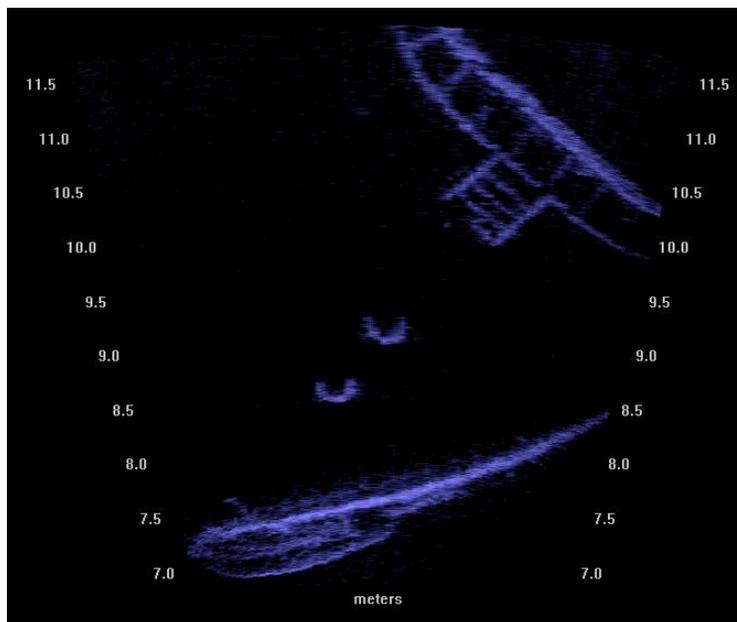


DIDSON Diver Evaluation for Sound Metrics Corporation

*By NOAA Diver – Nat. Ocean Service
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During the months of July and August the DIDSON (Dual frequency Identification Sonar) was loaned to Navigation Response Team 2 for the purpose of conducting a divers evaluation. There were two dives performed in July and in August nine more dives were conducted during a one- week period offshore of Savannah, GA. The Acoustic Lens Sonar was put through a wide variety and series of dives from 4 meters to 28 meters of depth. The DIDSON is equipped with a Divers Heads Up Display that is easily attached to a standard AGA full-face diving mask. The display provides the diver with images near three dimensional, and with a range scale. There are likewise other features such as tank pressure and depth that can be enabled or disabled in a user friendly advanced menu.

On July 25, 2005 the first dive was conducted on a 96 foot Tugboat in 4 meters of water. The wreck had been previously recovered and positioned with Side Scan Sonar and DGPS as part of a chart evaluation survey during this same period. The water visibility was zero and the current was one knot. Upon entering the water and turning on DIDSON the sunken Tugboat immediately came into focus as I held the instrument in the direction of the wreck hovering just below the surface.



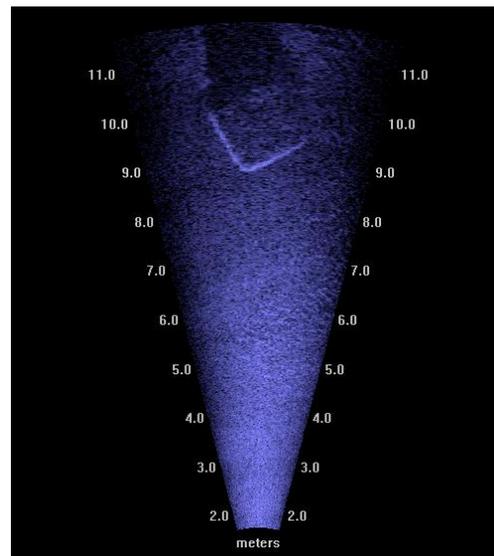
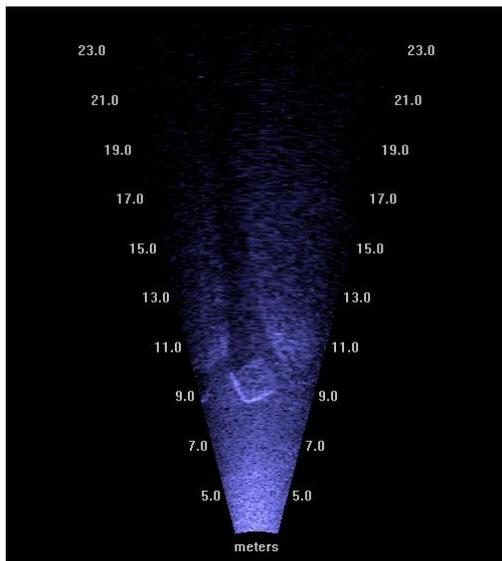
The ladder to the cabin was noted and twin bollards on the bow were recognized from previous side scan imagery. At this point I swam down to the wreck and acquired video captures along the length of the vessel. The four controls on the instrument are placed conveniently next to the handle and easily operated even with gloves on. The range scale

selector switches F3 & F4 for bringing the object closer as the diver swims along is especially advantageous for coming into contact with the feature safely and avoiding collision. The overall casing of the device is well constructed and completely neutral in the water column making it easy to swim with. The heads up display can easily be lifted out of the divers field of view and was not affected by the current. During this dive I noticed that the Pressure Sensor was not registering Volume psi in the display. That function was later disabled in the advanced menu.

On July 26th a dive was attempted on another charted obstruction in seven meters of water. It was during this second day of diving that some moisture was noted in the heads up display. The DIDSON came on line in a typical manner but the heads up display was obscured and had a red tint. The unit was re-booted several times to no avail and was packaged and returned to Steam Machines Inc. the next day for repairs.

The DIDSON returned to NOAA divers on Aug. 18th.

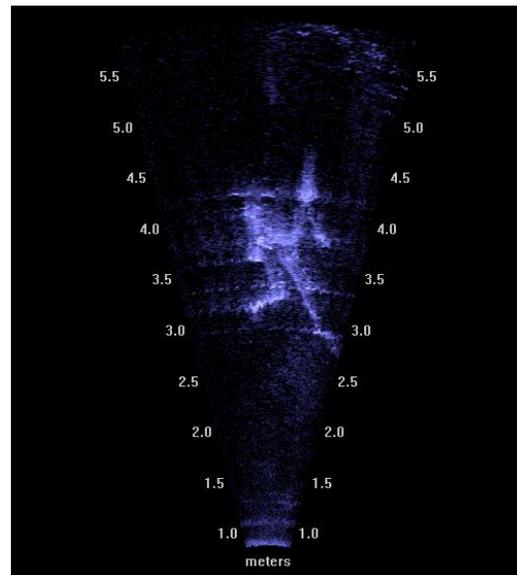
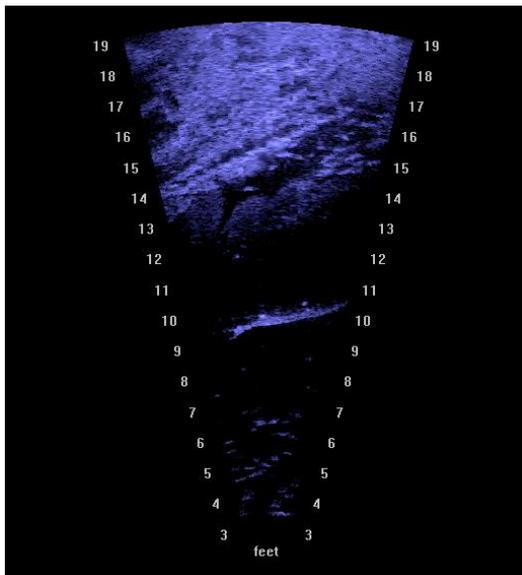
On Aug. 19th a dive was conducted just outside the Savannah River channel on an outgoing tide in seven meters of water. The water visibility was zero with a two and a half knot current. There was a genuine interest in learning how the instrument would perform in a strong current. The location of the dive was an old buoy block where a fuel tanker had ruptured a hull in 2003 releasing 37,000 gals of fuel oil. After entering the water the instrument was turned on as I pulled my way down the anchor line. Once on bottom I began to sweep the sonar in the direction of the block and noted the image at about ten meters from the anchor line. The image came through sharp and clear in spite of the raging current that prevented me from leaving the line.



During this dive DIDSON provided a strong picture of the Buoy Block and easily focused even though the current made it difficult for me to hold the unit steady. The diver display was clear and showed no signs of leakage at the termination of the dive.

On the 22nd of Aug. two dives were performed on a sunken barge called “Motherlode” in about 14 meters of water. The water visibility was 3 meters and the current was one knot. The heads up display once again performed well but it was noted that the depth displayed in meters from DIDSON was about ten meters off from the depths displayed topside on the two survey fathometers of the survey vessel. During this dive the Heads Up Diver Display was transferred from one diver to another. The frame can be removed by an assisting diver and placed on his mask by the previous operator.

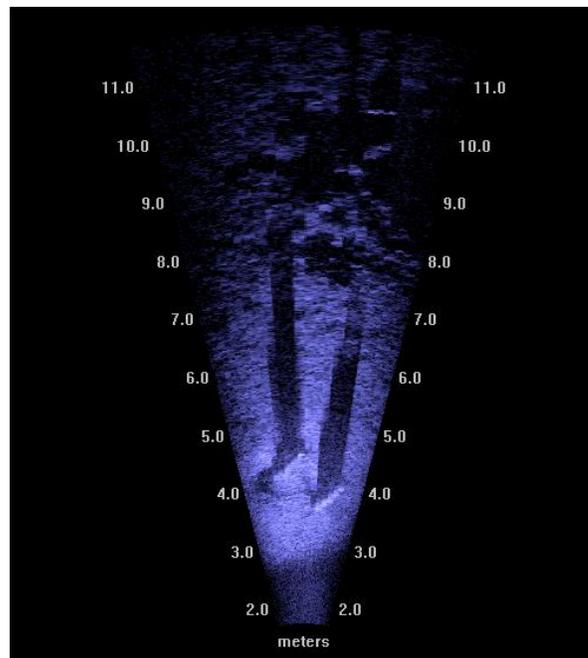
On the 24th of Aug. two more dives were conducted on the wreck of an old Coast Guard buoy tender the “Sagebrush” in 28 meters of water. The visibility was 8 meters and the current was less than one knot. This wreck provided some great imagery with numerous fish and Barracuda. The DIDSON was tested in a chase sequence, while following a diver. The attempt was to keep the diver centered in the range scale selected. This exercise was noteworthy in respect to the instrument holding focus while swimming swiftly. There were no noted focal distortions during the chase. Some attempts were made to focus on a divers face at the zoom level but were not very successful. I later learned that the gain has to be reduced during this type of acquisition in the advanced menu for clarity of the object. With this procedure close ups are better focused. The operator must remember to return the gain setting back up for detection and identification modes. I was very impressed with the quality of the images obtained on a passing barracuda and my dive partner. The “Windows” driven software is user friendly and provides the processor with selections such as threshold and sensitivity control as well as measuring and grid. The ability to screen capture portions of a video file is a great asset in the post processing portion of DIDSON software after download is completed.



The essential operation of DIDSON is comfortable but requires the user to have a basic concept of acoustic imaging. This perception may lend credence to how fast a diver becomes proficient with the device. Once an individual becomes accustomed to the images created by the acoustic lens their ability to hold the instrument in perspective is easy.

The angle and attitude of the sonar for screen capture/recording is a technique that the operator can warm up to quickly after the first dive.

On Aug. 26th NOAA-Divers transported DIDSON to “Lake Wylie” a freshwater lake near Charlotte, NC to assist the South Carolina Geodetic Service with a search for a 185-year old “Benchmark” monument. This monument was set in 1820 and last seen in 1921 when the lake was flooded for hydro- electric power. The site had been previously side scanned by NOAA and several noteworthy contacts were targeted. There have been ongoing searches for the monument since 1950. There were two dives conducted on the most significant sites and DIDSON proved itself with both detection and identification. The water visibility was zero, black as ink and there was zero current. On the first dive several contacts were seen at a distance that looked promising and the sonar guided divers to the location. The monument was reported as being a ten-inch square 3-foot high soapstone obelisk. Moving towards the largest contact I viewed the image below.



Unfortunately upon arrival the object being detected turned out to be a steel drum with the center rotted away leaving behind the opposing ends stuck in the silt. There were numerous features located during the course of the remaining dives including stumps, logs, cans and a small boat anchor. The ability to find these small items in such black water was very valuable in the search regions to provide conclusive evidence that the monument is not recoverable. The consensus of all parties was that the monument was either buried in silt or had been physically removed prior to the flooding of the valley. The later theory is probably more accurate since the western monument set around the same time period with similar characteristics was found in a local museum in North Carolina and later reset at the original position.

Summary

Evaluating this instrument was a genuine thrill for NOAA divers Robert Ramsey and myself, two divers that have spent over twenty-five years in search and recovery in limited or zero visibility. Holding a sonar in your hands that provides these kinds of images creates an element of safety for the diver and places topside personnel in scientific as well as commercial applications on scene. There are vast differences between these two operations however no individual could dispute the advantages of holding an image in their hands of an area where photography is rendered useless.

In the course of collecting data for this evaluation many divers have contributed valuable information, including French and Royal Navy divers. All parties involved have been independent of Sound Metrics Corporation and have provided positive comments and a sense of awe upon conducting their own diving operations. The two features that most users have expressed an interest in are a compass heading in the display and a tilt or attitude register to assist the diver with a perspective of the lens orientation. Naturally the compass would be useless on a ship's hull investigation but may have merit in the detection mode for searching out a feature or side scan target. These features could perhaps be enabled or disabled in the advanced menu at the users discretion.

William Shakespeare was quoted in saying that: "*A man or woman can only be as happy as they allow themselves to be*" and in that manner of thinking it is apparent that the greatest inventions in the world are prone to criticism.

Acknowledgement

I would like to thank Dr. Ed Belcher, at Sound Metrics Corp. and Jeanne Dorsey at Ocean Marine Inc. with providing me the opportunity to evaluate DIDSON, a device that will no doubt continue to amaze marine constituents around the world. Also thanks, to Joe Burch and Bill Hanot at SMI for technical support and Tom Kehoe at OMI for his assistance with European contacts.

This evaluation represents the opinions of the author and may not represent those of the National Oceanic and Atmospheric Administration, or the U.S. Government.