

# New Generation Polar Research Vessel



ICETECH 2006

Banff, Alberta, Canada

July 17, 2006

- Background
- Science and Operational Requirements
- Results from Project Technical Studies
- Project Schedule
- Summary





# National Science Foundation (NSF)

- Mission is to serve as a catalyst for progress through investment in science, mathematics, and engineering
- Annual budget is approximately \$5.6 billion and provides funding for about 10,000 research and education projects in science and engineering
- One of the programs is the United States Antarctic Program with a \$200 million annual budget
  - **\$32 million for research grants**
  - **\$168 million for operations and science support, logistics, and infrastructure upgrades**



# NSF's Office of Polar Programs

Supports basic research in a wide range of scientific disciplines in both the Arctic and Antarctic

Additionally, provides logistics, operational, and laboratory support both shore side and in the marine environment

McMurdo Station

Amundsen-Scott South Pole Station

Palmer Station



U.S. Antarctic Research Vessel HERO - 1968 to 1984



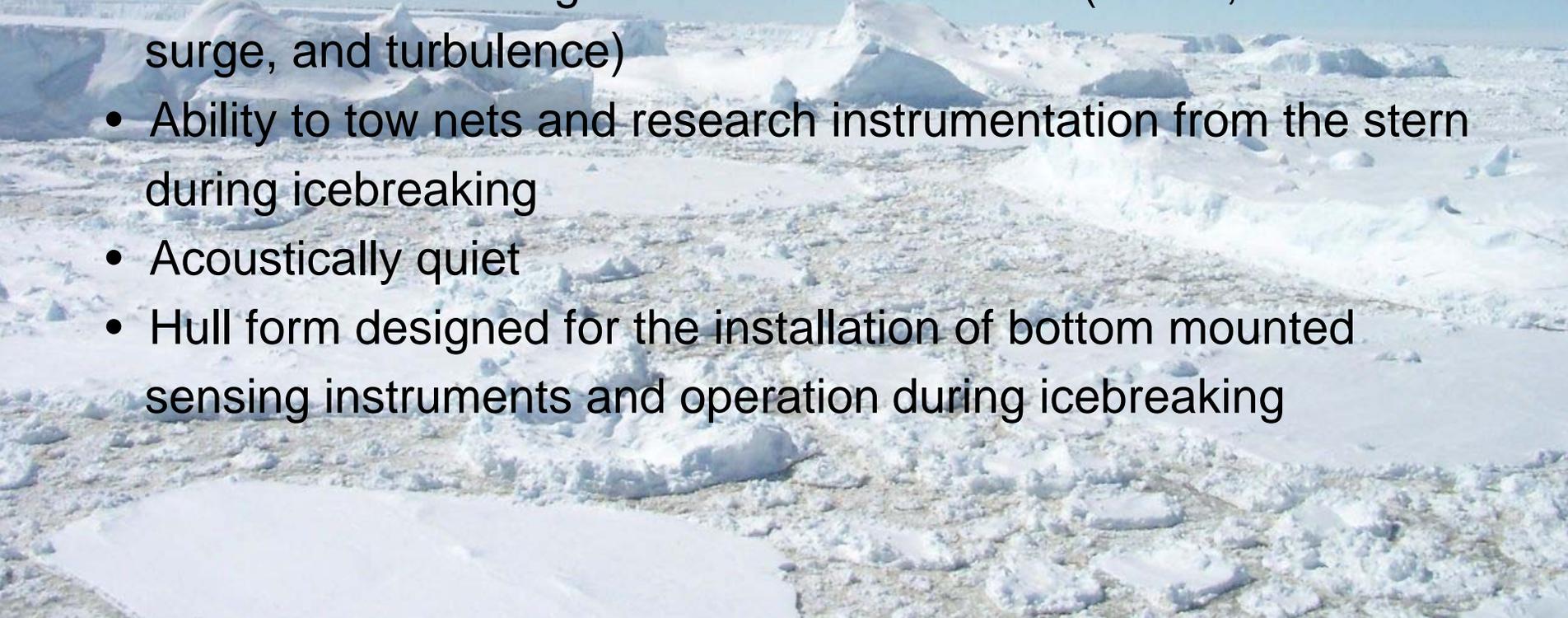
NATHANIEL B. PALMER - 1992 to present

# Science and Operational Requirements

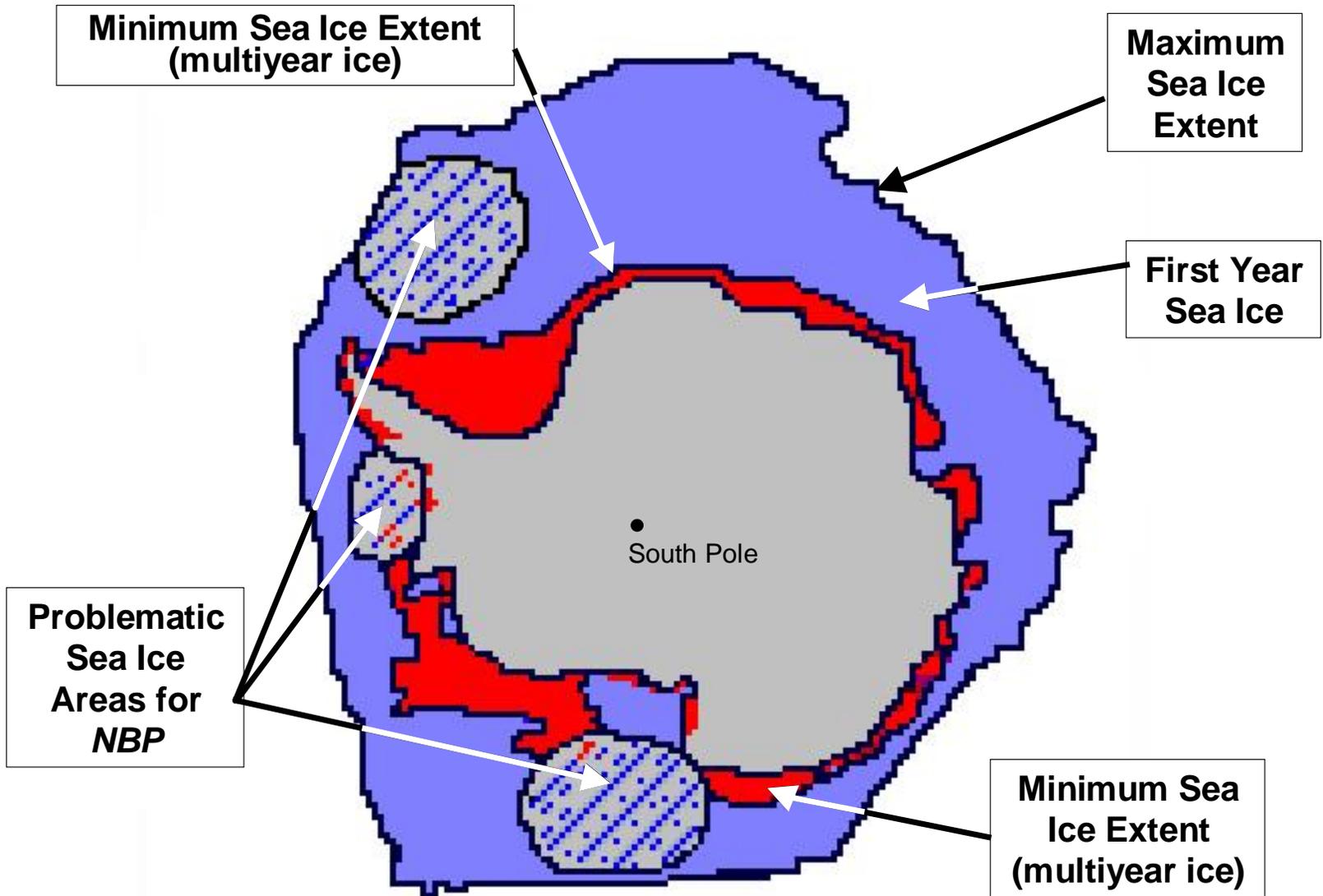


# Critical New Research Requirements

- Enhanced icebreaking capabilities 1.4m (4.5 ft) at 3 kts
- Increased endurance to 80 days and 20,000 miles at 12kts
- Increased accommodations for 50 and lab space
- Moon pool for geotechnical drilling - provides access to the water column through a controlled interface (no ice, limited surge, and turbulence)
- Ability to tow nets and research instrumentation from the stern during icebreaking
- Acoustically quiet
- Hull form designed for the installation of bottom mounted sensing instruments and operation during icebreaking



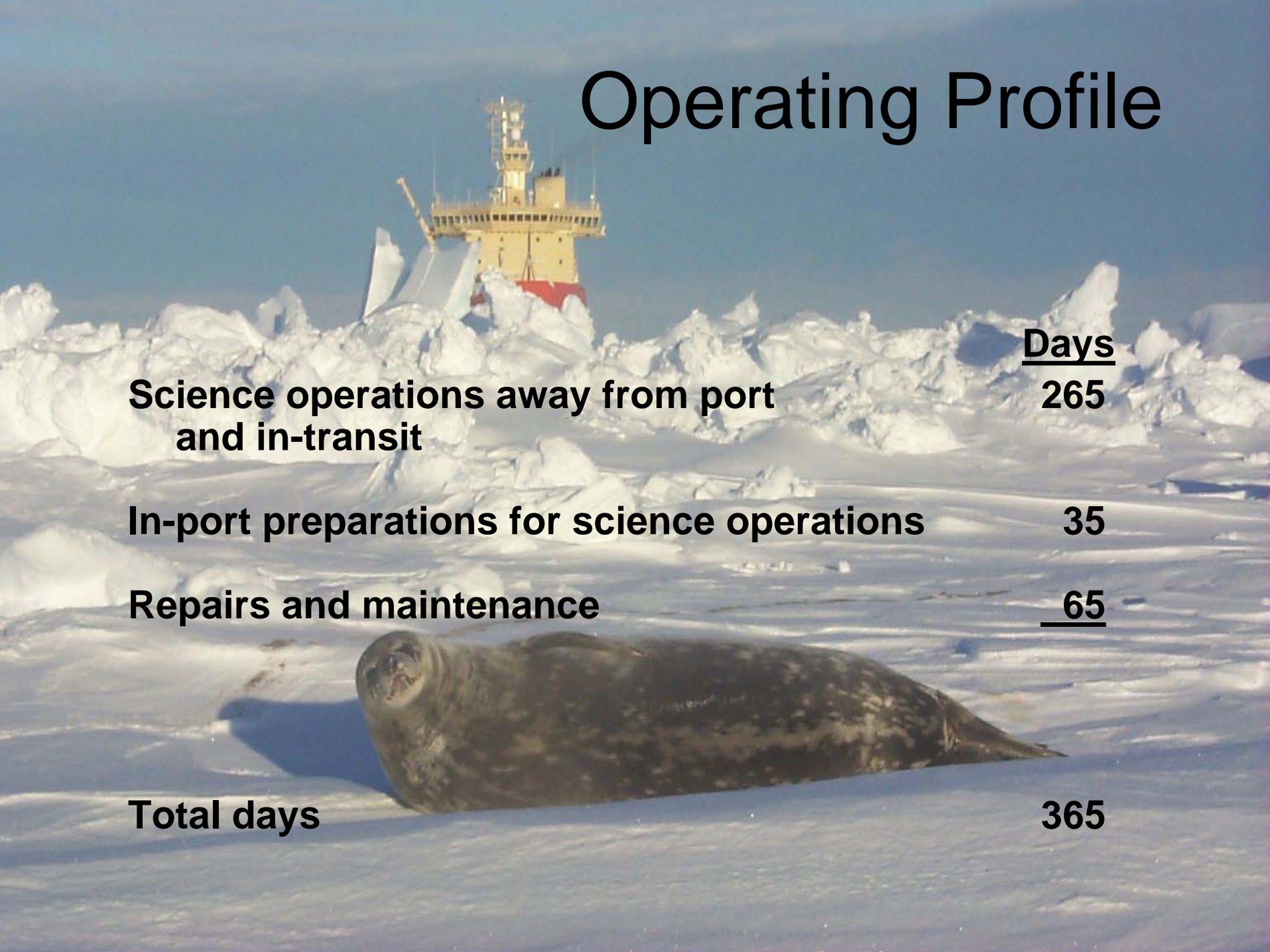
# ANTARCTICA



# Additional Science and Operational Requirements

- Capability to conduct autonomous underwater vehicle remotely operated vehicle (AUV/ROV) operations
- Jumbo piston coring (JPC) capacity for 50 m
- Compliance with International Maritime Organization (IMO) guidelines for Arctic vessels
- Reduced air emission from diesel engines and incinerator and other features for a “greener” ship
- Provision for a helicopter flight deck and hangar
- Space for 6 portable lab containers
- 2.4 m (8 ft) wide passageway on the Main Deck and inter-deck elevator
- Aloft, enclosed platform for science observations

# Operating Profile



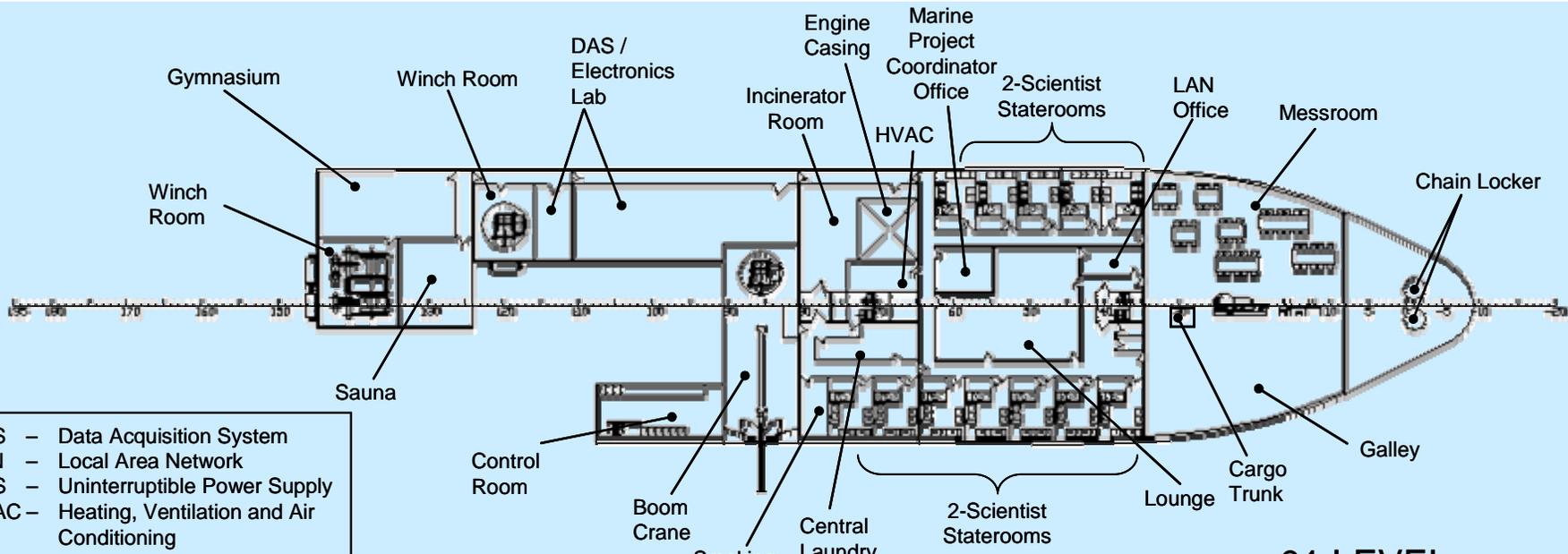
	<u>Days</u>
Science operations away from port and in-transit	265
In-port preparations for science operations	35
Repairs and maintenance	<u>65</u>
Total days	365

# Results from Project Technical Studies



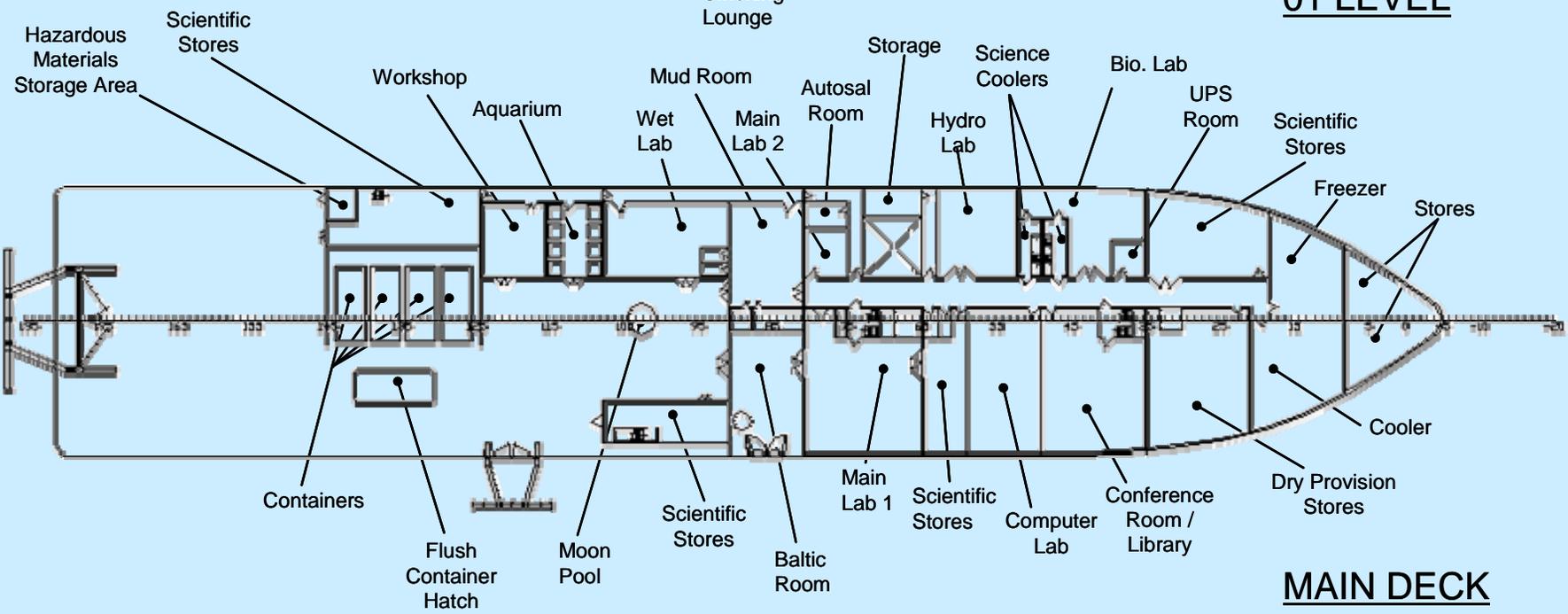
# Above water features of PRV





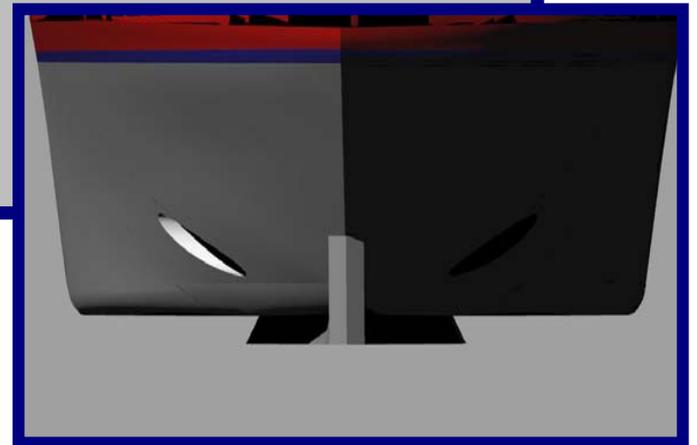
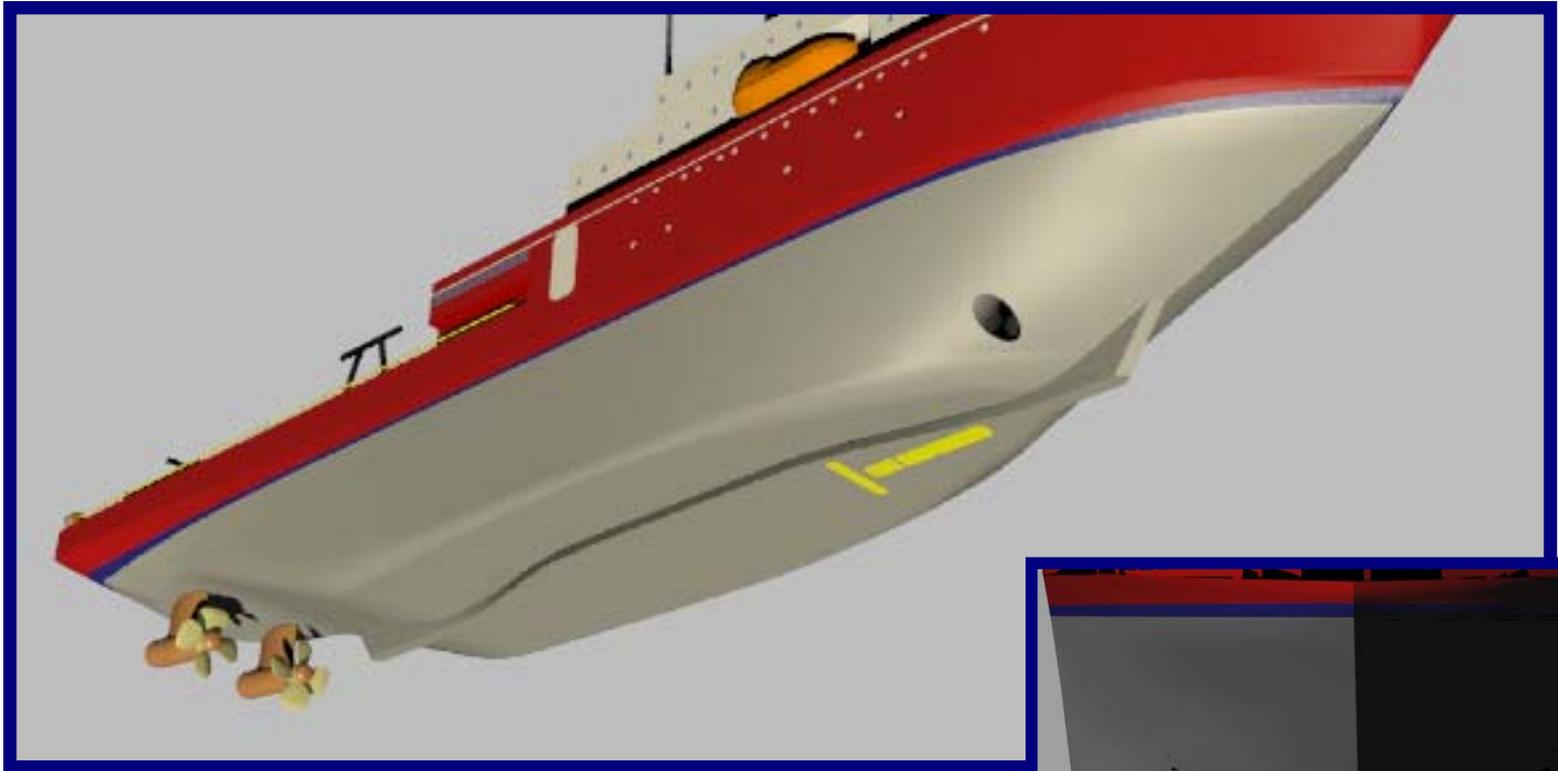
DAS - Data Acquisition System  
 LAN - Local Area Network  
 UPS - Uninterruptible Power Supply  
 HVAC - Heating, Ventilation and Air Conditioning

**01 LEVEL**

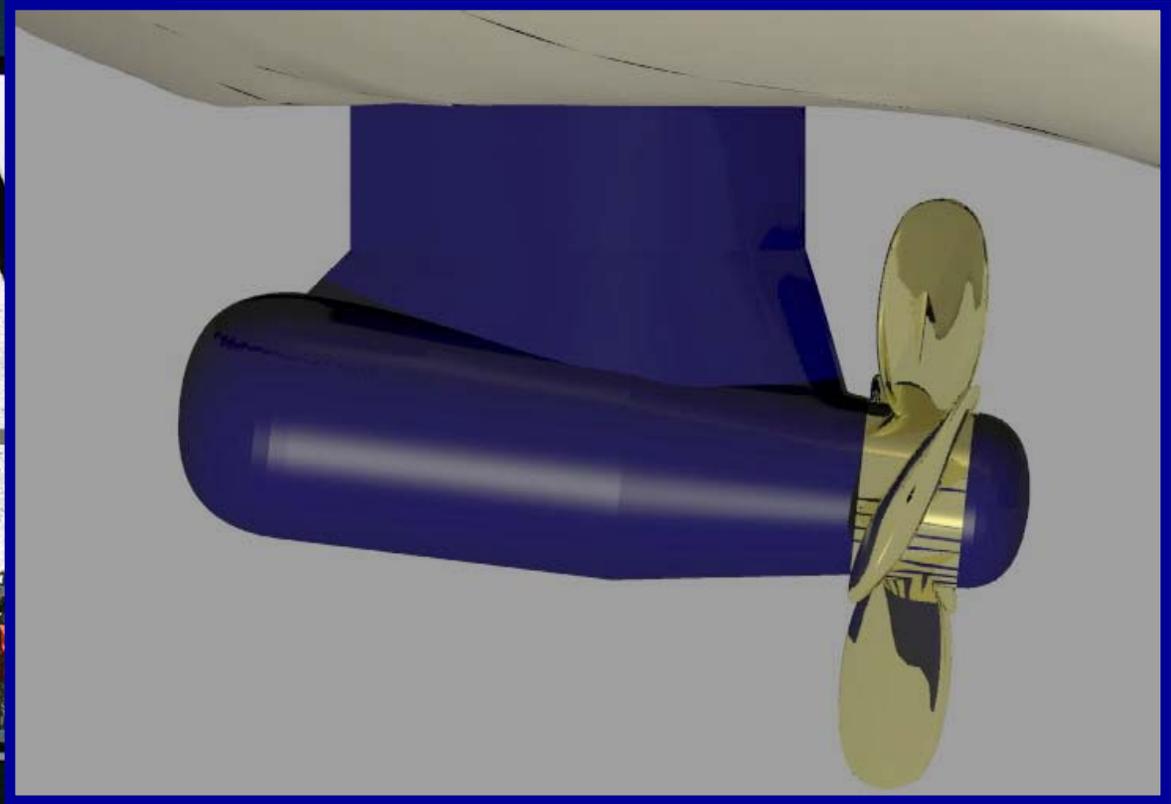


**MAIN DECK**

# Underwater view of PRV box keel with bottom mapping sensors



# Podded Propulsion System



# Principal Characteristics



**LOA**     **120.2 m**

**Draft**     **10.2 m**

**LWL**     **108.3 m**

**Displacement**     **13,900 MT**

**Beam**     **22.3 m**

**Shaft Power**     **15,000 kW**

# Some Environmental Features Incorporated in the PRV

Rate of greenhouse emissions reduced by 90% compared to existing vessel

No emissions in port; PRV connects to shore side electric power (cold ironing)

In addition:

- Designed for 40-year ship life and environmentally friendly disposal
- Waste water and waste oil treated to highest international standards
- Environmental management system on-board and ashore

Improved hull form reduces energy by 20%

Double hull construction minimizes risk of oil spill

Employs latest ballast water exchange and treatment technology

Hull coated with non-toxic paint





# Looking Ahead - Next Phase

## Procurement

- Evaluate lease versus buy alternatives
- Develop a procurement plan and schedule
- Conduct meetings with industry
- Prepare RFP

## Science

- Develop laboratory and science space arrangements
- Integrate science equipment with ship equipment (winches, cranes, storage)
- Check design for efficient flow of samples through the labs and suitability for multiple science disciplines

## Vessel

- Refine hull form and propulsion plant
- Conduct model tests to demonstrate performance
- Validate the suitability of podded propulsion systems (reliability in ice and low noise)

# Project Newsletter

## Project Web Site

[www.usap.gov/  
vesselscienceandoperations/  
prvsection.cfm](http://www.usap.gov/vesselscienceandoperations/prvsection.cfm)

U.S. Department of Transportation  
Maritime Administration  
Office of Shipbuilding and Marine Technology



## New Generation Polar Research Vessel

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**Highlights from Prior Newsletters**

**No. 1**

- PRV Technical Studies Begin
- Visit to Scandinavian Icebreakers
- Status of Studies
- European Drilling Research Icebreakers

**No. 2**

- PRV Features Unveiled
- Science and Operational Features
- Machinery and Propulsors
- The Role of ARVOC
- New Generation XBT System
- PRV: A Green Ship

**No. 3**

- PRV Studies Continue
- Mission Sensitivity Study Completed
- Powerful Icebreakers Under Construction
- U.S. Polar Icebreakers, Future Needs and Possible New Policy

### Feasibility Study Nears Completion

A milestone nears with the completion of the most recent science and technical efforts for the next generation Polar Research Vessel (PRV). These efforts began in 2003 when the National Science Foundation, Office of Polar Programs (NSF-OPP) initiated a program to determine the national requirements for polar marine science in the Antarctic and to determine the appropriate vessel characteristics.

The achievements to date reflect the considerable time and effort expended by over 250 U.S. scientific experts at the request of the Antarctic Research Vessel Oversight Committee (ARVOC) and its Scientific Standing Committee for the PRV (SSC-PRV).

These experts provided information, comments, and opinions that led to a well defined set of science and operational requirements. Furthermore, they provided timely guidance to the project team responsible for translating those requirements to a feasible vessel.

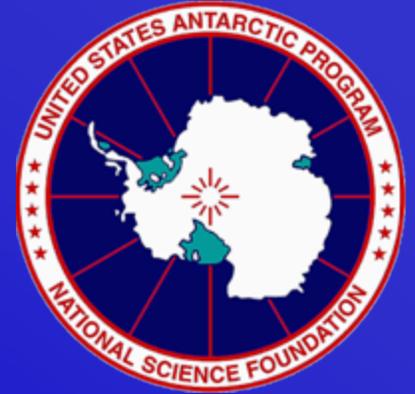
While there were many components to the feasibility study, this Newsletter focuses on the "science platform" aspect and how the PRV will satisfy the national needs.

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Artist's Rendering of Polar Research Vessel



# Questions