

# Marine Acoustic Research Station (MARS)

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Transport  
Canada

Transports  
Canada

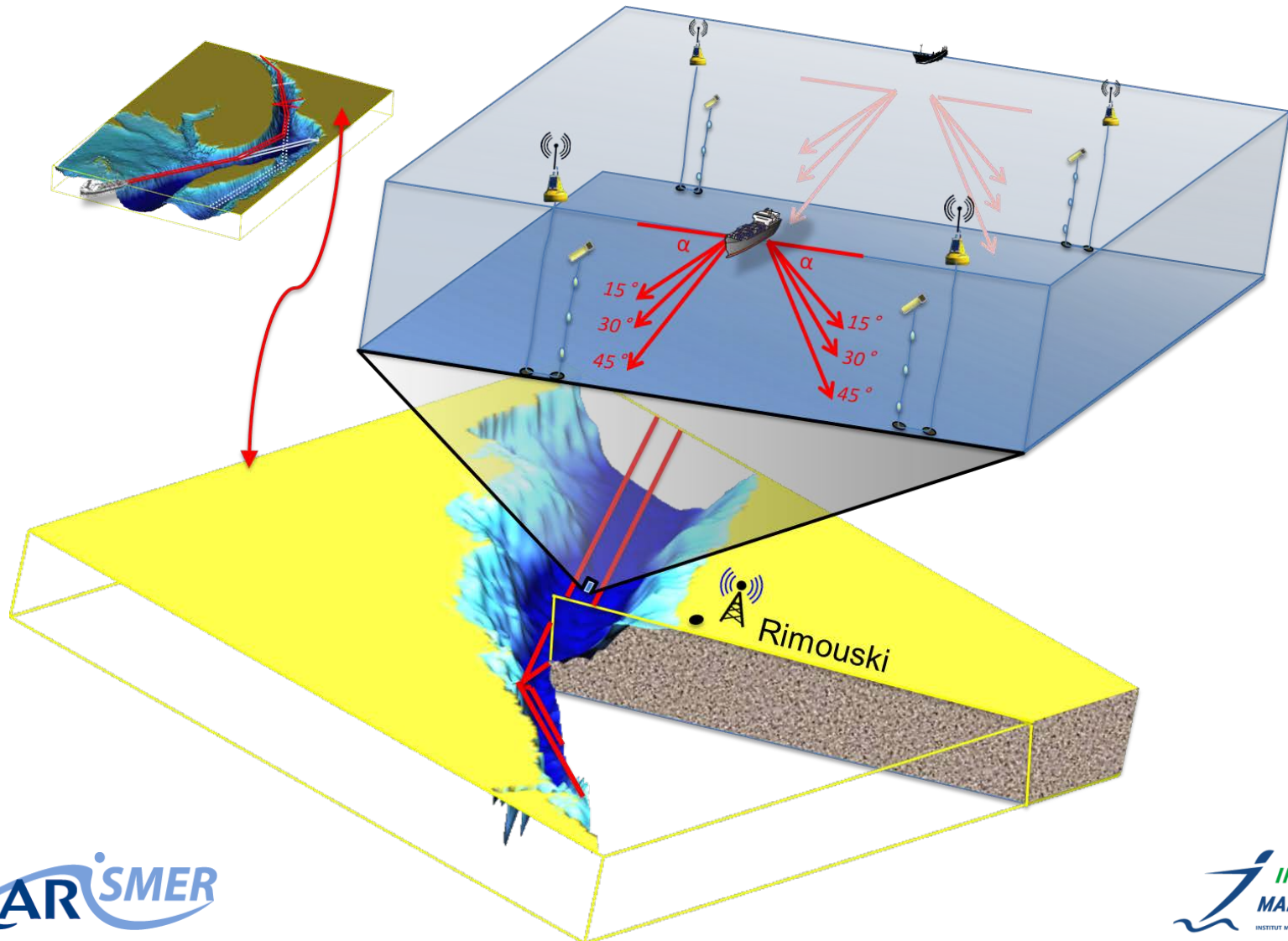
Économie  
et Innovation

Québec



# Marine Acoustic Research Station (MARS)

ISMER and Innovation maritime (~6 M\$ over 3.5 years)



# Marine Acoustic Research Station (MARS)

- Establishment and operation of a world-class marine acoustic research station in the St. Lawrence Estuary, offshore Rimouski
- Area recognized for the abundance and diversity of marine mammals that frequent it, has several favorable characteristics for the establishment of the research station (bathymetry, weak currents, etc.)
- Measure the noise level of ships passing through the St. Lawrence Estuary according to international standards (ISO/ANSI S12.64 2009)
- Establish the link between the noise level of ships, their operating conditions and the elements on board generating these noises (instrumentation of ships) in order to assess and develop mitigation methods
- The unique character of the station will allow ISMER-UQAR and IMAR to develop research and training in marine acoustics
- Valorization of measurements carried out by the station for related topics such as physical oceanography, acoustic monitoring of cetaceans, ambient noise, signal processing applied to acoustic data, telecommunications, instrumentation, etc.
- Total budget about 6 M\$ over 3.5 years
- Many partners
- Currently recruiting...

# Partners

Partners supporting the project	Partners contributing to the project
<p>Alliance verte Armateurs du Saint-Laurent Port de Montréal Port de Trois-Rivières Port de Québec Port de Saguenay Technopole maritime du Québec Réseau Québec maritime Stratégies Saint-Laurent Sodes ACCORD Société de promotion économique de Rimouski WWF Canada Première Nation Malécite de Viger</p>	<p>Transport Desgagnés Canada Steamship Lines Fednav Algoma OpDAQ Systèmes Multi-Électronique</p>

# Funding

Transport Canada: 2,5 M\$

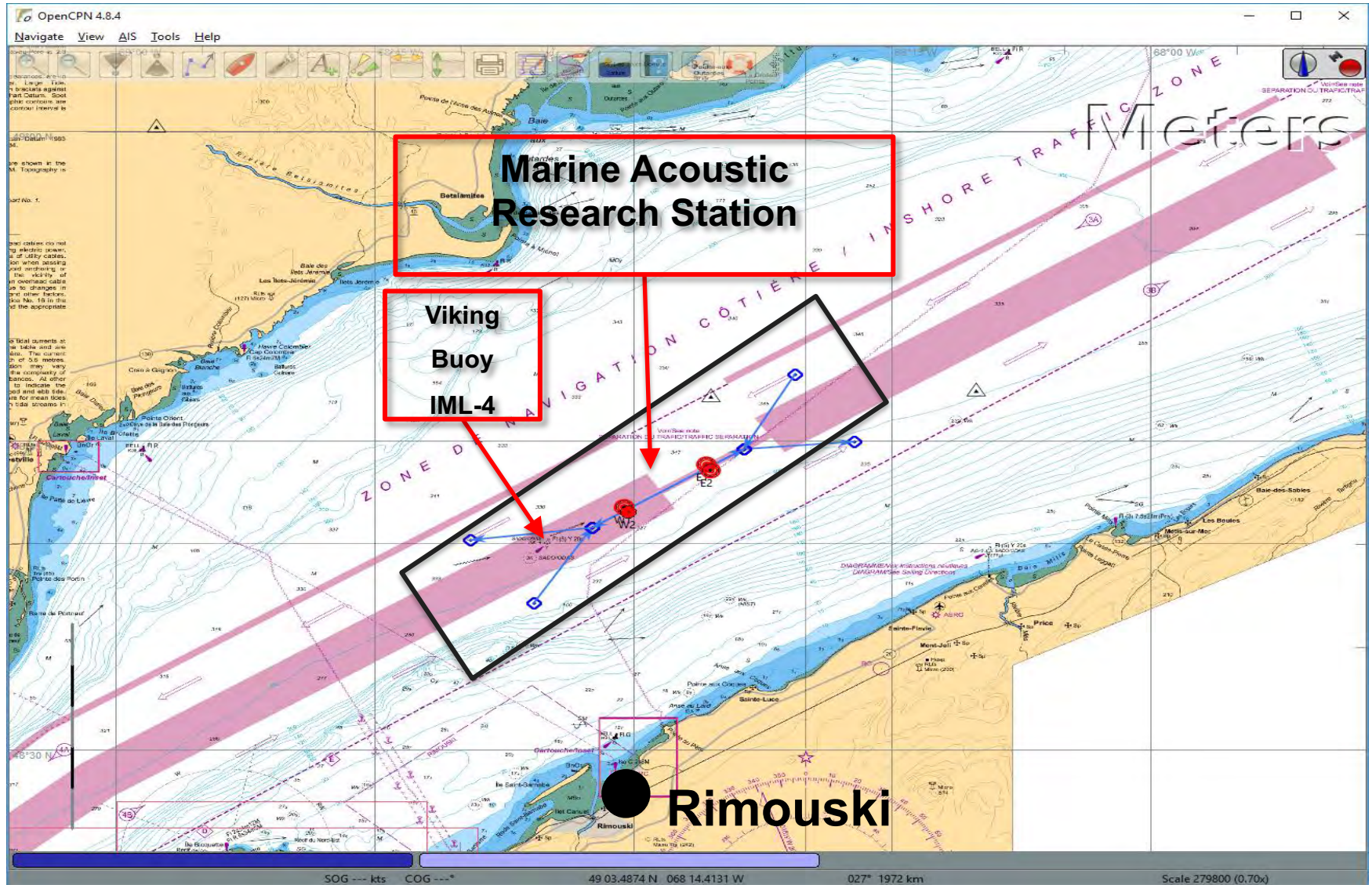
Ministère de l'Économie et de l'Innovation: 1,5 M\$

OpdAQ and Multi-Électronique: 360 k\$

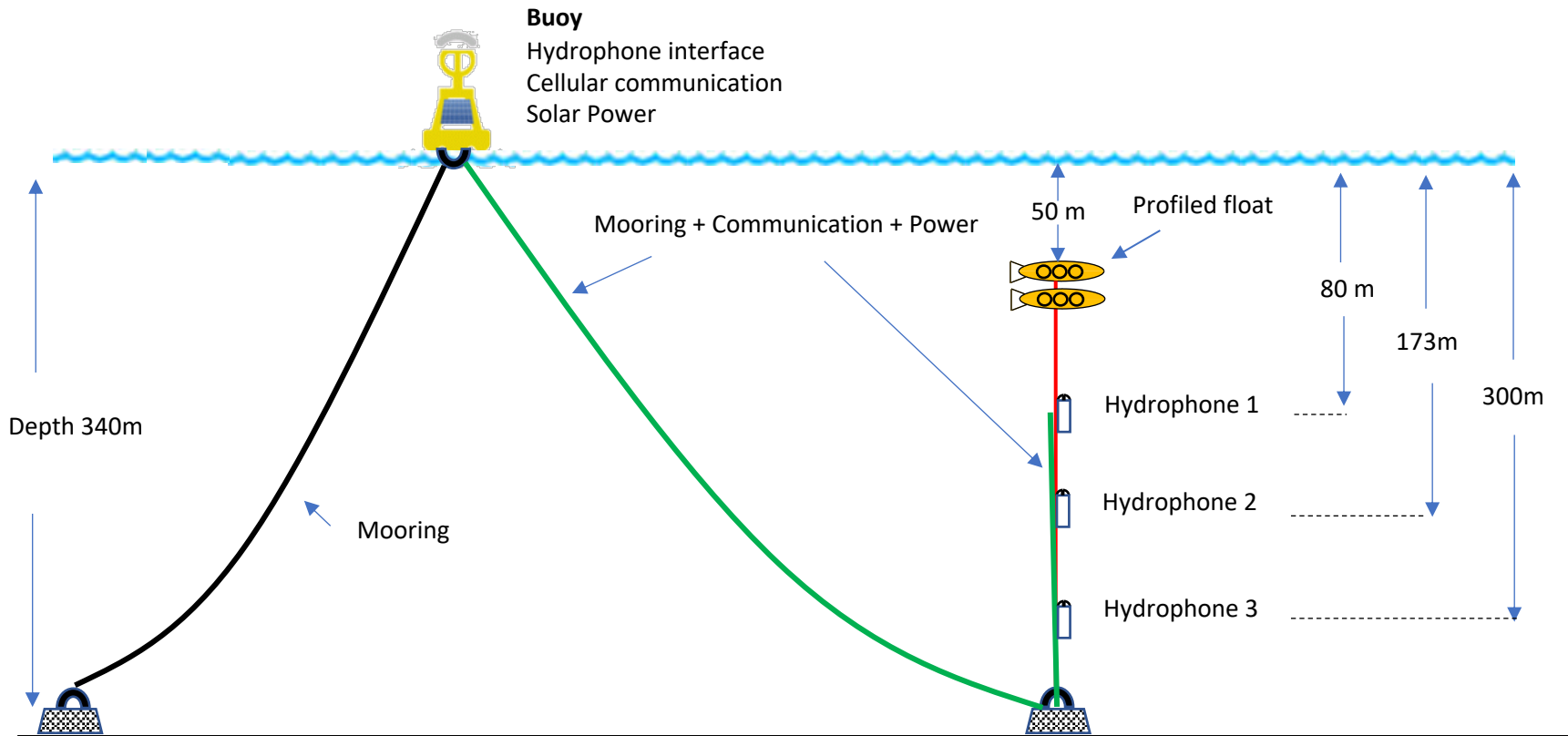
Ship-owners: 360 k\$

Réseau Québec maritime (RQM): 48 days of ship time (under review)

# Location of the station



# Moorings and instruments



# Deployment in April (June this year) and recovery in November on board the R/V Coriolis II





IMO :

MMSI :

Year of construction: 1993

Length: 123.7 m    Breadth: 17.7 m    Draft: 8.4 m

Optimal speed: 13 kn

Propulsion: DIESEL, Engine : MAN B&W 6L35MC

Nb. of propellers: 1, Nb. cylinders/engine: 6

### Vessel Spectral Acoustic Signature<sup>†</sup>

#### Method

The acoustic signature is calculated following the ANSI standard 512-64-2009, as applied in the study by Simard et al.(2016)<sup>\*</sup>. This signature is compared to that of the ships of similar length that were measured by the Acoustic Surveillance of Seaway and Ship Signatures (AS<sup>4</sup>) observatory between 4 Nov. 2012 and 29 Oct. 2013.

<sup>\*</sup>Simard, Y., N. Roy, C. Gervaise and S. Girard, 2016: Analysis and Modeling of 255 source levels of merchant ships from an acoustic observatory along St. Lawrence Seaway. J. Acoust. Soc. Am., 140(3), pp. 2002–2018.

#### Interpretation

Frequencies at which the vessel signature interquartile range (blue box) is within the top or bottom white region indicate spectral ranges where the vessel is in the loudest or quietest quarter of their length-based category, respectively.

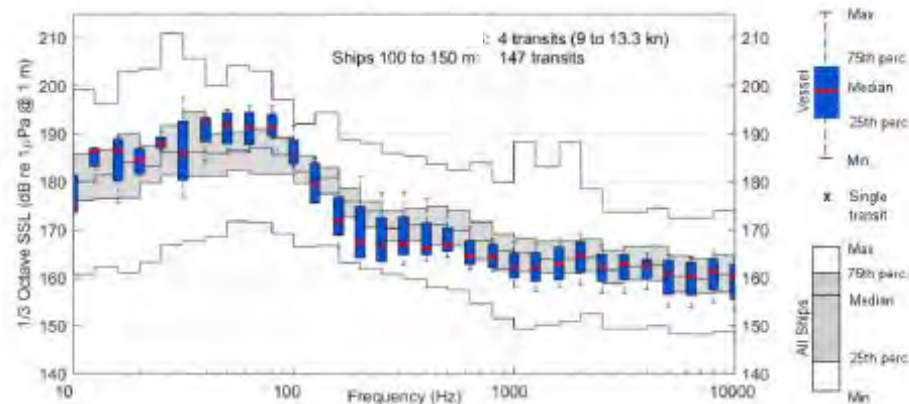
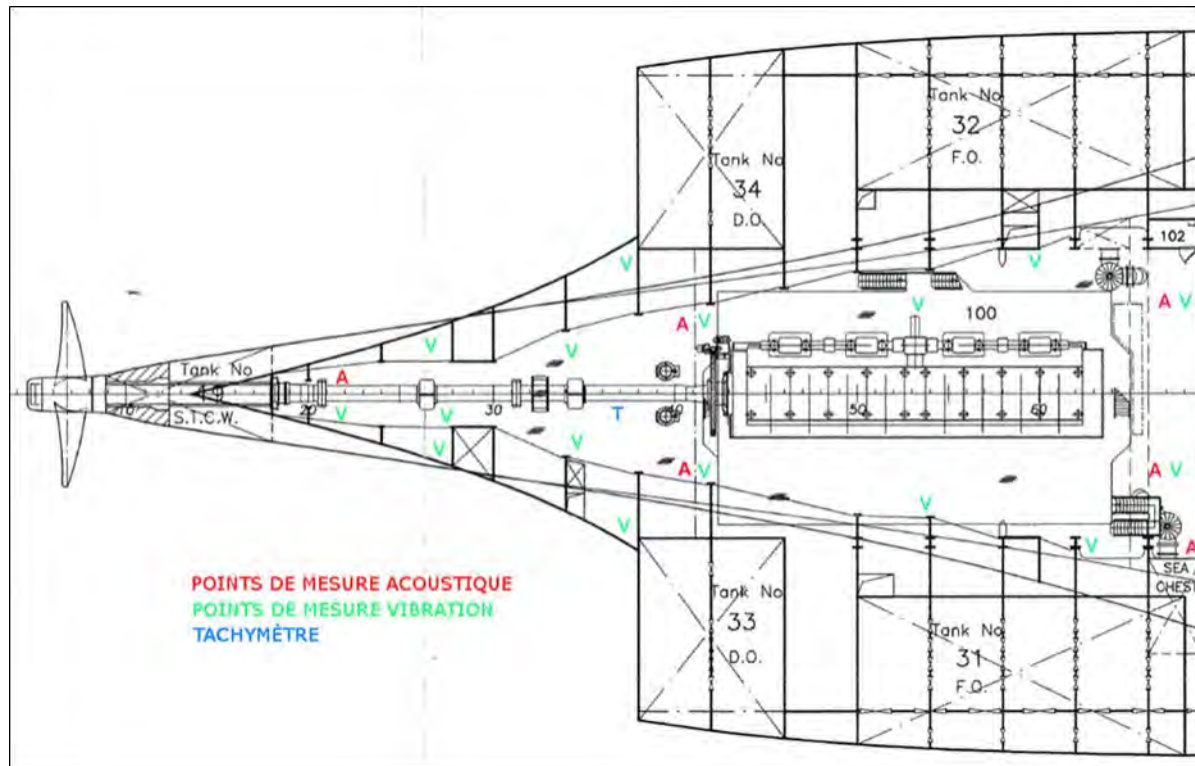


Figure: Acoustic signature (third-octave Spectral Source Level) of a vessel (box-whisker plots), compared to observed ships of similar size (lengths 100 – 150 m ; step plot). Note that low transit numbers can affect the statistical significance of percentile values. Data is shown as black crosses when only one transit was measured.

**Table 1**  
**Examples of sensors installed onboard**

Sensor	use	Brand and model
Accelerometer	Vibration of the various machine elements as well as the vibration of the structure	Dytran series 3093
Microphone	Airborne noise level in machinery spaces	BSWA MPA201
Tachometer	Actual mechanical rotation speed	LaserTach LT2

**Figure 1**  
**Example of sensors disposition onboard**



# Ongoing and next steps

- Funding agreements with Transport Canada and partners
- Finalise mooring/instruments design and mooring/instruments acquisition
- Finalise permit application to the Navigation Protection Program (NPP)
- Ongoing recruitment of professionals and students

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**Thank you!**