS techniques**

Warren A. Connors<sup>1</sup>, Alan J. Hunter<sup>2</sup>, Jeremy Dillon<sup>3</sup>

1 Defence R&D Canada, Canada, 2 University of Bath, UK, 3 Kraken Robotics, Canada

**1535 Analysis and exploitation of complex SAR phenomena produced from vibrating targets**

Brandon Corbett<sup>1</sup>, Daniel Andre<sup>1</sup>, Darren Muff<sup>2</sup>, Mark Finnis<sup>2</sup>, Dave Blacknell<sup>2</sup>

1 Cranfield University, UK, 2 DSTL, UK

1555 Questions

1615 Close

**Thursday 6 September 2018**

0830 Coffee

**SESSION 4**

**0920 Transfer-learning with deep neural networks for mine recognition in sonar images**

Narada Warakagoda, Øivind Midtgaard

Norwegian Defence Research Establishment (FFI), Norway

**0940 Convolutional neural network transfer learning for underwater object classification**

David P. Williams,

NATO STO CMRE, Italy

**1000 Interpretable semi-supervised deep learning with synthetic aperture sonar for automatic target recognition**

Johnny L. Chen, Jason E. Summers, Jason M. Trader,

ARIa, USA

**1020 Supervised deep learning classification for multiband synthetic aperture sonar**

Matthew Emigh, Bradley Marchand, Matthew Cook, James L Prater,  
Naval Surface Warfare Center, USA

1040 Coffee

**SESSION 5**

**1100 Synthetic aperture sonar phase correction for a curved projector**

Ciaran Sanford<sup>1</sup>, Alan Hunter<sup>1</sup>, Allan Willcox<sup>2</sup>

1 University of Bath, UK, 2 Picotech Ltd, UK

**1120 Evaluation of a non-coherent synthetic aperture sonar autofocus**

Vincent Myers<sup>1</sup>, Duncan P. Williams<sup>2</sup>, Jeremy Dillon<sup>3</sup>

1 Defence R&D Canada, Canada, 2 Dstl Porton Down, UK, 3 National Research Council, Canada

**1140 Calibration transponder measurement of synthetic aperture sonar beampatterns**

Brian O'Donnell, Shaun D Anderson, Marsal Bruna, Jake Robinson, Daniel A Cook

Georgia Tech Research Institute, USA

1200 Lunch

**SESSION 6**

**1245 An improved SAR-near-field spatially variant basebanding technique**

Daniel Andre<sup>1</sup>, Mark Finnis<sup>1</sup>, David Blacknell<sup>2</sup>

1 Cranfield University, UK, 2 DSTL Scientific Intelligence Team, UK

**1305 Adaptive waveform design for interference mitigation in gapped spectrum SAR**

Claire Tierney, Bernard Mulgrew,

Edinburgh University, UK

**1325 Side-looking sonar Image quality assessment using reference targets**

Anna van Velsen, Robbert van Vossen, Guus Beckers

TNO Defence, The Netherlands

1345 Coffee

**SESSION 7**

**1405 Data driven corrections to multistatic 3D through-wall SAR imagery**

James Elgy<sup>1</sup>, Daniel Andre<sup>1</sup>, Mark Finnis<sup>1</sup>, David Blacknell<sup>2</sup>

1 Cranfield University, UK, 2 DSTL Scientific Intelligence Team, UK

**1425 Synthetic aperture sonar despeckling based on total variation regularization**

Marsal A. Bruna, David L. Pate, Daniel A. Cook,

Georgia Tech Research Institute, USA

**14.45 Additional representations for improving synthetic aperture sonar classification using convolutional neural networks**

Isaac D. Gerg<sup>1</sup>, David P. Williams<sup>2</sup>

1 The Pennsylvania State University Applied Research Laboratory, USA

2 Centre for Maritime Research and Experimentation, Italy

1505 Questions  
1530 Close

1900 Drinks Reception – Villa Marigola  
1930 Conference Dinner – Villa Marigola

### Friday 7 September 2018

0830 Coffee

#### SESSION 8

0920 **Preliminary results from attempts to determine SAS array coherence from image metrics**  
James L. Prater<sup>1</sup>, Holger Schmaljohann<sup>2</sup>  
1Naval Surface Warfare Center, USA, 2 Naval Maritime Technology and Research, USA

0940 **Measuring human assessed complexity in synthetic aperture sonar imagery using the ELO rating system.**  
Brian Reinhardt, The Pennsylvania State University, USA

1000 **Approaches to false alarm reduction for synthetic aperture sonar change detection**  
Jeannine Abiva<sup>1</sup>, Tesfaye G-Michael<sup>1</sup>, Øivind Midtgaard<sup>2</sup>, Vincent Myers<sup>3</sup>, Rodney Roberts<sup>4</sup>  
1 Naval Surface Warfare Center, USA, 2 Norwegian Defence Research Establishment (FFI), Norway,  
3 The Defence Research and Development Canada (DRDC), Canada 3 Florida State University, USA

1020 Coffee

#### SESSION 9

1040 **Impact and limitations imposed by stop-and-hop approximation on CSAS imagery**  
Ulrich Herter<sup>(1)</sup>, Holger Schmaljohann<sup>(2)</sup>, Thomas Fickenscher<sup>(1)</sup>  
1 Helmut Schmidt University, Germany  
2 Bundeswehr Technical Center for Ships and Naval Weapons, Germany

1100 **Automated change detection in streaming SAS imagery**  
Øivind Midtgaard,  
Norwegian Defence Research Establishment (FFI), Norway

1120 Questions  
1145 Chairs Closing Comments  
1200 Lunch and close