



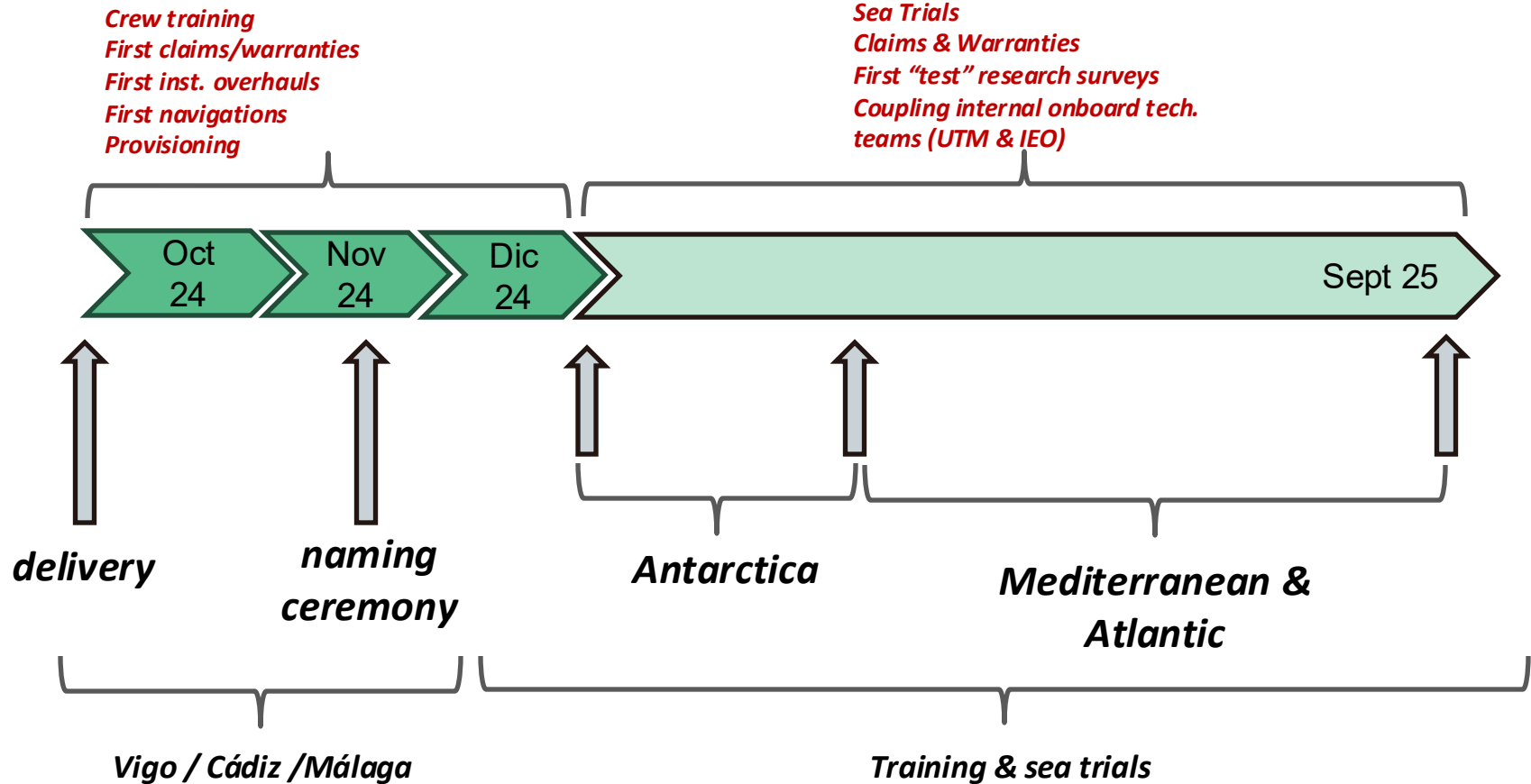
**International Research
Ship Operators**

***Experiences and lessons learned after the first year of operation of the
RV Odón de Buen, and prospects for new vessels in Spain***

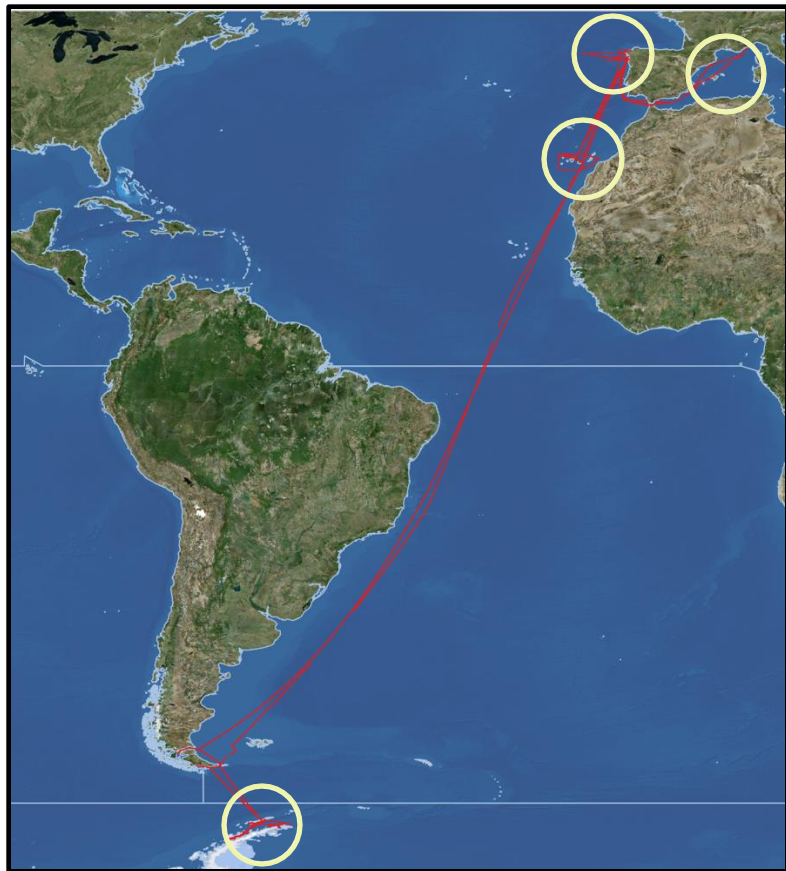


36th IRSO Meeting - Bergen, Norway – September 22-26, 2025

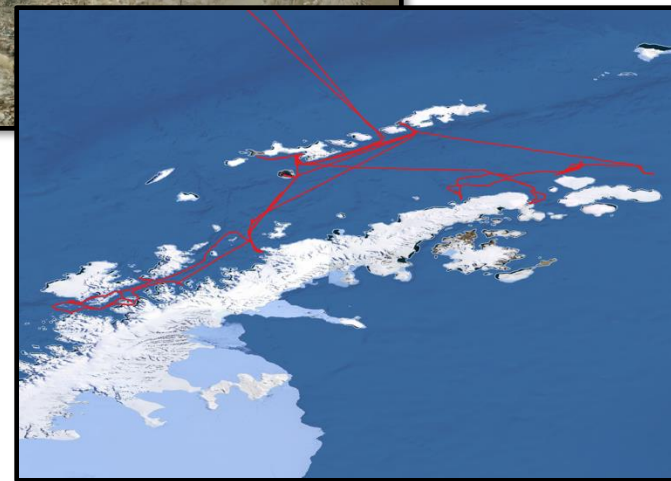




Testing, and training



27.553 miles



TEST ATLANTIC NAVIGATION CONDITIONS

1. Long navigation (27 days)
2. Contrast warm zone (equator). Refrigeration/climate/refrigerator systems, etc. ...
3. LNG refuelling in the Americas (Chile / Argentina)

TEST COLD WATER NAVIGATION CONDITIONS

1. System checks according to Polar PC7 class recommendation recommended by Lloyd's Register Classification Society. (battery of tests)
2. Test ice navigation according to class PC7 (ship structure, navigation systems, propulsion-maneuvering, auxiliary systems)
3. Crew training ice navigation
4. Additional equipment - ship equipment and refrigeration equipment (crew and PAT)
5. Test of Logistics capabilities (station support)

EQUIPMENT TESTS and TECHNICAL TRAINING

- Ability to work in cold areas (deck, hangars, workspaces, common – acoustic control – winches control – cabinet)
 - Test of basic equipment (underway sys., weather, probes, CTD winch-frame, frames, multipurpose winch)...
 - Basic sampling equipment (dredgers, manta-trawl, box-corer)
 - Active-heave compensation advanced function
 - Basic software testing (logging and processing of probes, browsers and event logging)
 - Communications
 - External equipment (Connectivity and manoeuvring). ROTV Politolana / Multinet Grogga
- UTM & IEO technical teams work together. Notes of feasible improvements in operation / distribution of space (equipment / work techniques)

EQUIPMENT TESTS and TECHNICAL TRAINING

- A. ANTARCTIC LOGISTICAL SUPPORT
 - 1. Load Capacities (deck)
 - 2. Heavy Lift Disembarkation/Embarkation Capabilities at the stations premises
 - 3. Crew Training (Procedures)
- B. Health and Safety Environment
 - 1. Review / Verification of protocols and PPE equipment in different manoeuvres
 - 2. Proposals for improvements
 - a) Signage
 - b) EPIS (safety personnel equipment)
 - c) Maneuvers
 - d) Protocols / Documentation
 - e) Ergonomic details / improvements in access-covers for cold areas

Navigation with summer ice

Navigation Tests

Antarctica

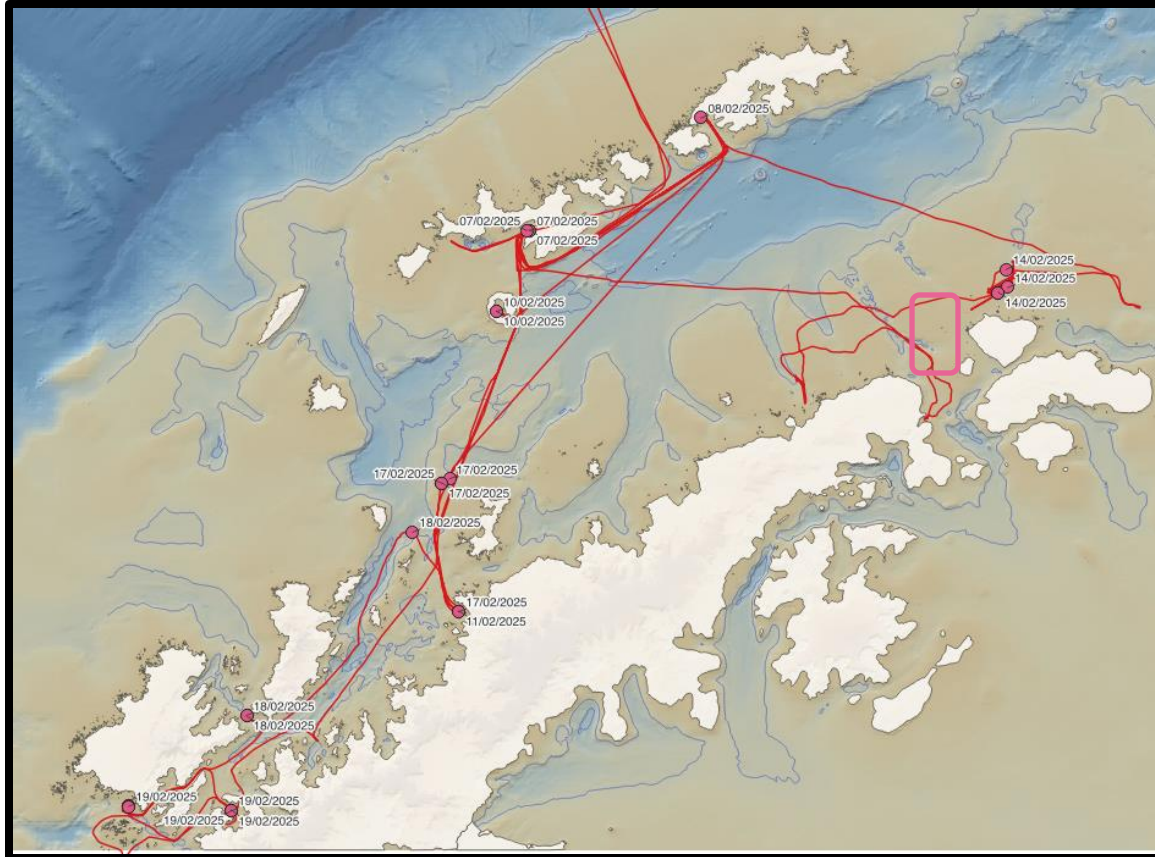


Navigation Tests

Antarctica

Navigation with summer ice conditions (Wedell Sea)





14 different areas
Prof. 80 - 1100 m

26 techs. (13 UTM + 13 IEO)

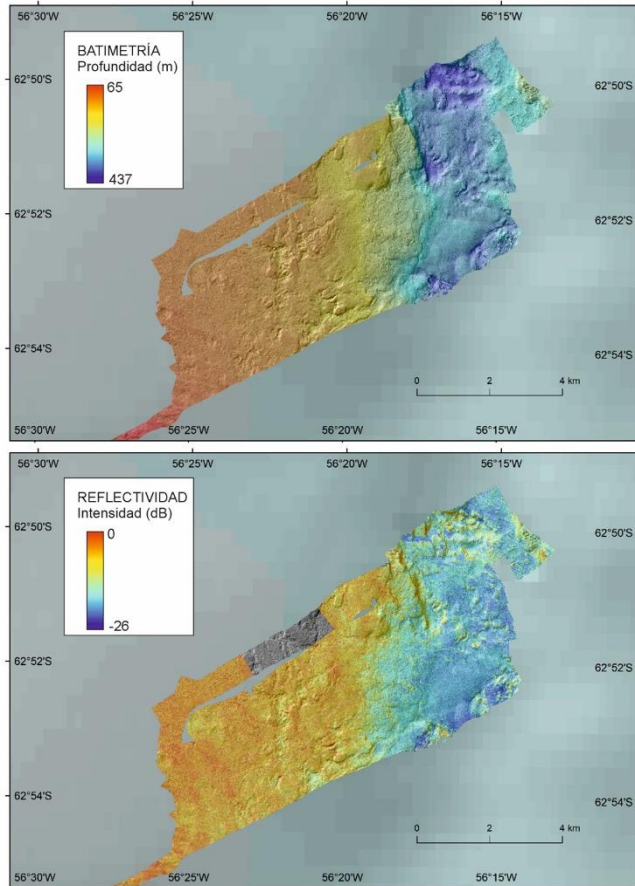
Testing of different sampling methodologies and their feasibility in the Odón and in Antarctica: ROV, towed video (ROVT), CTD, underway, multibeam EM712, EM124, EK80, SPB, manta trawl, plankton and pelagic fish nets, and sediment sampling (rock, Shipek, Van Veen, and box corer).

Multibeam Echosounders

- Functionality check of EM712 and EM124 (Kongsberg), and the SBP function of the EM124
- Mainly using the EM712 due to the depth of the work area
- Synchronized through the K-Sync synchronization unit
- Sound velocity profile measured with the AML Valeport profiler, which was integrated into the processing using the CARIS HIPS and SIPS software

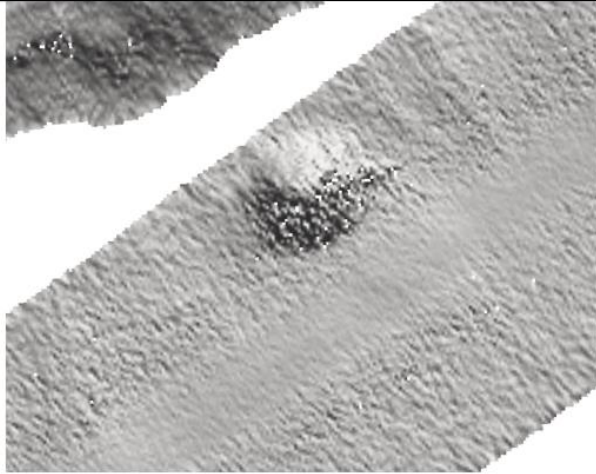
The process was divided into distinct phases:

- Acquisition
- Parameter setup
- Overlap testing
- Noise testing with the echosounders in synchronization

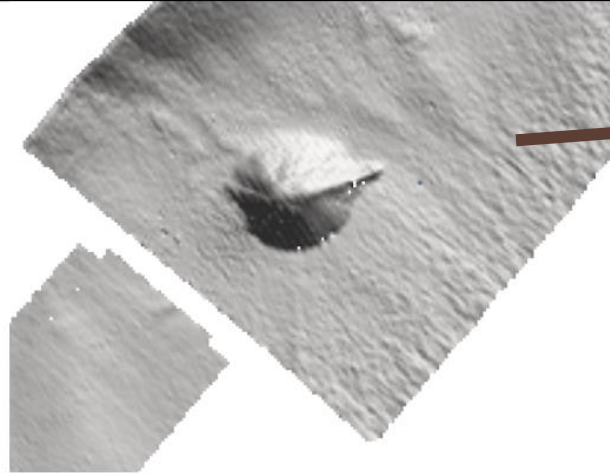


Multibeam Echosounders

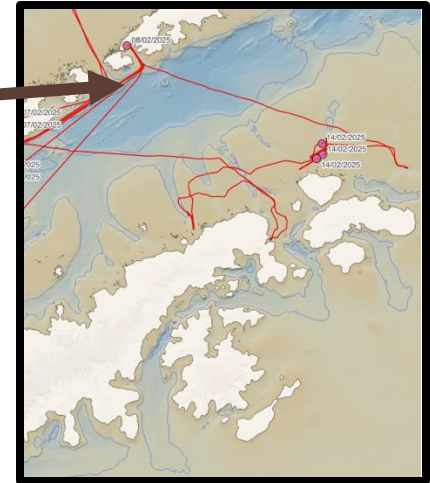
**Reson Teledyne Hydrosweep DS RV Sarmiento de Gamboa vs
EM124 RV Odón de Buen**



Datos adquiridos con la ecosonda Hydrosweep DS, B/O Sarmiento de Gamboa



Datos adquiridos con la ecosonda EM124, B/O Odón de Buen



Biological Acoustics

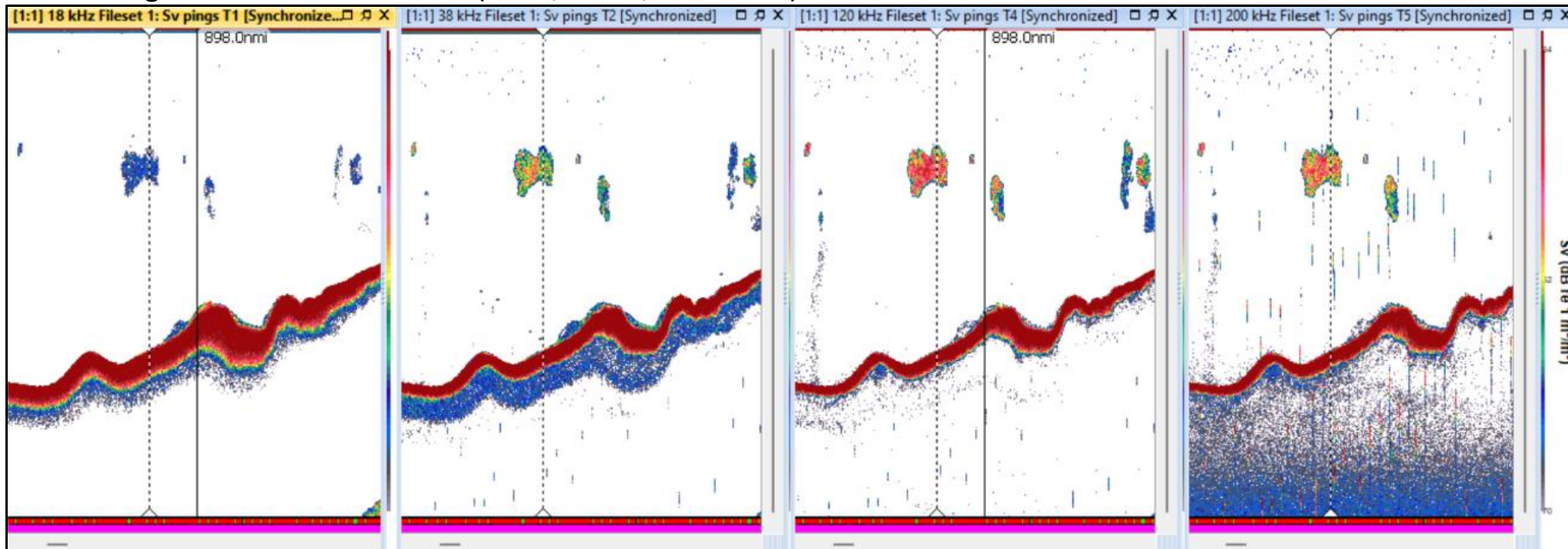
Equipment Tests

Antarctica

EK80 and EM70 echosounders have been tested.

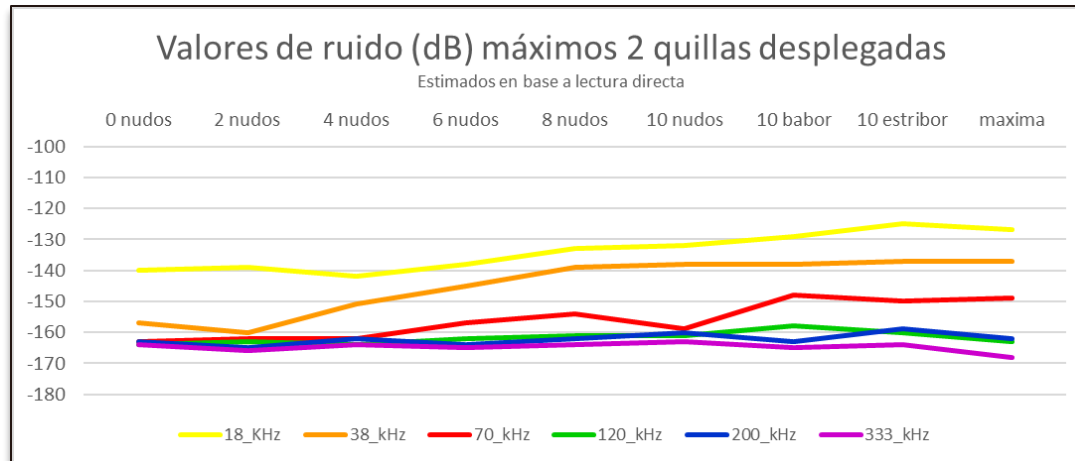
High data storage requirements: EK80 data were recorded in Continuous Wave (CW) mode (narrowband, discrete frequencies) for 29.4 hours, consuming 373 GB. With the EM70 multibeam echosounder, 42 minutes of recording (single sector) consumed 1 GB.

The biological and fisheries sonars (SU90, MF90, and MS70) were not tested.



Radiated noise

- A radiated noise test was conducted at a depth of between 150 and 250 m, with both keels flush and unfurled.
- Preliminary results (direct readings) from the noise tests revealed inconsistencies, especially at 18 and 38 kHz, indicating the need for specific noise tests and calibration of the various transducers.
- The noise detected by the EK80 at 18 and 38 kHz disappeared when the EA640 stops transmitting at 12 kHz.



Active Heave Compensation (AHC) Winches



- Good heave compensation (waves of 3 m, crosswise to the sea. Stabilization +/- 10 cm)
- Tested with ROVT & CTD

Equipment Tests

Antarctica



- CTD hangar ok (dimensions / operation)
- Winch control area some changes proposed
- CTD winch controls complex but safe and reliable

Matrix: Data sharing and visualization



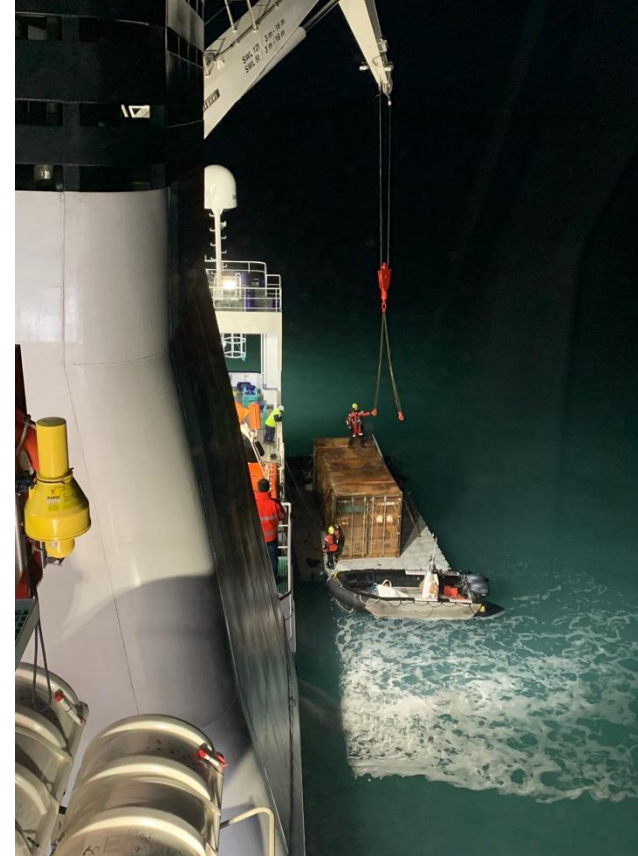
- > 50 different config/working sites options
- Complex system that needs training and adjustments



Logistics Capabilities

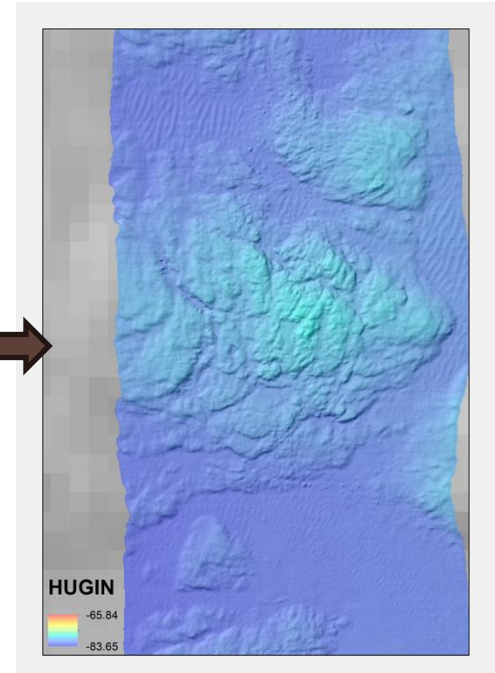
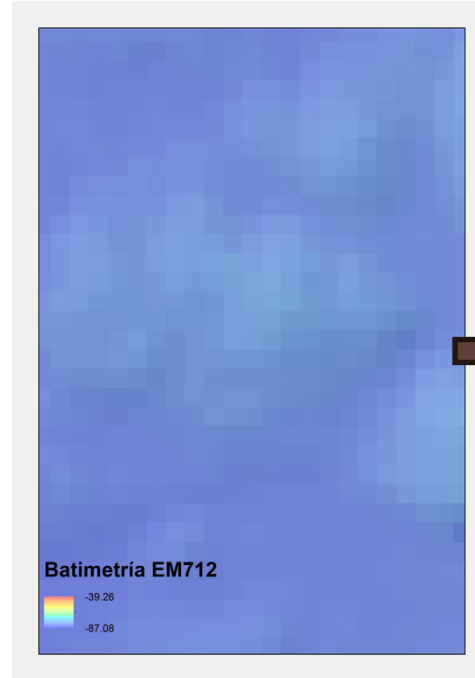
Operational Cap.

Antarctica



Continue training and testing

AUV



First tests with a new Hugin 6000 vehicle. Training of crew and technicians on operational procedures. A complex system that requires a great deal of coordination between the vehicle operators and the crew. Data quality and resolution, especially at great depths, is spectacular.

About the vessel

Conclusions & Lesson Learned

- The good:**
- ✓ Vessel really very comfortable
 - ✓ Wide spaces
 - ✓ Natural light
 - ✓ Good communication between working areas and rest spaces
 - ✓ Low noise and vibrations (inside & radiated)
 - ✓ Acceptable movement during navigation
 - ✓ Decks with good visibility
 - ✓ Many practical design details.

- Cons:**
- Multidisciplinary approach
 - Difficulty in satisfying 100% different user communities (spaces)
 - Some details about winches and cable run are not really 100% well resolved (plans and 3D simulations Ok, but reality impose physical conditions and “small” details not taken into account)
 - Need more service lines on Deck

The

good:

- ✓ During construction...
 - ✓ Shipyard very flexible in adopting changes and improvements and modifications to the initial specifications
- ✓ Delivery: Fits in time and money
- ✓ Excellent relation and integration between teams (shipyard, owner and external inspection)
- ✓ Lloyd's inspections really continuous and exhaustive.

Cons:

- After delivery (warranty claims)
 - Not processing not so fast as the constructions works not as fast as the construction process was
 - not because of the shipyard's bad faith. (disposition remains excellent)
 - high workload of the shipyard which has grown a lot
 - Interaction with external contractors and suppliers (not always easy)

Cons:

- The documentation provided could have been better (quantity & quality). Probably due to a really tight delivery timing & not really well defined in tender (so general)

Lessons:

- The nautical technical specifications should have been more exhaustive, detailed and precise.
- Having much more time during sea trials with the shipyard before delivery, especially for deck scientific equipment, echo sounders, etc.
- Have a person from the shipyard always on board during the first year to facilitate the processing of guarantees
- A less multidisciplinary vessel might have been a better choice. A problem related to having a better strategic fleet plan or a better analysis of user needs. "A vessel for everything and for everyone."

Conclusions & Lesson Learned

About the equipment

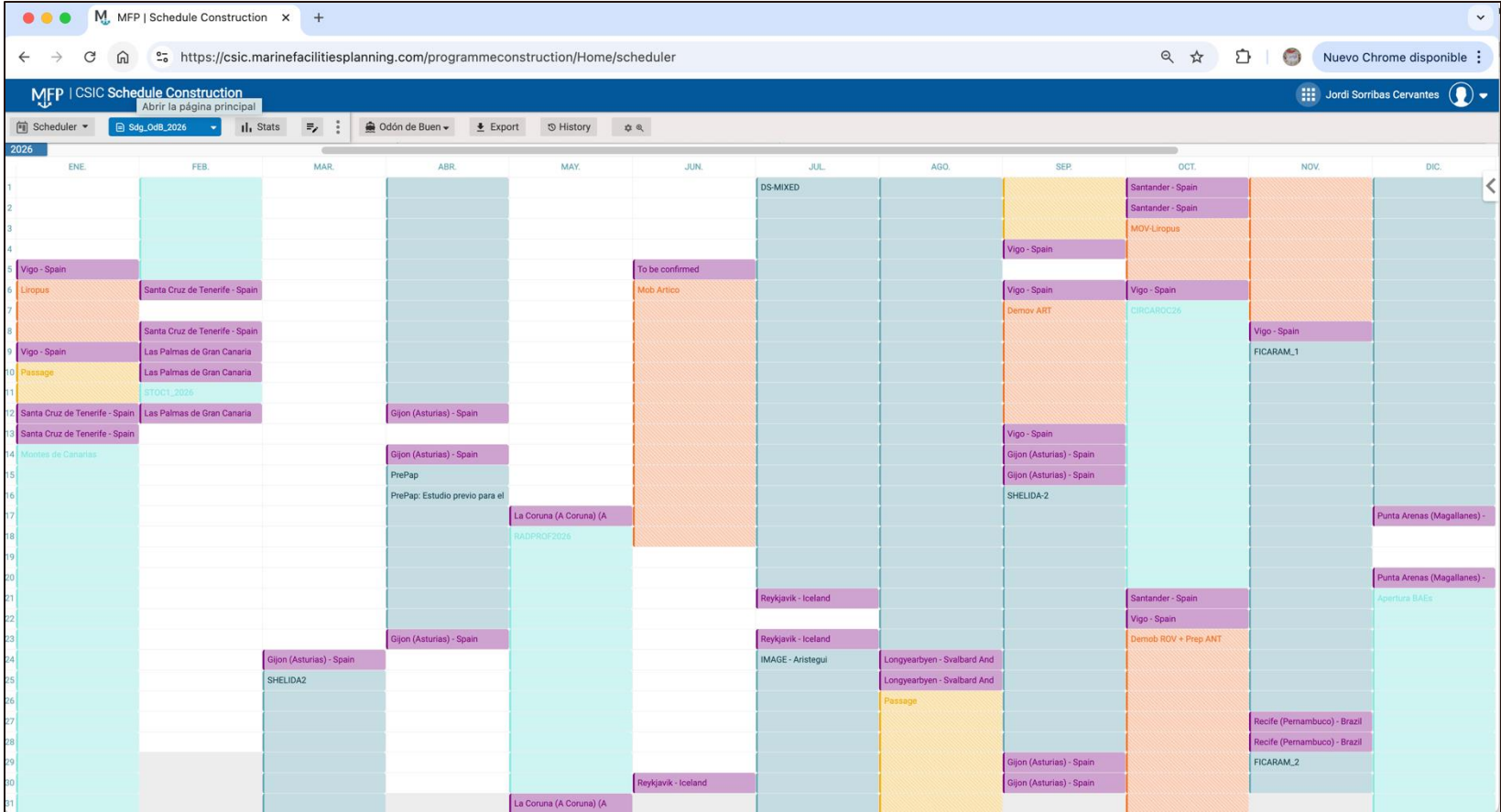
Pros:

- To have a lot of equipment inside the same vessel design and construction tender:
 - Avoid multiple tenders not easy for get what we really want. A matter of negotiation with shipyard.
- The installation is responsibility of shipyard: Adopting “design” solutions
- The vessel is delivered with full capabilities

Cons:

- Some equipment's are provided by resellers or suppliers not by manufacturers. Could be better o easiest for the shipyard to have less contracts “packing” different equipment in less contracts with resellers. This is bad to ask for a technical service or interact with manufacturers later on.
- Having at the begging to much equipment demands a higher effort for the technicians to complete own training and be ready to put in service for “real surveys”

2026 and beyond ...



Prospects for new vessels in Spain

- *Strategic Plan of the CSIC Fleet (vessels, facilities, equipment and organization, in line with PE infrastructures-general CSIC)*
- *Strategic Plan for all Ministry of Science vessels*
 - *January-February 2025*
 - *Investment plan and possibility of access to European derivatives funds*
 - *that may have an impact on the strategy of the CSIC fleet (e.g. replacement of the BIO Hespérides)*

The Spanish research fleet

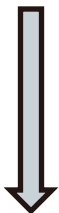
vessel	<i>length</i>	<i>launching</i>	<i>Date of retirement</i>	<i>Age at retirement</i>	<i>Current age</i>	<i>Time for retirement</i>	<i>status</i>
BO Miguel Oliver	70,00	2006	2041	35	18	17	half-life
BO Vizconde de Eza	53,00	2000	2035	35	24	11	active
BIO Hespérides	82,50	1990	2030	40	34	6	near to be retired
BO Sarmiento de Gamboa	70,50	2006	2041	35	18	17	half-life
BO Ramón Margalef	46,70	2011	2046	35	13	22	active
BO Angeles Alvarino	46,70	2012	2047	35	12	23	active
BO Francisco De Paula Navarro	30,46	1984	2028	45	40	5	near to be retired
BO Garcia del Cid	37,20	1979	2024	45			retired
BO Lura	14,30	1981	2025	45	43	2	near to be retired
BO Mytilus	24,00	1996	2031	35	28	7	near to be retired

The Spanish research fleet

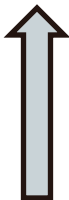
- *To initiate the Strategic Plan with an analysis of past and current experience of use, the future prospects of researchers and technicians, and international benchmarks for the future of marine research.*
- *Look for technical solutions once the needs of use are clearly defined. Separate phases and not think of solutions in advance.*
- *Evaluate costs and priorities based on economic availability and urgency in adopting solutions.*
- *Have an external vision and guidance throughout the process that eliminates as far as possible the biases of vision that we may have.*
- *Align objectives and solutions with the respective frameworks in terms of strategic plans. (CSIC and Ministry Fleet).*

Step by step

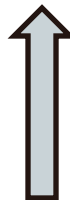
Now ...



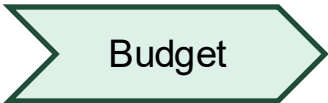
In house



**external
consultancy**



**external
consultancy**



Next steps



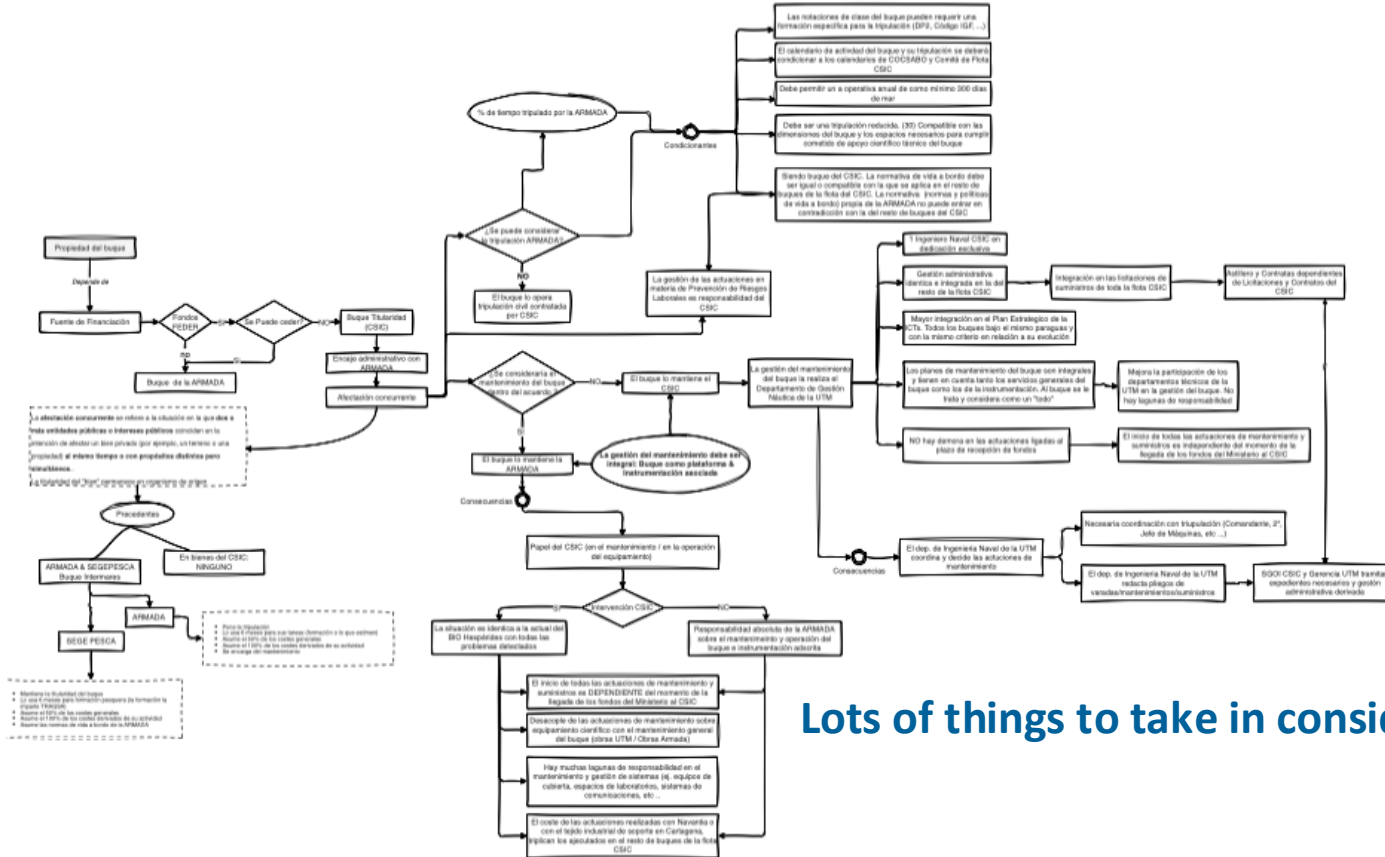
1. **User prospective: focus on potential new local/regional vessel.**
 - a) The user survey detects a need but difficult to decide what the profile of the ship will be.
 - b) A certain intention to avoid "multidisciplinarity"
 - c) New regulations (IMO, MLC, ...) and future trends



2. **opportunities and urgencies. Replacement of the RV Hesperides (Polar – 1991)**

RV Hespérides replacement

Accommodation of Navy role in this new scenario ...



Lots of things to take in consideration ...

1. **Polar Vessel. PC6-PC7 with high logistic profile but with some research capabilities. Complementary to RV Odón de Buen and RV Sarmiento de Gamboa**
2. **2025. General specification & exploitation model**
3. **2026. Tender**
4. **2027-2030 Construction**
5. **STEP technologies & sustainability solutions**
6. **Spanish Navy will “play a role” but with CSIC building and owning the vessel**
 - **Need to accommodate this and with available funding. (Design & exploitation model)**



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