

# 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?