Ocean Class SMR Input
Gear Handling over the side, towing, winches, wire & cranes

<table>
<thead>
<tr>
<th>Robert Knox</th>
<th>SIO</th>
</tr>
</thead>
</table>

1 Physical Oceanography

Ocean circulation - But I'm going to use this form mainly to insert some overall observations or workshop discussion items into the mill, based on my reading of inputs thus far (7/1/02)

**Over the side handling**

See J. Christensen plea for hands-off CTD. If that, or similar-size package, could be done well, and if the system could adapt to other packages of roughly similar size/weight, this could make for safer/better operations into worse weather. How best to accomplish? What implications for winch/crane/overboarding system/auxiliary restraints? Good topic for further thought.

**Towing**

Instrument towing (e.g. Seasoar) is not a major design driver; heavy-duty towing appears not to be an issue.

**Winches**

Needs to be considered together with wire (#13) and overboarding gear (#15). Seems as if two "CTD" or next-generation CTD winches and one trawl winch are needed. Can any of these readily be used for "clean" work (e.g., trace metal) or must that be a separate winch system?

**Wire**

Current UNOLS effort to specify next-generation wires is important here - may imply different winches.

**Crane**

Various functional requirements emerge - self-loading of vans from pier, small relocatable cranes to serve deck gear and hatches, use of main crane(s) as overboarding/coring/towing equipment (suitable crutch or restraint). Some numbers for load/reach limits will be needed, as well as definition of crane performance at sea vs in port (dynamic effects).

<table>
<thead>
<tr>
<th>Ed Carpenter</th>
<th>SFSU</th>
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</table>

Biology

phytoplankton ecology, nutrient cycling

**Over the side handling**

Need to launch and recover sediment traps in uncluttered deck area.

**Towing**

**Winches**

Need conducting cable winch for CTD Rosette. We typically work just in upper 300 m but of course should have ca 5000 m of wire. We still use old non conducting hydro cable for towing 1 m dia plankton nets to collect larger phytoplankton.

**Wire**

**Crane**

Need for loading & unloading. Should have a simple setup for launch & recovery of a Zodiac.
Over the side handling

Towing
Occasional dragging for stuck mooring with trawl wire and drag.

Winches
Standard kinds of winches. Simultaneous usability for CTD, hydrowire, trawl (conducting?), mooring recovery, and specialized trace-metal winch (user provided). We usually ask for this full mix at one time on our bigger cruises for CTD ops, plankton tows, MOCNESS, trace metal sampling, mooring recovery/deployment, piston cores and the occasional dragging for dead moorings.

Wire
The usual

Crane
Loading, unloading. Sometimes used at sea instead of A-Frame

Over the side handling

hero pltfm

Towing
<1kt or drift

Winches
light

Wire
for Niskin or CTD

Crane
Ocean Class SMR Input
Gear Handling over the side, towing, winches, wire & cranes

Grace Klein-MacPhee  -  URI
Biology  -  Fishery Science

Over the side handling

side deployment of CTD and smaller MOCNESS

Towing

Winches

at least 3, A trawl winch, dual drum winch, hydrographic winch for MOCNESS up to 10 meters

Wire

Crane

2 cranes

---

Edward Durbin  -  URI
Biology  -  Zooplankton

Over the side handling

Motion compensated winch for heavy gear.

Towing

Winches

Wire

Optical fiber for VPR

Crane
<table>
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<tr>
<th>Gear Handling over the side, towing, winches, wire &amp; cranes</th>
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</thead>
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<tr>
<td>Joan Bernhard</td>
</tr>
<tr>
<td>Biology</td>
</tr>
</tbody>
</table>

**Over the side handling**

Existing A frames are often too small (narrow and/or throw--angle of extension) to accommodate newer/larger sampling gear (e.g., MC800 multicorer). Width of A frame needs to be at least 15 feet.

**Towing**

To applicable to my work to date

**Winches**

Nothing out of the ordinary required (NOOTOR)

**Wire**

NOOTOR

**Crane**

NOOTOR

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<table>
<thead>
<tr>
<th>Bess Ward</th>
<th>Princeton University</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biology</td>
<td>microbial ecology/biogeochemistry</td>
</tr>
</tbody>
</table>

**Over the side handling**

nothing special

**Towing**

**Winches**

things that can handle CTD, box core, individual bottles

**Wire**

see above

**Crane**

just for loading
### Ocean Class SMR Input
**Gear Handling over the side, towing, winches, wire & cranes**

<table>
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<tr>
<th>Richard Barber</th>
<th>-</th>
<th>UNC/Duke</th>
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<tbody>
<tr>
<td>Biology</td>
<td></td>
<td>primary productivity regulation</td>
</tr>
</tbody>
</table>

#### Over the side handling
- **conventional**

#### Towing
- n/a

#### Winches
- in addition to conventional hydroline conducting, a Kevlar/teflon-coated winch and wire is needed

#### Wire
- Kevlar

#### Crane
- n/a

<table>
<thead>
<tr>
<th>William Cochlan</th>
<th>-</th>
<th>SFSU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biology</td>
<td></td>
<td>Phytoplankton and bacterial productivity, nitrogenous nutrition</td>
</tr>
</tbody>
</table>

#### Over the side handling
- rigid inflatable(s) for special sampling requirements

#### Towing

#### Winches
- 2 standard winches for CTD/rosette (stardboard) and 1-2 located aft for net hawls, etc.

#### Wire
- standard conductivity cables for upper 500 meters

#### Crane
- Ability to launch/recover standard rosettes with bottles/CTD as well as wire sampling. Also a boom 'outrigger-typ'e system to hang over the side for deployment of underway sampling systems (i.e., trace-metal clean sipper system)
Over the side handling

good aft A frame, as present Thomas Thompson

Towing

maintain steady 2kts.

Winches

capable of towing MOCNESS nets of all sizes, hydrowinch

Wire

0.68 conducting; 0.32 conducting, regular hydrowire

Crane

as present Thomas Thompson

Over the side handling

Rear A-frame, dedicated CTD launching system, hydro boom. May in future need buoy tending capabilities.

Towing

Winches

trawl winch, hydrowinch, CTD winch. May, in future, need ability to tow SeaSoar or underway CTD

Wire

Crane

Mostly for loading and unloading in port. Occasional use at sea for launching skiffs, moving equipment. May in future be needed for tending moorings.
### Gear Handling over the side, towing, winches, wire & cranes

<table>
<thead>
<tr>
<th>James Meehan</th>
<th>-</th>
<th>NMFS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biology/Other</td>
<td></td>
<td>Living Marine Resources life histories, population structures, and stock assessments. Ecology and dynamics of Large Marine Ecosystems. Identification and description of Essential Fish Habitats and endangered species Critical Habitats</td>
</tr>
</tbody>
</table>

#### Over the side handling

Extendable beams or frames (A, U, J)
Capable of handling 910 kg plus 5,000 meters of 8.2 mm or 9.5 mm electromechanical wire.
Outboard extension at least 3 m from side shell

#### Towing

#### Winches

Two autocompensating trawl winches to support trawling to a depth of 1,800 m.; Third wire winch with cable length compatible with maximum trawl warp scope.; Oceanographic winch w/a working depth of 5,000 m; Two hydrographic winches w/a working depth of 5,000 m

#### Wire

Trawl winches - 28 mm trawl cable; 14.3 mm wire rope (3x19 torque balanced); Oceo winch - 14.3 mm wire rope; 15.9 mm mechanical wire; " 17.3 mm electromechanical wire or fiber optic cable"
"Hydro winches 8.2 mm or 9.5 mm electromechanical wire"
" 6.35 mm mechanical wire rope"

#### Crane

Aft working deck -
Dockside static load - 3650 kg at 9 m
At sea dynamic load - 4550 kg at 6 m
2275 kg at 15 m
250 kg at 20 m

<table>
<thead>
<tr>
<th>Rana Fine</th>
<th>-</th>
<th>RSMAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chem. Oc.</td>
<td></td>
<td>Tracer Oceanography</td>
</tr>
</tbody>
</table>

#### Over the side handling

for hydrography

#### Towing

#### Winches

for hydrography 36 place rosette

#### Wire

for hydrography, 7000 m

#### Crane
**Over the side handling**

### Towing

Ability to perform tow-yo operations with CTD-rosette

### Winches

Ability to perform tow-yo operations with CTD-rosette

### Wire

Ability to perform tow-yo operations with CTD-rosette; 4 conductors for CTD cable

### Crane

Knuckle crane or similar for deploying/recovering floats and attached sample arrays

---

**Over the side handling**

Why can't CTD/rosette packages be deployed and recovered without manually clippng lines to them? Why can't the operation be fully untouched? Free swinging heavy gear is dangerous. Similarly, boxcores and other devices of similar size and weight should also be made hands-free in deployment and recovery.

### Towing

none

### Winches

Boxcores require deep-sea winches. CTD/rosette. Ability to deploy benthic landers via capstan and A-frame.

### Wire

box cores usually the heaviest gear deployed.

### Crane
Ocean Class SMR Input
Gear Handling over the side, towing, winches, wire & cranes

Craig McNeil | URI
Chemical Oceanography | Dissolved gases, biogeochemical cycling

**Over the side handling**
rigid inflatables for at sea operations

**Towing**

**Winches**
CTD/rosette, starboard and stern

**Wire**
full ocean depth, power and coms (RS-232/485)

**Crane**
mooring deployment/recovery

Bob Collier | OSU
Chemical Oceanography | Marine Biogeochemistry, Trace Element Chemistry, Hydrothermal Systems

**Over the side handling**
Ability to launch a workboat.

**Towing**

**Winches**
Full ocean CTD winch (em.322), enable mission-based science operators (like WHOI ships), ability to tow-yo up to 1.5 knots on stdb., ability to place a second winch for special purpose use (clean wire), trawl winch for coring ops (piston, box, etc.), fiberoptic em wire for ROV and camera ops - support of Observatory service and science ops. Utility Pango winch or traction winch for mooring / equipment recovery and deployment.

**Wire**

**Crane**
Shipboard crane capable of placing science vans and picking from shore (reasonable distance).
### Over the side handling

<table>
<thead>
<tr>
<th>Gear Handling over the side, towing, winches, wire &amp; cranes</th>
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</thead>
</table>

#### Chemical Oceanography

- Marine biogeochemistry; oceanic nitrogen cycling, N and C isotope biogeochemistry

#### Towing

Sufficient for MOCNESS

#### Winches

- 1 hydro (1 backup), 2 for CTD/Rosette, 1 trawl with possible backup

#### Wire

- Hydro sufficient for 30-l Nisking bottle and in-situ pump deployments; acoustical wire sufficient for CTD/Rosette; trawl wire sufficient for MOCNESS; also interested in multicore, gravity core, and piston coring capability.

#### Crane

- Sufficient for handling coring operations and MOCNESS towing if used instead of A-frame
### Gear Handling over the side, towing, winches, wire & cranes

#### James Cochran - LDEO

| G & G | lithospheric/crustal creation and evolution, rifting processes - both at mid-ocean ridges and continental rifts |

#### Over the side handling

- Motion compensated frames for launch and recovery in rough seas

#### Towing

- Seismic ship needs to be able to handle 6+ km streamer, perhaps multiple streamers, and large air gun array. Requirements are less for general purpose ships

#### Winches

- Suitable for deployment of standard piston core and dredging equipment

#### Wire

- Suitable for deployment of ROV (fiber-optic cable)

#### Crane

### Carey Steven - URI

| G & G | volcanology and volcaniclastic sedimentation |

#### Over the side handling

- Deployment of piston coring equipment

#### Towing

- Suitable for towed side-scan sonar survey

#### Winches

- Suitable for deployment of standard piston core and dredging equipment

#### Wire

- Suitable for deployment of ROV (fiber-optic cable)

#### Crane
**Over the side handling**

**Towing**
- ability to tow magnetometer or perhaps a towed mapping system

**Winches**
- sufficient to put DSL120 or Jason II types instruments over the side

**Wire**
- Conductor and/or fiber optic

**Crane**
- current std wires OK, improved FO cable including FO hydrographic cable

---

**Over the side handling**

**Towing**
- for ROVs and towed packages, controlled speeds of 1/4 to 1 kt w/DP

**Winches**
- current Agor 24 class OK, better traction winches?

**Wire**
- current std wires OK, improved FO cable including FO hydrographic cable

**Crane**
- similar to current capabilities but with MUCH better reliability and design for at sea operations/maintainence
**Ocean Class SMR Input**

*Gear Handling over the side, towing, winches, wire & cranes*

<table>
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<tr>
<th>John Collins</th>
<th>-</th>
<th>WHOI</th>
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<td>G &amp; G</td>
<td></td>
<td>Seismology</td>
</tr>
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</table>

**Over the side handling**

Big A-frame aft + stbd. A-frame

**Towing**

Capability to tow 6 airguns

**Winches**

2 entirely independent winches, 2 drums 2 traction motors. Must be able to switch between fiber and trawl.

**Wire**

> 40,000 lbs, fiber, coax, and trawl.

**Crane**

Articulated crane on fantail + portable crane (e.g. Hiab)

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<table>
<thead>
<tr>
<th>Fred Spiess</th>
<th>-</th>
<th>SIO</th>
</tr>
</thead>
<tbody>
<tr>
<td>G &amp; G</td>
<td></td>
<td>seafloor deformation measurement, seafloor work systems, plate tectonics, etc.</td>
</tr>
</tbody>
</table>

**Over the side handling**

Assume this includes over the stern - large A frame capable of moving 10 ton load from inboard to outboard. 3 or more suspension points.

**Towing**

tow FLIP

**Winches**

dredge & em cable - capability of shifting from one to the other easily. at least 9 km of wire CTD or light coring winch.

**Wire**

3 fibers & 3 copper. 3Kv. 15kVA. at least 15,000 lbs working load

**Crane**
Over the side handling

Towing

small booms for towing aigun arrays and seismic streamer (looking ahead, multiple streamers) plus mag

Winches

9/16" main winch plus a standard hydro

Wire

9/16" + hydrowire

Crane

John Hildebrand - SIO

G & G

Marine Geodesy - study of crustal movements using acoustics and GPS

Over the side handling

A frame with 20-30 Klb rating

Towing

Winches

Wire

Fiber optic cable and appropriate shieves, capable of changing to dredge wire with minimal down time.

Crane
### Ocean Class SMR Input

**Gear Handling over the side, towing, winches, wire & cranes**

<table>
<thead>
<tr>
<th>Robert Ballard</th>
<th>URI</th>
<th>Deepwater Archaeology</th>
</tr>
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<tbody>
<tr>
<td>G &amp; G; Other</td>
<td></td>
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</tbody>
</table>

**Over the side handling**
- ability to launch 3,000 lbs ROV

**Towing**
- towing side-scan sonar system at 1-3 knots

**Winches**
- traction winch

**Wire**
- 0.68 inch fiber optic wire for working in 6,000 meters

**Crane**
- ability to launch 3,000 lbs ROV

<table>
<thead>
<tr>
<th>John Orcutt</th>
<th>Scripps Institution of Oceanography</th>
<th>Marine seismology</th>
</tr>
</thead>
<tbody>
<tr>
<td>G &amp; G; other</td>
<td></td>
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</tbody>
</table>

**Over the side handling**
- A-frame as above. Load should exceed crane significantly; e.g. 10 tons.

**Towing**
- Tow a single multichannel (2.g. 24 channels or less) streamer and modest airgun array.

**Winches**
- EM and fiber optical cable capability to as great a length as possible - perhaps 8-9km.

**Wire**
- 3 optical fibers and 3 copper conductors. 18,000 lb working load. High voltage conductors (e.g. 3kV).

**Crane**
- At least a 2-ton working load at full extension on fantail. A-frame desireable for larger loads.
Ocean Class SMR Input
Gear Handling over the side, towing, winches, wire & cranes

<table>
<thead>
<tr>
<th>Sean Wiggins</th>
<th>-</th>
<th>SIO</th>
</tr>
</thead>
<tbody>
<tr>
<td>G &amp; G; other</td>
<td>Marine Geophysics &amp; Oceanographic Instrumentation</td>
<td></td>
</tr>
</tbody>
</table>

**Over the side handling**

- A-Frame

**Towing**

**Winches**

- fiber optics and coax

**Wire**

**Crane**

- launch and recovery of small instruments

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<table>
<thead>
<tr>
<th>John Bash</th>
<th>-</th>
<th>URI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other</td>
<td>Research Vessel Management</td>
<td></td>
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</tbody>
</table>

**Over the side handling**

- Motion compensated frame for handling equipment in heavy seas

**Towing**

**Winches**

**Wire**

**Crane**
**Over the side handling**

Stern frame, side hydrobooms port & starboard; one of which rated for cable with broadest bandwidth (currently .680 FO). Motion compensated system - specs to be determined.

**Towing**

Should not be a defining requirement - 10,000# @ 6 knots

**Winches**

2 Hydrowinches, 1 traction winch with capability of changing between trawl wire and FO, not necessary to carry both simultaneously.

**Wire**

Next generation of oceanographic cables. Fiberoptic.

**Crane**

Cargo-type crane to load from dock to key deck locations. Portable (relocatable) articulated crane for handling AUV, ROV, etc.
Over the side handling

Hydro booms Port and Starboard, A-frame, U-frame (including AUVs) in a sea way

Towing

10 meter MOCNESS, mid-water trawl.

Winches

2 hydro winches, convertible traction dredge/.680 fiber optic

Wire

Standard UNOLS .322, .680, 9/16

Crane

Hyab knuckle crane, 20,000 lbs.

Over the side handling

STern Aframe- rated 30 tons or capable of exceedign breaking strength of wire to be employed on it. 25 ft vertical clearance. 15 ft horizontal clearance. CApable of reachin 12-15 ft inboard or outboard of vessel.

STarboard side hyrderboom

Towing

Winches

All winches wire, tension, speed read outs.
Capacity of 10,000m of UNOLS standard wire or electromechanical cable
Winches to include:
CTD/hydro winch
Core winch

Wire

Crane

Three cranes-
1-Small portable articulated crane capable of being positioned to support over the side oeprations.
1-Articulated crane with 40 boom rated for 3000 lbs at 40 ft.
1-Large telescoping boom crane- capable of handling 15000-20000lb containers
## Ocean Class SMR Input

### Gear Handling over the side, towing, winches, wire & cranes

<table>
<thead>
<tr>
<th>Thomas Rossby</th>
<th>URI</th>
<th>Phys. Oc.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Ocean circulation with emphasis on the Gulf Stream and North Atlantic Current system. Perhaps work farther north in future.</td>
</tr>
</tbody>
</table>

**Over the side handling**

- Long rail on starboard side for access to water line for recovery ops.

**Towing**

**Winches**

**Wire**

**Crane**

<table>
<thead>
<tr>
<th>Terrence Joyce</th>
<th>WHOI</th>
<th>Physical Oceanography</th>
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<tr>
<td></td>
<td></td>
<td>Ocean general circulation, mesoscale variability</td>
</tr>
</tbody>
</table>

**Over the side handling**

- recovery/deployment of 3m discus buoy for meteorology, standard surface and intermediate moorings

**Towing**

**Winches**

**Wire**

**Crane**

- lift capability for standard container vans, specialized for science labs [hydro]

- A-frame for towing SeaSoar

- trawl winch, 2 hydro winches

- standard UNOLS wire for above (8000m)
**Over the side handling**

Low freeboard to deploy sleds, bottles and instruments on wire, deploy and recover profilers; launch 10-meter long floats

**Towing**

Low tow speeds, 0 to 2 knots, 6000 pound maximum tension with CTD cable

**Winches**

CTD winch, with backup, for 10,000 meters of CTD cable; Computer control

**Wire**

Present 0.322" CTD wire is marginally OK; go stronger; add optical fiber

**Crane**

Light - for launching delicate floats at sea

---

**Over the side handling**

State-of-the-art handling where minimal tag lines, etc. are needed. A system such as Wiebe's is a good start.

**Towing**

Towing - 10000 lbs at 6 kts

**Winches**

**Wire**

**Crane**

Able to load gear from dock to all points on the ship.
### Ocean Class SMR Input
**Gear Handling over the side, towing, winches, wire & cranes**

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<tr>
<th>Bill Johns</th>
<th>-</th>
<th>RSMAS</th>
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<tr>
<td>Physical Oceanography</td>
<td>Large-scale Ocean Circulation, Western Boundary Currents and Mesoscale Processes</td>
<td></td>
</tr>
</tbody>
</table>

**Over the side handling**

CTD boom and all-weather hangar

**Towing**

**Winches**

Trawl winch w/ 12000 m wire; hydro winch 7000m wire; twin (fully-redundant) motion compensated CTD/profiling winch 7000m cable

**Wire**

**Crane**

articulated crane back deck, standard crane midships/aft able to reach all deck/stowage areas

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<table>
<thead>
<tr>
<th>Tetsu Hara</th>
<th>-</th>
<th>URI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Oceanography</td>
<td>Air-sea interaction</td>
<td></td>
</tr>
</tbody>
</table>

**Over the side handling**

**Towing**

**Winches**

**Wire**

**Crane**

Able to load research platforms (e.g., buoys) from dock to the deck, and to deploy them from the deck.
Ocean Class SMR Input
Gear Handling over the side, towing, winches, wire & cranes

David Farmer  -  URI
Physical Oceanography  Upper Ocean Physics, Internal Waves, Coastal Processes

**Over the side handling**

Need to be able to easily recover drifting instruments over the side. Must be good visibility from bridge and excellent maneuverability.

**Towing**

Tow-yo CTDs are the primary application.

**Winches**

Standard CTD winch meets requirements, i.e. similar set-up to Ocean class vessels.

**Wire**

As for #12

**Crane**

Sufficient for standard current meter moorings etc. Present Ocean class capability sufficient.

---

Mark Wimbush  -  URI
Physical Oceanography  Western Boundary Currents, esp. Kuroshio

**Over the side handling**

See 15 above

**Towing**

none

**Winches**

Conducting-wire CTD winch for hydrographic profiling to 7,000 m.

**Wire**

See 12 above

**Crane**

normal -- able to reach at least 6 ft over the fantail and side.
### Ocean Class SMR Input

#### Gear Handling over the side, towing, winches, wire & cranes

<table>
<thead>
<tr>
<th>Jack Barth</th>
<th>OSU</th>
</tr>
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<tbody>
<tr>
<td><strong>Physical Oceanography</strong></td>
<td>coastal physical oceanography especially fronts and jets</td>
</tr>
</tbody>
</table>

#### Over the side handling

**Towing**
- Tow SeaSoar vehicle at 7 knots on user-supplied cable and winch. Tow bioacoustics package off stern quarter at 7 knots using a tow wing or crane-in-crutch system.

**Winches**
- full-ocean depth CTD/rosette capable winch; trawl winch for mooring ops

**Wire**
- full-ocean depth CTD/rosette capable wire; non-conducting 10K lb wire for emergency dragging for lost gear or unresponsive moorings.

**Crane**
- Large crane for loading from shore. Articulating crane for moving relatively small packages around the deck at sea.

<table>
<thead>
<tr>
<th>John Toole</th>
<th>WHOI</th>
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<tbody>
<tr>
<td><strong>Physical Oceanography</strong></td>
<td>observational physical oceanography</td>
</tr>
</tbody>
</table>

#### Over the side handling

**Towing**
- none

**Winches**
- 2 .322" conducting wire, 1 trawl wire, ability to mount mooring winch

**Wire**
- see above

**Crane**
- stern A-frame, midships J- or A-frame, full deck coverage w/ main crane(s) capable of lifting loaded vans
Over the side handling

I like the arrangement on the knorr (the extensible boom) better than a variety of J-frames and side A frames that I have used on other ships.

Towing

none

Winches

Winch and wire for CTD operations at least at the capacity of the Knorr. I believe a somewhat greater actual power might be needed as I believe in some circumstances it is the potential overheating of the winch that limits haul in, not tensions.

Wire

CTD cable is still my only real need.

Crane

I believe the primary crane pair on the Knorr has been fine for all my mooring operations. I do not do massive surface buoys, so will defer to those like Wellers folks that do.

Over the side handling

Crane and A frame for mooring launch and recovery. CTD launch and recovery. Towed sled requiring crane, CTD winch and another winch with 1 ton lifting.

Towing

slow speed tows of 2 knots or less

Winches

CTD with backup, trawl and something that can handle a 4 ton or larger lift with non conductive wire.

Wire

3 conductor CTD cable, fiber optic for future use.

Crane

10-20 ton to any part of main deck
### Ocean Class SMR Input

**Gear Handling over the side, towing, winches, wire & cranes**

<table>
<thead>
<tr>
<th>Charles Flagg</th>
<th>-</th>
<th>BNL</th>
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</thead>
<tbody>
<tr>
<td><strong>Physical Oceanography</strong></td>
<td>Continental Shelf Processes, Shelf-ocean exchange, fronts</td>
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</table>

**Over the side handling**

- A-frame amid-ships for CTD and coring work and a large a-frame on the stern for mooring and towing.

**Towing**

- Towing requirements include constant slow speed for MOCNESS (~2-3 kts) and higher speeds for SEASOARs (~8 kts).

**Winches**

- There should be the standard suite of winches permanently available and the big winch should be below the main deck if possible. The number of pulleys over which the wire passes should be minimal while the pulleys themselves should be as large as practicable. Winches that are roll compensated would be nice for hydrocasts but I am more worried about winches doing things autonomously outside the control of an operator to support their inclusion in the suite of equipment.

**Wire**

- I'm uncertain what the strength requirements are for the various packages but clearly the ship should be able to do coring, tow SEASOARs and MOCNESSs, do vertical hauls, and hydrographic casts with large rosettes.

**Crane**

- Articulated cranes should be able to reach all areas of the deck and storage areas on top of the deck houses. They should be able to self load items the size of storage and science vans.

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<table>
<thead>
<tr>
<th>Craig Lee</th>
<th>-</th>
<th>UW</th>
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<td><strong>Physical Oceanography</strong></td>
<td>upper ocean and mesoscale dynamics</td>
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</tbody>
</table>

**Over the side handling**

- Large A-Frame.
- I-beam or J-frame
- Relatively low freeboard... accept wet fantail for easier handling of delicate gear.

**Towing**

**Winches**

- Hydro and trawl winches.
- Might also think about a towed profiling/multi-purpose winch with electro-optical cable.

**Wire**

- Standard cables and wire ropes
- Ability to handle electro-optical tow cables (no standards yet)

**Crane**

- Handle loaded containers sited alongside the ship.
- Cranes with ample scope to cover the entire ship.
- Articulating crane to supporting the fantail.
**Ocean Class SMR Input**  
Gear Handling over the side, towing, winches, wire & cranes

| Ruth Curry | WHOI |
| Physical Oceanography | Water mass properties and ocean circulation in the context of global and regional climate |

**Over the side handling**

**Towing**

| none |

**Winches**

Hydro winch for CTDs. For subsurface mooring work, we generally bring our own.

**Wire**

Standard conducting wire capable of lowering CTD and large volume rosette package.

**Crane**

For loading/off-loading dockside.

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| Al Plueddemann | WHOI |
| Physical Oceanography | air-sea interaction and upper ocean dynamics |

**Over the side handling**

| crane lifts over stbd or port rail |

**Towing**

| H-bit and capstain adequate |

**Winches**

hydro winch, trawl winch

**Wire**

| > 15,000 lb, comm's for CTD wire |

**Crane**

one or more deck cranes able to load vans, reach to fantail and one rail
Over the side handling

Towing

Winches

2 moderate strength, one occasionally for dragging

Wire

ctd strength, 4000 lbs for anchors, power for ctd

Crane

fantail and side for ctd

Over the side handling

CTD; testing acoustic releases and other packages; deploying moorings

Towing

Sea-Soar and nets and acoustic packages

Winches

1 CTD winch; 1 higher bandwidth-capable winch might look to the future; 1 non-conductive hydro winch; 1 trawl winch

Wire

see above; CTD, faster, and non-conductive (to hang things inexpensively in the water)

Crane

1 able to load 20-ft containers from dockside;
**Over the side handling**

**Towing**
- can tow FLIP

**Winches**
- electro-optical capability

**Wire**

**Crane**