

New Study: The Evolving Role of Research Vessels

Objectives

- Understand how the missions undertaken by research vessels have (or have not) changed over recent decades.
- Identify resulting changes in capabilities and operations required to complete these missions.
- Explore implications for the academic research fleet.

Motivation

1. Perceived trends in seagoing science
2. Technological shifts
3. Resource Constraints
4. Cultural shifts
5. Inform discussions on fleet operations, improvement and replenishment

Phase 1: Ship Use Trends

Begin with data distilled from STRS.

Seek other sources to extend timespan, add depth.

Quantify patterns in:

- Discipline(s)
- Vessel(s) requested
- Science team size
- Mission type: expeditionary, process study, sustained observing, observing system maintenance, ... (?)
- Overboarding needs
- Lab needs
- Storage needs
- Seakeeping and endurance requirements
- Autonomous platform use
- Communications needs

Phase 1: Operational Models

Review existing models for vessel operations.

1. Government/agency managed (e.g. NOAA, USCG)
2. Consortium managed (e.g. UNOLS)
3. Institutionally managed (Universities, labs, Schmidt, etc)
4. Other ...?

Phase 1 Timeframe: STR data by spring 2020, decide whether to seek additional sources.

Phase 2: Analysis

Hypotheses on the changing nature of the science missions:

- Complex, multidisciplinary problems require large teams (and/or potential for high bandwidth comms).
- Operational observing - maintain sustained observing systems with real-time data return and limited tolerance for downtime.
- Climate scale observing - support for broad, sustained observations.
- Process studies with more challenging demands for event-driven, rapid response sampling (HABS, storms, etc) and access in difficult environmental conditions.

Phase 2: Analysis

Hypotheses on the changing technology:

- Advent of autonomous technologies enable new modalities for sampling - new range of observational approaches with implications for how ships are used.
- Increasing communications bandwidth opens demand for telepresence for outreach and for greater role for shoreside participants in seagoing work.

Phase 2: Additional Concerns

Mandate Driven Science

- Legally mandated observing (marine mammal, harmful algal blooms)
- Balancing mandates with pure science

Regulatory Constraints

- MARPOL Special Areas and Undersea Monuments (in the US) requires specialized equipment and more storage on ships to extend time in research area
- Emissions requirements in some areas
- Minimum safe manning crew size and licensing
- Polar code
- Marine seismic environmental regulations

Phase 3: Implications

- What do the data say about trends in missions undertaken by research vessels?
- How do these trends map onto demands for specific capabilities?
- What do these trends suggest about operational modes?
- What do the trends suggest about the makeup and size of the academic research fleet?