R/V Sikuliaq Progress
RVTEC November 2011
R/V SIKULIAQ

• Ice-capable General Oceanographic Research Ship
  • IACS PC-5 Ice Classification – one of the first in US
  • 261 feet length
  • 4,053 LT displacement at design draft
  • 5,750 BHP
  • 45 day endurance
  • Integrated power plant with AC propulsion motors
  • Tractor style Z-drives
• Owned by NSF, being built and operated by UAF
• UNOLS Global Class
• 20 Crew, 26 Science
• Homeport in Seward, Alaska
Milestones

• October 2008          Final Design Review
• August 2009          Z-drive Contract with Wartsila
• December 2009        Shipyard Contract With Marinette Marine
• January 7th 2010     Shipyard Contract Start Date
• January 4th 2011     Cutting Steel
• January 21st 2011    Module Construction Started
• April 11th 2011      Keel Laying Ceremony
• May 10th 2011        Science Workshop (Shipyard)
R/V Sikuliaq Progress
Marinette Marine, Marinette Wisconsin
Building 10
Sonar Installations

- Sonars are synchronized to reduce interference between systems
- Self-noise monitoring system included

Sonar “blister” flat with multibeam, single-beam sonars and ADCPs

Retractable Centerboard
EK-60 Array 18,38,70,120 & 200 kHz

Aft Transducer well
With 2 spare mounting rings
Sonar Flat - “Blister”
EM302 Multibeam

- Operating Freq: 30 kHz
- Transducer array: 0.5 deg X 1 deg
- Depth Range: 10-5000m
- Pulse Forms: CW and FM chirp
- Max soundings/ping: 864
- Depth Resolution: 1 cm
**EM710S Multibeam**

- Operating Freq: 70-100 kHz
- Transducer array: .5 X 1
- Depth Range: 3-1000m
- Pulse Forms: CW
- Max soundings/ping: 400
- Depth Resolution: 1 cm
**PS18 Sub-bottom profiler**

- **Frequency Range:** 0.5-6, 15-20, 30-42 kHz
- **Signatures:** CW, Chirp, Ricker
- **Depth Range:** 30 – 10000 m
- **Max Penetration:** ~150 m

- **Audible noise inside hull:** none
ADCP 75 kHz and 150 kHz and 12 kHz echosounder

- RDI Ocean Surveyor ADCPs
  - Provision for future 38 kHz installation
- “Traditional” 12 kHz echosounder
  - Knudsen 3260 system common to UNOLS fleet
Hydrophones
Monitoring of Underwater Radiated Noise
Harris Acoustic HAP 5050

1. Port of RX Array
2. Fwd of TX Array
3. STBD of RX Array
4. AFT Sonar Flat
5. Centerboard
6. Adjacent to Propeller Plane
Radiated Noise Paths

Propeller
Machinery Structureborne
Airborne (via Machinery Rooms)
Fluidborne (via Sea Chest)
Bow Thruster
073.2.1 Radiated Noise Criteria

Underwater Radiated Noise Limit for Other R/V Programs

- SK II (UAQ)
- FIN-40 (ICES)
- Ocean AGOR

Graph showing SPL (dB re 1 micro-Pa at 1 meter) vs. 1/3-Octave Band Center Frequency (Hz).

Noise Control Engineering, Inc., 799 Middlesex Turnpike, Billerica, MA 01821
Phone: 978-670-5339 Fax: 978-667-7047 nonoise@noise-control.com
SIKULIAQ

Predicted Underwater Radiated Noise

- Self-noise baseline assessment will be part of post-delivery sea trials
Forward Transducer Flat in Production
Machinists, Inc, Seattle, WA
13 July 2011
Ice Knife

Leading Edge of EM302 TX Array
Retractable Centerboard

- EK-60 Scientific Sounder System
- One spare mount for project use
  - Accessible from main deck for transducer installations
Center Board Keel
CS Controls, Houma Louisiana
Deck Area Comparison
SIKULIAQ, THOMPSON and KNORR
Overboarding Winches

- Two Mo-Comp Hydro winches forward
  - Both with .322” EM cable
  - Drums can be changed
  - Can be led to side boom or stern
- Traction winch with two drums
  -.680” coax and 9/16” Wire Rope
Mo-Comp Hydro Winches
Rapp Hydema Seattle
Traction Winch
Rapp Hydema Seattle
**A-Frame**

- 120,000 lbs maximum loading
- 30,000 lbs luffing capacity
- Unique features
  - Forward maintenance position
  - Aft laydown for towing in ice

**PRELIMINARY**

- Height 25 ft
  - Thompson @ 25 ft
  - Knorr @ ~25 ft
- Width 20 ft
  - Thompson @ 20 ft
  - Knorr @ ~20 ft
Baltic Room Load Handling System

PRELIMINARY
Integrated Bridge
Marine Technologies, Mandeville Louisiana
<table>
<thead>
<tr>
<th>Event</th>
<th>Date</th>
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<tr>
<td>Z-drives Delivered to Shipyard</td>
<td>Jan 2012</td>
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<tr>
<td>Ocean Science Meeting Salt Lake</td>
<td>Feb 2012</td>
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<tr>
<td>Launch</td>
<td>Oct 2012</td>
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<tr>
<td>Builder’s Trials</td>
<td>April 2013</td>
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<td>Acceptance Trials</td>
<td>May 2013</td>
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<td>NSF Inspection</td>
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<td>Available for Science</td>
<td>Jan 2014</td>
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<td>Ice Trials</td>
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<tr>
<td>Inport and Drydock</td>
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Marc Willis
SIKULIAQ Shipyard Project Office
715-735-0372
willis@coas.oregonstate.edu

Steve Hartz
UAF Seward Marine Center
907-224-5261
sjhartz@alaska.edu