Antarctic Expedition Debrief: R/V Revelle PAL LTER Project

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Mission Overview

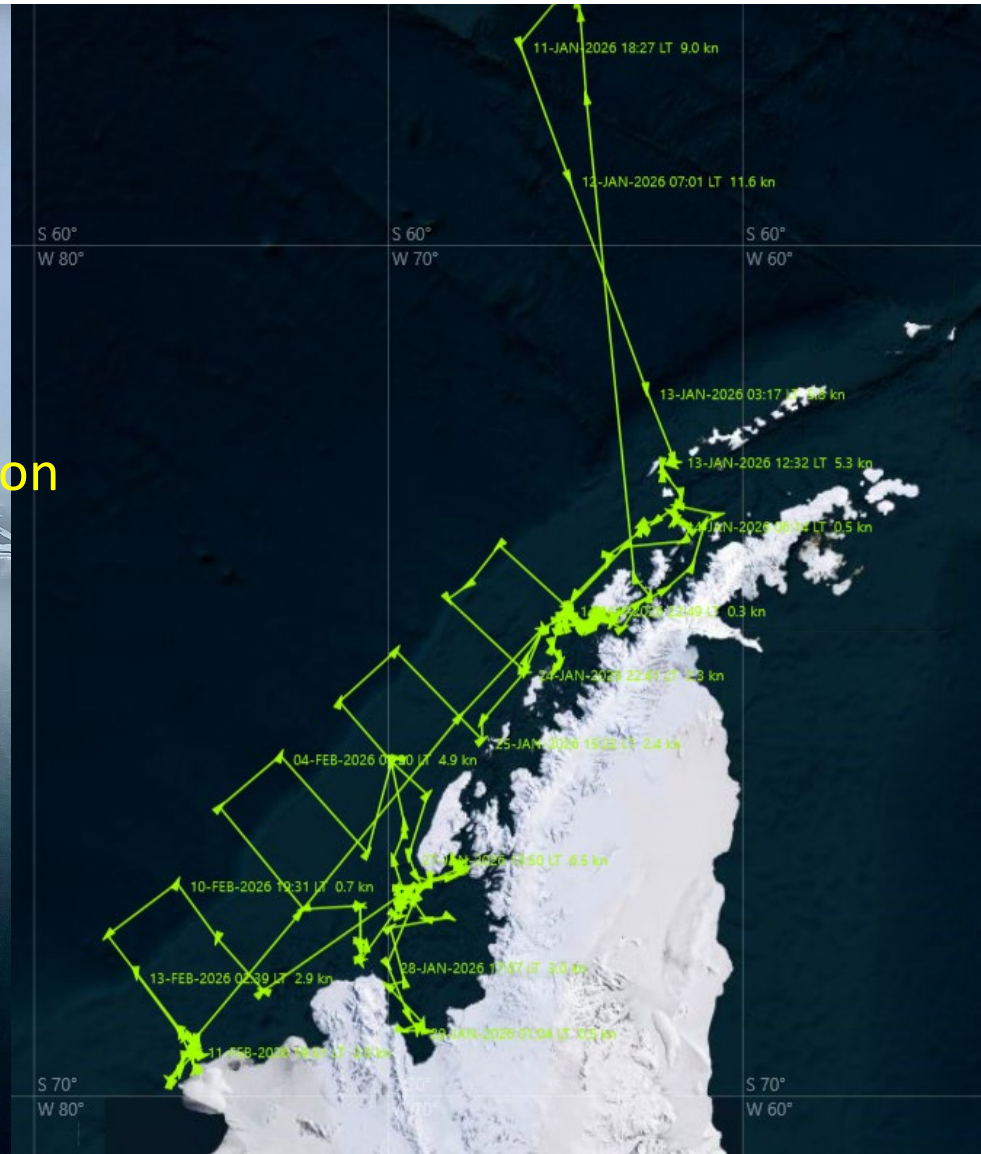
Project: Palmer Long Term Ecological Research (PAL LTER) – Cruise RR2601.

Funding Source: NSF/Polar Programs Division Antarctic Program Proposals (ANT)

Principal Investigator: Dr. Deborah Steinberg (VIMS).

Objectives: To study the marine ecosystem of the West Antarctic Peninsula (WAP), specifically how climate change and the reduction of annual sea ice impact the food web—from microbial communities to apex predators (Adélie penguins).

Scientific Operations: Time-series sampling along the LTER grid. Water column profiling via CTD casts and bio-optical measurements. Zooplankton and fish sampling using various net tows. Deployment and recovery of autonomous gliders and sediment trap moorings.

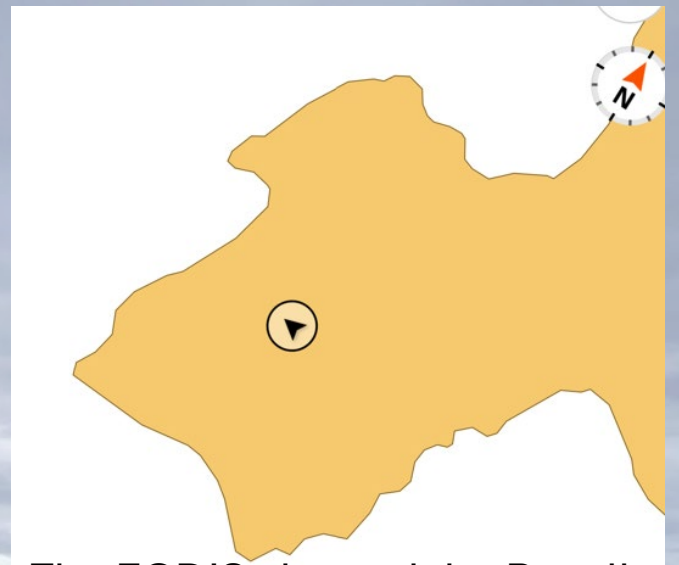


Planning & Administrative Hurdles

- USAP Technical Support model is very different from ARF support model. A significant amount of technical support services and research equipment is provided through the NSF USAP contract.
  - Chemicals, Hazardous waste disposal and lab supplies are all managed and provided by USAP
  - A very broad set of research equipment, laptops, satellite phones are all managed and provided by USAP
- Due to the short planning horizon for the REVELLE PAL LTER project there were many obstacles to overcome
  - Due to contracting negotiations dialog with USAP personnel was limited
- There was unique permitting requirement for the Antarctic Conservation Act Waste Permit
- There were unique technical support needs for small boat operations and landings for field camps on islands
  - Additional support was provided through the UNOLS Tech Pool of USAP small boat qualified technicians
- We had to “upgrade” our Polar Water Certificate by rewriting parts of our polar water manual and install a special search light on the vessel. We had the Polar Certificate renewed just before our departure to Antarctica in Punta Arenas
- As per murphy’s law, we had a radar problem that we corrected in Punta Arenas prior to sailing thanks to a service provider we found.
- Our container with gear made it on time to the vessel, but due to an error with Hapag Lloyd, our container was considered Hapag’s property and taken away. This was very challenging paperwork.

Navigation: Forecast vs. Reality & Paper Charts

- Reports predicted 3–5 tenths sea ice; actual conditions were **zero** sea ice. (Which was good for navigation!)
- Glacier vs. Sea Ice: Frequent misidentification in reports; glacier ice (icebergs/bergy bits) was abundant, but sea ice was absent.
- We created 6-knot speed limits at night and in low visibility.
  - POLARIS code restrictions (3/10ths limit) would have caused tension between scientific goals and safety protocols, if there was that much sea ice.
- It is important to remember that ice can travel much farther north than 60 degrees, where our polar code is in effect. Due to the risk and having to reduce speed, early departure from Palmer station to Punta Arenas (18–19 hours) was necessary.
- Even though *Roger Revelle* is a paperless chart ship, we went back to using paper charts in Antarctica as there are simply no proper ECDIS charts available. (Yet) Charcot Island ended up 3' farther east than expected on the ECDIS. This is why (visual+) radar bearings are so important.



The ECDIS showed the Revelle aground on Charcot island

Palmer Station Operations

- Our captain’s "Golden Rule": Avoid the inner harbor at night due to reefs and rocks within 50 feet; radar does not pick up these hazards.
- Bowthrusters in tunnel mode are not performing well in winds exceeding 20 knots. (And of course, we can’t drop them in azipod mode either)
- Required 600-foot Panama lines manually dragged to shore; and they have to all be winched in again when departing.

Rothera Station & Small Boat Ops

Docking Dynamics: New dock but more difficult than Palmer Station to tie up; utilized DP and Panama lines.

Ice Hazards: Car-sized icebergs occasionally trapped between the ship and the dock; risk of propeller ingestion.

Successful integration of the UNOLS Tech Pool for USAP-qualified small boat technicians.

Recommendations / Lessons learnt for Future Cruises

- **Ice Reporting: Be aware of the sometimes lack of distinction between glacier ice** (maneuverable) **and sea ice** (constraint at 3/10th) in ice reports.
- **Stay aware of the fact that ice "travels" further north** than just 60°S and that this impacts a safe transit speed between Antarctica and Punta Arenas.
- **Secure docking at Palmer Station**, it is not an ideal place to dock, but **it is much safer than sitting in DP mode between the rocks.** Certainly, do not recommend at night.
- Thruster Limitations: **Acknowledge bow thruster limits in high winds during (un)docking.**
- **Longer planning lead times are important** to facilitate better USAP technical dialogue. (we understand the situation we were all in, of course)

Recommendations / Lessons learnt for Future Cruises

- On *Roger Revelle* It takes one day **moving science gear to higher decks for the Drake Passage**, then back down for Palmer. No ships doing this passage leave their gear out on deck.
- We sent fuel stabilizer to Punta Arenas in October. It was impossible to get it there due to logistic problems. **We ended up going without fuel stabilizer** after making a risk assessment based on the fuel specifications on pour point and the seawater temperature. We calculated that right and we had no issues with gelling fuel.
- **We had to make sewage runs 12 miles away from land**. We did this during the evening while we were unable to moor at Palmer Station.

  (Palmer Station takes no sewage)
- **Paper Charts. Still a very real thing in Antarctica**. And of course, as per good seamanship, the old taking visual bearings and radar distance close to land will always be a thing of the present.
- **Pilots** cost you $1,294 per pilot, per day, times 2. **Cost Revelle: ~$150,000**

Thank you

National Science Foundation

Conclusion

Mission success!

And thank you to Hannah Gray and Jamee Johnson in additional to all NSF/ASC/USAP staff that assisted.

And of course all crew, technicians and scientists on board *Roger Revelle* and SIO staff.

Photo Credits: Captain W. Wakeman

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