

DIRECTORATE FOR  
GEOSCIENCES

OFFICE OF POLAR PROGRAMS

# Antarctic Research Vessel (ARV)

UNOLS Annual Meeting

15 November 2023

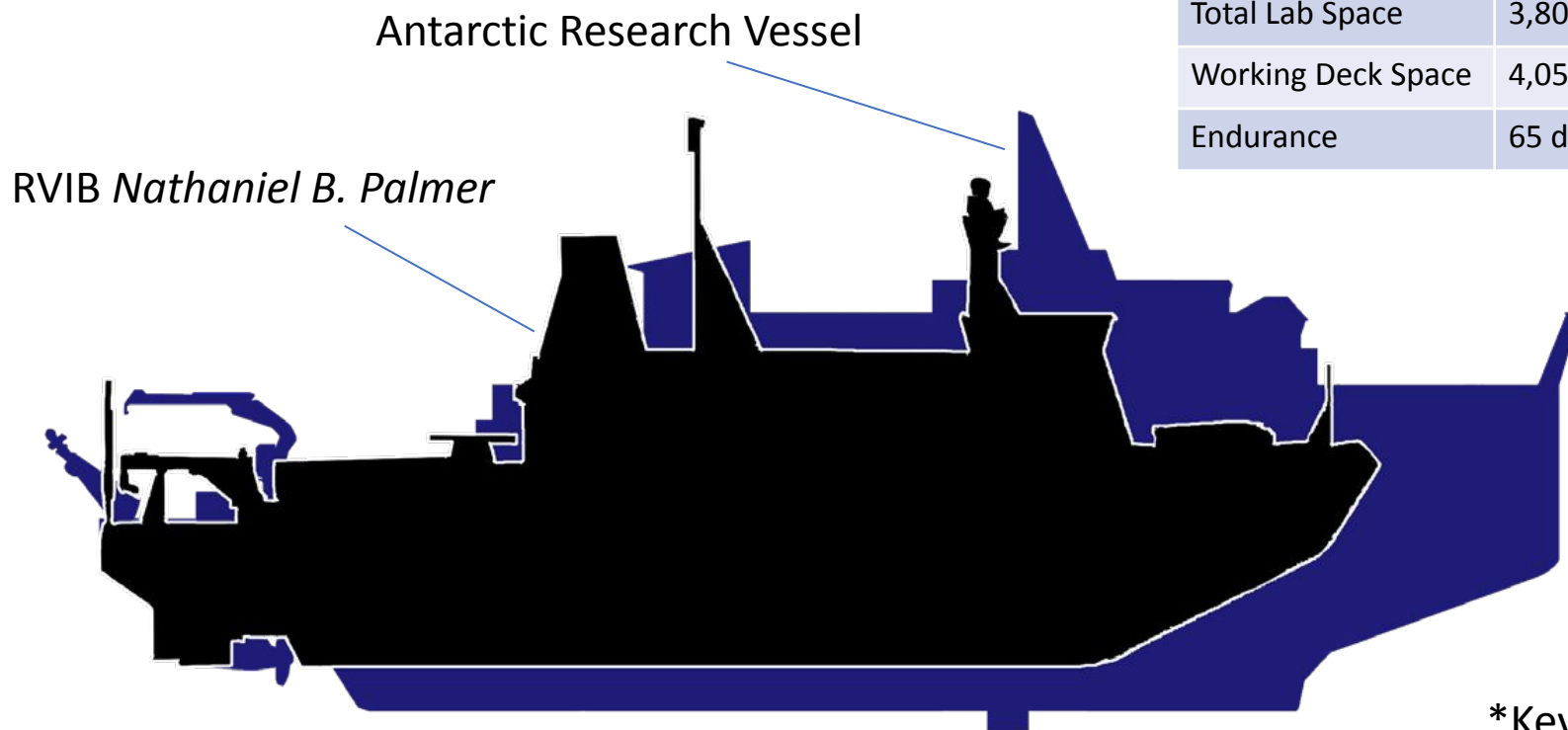
## NSF ARV Team

Stephanie Short, ARV Program Lead

Tim McGovern, ARV Program Manager

Caitlin Jarecki ARV Assistant Program Manager (USN PEO Ships)

Mike Prince, ARV Project Manager



	<i>Nathaniel B. Palmer</i>	Antarctic Research Vessel	
Length	309 ft	365 ft	<b>Bigger</b>
Sci/Tech Berthing	45	<b>55*</b>	<b>More scientists</b>
Total Lab Space	3,805 sq ft	4,497 sq ft	<b>More lab space</b>
Working Deck Space	4,054 sq ft	7,197 sq ft	<b>More deck space</b>
Endurance	65 days	<b>90 days*</b>	<b>Longer endurance</b>

**AND greater icebreaking capability  
≥4.5 ft @ 3 kts (Polar Class 3)\***

*\*Key Performance Parameter (KPP)  
Current Design & Hull Form meets all KPPs*

# ARV Placemat with Specifications



## Antarctic Research Vessel (ARV) Preliminary Design Placemat



### REFERENCE MISSION

Duration	90 days
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### DIMENSIONS

Length, Overall	365.0 ft
Length, BP	349.0 ft
Beam, Overall	80.0 ft
Beam, WL	79.3 ft
Design Draft	32.5 ft
Working Deck Freeboard	13.0 ft
Displacement (Design Draft)	13,430 LT
Light Ship Weight (including margins)	9,790 LT
Deadweight	3,640 LT

### ACCOMMODATIONS

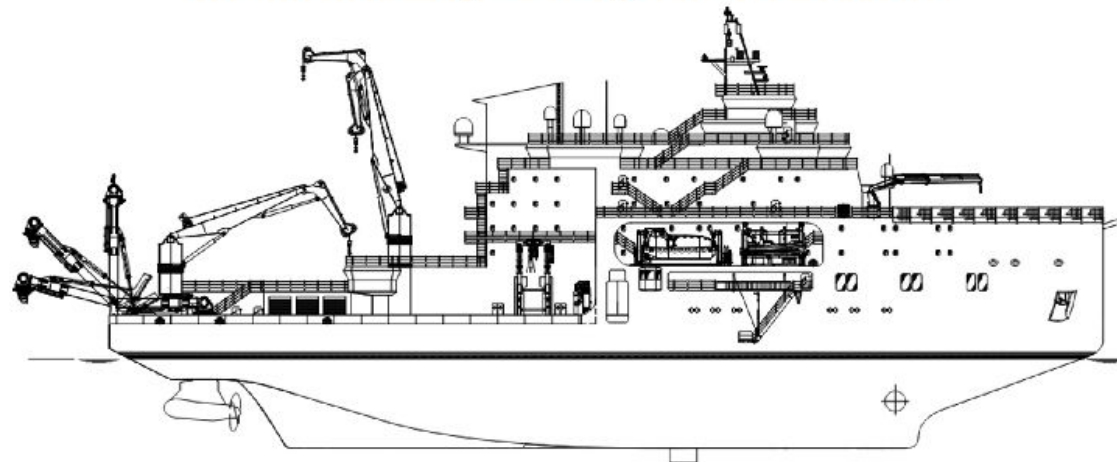
Ship's Crew	29
Science Complement	55 (Including 2 ADA-accessible berths)

### PROVISIONS

Freeze	90 days
Chill	90 days
Dry	90 days

### AVIATION

UAV Launch/Recovery	150 lbs
UAV Hangar	1,472 ft <sup>2</sup> Bell 407
Helicopter Landing	Airbus H1125



### MACHINERY SYSTEMS

Azimuthing Padded Propulsors	2 x 9.5 MW
Bow Thrusters	1 x 1.9 MW
Ship Power Plant	22.3 mW
Propeller	2 x 16.0 ft F7P

### AUXILIARY SYSTEMS

A/C Plants	Qty: 3 @ 205:
Fire Suppression	NOVEC and Water Mist
Mission Fuel Capacity	60,000 gal
Ship Service Battery	2.7 MWh
Wastewater Holding	20 days

### COMMUNICATIONS

HF Transmit and Receive
Ku, Ka, C, and UHF SATCOM
GMDSS
INMARSAT
UHF/VHF LOS Comms
UAS Comms
Fleet Broadband

### NAVIGATION

AIS
ECDIS
S & X Band Radar
Ice Radar
DGPS

### MISSION EQUIPMENT

2 Main Deck Cranes	Maximum reach: 65ft 70,000 lbs @ 50ft
Portable Utility Crane	4,000 lbs @ 40ft
Forward Crane	4,000 lbs @ 40ft
Stern A-Frame	
Side A-Frame	80,000 lbs slewing
Meteorology Mast	1
Atmospheric Mast	1
CTD Hydroboom	Fast-acting, Reaches water level 40m
Piston Core LARS	
Multibeam Sonar Suite	
Sonar Dredge Keel	0 ft / 3 ft / 10 ft
UNOLS Lab Van Quantity	20 TEU

### PERFORMANCE

Open Water	
Maximum	> 17 kt
Cruise	11 kt
Quiet	9 kt
Ice	
Continuous 3 kt	> 4.5 ft / 1.1 ft snow
Continuous 6 kt	> 1.6 ft
Turning out	> 4.5 ft
Range	> 17,000 nm
Towing	
4 kt	25,000 lbs
6 kt	10,000 lbs

### CLASSIFICATION

ABS #A1 Oceanographic	Ice Class PC3
AMS	CCO-POLAR (-35°C, -45°C)
ACCU	CR
Unrestricted service	R2
EEDI-PH3	ENVIRO
HAB++(WU)	BW1+
ESS-LIBATTERY	HYBRID IEPS
ILM	UWILD
PO+	

### MISSION SPACES

UNOLS Lab Vans	2 in Science Hold 12 on Weather Decks
Lab Area, Total	8,263 ft <sup>2</sup>
At. Work Deck	7,774 ft <sup>2</sup>
Science Stores	42,571 ft <sup>2</sup>
Side Deck Length	111 ft
Baltic Room Area	704 ft <sup>2</sup>
Total HAZMAT Storage	217 ft <sup>2</sup>
Science Observation Deck	1,163 ft <sup>2</sup>



<https://future.usap.gov/arv/>



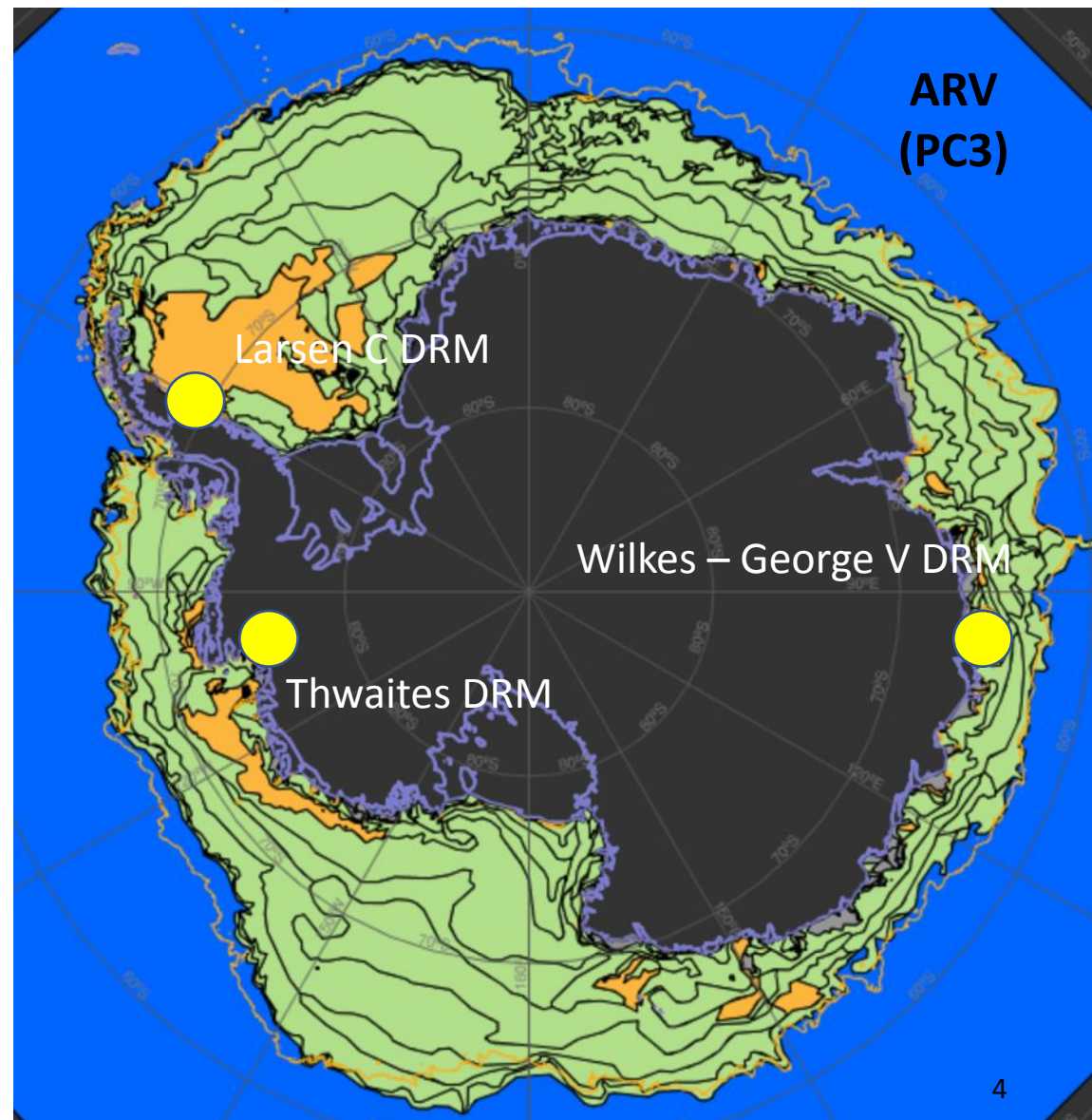
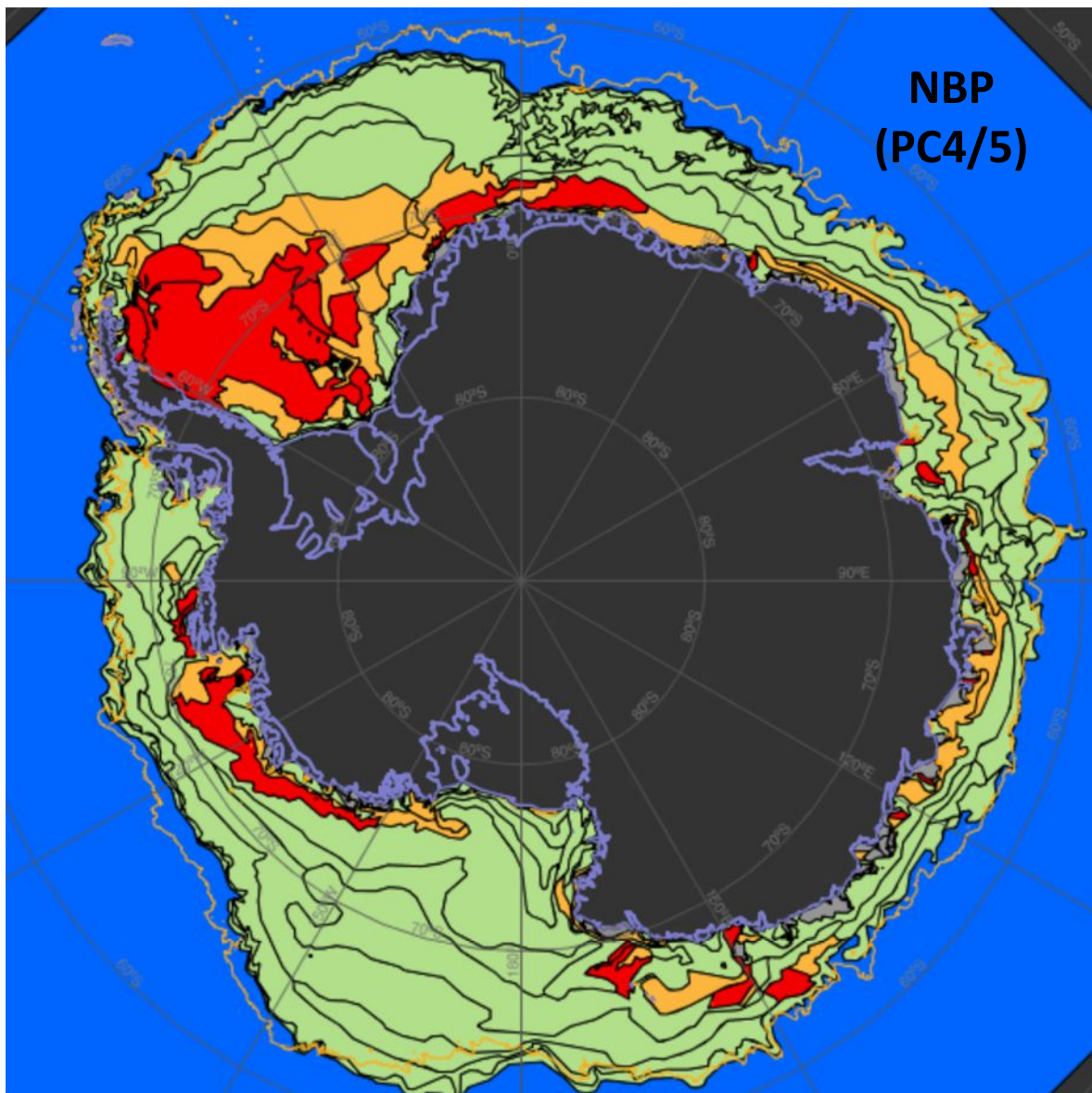
October 20, 2023

# PC3 & Icebreaking KPP

Green = accessible; Orange = accessible with difficulty & slower speeds; Red = not accessible



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# Model Test Results Showing Ice Management



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Clearing of a pool with thrusters in the HSVA Test Basin (Side Step)

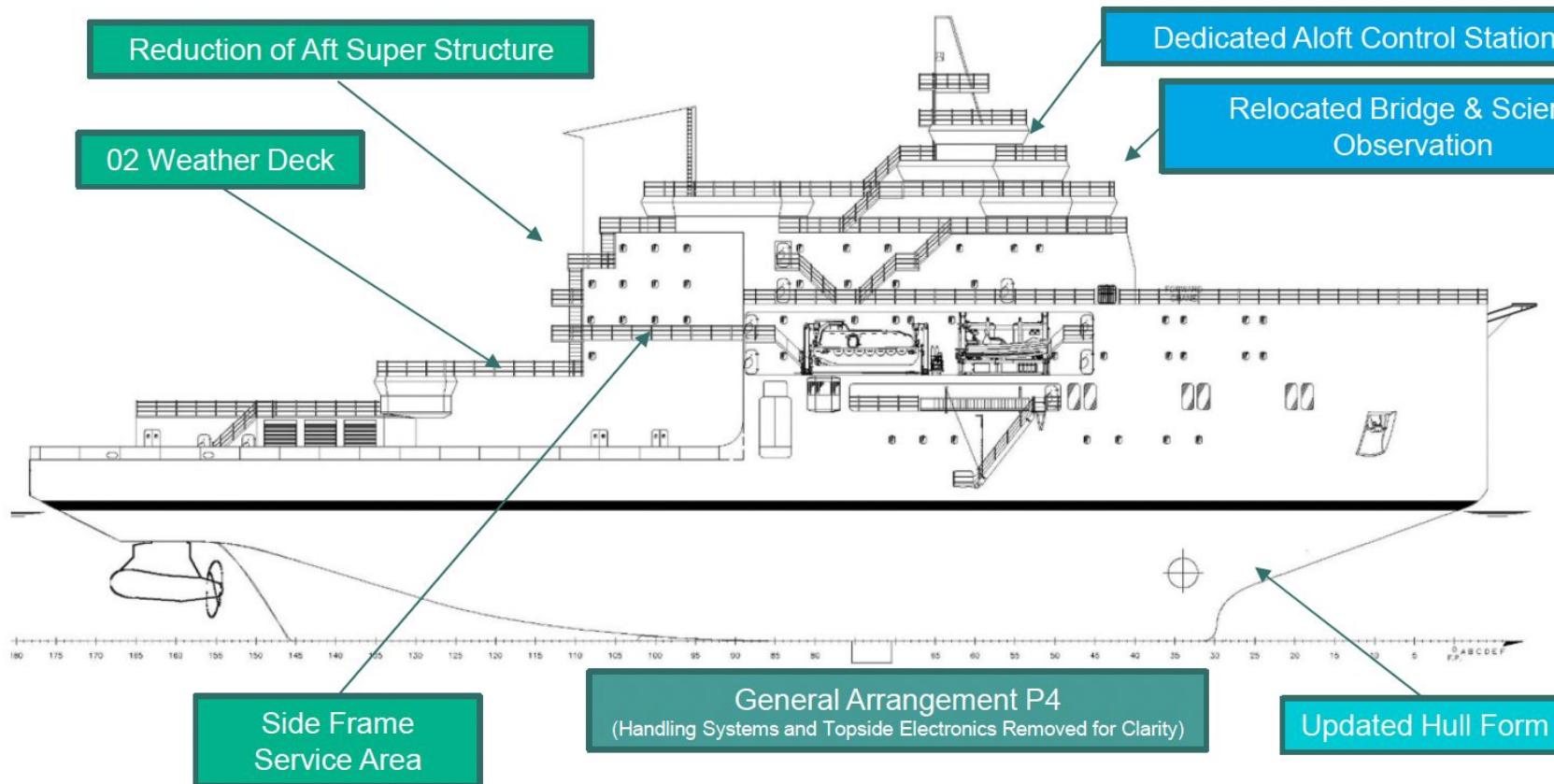


*R/V Sikuliaq* creating pool in  
Ice with thrusters



Ice Management Astern in the HSVA Test Basin (30° toe-in angle)

# General Arrangement – Recent Changes



## Sightline Improvements

- 08 Level Aloft Control Station
- 07 & 06 Level Relocation

## Superstructure Modifications

- Improved Incubation Area
- Creation of Side Frame Servicing Area
- Improved Range of Motion for Starboard Main Crane
- Improved Location for Flagging Block to Serve Aft A- Frame

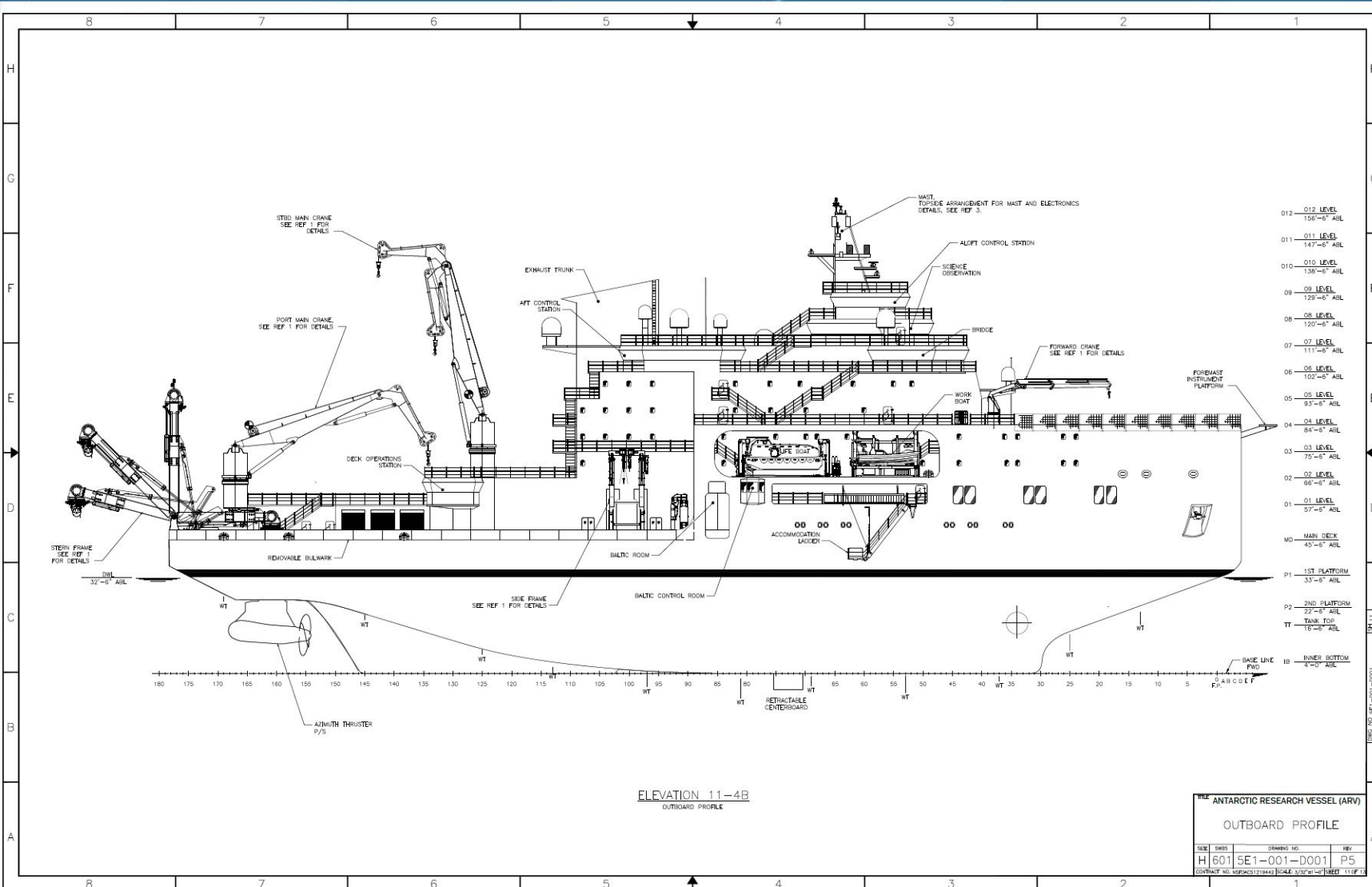
## Improved Hull Form

- Improved Bubble Sweepdown Performance
- Improved Fuel Oil Capacity

# General Arrangement – Profile



Drawings & Reports go to:  
<https://future.usap.gov/arv-doc-library/>



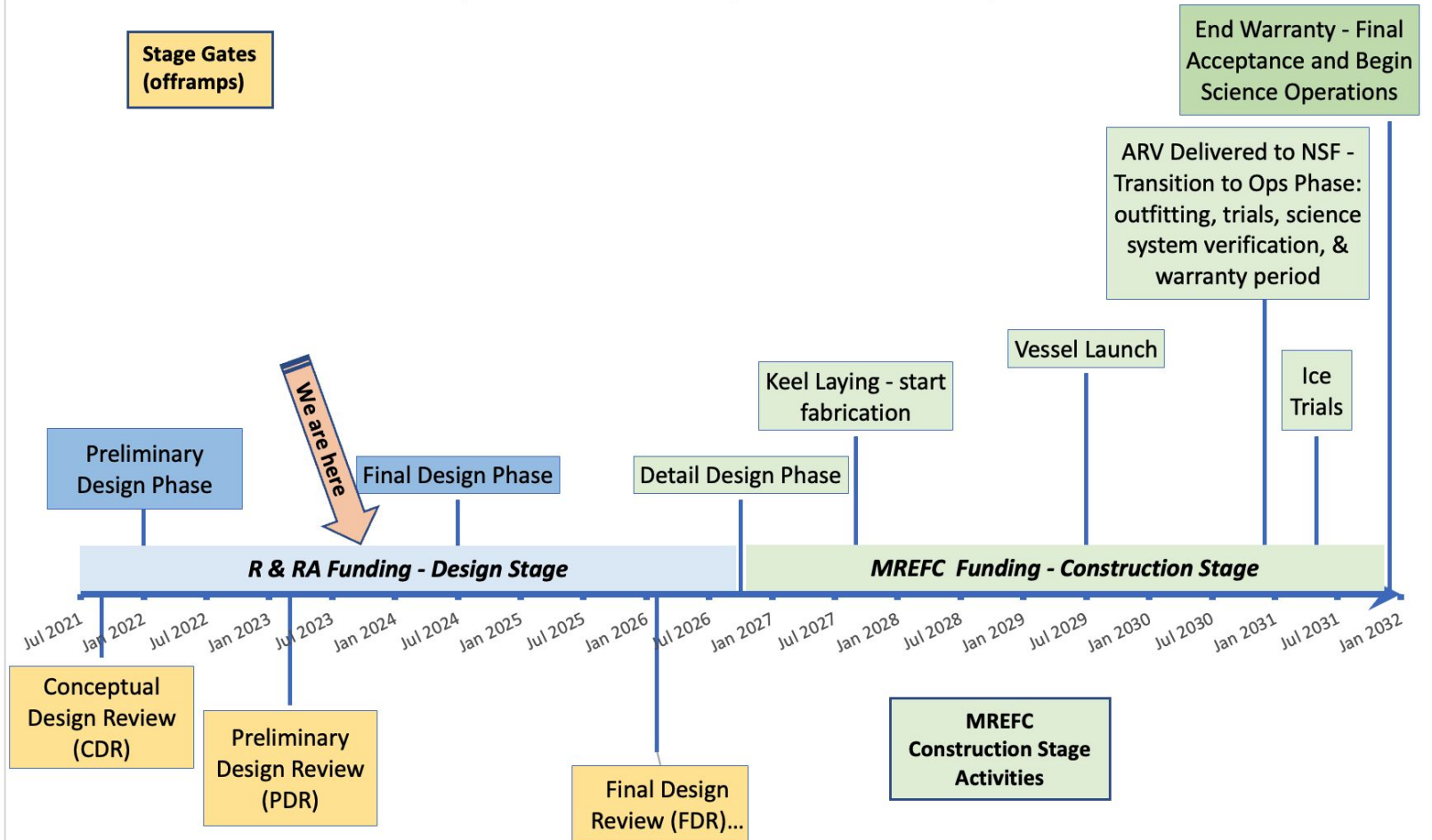
# ARV Schedule



## ARV Project Timeline

Rev - November 2023 - Preliminary Design Phase

Reflects possible 6 month delay in start of Final Design Phase



## Next Steps:

- RFP and Selection of the Vessel Integrator to complete the project. (CY 24)
- Final Design Phase (CY 24-26)
- Final Design Review (CY 26)
- Appropriation and Approvals to start Construction Stage (CY 26)



# Science Community Engagement



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National Academies of Sciences, Engineering,  
and Medicine

**Future Directions for Southern Ocean and  
Antarctic Nearshore and Coastal Research**

<https://www.nationalacademies.org/our-work/future-directions-for-southern-ocean-and-antarctic-nearshore-and-coastal-research>



Science Advisory Subcommittee (SASC)

Reports:

<https://future.usap.gov/arv-community-input/>

- Dr. Amy Leventer, (Chair) Colgate University
- Ms. Alice Doyle, UNOLS
- Dr. Carlos Moffatt, Univ of Delaware
- Dr. Deborah Steinberg, VIMS
- Dr. Kristin O'Brien, UAF; GEO AC Rep

Past Members

- Dr. Patricia Quinn, NOAA/PMEL
- Dr. Clare Reimers, OSU
- Dr. Bruce Appelgate, UCSD/Scripps

**\* Seeking nominations for 3 new members**



## New Antarctic

Planning for the Next Generation of Oceanographic Research Vessel

What's New?

JUL 22, 2021

### New Antarctic Research Vessel

Advanced Icebreaking Research Vessel Development Beginning

[Read More](#)



## New Antarctic

Planning for the Next Generation of Oceanographic Research Vessel

### Ship Design

#### Current Science Missions

Key performance parameters, operational requirements, and other information found here.

#### Science Mission Requirements (PDF)

#### Placemat

The ARV Preliminary Design Placemat is a key performance parameter document for the ARV. It lists overall hull dimensions, installed equipment, and other information.

DIMENSIONS	
Length Overall	345 ft
Length BP	325.5 ft
Beam Overall	73.5 ft
Beam LWL	72 ft
Draft FLD Load Line	28 ft
Draft Full Load	28 ft
Draft Lightship	17 ft

PERFORMANCE	
Open Water	11 kt T / 12 kt O
Cruse	8.5 kt
Quiet	8.5 kt

ACCOMMODATIONS	
Ships Crew	29
Deck	15
Engineering	9
Stowage	5
NSF Science Party	2
ADA Accessible	2
Scientists	30
Waterwater (days)	20T / 40O

PROVISIONS	
Freeze	90 days
Chill	45 days
Dry	90 days

AVIATION	
UAV Launch/Recovery	150 lbs
UAV Hangar	No IP-5
UAV Workshop	150 sq ft

COMMUNICATIONS	
HF Terminal	1
C-Band SAT	1
UHF SATCOM	1
GMDS	1
INMARSAT F	1

Design placemat of the new Antarctic Research Vessel

Credit: NSF, Leidos Inc.

## New Antarctic Research Vessel (ARV)

Planning for the Next Generation of Oceanographic Research Vessel

### Documents Library

#### Concept Design

- Conceptual Design Memo
  - [Leidos ARV Conceptual Design Memo](#)
- Concept Design Reports (Glosten Documents)
  - [19136 Concept Design Report](#)
  - [19136 Science Berthing Study Project Memorandum](#)
  - [19136.01 ARV Deck De-icing Systems Study - Status Update 09/29/20](#)
  - [19136.01 ARV Ice Environment Study - Status Update 09/25/20](#)
  - [19136.01 ARV Jumbo Piston Coring Study - Status Update 09/25/20](#)
  - [19136.01 - Manning Study](#)

#### Trade Off Studies

- [19136-000-01 ARV USCG Compliance Study Report](#)
- [19136-000-02 ARV Propulsor Study Report](#)
- [19136-000-03 ARV Power Systems Study Report](#)
- [19136-000-04 ARV Climate Study Report](#)
- [19136-000-05 ARV Seakeeping Study Report](#)
- [19136-000-06 ARV Ice Environment Study Report](#)
- [19136-000-07 ARV Green Ship Alternatives Report](#)
- [19136-000-08 ARV Autonomous Vehicle Handling Study Report](#)
- [19136-000-09 ARV Deck De-icing Study Report](#)
- [19136-000-13 ARV Triple Propulsor Report](#)

#### Applicable UNOLS Guidelines and Reports

- [American Disabilities Act \(ADA\) Guidelines for UNOLS Vessels](#)

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May 18, 2022



#### What is Future USAP?



Future USAP is a part of the United States Antarctic Program (USAP). Funded by the National Science Foundation, Future USAP is dedicated to long range investments in Antarctic infrastructure.

#### News and Updates



Wednesday - July 06, 2022  
Construction of New Pier at Palmer Station Now Complete

[future.usap.gov/arv](https://future.usap.gov/arv)

# Preliminary Design Rendering



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# Preliminary Design Rendering



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# Preliminary Design Rendering



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- ❖ ~20 years of sustained scientific demand
- ❖ Continued ability to support cutting edge NSF research for the next 40 years
- ❖ Enhanced capabilities over existing USAP research vessel
- ❖ Strong Teaming with Industry

