

# Scientific Requirements for Small General-purpose Oceanographic Research Ship, Small Waterplane Area Twin Hull ()

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General:	The general aim of this study is to design a SWATH vessel that will provide a more stable platform in higher sea states and have a higher cruising speed (15 knots in sea state 5). On the other hand, this SWATH will be weight- limited; its payload will only be 50 LT including winches, cranes, and frames, but not fuel.
Size:	The size is determined by the requirements for a 15-knot cruising speed and a 2,000 mile range. It is expected that the size of the "box" will be approximately 100 ft long.
Endurance:	7 days; 2000 mile range.
Accommodations:	12 scientific personnel.
Speed:	18 knots in sea state 4; 15 knots cruising; sustainable through sea state 5; fine speed control between 0-6 knots.
Station Keeping:	Maintain station and work through sea state 5; limited work in SS 6.
Ice Strengthening:	None.
Deck Working Area:	<p>Spacious work area -2,000 sq ft minimum with contiguous waist work area along one side 12 x 50 ft minimum. Provide for deck loading up to 1,200 lbs/sq ft in selected areas and an aggregate total of 50 tons. A 15 x 25 ft centerwell to be provided.</p> <p>Holddowns on 2-ft centers. Highly flexible to accommodate large but not necessarily heavy equipment A deck at the bottom of the centerwell to be 10 ft or less above waterline.</p> <p>All working decks accessible for power, water, air, and data and voice communication ports.</p>
Cranes:	A modern crane to handle heavy and large equipment capable of reaching working deck areas and offload vans and heavy equipment up to 8,000 lbs to 20 ft. Crane to have servo controls and motion compensation and be usable as overside cable fairleads at sea.
Winches:	New generation of oceanographic winch systems providing fine control (0.5 m/min); constant tensioning and constant parameter. Wire monitoring systems with inputs to laboratory panels and shipboard recording system. Local and remote controls.

Removable general purpose winches will include:

- Hydrowinch with interchangeable drums capable of handling 30,000 ft of wire rope, Kevlar synthetic line or electromechanical cables having diameters from 3/16" to 5/16" (Markey DESS-3 or equivalent) weight with wire 5 tons.
- Capable of loading and using portable winches such as a double drum winch with 15,000 ft of 1/2" trawling wire on each drum for large mid-water net towing.

Portable shelters available to winch work areas for instrument adjustments and repairs. Two winch control stations located for optimum operator visibility with reliable communications to laboratories and ship control stations.

Overside  
Handling:

Various frames and other handling gear and more versatile than present to accommodate wire, cable and free launched arrays. Matched to work with winch and crane locations but able to be relocated as necessary.

Laboratories :

Stern A-frame to have 15-ft minimum horizontal and 20-ft vertical clearance; 15-ft inboard and outboard reaches.

Provision to carry additional overside handling rigs along working decks from bow to stern.

Control station(s) to give operator protection and operations monitoring and be located to provide maximum visibility of overside work.

Approximately 1,200 sq ft of laboratory space including: Main lab area (700 sq ft) flexible for subdivision providing smaller specialized labs; Wet lab (300 sq ft) both located contiguous to sampling areas; plus Electronics/Computer lab and associated users space (300 sq ft); and freezer (100 sq ft).

Access between labs should be convenient.

Labs to be fabricated using uncontaminated and "clean" materials and constructed to be maintained as such. Furnishings, HVAC, doors, hatches, cable runs, and fittings to be planned for maximum lab cleanliness.

Cabinetry shall be laboratory grade including flexibility through the use of unistruts and deck boltdowns.

HVAC:

Heating, ventilation, and air conditioning appropriate to laboratories, vans, and other science spaces being served. Laboratories shall maintain temperature of 70-75° F, 50% relative humidity, and 9-11 air changes per hour.

Power:

Each lab area to have a separate electrical circuit on a clean bus with continuous delivery capability of at least 40-volt amperes per square foot of lab deck area. Labs to be furnished with 110 v and 220 v AC. Total estimated laboratory power demand is 40 KVA.

Sea water:	Uncontaminated sea water supply to most laboratories and deck areas.
Vans:	To carry one or two standardized 8 ft by 20 ft portable vans which may be laboratory, berthing, storage, or other specialized use. Hookup provision for power, fresh water, drains, communications, data and shipboard monitoring systems.
Workboats:	One 16-ft inflatable (or semi-rigid) boat located for ease of launching and recovery.
Science storage:	Science storage space should be provided as feasible.
Acoustical Systems:	Ship to be as acoustically quiet as practical.  Ship to have 12 kHz and 3.5 kHz echo sounding systems and provision for additional systems.
Navigation/ Positioning:	Global Positioning System (GPS) with appropriate interfaces to data systems and ship control processors.  Shore baseline acoustic navigation system.
Internal Communications:	Internal communication system providing high-quality voice communications throughout all science spaces and working areas.  Data transmission, monitoring, and recording system available throughout science space including vans and key working areas.  Closed-circuit television monitoring and recording of all working areas including subsurface performance of equipment and its handling.  Monitors for all ship control, environmental parameters, science and oversight equipment performance to be available in all, or most, science spaces.
External communications:	Reliable voice channels for continuous communications to shore stations (including home laboratories), other ships, boats, and aircraft. This includes satellite, VHF and UHF.  Facsimile communications to transmit high-speed graphics and hard-copy text on regular schedules.  High-speed data communications (56 K Baud) links to shore labs and other ships on a continuous basis.  Capability to receive realtime or near realtime satellite imagery.
Ship Control:	Chief requirement is maximum visibility of deck work areas during science operations and especially during deployment and retrieval of equipment.

The functions, communications, and layout of the ship control station should be carefully designed to enhance the interaction of ship and science operations. For example, ship course, speed, altitude, and positioning will often be integrated with scientific operations requiring control to be exercised from a laboratory area.

<i>Sea State</i>		<i>Height</i>	
		<i>Feet</i>	<i>Meters</i>
0-----	<b>Calm-glassy</b> .....	0 .....	0
1-----	<b>Calm-rippled</b> .....	0 to 0.5 .....	0 to 0.1
2-----	<b>Smooth-wavelets</b> .....	0.5 to 1.5 .....	0.1 to 0.5
3-----	<b>Slight</b> .....	1.5 to 4 .....	0.5 to 1.25
4-----	<b>Moderate</b> .....	4 to 8 .....	1.25 to 2.5
5-----	<b>Rough</b> .....	8 to 13 .....	2.5 to 4
6-----	<b>Very rough</b> .....	13 to 20 .....	4 to 6
7-----	<b>High</b> .....	20 to 30 .....	6 to 9
8-----	<b>Very high</b> .....	30 to 45 .....	9 to 14
9-----	<b>Phenomenal</b> .....	Over 45 .....	Over 14