International Research Ship Operators

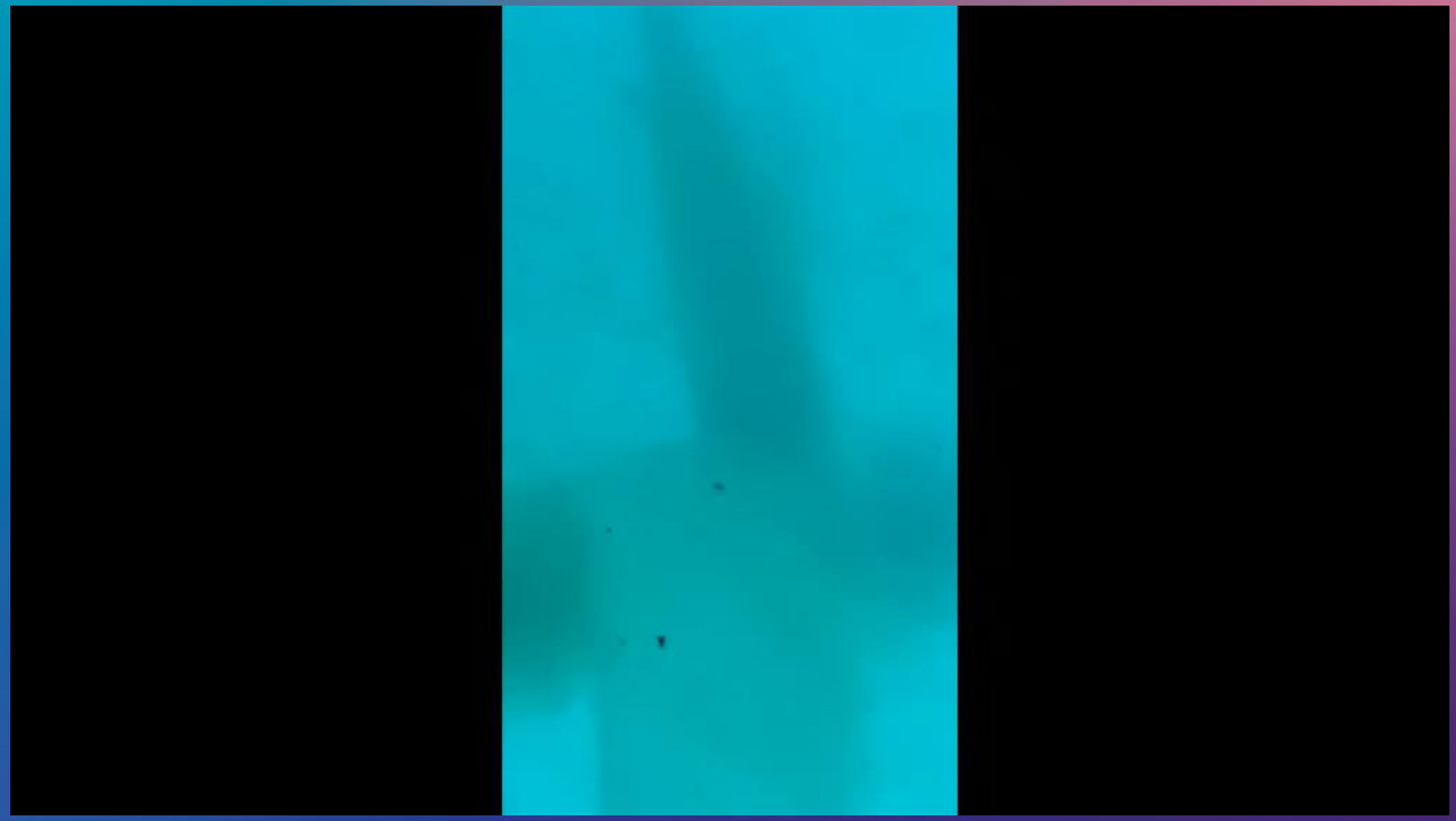
OCEAN SONICS

Underwater Radiated Noise (URN)

Presented by: Jackie Guo

Burges, Belgium
October 16-20, 2023

Propeller Song



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IMO Revised Guidelines on reducing URN from Ships

INTERNATIONAL MARITIME ORGANIZATION

E

4 ALBERT EMBANKMENT
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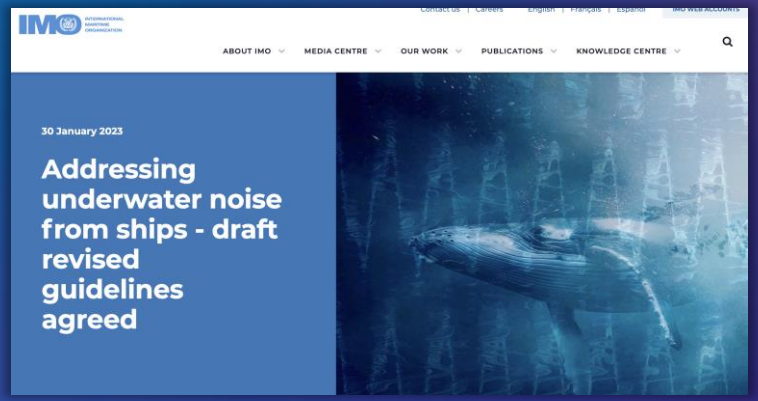
MEPC.1/Circ.906
22 August 2023

REVISED GUIDELINES FOR THE REDUCTION OF UNDERWATER RADIATED NOISE FROM SHIPPING TO ADDRESS ADVERSE IMPACTS ON MARINE LIFE



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MEPC.1/Circ.906
22 August 2023

INES FOR THE REDUCTION OF UNDERWATER RADIATED NOISE
PPING TO ADDRESS ADVERSE IMPACTS ON MARINE LIFE

Environment Protection Committee, at its sixty-sixth session (31 March
a view to providing guidance on the reduction of underwater noise from
and following a recommendation made by the Sub-Committee on Ship
Design and Equipment (DE), at its fifty-seventh session, approved the *Guidelines for the reduction of underwater noise from commercial shipping to address adverse impacts on marine life* (the Guidelines).

2 The Marine Environment Protection Committee, at its eightieth session (3 to 7 July 2023), following a comprehensive revision of the Guidelines by the Sub-Committee on Ship Design and Construction (SDC), at its ninth session (23 to 27 January 2023), with a view to increasing awareness, uptake and implementation, approved the annexed *Revised guidelines for the reduction of underwater radiated noise from shipping to address adverse impacts on marine life* (Revised Guidelines).

3 Member States are invited to use the annexed Revised Guidelines with the aim of reducing underwater radiated noise from ships and to bring them to the attention of all parties concerned, in particular ship and equipment designers, shipbuilders and shipowners and operators, classification societies, suppliers, manufacturers and other stakeholders.

4 Member States and international organizations are also invited to submit information, observations, comments and recommendations based on the practical experience gained through the application of these Revised Guidelines to the Marine Environment Protection Committee under the agenda item "Any other business".

5 These Revised Guidelines will take effect on 1 October 2023.

6 This circular revokes MEPC.1/Circ.833.

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Main takeaway from IMO workshop:

Real-time URN measurement is key to reduce URN

IMO INTERNATIONAL MARITIME ORGANIZATION

IMO Expert Workshop on the relationship between Energy Efficiency and Underwater Radiated Noise

Time	Agenda	Speakers
DAY 1 September 18th		
9H30	Opening Address (15 min)	**IMO Marine Environment Division**
9H45	Overview of the Format and Objectives (15 min)	**Chairs: Eric Baudin (France), Leila Hatch (United States) and Michelle Sanders (Canada)**
Theme 1 REDUCING GHG AND NOISE EMISSIONS: Setting the Stage Chair: Leila Hatch, US		
10H	Introduction and Overview of IMO Energy Efficiency Work (12 min)	**Sveinung Oftedal (Norway / Chair of ISWG-GHG)**
10H15	Introduction and overview of IMO URN (12 min)	**Michelle Sanders, Alternate Permanent Representative of Canada to the IMO**
10H30	GloNoise (10 min)	**Steven Reyersen & Jose Matheickal**
10H40 Health break (20 min)		
11H	Presentation on the findings and recommendations on the GHG-URN matrix. (30 min)	**Rienk Terweij, VARD Marine**
11H30	Panel: perspectives on implementation of GHG and noise reduction strategies (1hr)	
		Chris Waddington, International Chamber of Shipping (ICS)
		Jim Covill, International Association of Classification Societies (IACS)
		Madadh MacLaine, Zero Emissions Ship Technology Association (ZESTA)
		Tom Smith, University College London
		John Maggs, Seas At Risk / Clean Shipping Coalition (CSC)
Lunch break 12H30PM-1H45PM (1H15)		
Theme 2 ENERGY EFFICIENCY BY DESIGN AND RELATED NEW SYSTEMS: What do we know about URN relationships? Chair: Eric Baudin, France		
1H45PM	12 min x 8 presenters (2H)	**Lee B Kindberg, Maersk (remote)**
		Yousef El Bagoury, CSL
		Frans Hendrik Lafeber, MARIN
		Lars Eikeland, Oscar Propulsion
		Mehmet Atlar, Gaters project
		Tomaso Gaggero and Michele Viviani, Life PIAQUO project
		Hongseok Jeong and Hanshin Seol, KRISO
		Kevin Reynolds, Glosten, naval architecture & marine

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It’s about creating a Sustainable Ocean

SUSTAINABLE DEVELOPMENT GOALS

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SATURN Project - Developing ISO Standards and Solutions for Underwater Radiated Noise (URN)

https://www.youtube.com/watch?v=oHUeFolStfo

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SATURN Project : - Underwater Radiated Noise (URN) Measurements

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RSV NUYINA Listens for Vessel Noise and Bio-acoustic Research

11 real-time smart hydrophone installed in icebreaker NUYINA 2020

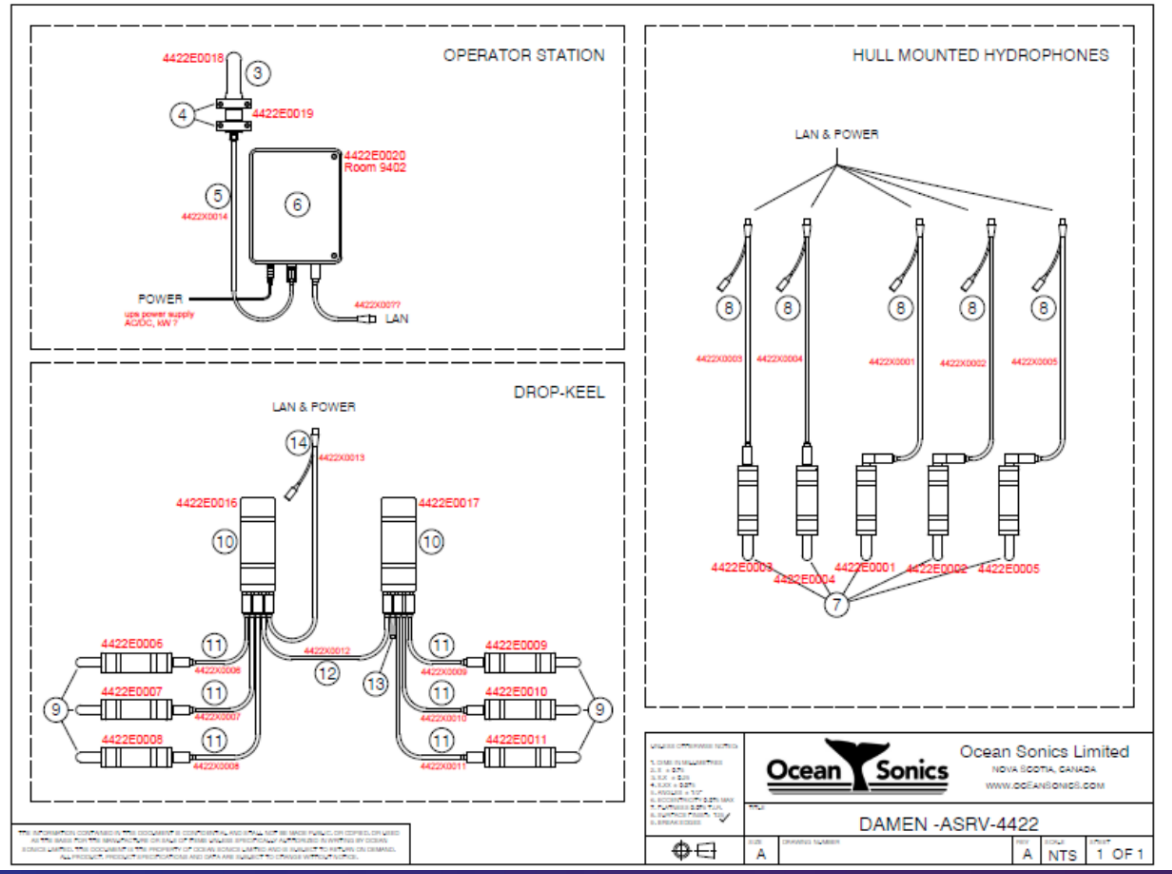
APPENDIX D – HYDROPHONE LOCATION CHARTS

Hull Mounted S/N	1759	1760	1813	1814	1815	
Drop Keel S/N	1785	1786	1787	1788	1789	1790

Hull Mounted Vessel Noise Measuring System			
Hydrophone Location	Hydrophone Serial Number	Fore/Aft from CRP	Port/Starboard from CRP
E0001 Bow Port			
E0002 Mid Starboard			
E0003 Port Stern			
E0004 Starboard Stern			
E0005 Prop Starboard			

Drop Keel Mounted Bioacoustics System			
Hydrophone Location	Hydrophone Serial Number	Fore/Aft from CRP	Port/Starboard from CRP
E0006 Starboard Aft			
E0007 Starboard Mid			
E0008 Starboard Forward			
E0009 Port Forward			
E0010 Port Mid			
E0011 Port Aft			

APPENDIX C – RSV NUYINA EQUIPMENT SET-UP SCHEMATIC



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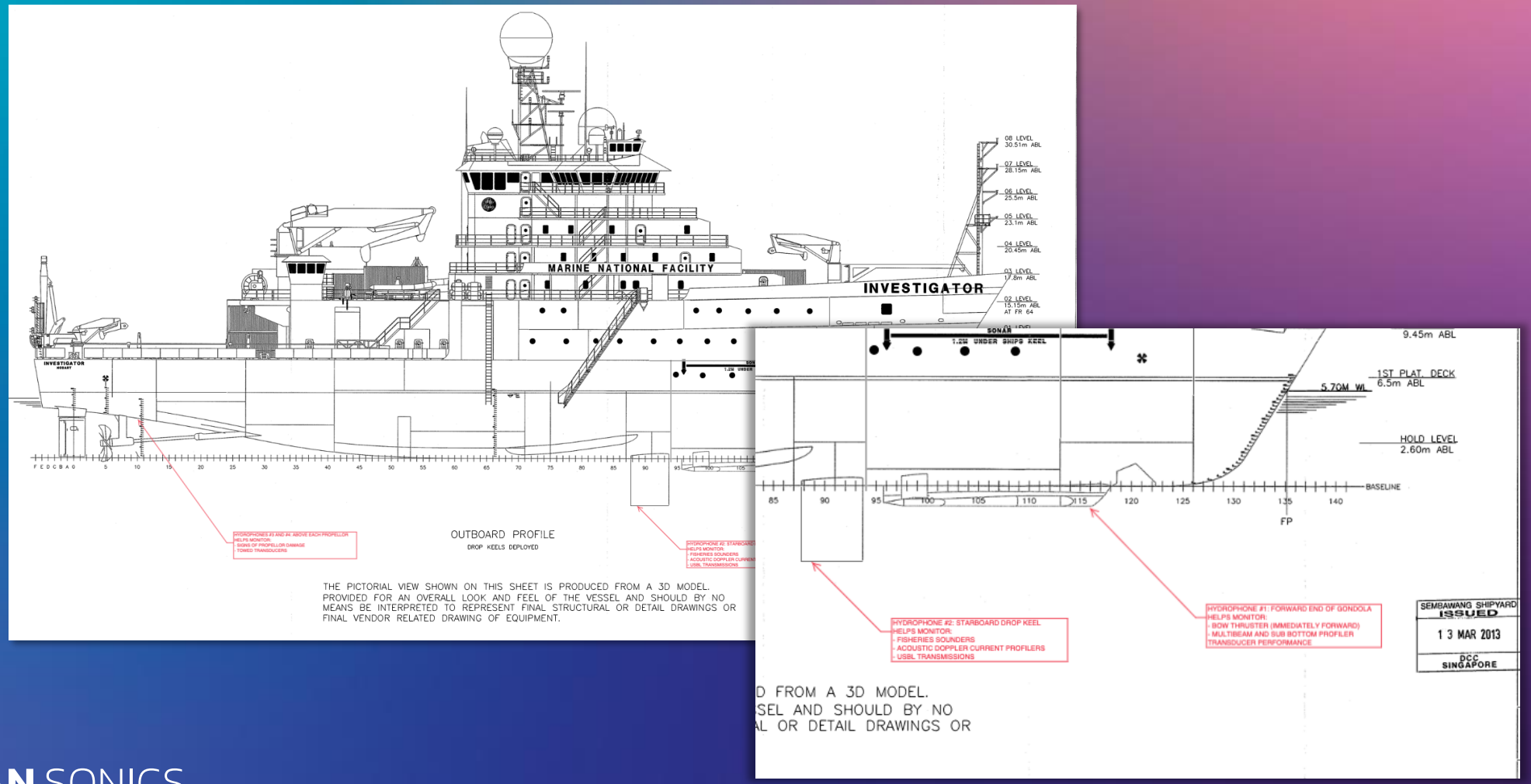
RV Investigator Listens for Machine Health and Acoustic Sensors Performance



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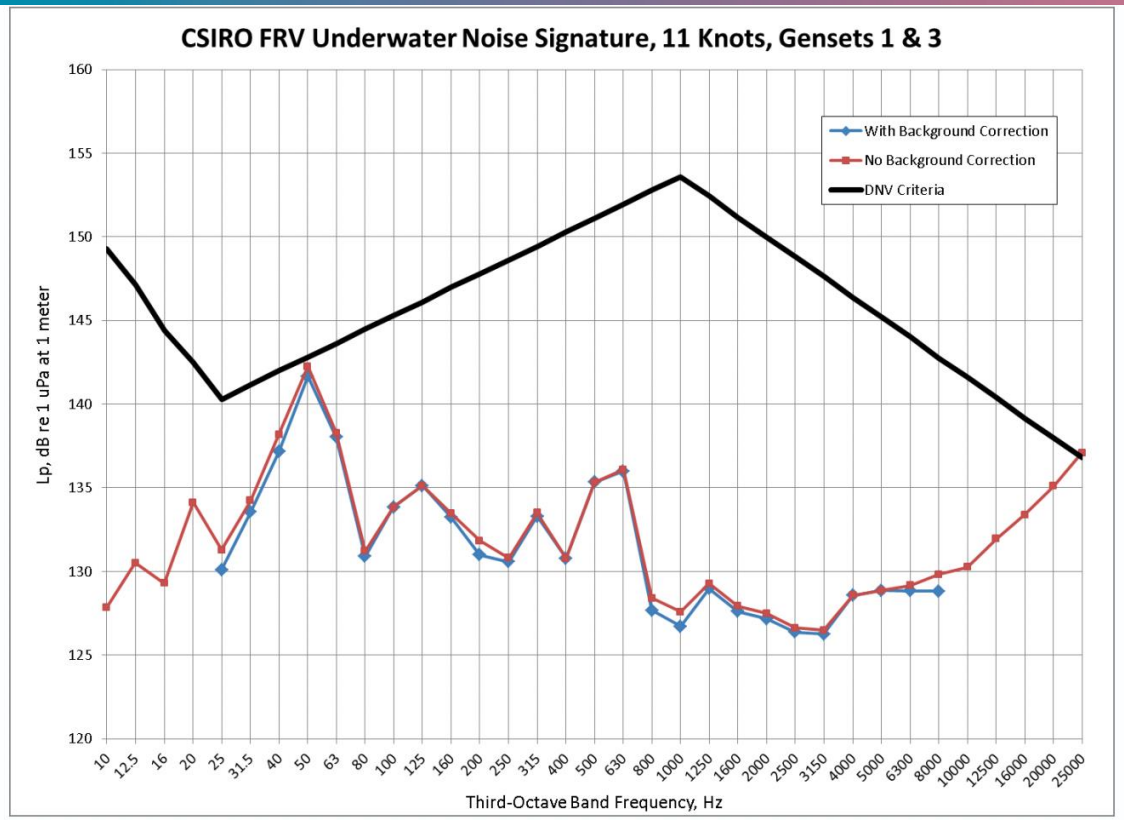
RV Investigator Meets DNV. Silent - R



MEETS DNV SILENT-R

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RV Investigator Listens for Acoustic Sensors Performance

INVESTIGATOR TRANSDUCERS	
GONDOLA	
EM122	12kHz FULL OCEAN DEPTH MULTIBEAM
SBP120	3.5kHz SUB BOTTOM PROFILER
EM710	100kHz SHALLOW WATER HIGH RESOLUTION MULTIBEAM
ME70	70-120kHz SCIENTIFIC MULTIBEAM ECHO SOUNDER
12/16-60	DUAL BEAM 12kHz TRANSDUCER FOR PINGER AND ACOUSTIC RELEASE WORK
DL850	DUAL AXIS DOPPLER
EN250	50kHz BRIDGE ECHO SOUNDER
SH90	114kHz OMNIDIRECTIONAL FISH-FINDING SONAR
HYDROPHONE	OCEANSONICS ICLISTEN HF
PORT DROP KEEL	
EK60 SUITE	18, 38, 70, 120, 200 AND 333kHz SPLIT BEAM TRANSDUCERS
OS75	75kHz RDI ADCP
OS150	150kHz ADCP
STARBOARD DROP KEEL	
SIMRAD ITI	SIMRAD TRAWL NET MONITORING SYSTEM
USBL	19-36kHz SONARDYNE RANGER ULTRA-SHORT BASELINE UNDERWATER POSITIONING SYSTEM
HYDROPHONE	OCEANSONICS ICLISTEN HF

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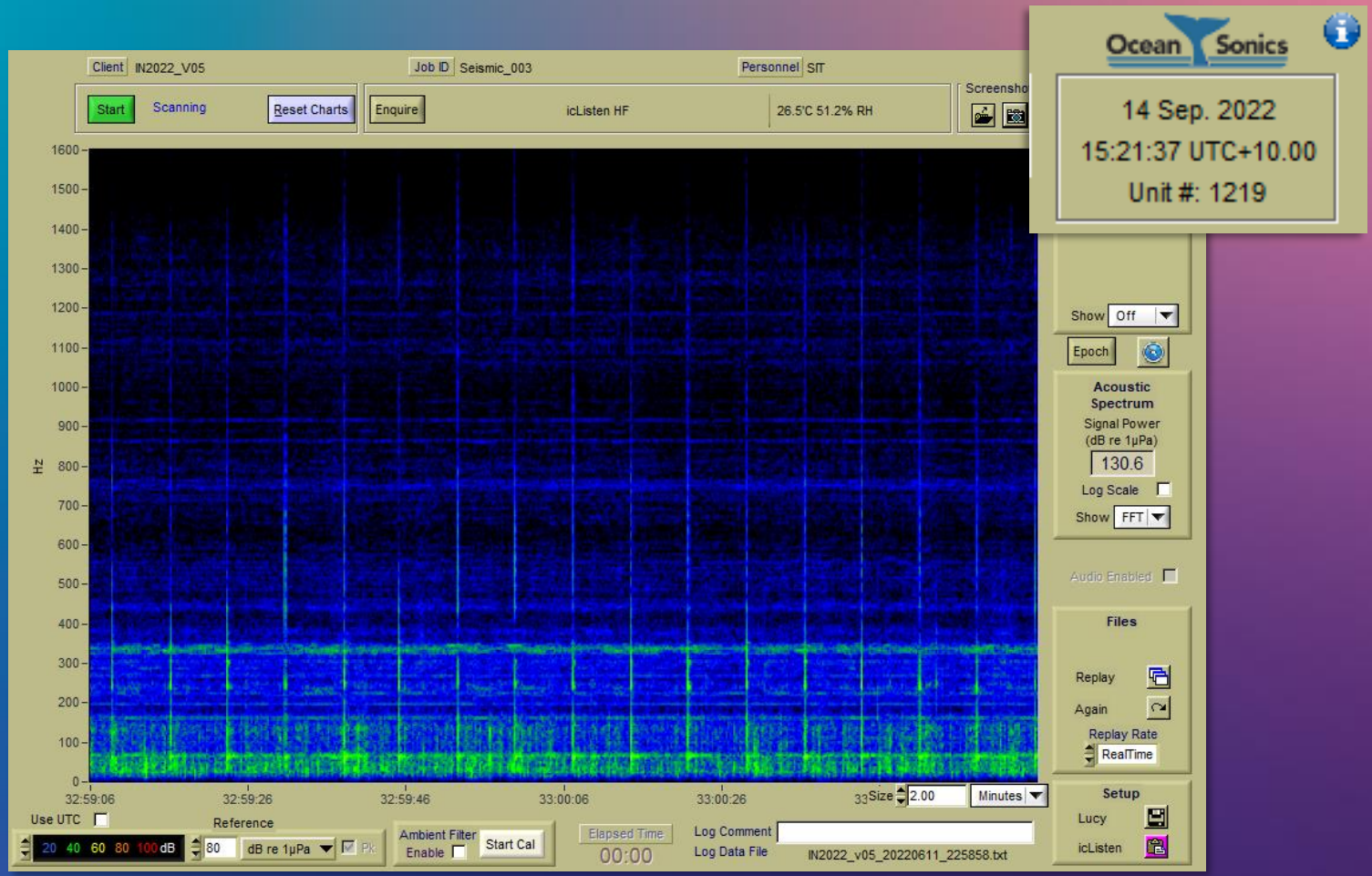
RV Investigator Listens for Acoustic Sensors Performance



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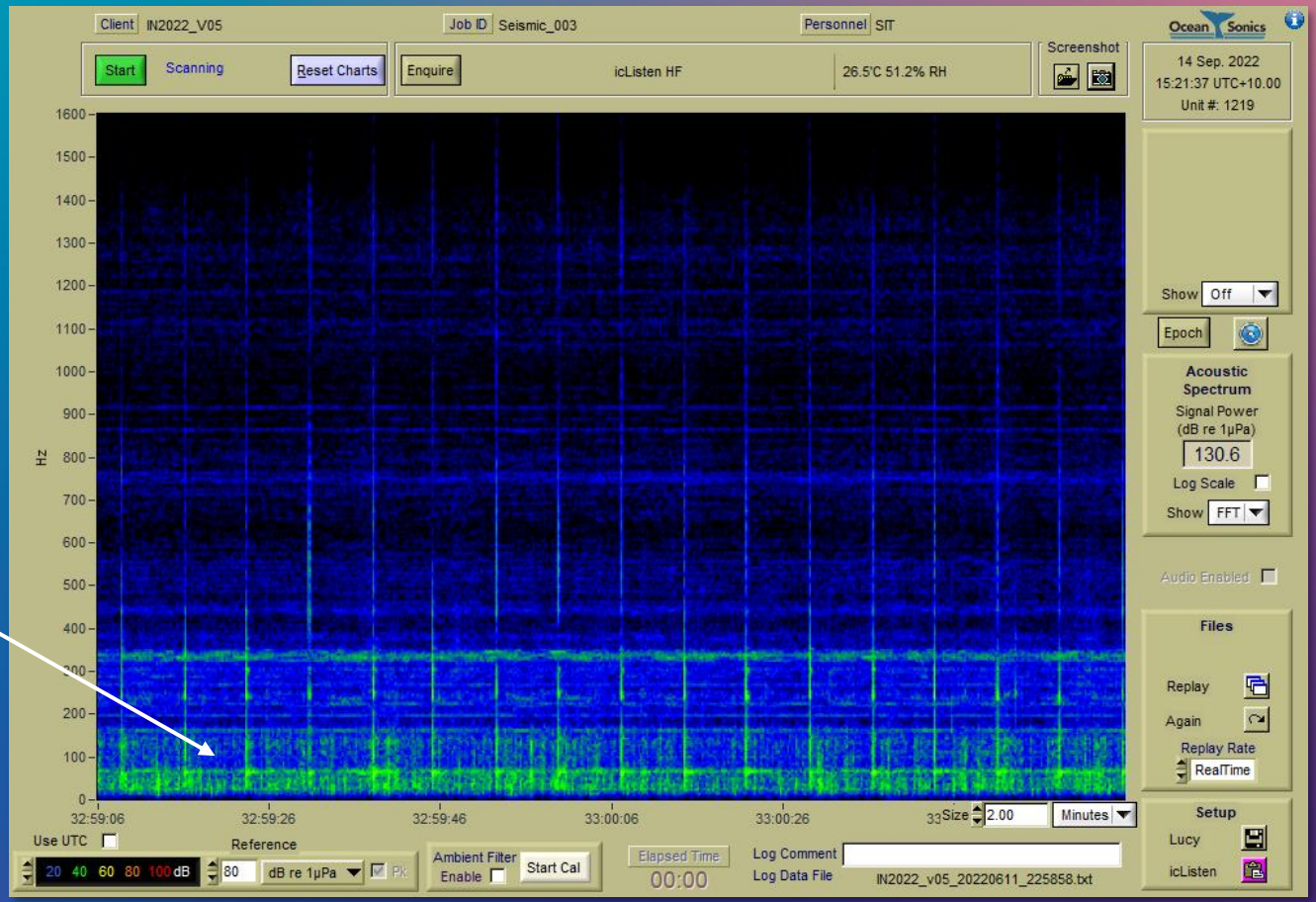
RV Investigator Listens for Acoustic Sensors Performance

70Hz: Ships twin blade propeller moving at 60-70 rpm each



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RV Investigator Listens for Acoustic Sensors Performance

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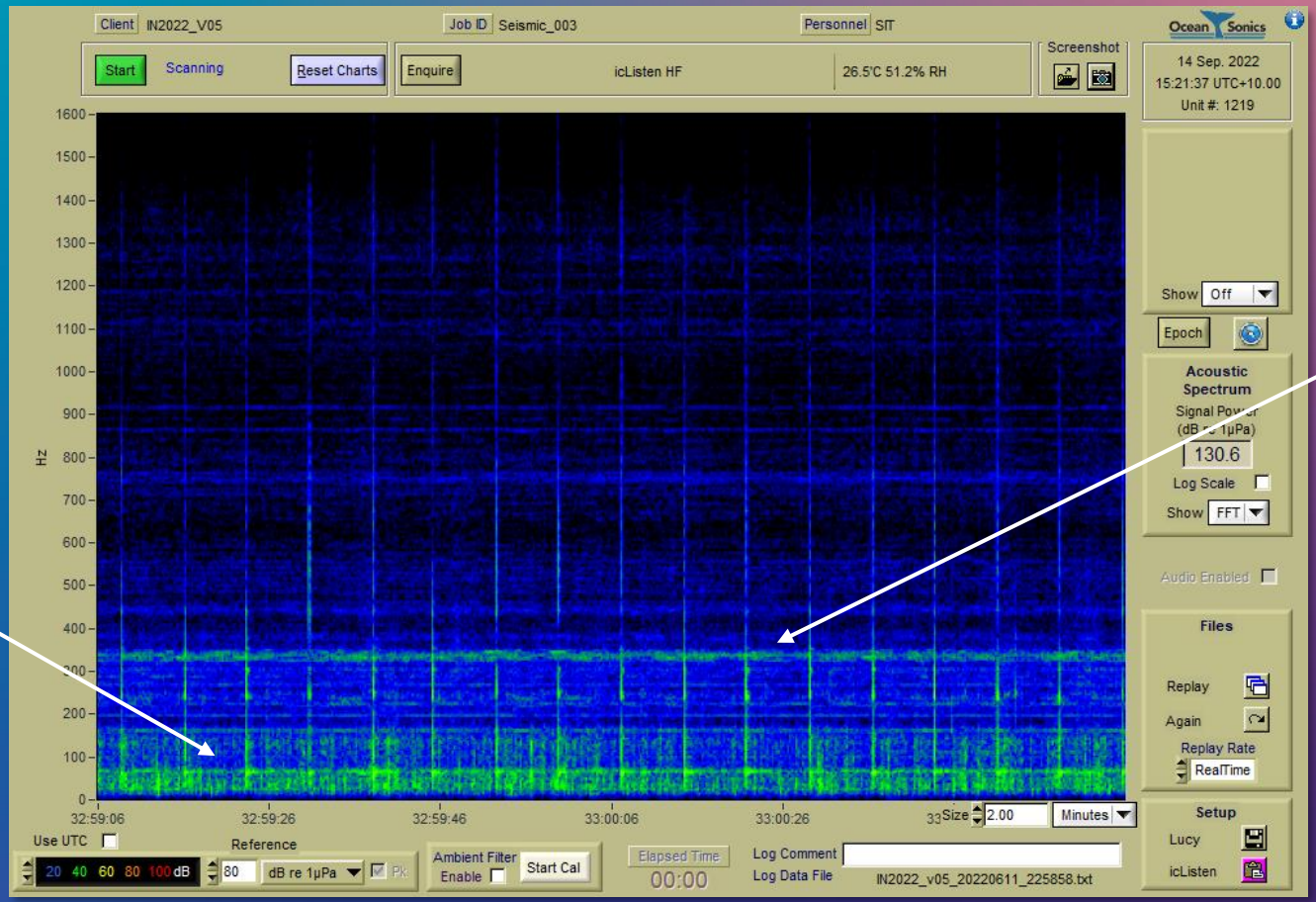

350 Hz: Likely ship machinery (diesel generators, pumps, air conditioning plant)

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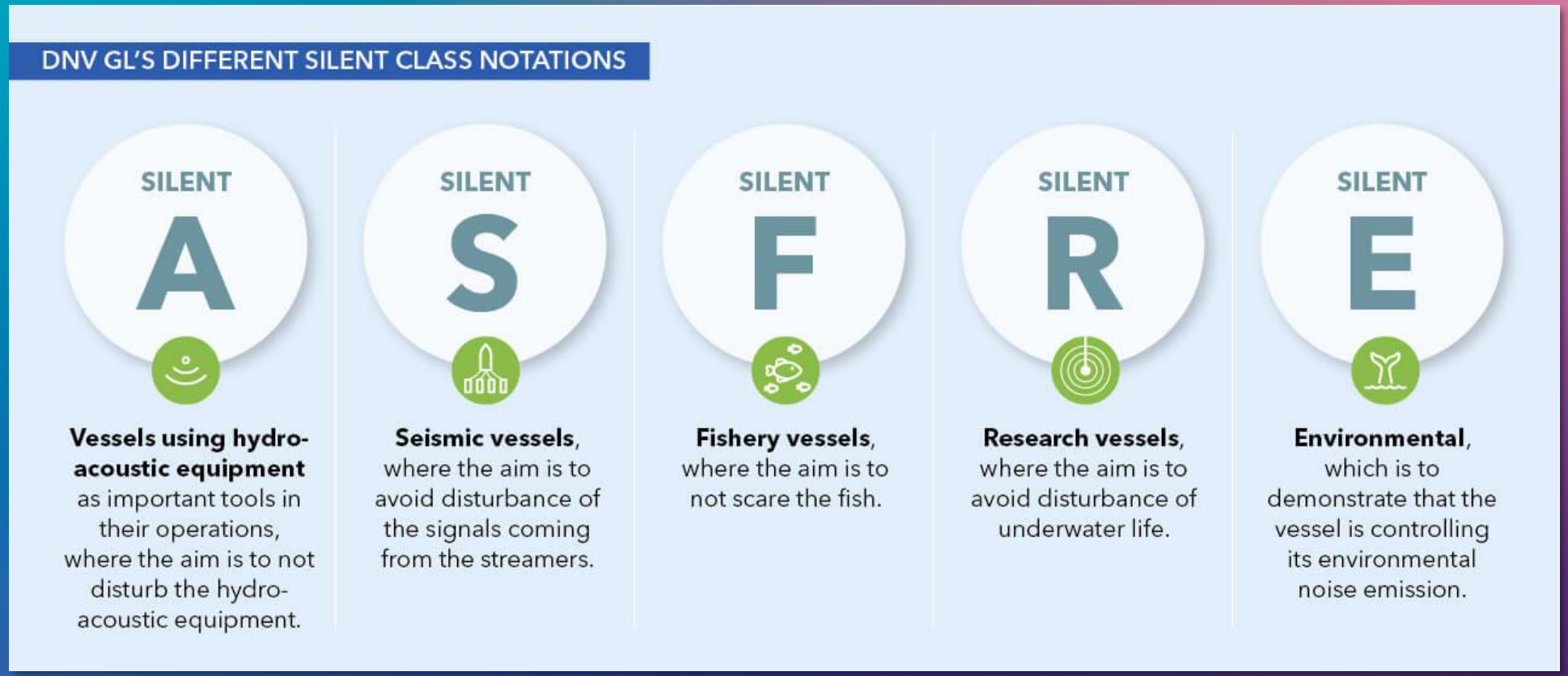
DNV Silent Vessel Class Notations



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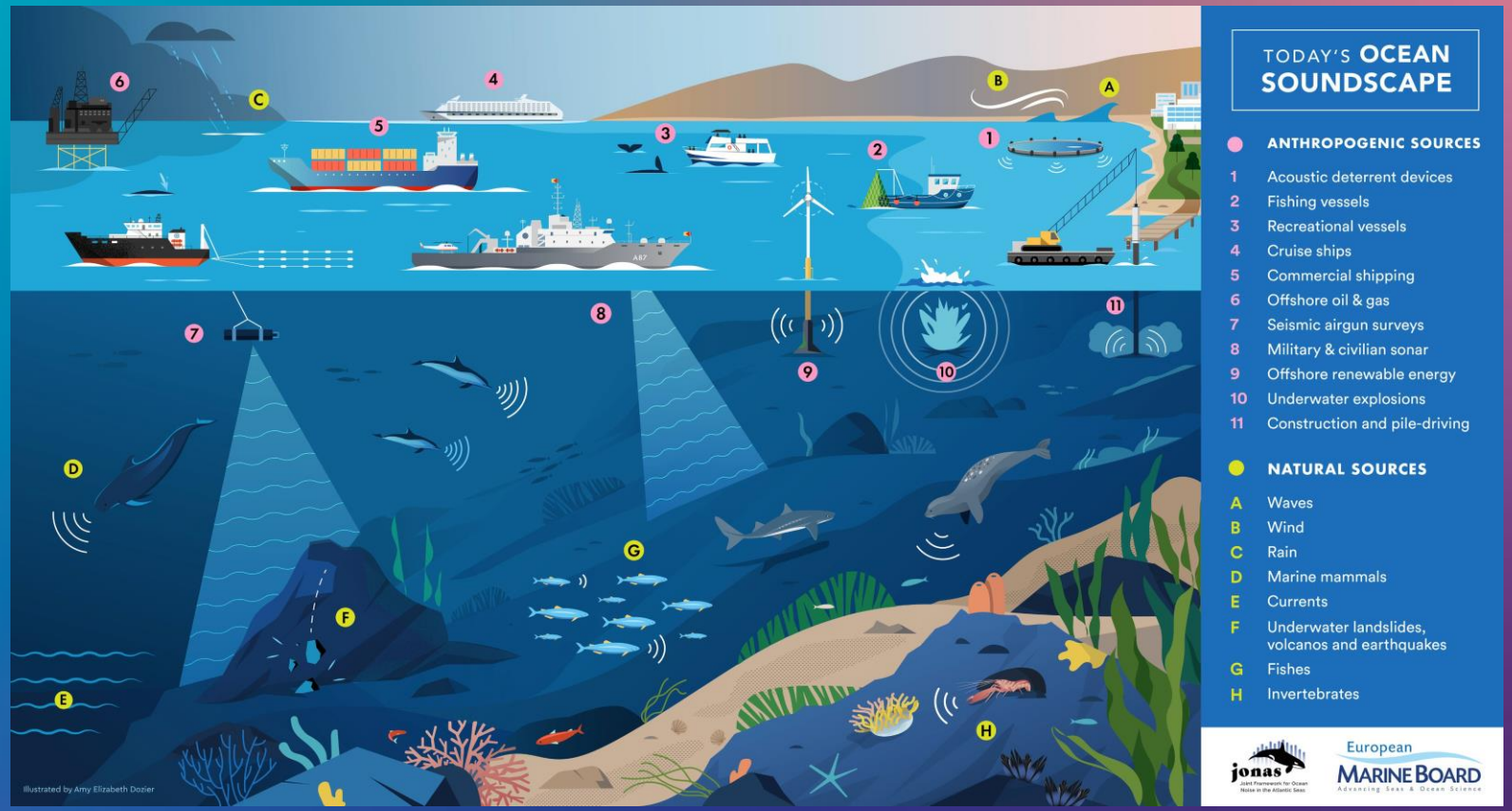
Why we listen to Ocean in real-time



Real-time ocean sound data is critical for us to better understand, protect and harness the power of our oceans

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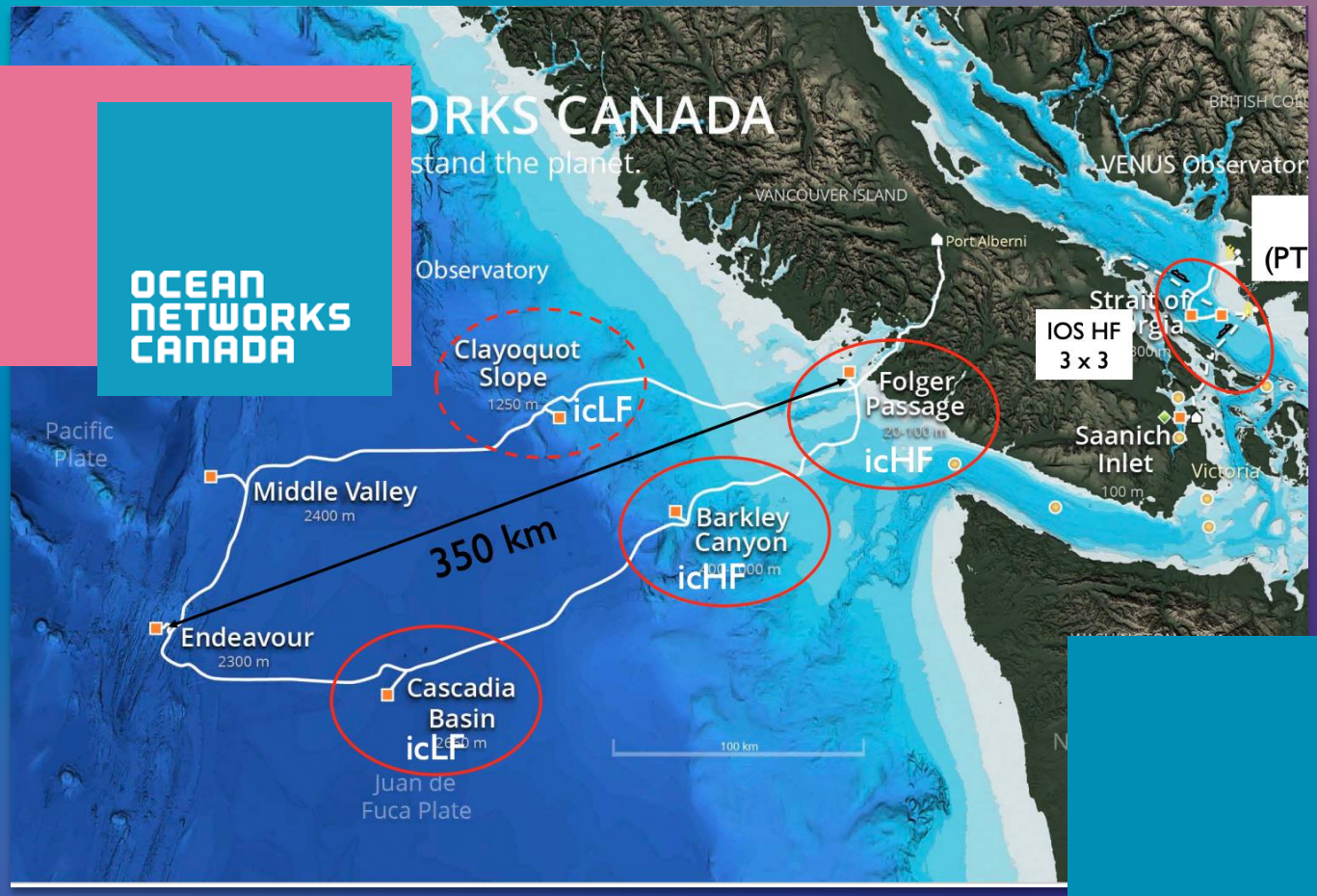
Real-time Ocean Observatories are Listening to and Monitoring the Ocean



Key End Users:

- Aloha (US)
- BPPT (Indonesia)
- Barrow Strait (Arctic)
- COVE (Canada)
- EMSO (EU)
- Holyrood Bay (Newfoundland)
- INESC-TEC (Portugal)
- INGV (Italy)
- LoVe (Norway)
- MBARI (US)
- ONC (Canada)
- OOI (US)
- Smartbay (Ireland)

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Smart Hydrophone Applications

Ocean Science

Energy

Defense & Security

Maritime Transportation

Fisheries & Aquaculture

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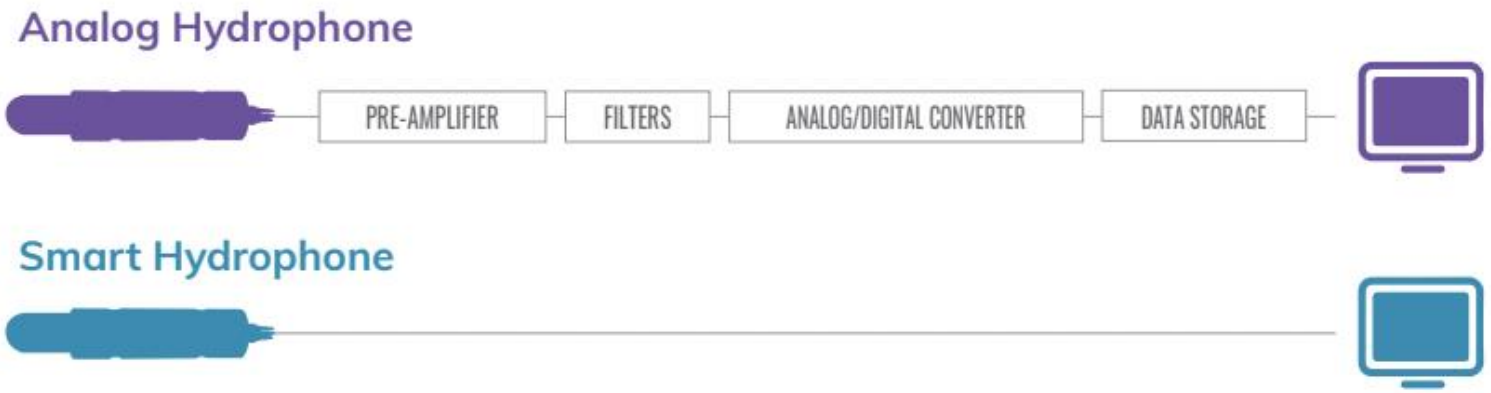
Why icListen?

The icListen eliminates the need for pre-amp, filters, converters and data-link with a self-contained, compact unit that streams or records HD acoustic data in real-time.



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The icListen benefits

The icListen Difference	Benefits
1. Edge Processing (processing data at source)	• Manage flood of data • Ready for AI and Machine Learning
2. Event Detection	• More options for data links • Event capture • Make decisions in real-time
3. Self-Synchronize	• Create arrays of any shape or size while maintaining highest signal quality
4. Ultra Low Self Noise Wide Dynamic Range	• Maximize sensitivity while eliminating clipping

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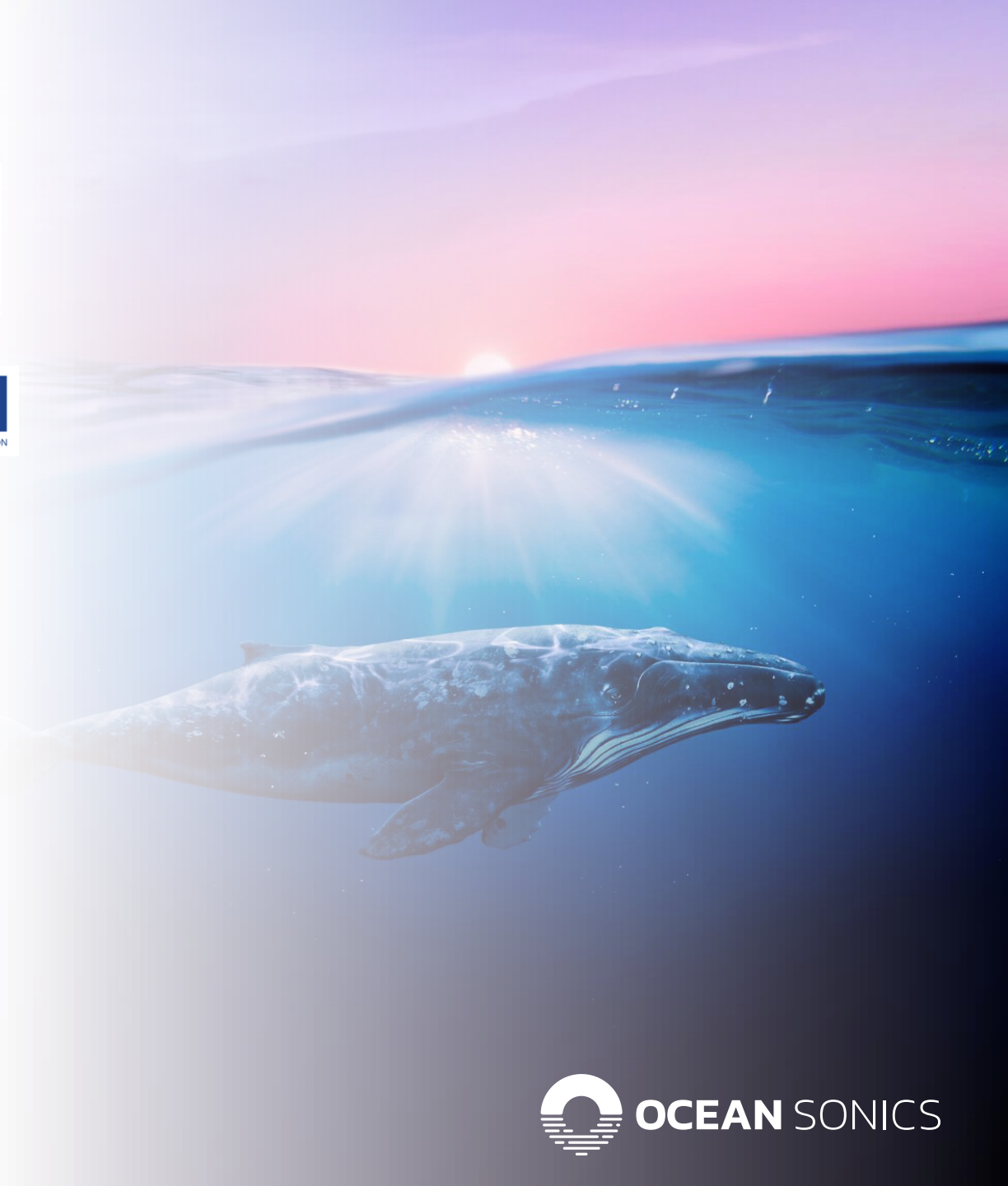
Some of Our Users



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Do you know your vessel URN?

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Image credit: DNV