

Emerging technologies enabling future Southern Ocean observations

Key Topics:

- Capabilities of modern autonomous observation platforms; results and upcoming field plans for deployments around Antarctica
- Opportunities for opportunistic observations using fishing vessels and subsea cables

Main Developments:

- There are now 6 UK Autosub underwater autonomous vehicles, rated to 6000m or 1500m, which can travel autonomously up to 2000km, taking ocean measurements over a 5-week period.
 - Gliders and floats can provide a complementary tool to AUVs, which are able to run over longer periods of time and closer to ice/ocean boundary layers.
 - Unmanned Aerial Vehicles (UAVs) can also be used to look at radiative fluxes, albedo, and ocean waves over ocean and sea ice, and could be potentially mounted with radar for ice thickness.
 - Toothfish shipping vessels often have berths for scientists/observers who can undertake science data collection. As well as gathering data on catches, vessels can also be instrumented with CTDs, benthic cameras, and acoustic recording equipment.
- Subsea cables can be instrumented to make measurements of temperature, pressure and seismic acceleration.

Open Questions/Future Directions:

- How can we design future campaigns to maximize data collection? Possibilities for deploying autonomous vehicles include swarming (deploying multiple vehicles at the same time), development of a heterogeneous vehicle fleet combining different strengths and capabilities, and increasing autonomy of vehicles to adjust mission plans. These strategies can help to reduce carbon impact and human risk involved with ship-based observations.
- The upcoming Decades field project will look at drivers of ocean change in the Amundsen Sea, as well as the utility of gliders and floats for constraining bathymetry in areas which are difficult to access by ship.
- A range of opportunistic observations and new technologies have the potential to expand where and when we can make oceanographic observations.

