Print

Oceanographic Systems Laboratory, WHOI: REMUS 100

The Invention of the REMUS AUV

In 1993 the REMUS vision began following the creation of Rutgers' ocean observatory LEO-15 in NJ. OSL engineers agreed that there needed to be an underwater tool that could measure oceanographic episodes with greater spatial variance accurately, at a small cost. This underwater tool or AUV became known as Remote Environmental Monitoring UnitS (REMUS).

The first REMUS was built in 1995. In its early deployments, REMUS was fitted with sensors like an ADCP, CTD and sidescan sonar, and would determine its position by transmitting a coded ping to transponders or beacons, set in the ocean at a known location, and it would wait for a reply. The range and bearing of the reply allows REMUS to determine its location. The acoustics, coupled with bottom lock using the ADCP, will allow the vehicle to navigate along a known track line and can be followed on for an entire mission.

Today REMUSing is even easier. Most vehicles are now outfitted with GPS, WiFi (wireless) and even Iridium capabilities. Also, we have integrated an inertial navigation system known as Kearfott, which uses ring laser gyroscopes to orient the vehicle spatially and accelerometers to then sense changes in speed and velocity, completing a navigation package of both precision and confidence.

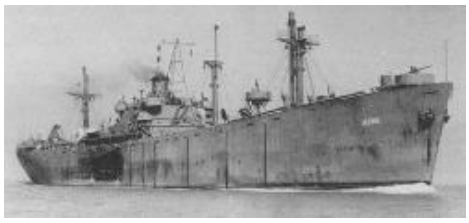
The strength of REMUS is its versatility. REMUS is commonly referred to as a pick-up truck, allowing the vehicle to carry a plethora of sensors. REMUS can be operated in fresh and salt water, in open ocean or even narrow rivers (also water aqueducts). Because of REMUS' small size, it can be operated with only two people and can be launched and recovered from a small vessel with very minimal handling equipment.

Enlarge Image

REMUS 100 surveys Glacier and remote fjord in Western Greenland. 2012 July (A.Kukulya)

Enlarge Image

REMUS 100 takes a swim in the cold, dark waters off of Palmer Station, Antarctica.



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WW II era Liberty Ship

Applications

- Hydrographic surveys
- Scientific sampling and mapping
- Very Shallow Water Mine Counter Measures (VSW)
- Pollution Detection and Monitoring
- Pipeline Inspection
- Undersea Search and Survey
- Homeland Security
- BIOMASS Survey
- Fishery Operations

Standard Sensors

- Sensor data is available immediately upon recovery of the vehicle

- Combing the sensor data with navigation data provides instant two and three dimensional visualization of the environmental parameters measured by the vehicle

Standard Sensor Data in all REMUS vehicles:

- Bathymetry
- Temperture
- Water Velocities
- Salinity
- Sound Speed
- Optical Backscatter

- Diver Visibility
- Sidescan Sonar
- Fluorescence

Low Speed Control Hover Capable REMUS-100

Hull and Harbor security applications:

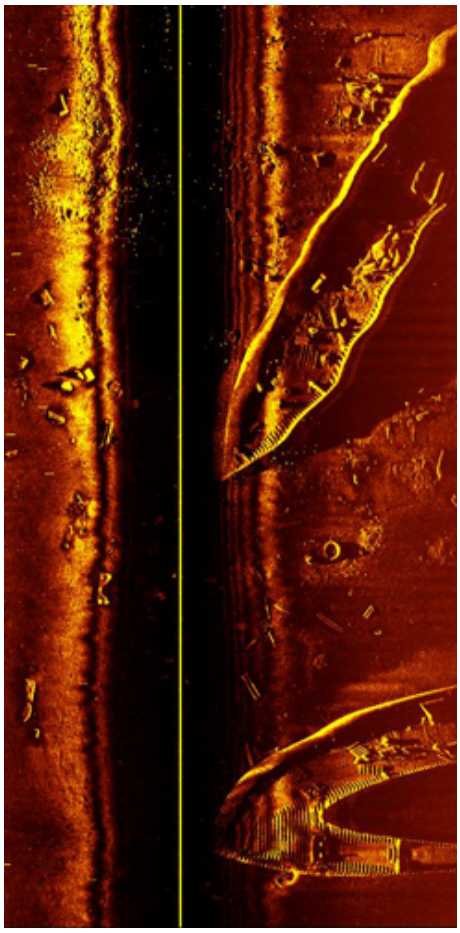
- Unobtrusive
- Fast, Detailed Look, in Zero Visibility
- Saves Time/Money
- Locate Suspicious Objects
- Increases Confidence

Key Features of Hover Capable REMUS 100:

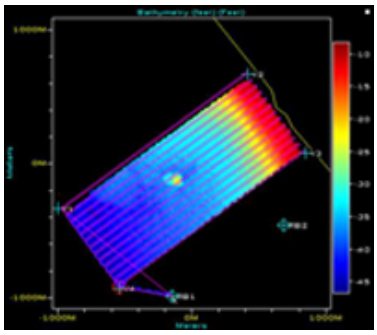
- Low drag, allows long transits to target, followed by hover survey or station-keeping.
- Can hold station in a strong current
- Ability to autonomously maneuver at velocities between 0 to 0.5 m/s in and around ships and piers
- Ability to autonomously follow a set of pre-programmed track lines while utilizing an acoustic navigation system at short ranges (10 - 100 m)
- Ability to maintain precise heading when operating near large metallic objects
- Ability to fly at a constant offset below or to the side of a ship's hull
- Ability to detect, locate and identify objects that are located on complex structures in a highly cluttered environment

Sensors include:

- T-16 Inertial Navigation System
- WAAS GPS
- Iridium, WIFI and Acoustic Modems
- Modular Docking endcap with blunt nose
- 1200 kHz RDI ADCP



Sidescan imagery taken with 600 kHz sonar from a REMUS 100 vehicle back in 1997. The image shows the top and bottom halves of a WWII era Liberty Ship. (REMUS)



Enlarge Image

Bathymetery data from a REMUS 100. Looking closly in the middle of the field you can see sharp wall, or spike, jutting up from the ocean floor.

Related Multimedia

REMUS 100 Sensor Slideshow

» View Slideshow

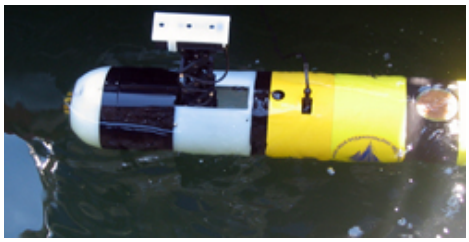
- Imagenex 837 multibeam profiling sonar
- Delta T Scanning Altimeter
- Forward and Aft Tunnel thrusters

REMUS Used to Help Clear Mine Infested Waters

Umr Qasr, Iraq

In 2003 off the Iraqi port city, Um Qasr, the U.S. Navy employed 6 REMUS vehicles alongside Marine Mammal Systems during mine countermeasures operations.

Last updated: January 27, 2014



REMUS Periscope Camera
Mike Purcell
» View Video (Media Player) LAN

REMUS Kelp Run
SPAWAR Systems, San Diego, CA
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Related Links

» Flying Vehicles under ice

» SCCOOS
Southern California Coastal Ocean Observing System

» CAL POLY REMUS SITE
Find out what CAL POLY is doing with their REMUS 100

Mail: Woods Hole Oceanographic Institution, 266 Woods Hole Road, Woods Hole, MA 02543, USA.
E-Contact: info@whoi.edu; press relations: media@whoi.edu, tel. (508) 457-2000
Problems or questions about the site, please contact webdev@whoi.edu