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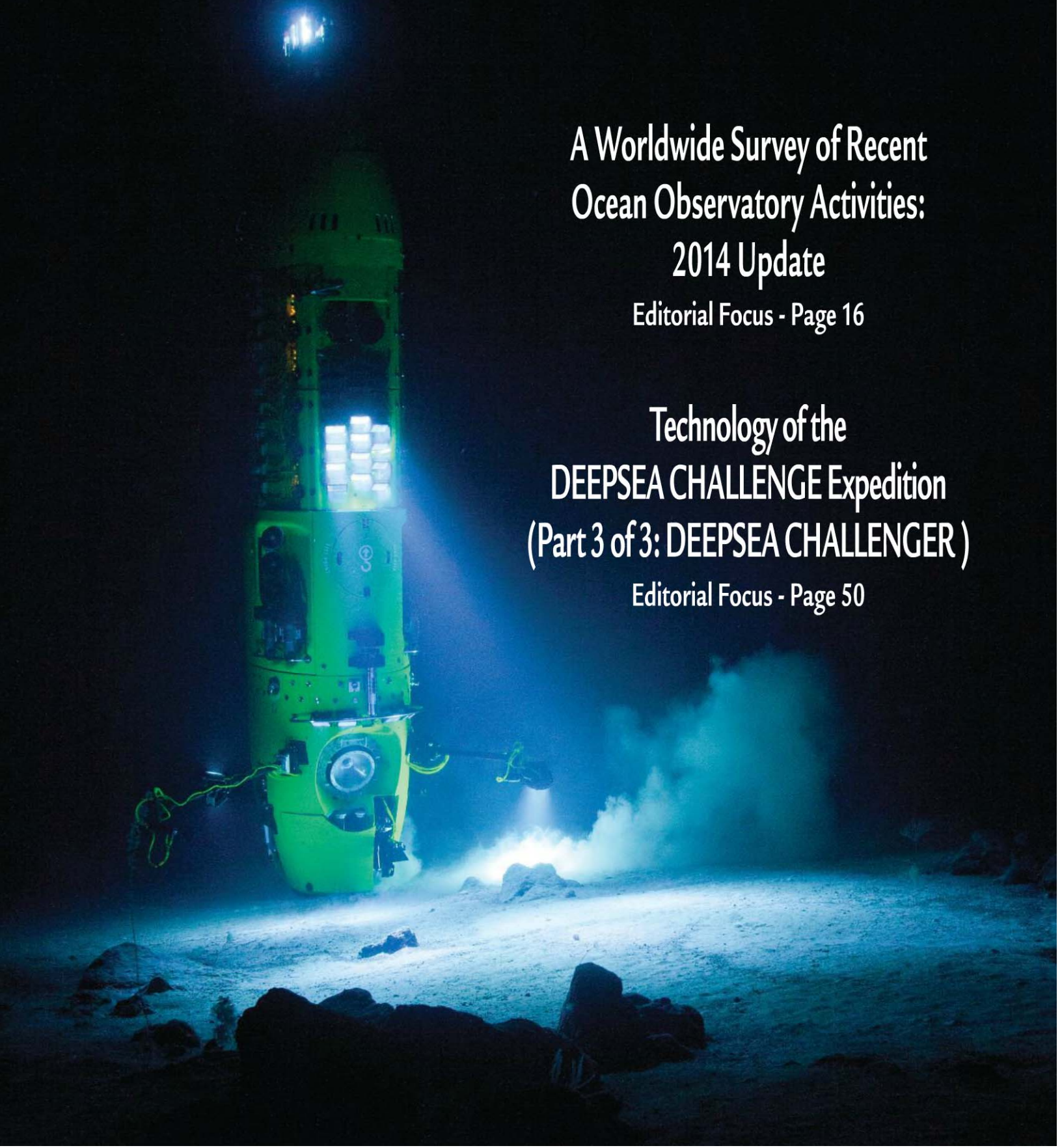

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The hadal submersible ***DEEPSEA CHALLENGER*** is photographed in the darkness at 850m off Ulithi Atoll, FSM, March 2012. Photo by Larry Herbst. Used with permission, Earthship LLC.

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Recently Discovered Italian WWII Battleship ROMA Mapped with AUV & ROV

By: Garry Kozak, GK Consulting

Introduction

It was September 3, 1943, and the Italian Armistice was agreed upon, ending Italian support of Germany during WWII.

The Roma (Image 1), under the command of Captain Adone del Cima, was leading a fleet of three battleships, three cruisers, and eight destroyers. The fleet left La Spezia on September 9 in an attempt to convince the Germans that they were going to attack Allied ships. The real intent was to divert to Malta and surrender to the allied forces. The deception did not work. Lookouts spotted aircraft shadowing the fleet. The hope was that the aircraft were from the Allied forces, but to their disappointment they were German Dornier Do 217 airplanes with the intent to bomb the fleet.

Bombs were dropped from an abnormally high altitude and, as became painfully clear, these were not standard free fall bombs. These bombs were being steered towards the Roma by remote control. The Roma was hit by two bombs, with one, detonating the forward magazine. A massive explosion resulted that blew the turret skyward. The type of bomb that was used to sink the Roma was the first in a new class of weapons known today as precision-guided munitions. The bomb was a massive 3,450-lb, radio-controlled glide bomb that the Germans called the Fritz-X. This was the first time this kind of high-tech weapon had ever been used. The Roma was sunk off Sardinia with only 596 survivors and the tragic loss of 1,352 men.

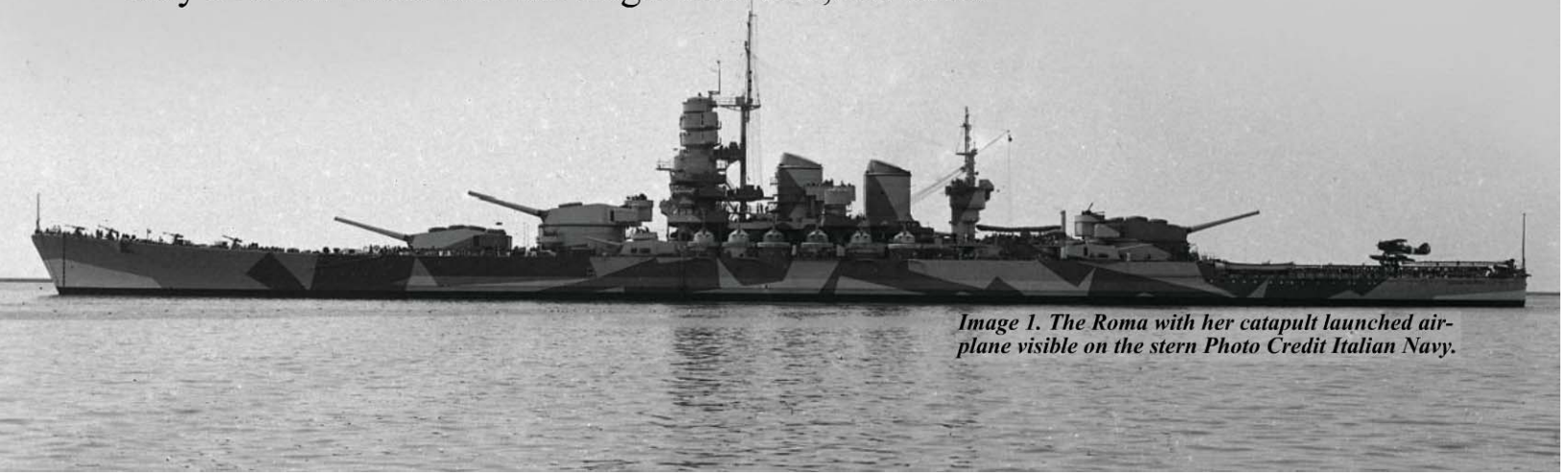

Image 1. The Roma with her catapult launched airplane visible on the stern Photo Credit Italian Navy.

Discovery

Guido Gay, a designer of underwater ROV technology for the Italian Navy, became interested in the history of the Roma. Thus, it became a personal quest to try and solve exactly where the Roma's remains came to rest. Gay's first attempt to locate the Roma began in 1980. In 2002, collaborating with the Italian Navy, another search effort was executed without success. Gay personally continued with the hunt from 2005 on. In 2012, he built his own side looking sonar that he used to survey the 1,200+ m deep canyons where he believed the Roma came to rest. This was a pole-mounted, single-sided side-scan, operating at 50 kHz. Using this technique, he found three targets that repeated, and he became convinced that these targets could be the Roma. He next deployed an ROV he built, called the "Pluto", from his sail boat in an attempt to identify if these sonar targets were the Roma. Success was realized in June 2012, when his underwater video clearly showed the remains of the Roma. Gay created a map of the wreck site, locating the bow and midsection, but he was unable to locate the stern section.

The Project

This project was made possible by the interest of Microsoft founder and philanthropist Paul Allen and with the support of his expedition yacht Octopus (Image 2). Mr. Allen is a history buff, especially in regards to the events of WWII. Upon hearing the story of the Roma and the discovery by Guido Gay, he sponsored an expedition to map the site using the latest AUV and ROV technology available today. Invited to participate in the expedition were Guido Gay, the discoverer of the Roma, the Italian Navy represented by Captain Lamberto Orlando Lamberti, and Ms. Maria Pia Pezzali, a journalist/researcher who specializes in the history of the Roma. The goals were to map and document with high positioning accuracy all parts of the wreck site and to locate the missing stern. Optimistically included in the mission goals was finding the airplane that was on the stern of the Roma, though this was considered to be a long shot. The team met the Octopus May 26 in Sardinia and departed May 27 to the Roma site. Operations were carried out through June 1, 2014.

Image 2. Expedition Yacht Octopus.

Challenging Location

The Italian Navy provided multi-beam data of the Roma area. To aid mission planning, the raw bathymetric data were processed onboard using Chesapeake Technologies SonarWiz Bathy software to generate a 3D map (Image 3) of the area in which the Roma was located. It was clear when reviewing the 3D map that "Murphy's Law" was at play. The wreck could not be in a worse location. It sat at the bottom of a 0.5 mi deep canyon that was only 600 m wide at the base. This particular site would be impossible to survey safely using traditional towed side-scan sonar systems.

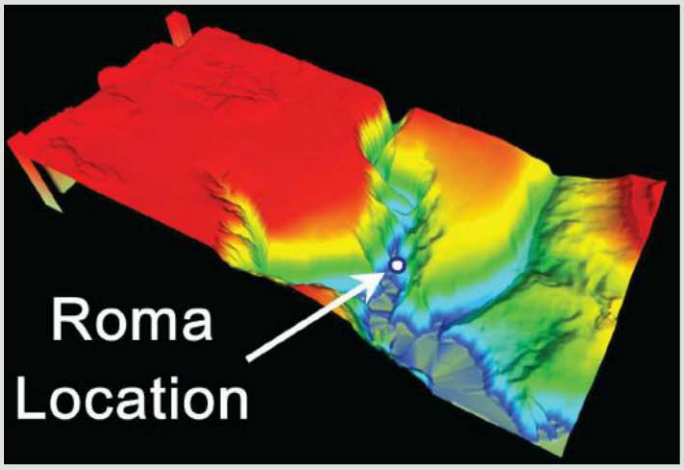

Image 3. Processed SonarWiz 3D Bathy showing Roma Location.

Phase 1: AUV Operations

The first phase was to map the wreck area in its entirety using high-resolution side-scan sonar. The survey was done using a Bluefin 12 AUV (Image 4) rated for 1,500 m depth and equipped with the latest EdgeTech 2205 100/400 kHz AUV side-scan sonar payload. The EdgeTech 2205 was the sonar of choice because of its superb deepwater performance as well as its proven track record. It had been used on the AUVs in the recent Malaysian MH370 search off Australia as well as the past Air France Flight 447 search in the Atlantic Ocean. Mission planning was challenging due to the severe terrain, but using a stepped approach over several AUV missions, the area was successfully and safely mapped. Once the sonar data were downloaded from each mission, they were brought into SonarWiz for processing and analysis. A complete sonar mosaic was made of the site, with the major wreck pieces and associated debris geolocated. This positioning data would be used in Phase 2 for the ROV mission planning to photo document the wreck site.

Image 4. Launching Bluefin AUV.

The missing stern section was successfully located in the mosaic, and it was lying partially embedded in the west canyon wall. The center section and bow section were lying at the bottom of the canyon. It was clear from the sonar data that the bow had slid partially down the east side of the canyon wall. This was evident by the large drag scar leading to its present location (Image 5). One of the high-priority objectives was to see if the airplane could possibly be located. GK Consulting, a consultant on the project, provided support with AUV mission planning and sonar data processing/analysis. The sonar data were analyzed, and a target that held a high probability of being the airplane was selected for further investigation during Phase 2 of the ROV operations.

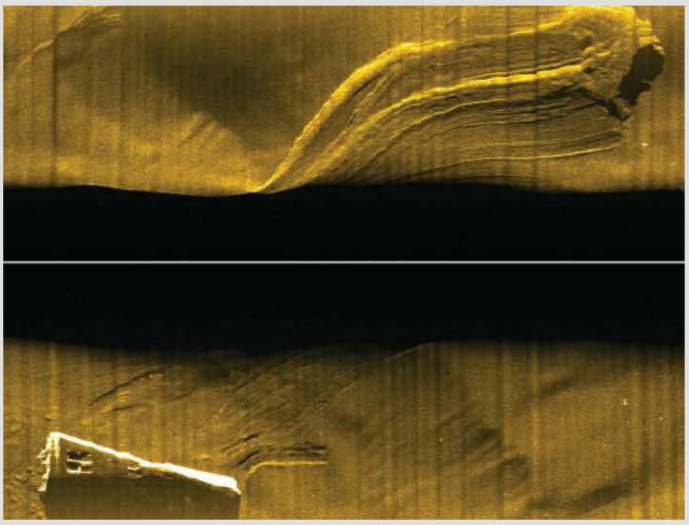

Image 5. EdgeTech sonar image showing Bow slid down canyon wall.

Phase 2: ROV Operations

Robert Kraft, the undersea project manager on board the Octopus, was keenly intrigued by the possible airplane contact in the sonar data. It was decided that this would be the target to check out immediately on the first ROV mission. Calculations for the plane-like target position were checked and re-verified as it was not that large of a target and time was not to be wasted driving the ROV around searching for it. The Octopus was stationed over the calculated target position using DP control, and the ROV began its descent to 1,200 m. As soon as the seafloor was acquired, the on-board ROV sonar detected the target and began moving in its direction. Slowly, the form of a mangled airplane materialized (Image 6). It was a great way to start the ROV Phase 2 missions, to have success in finding the most difficult objective right from the get-go.

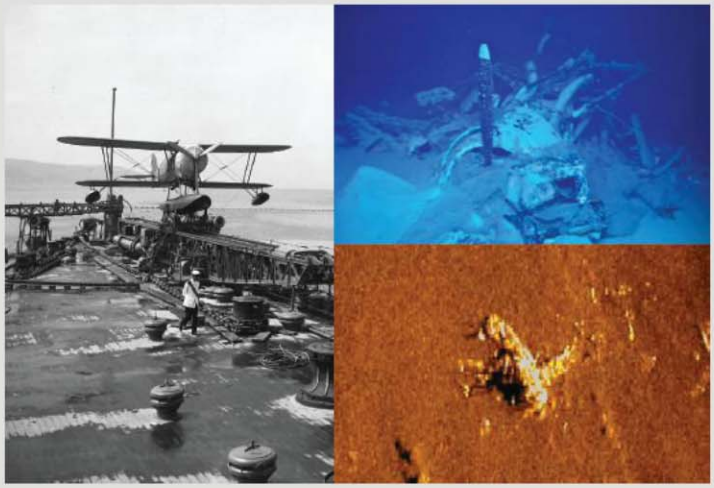

Image 6 The roma plane is located.

ROV operations continued over several days, documenting the wreck and associated debris. The AUV Ops Center was crammed with team members waiting for the camera to reveal each new discovery. Guido Gay had a grin on his face when viewing the real-time video of the wreck. That told the story and his satisfaction with the project. Visibilty on the bottom was superb, allowing large areas of the wreck to be imaged in a single view. Seeing the anti-aircraft guns poised and ready to fire (Image 7) took team members back to a time in history when the world was in chaos. Maria Pia, the journalist on board, showed the team a picture of the Roma's stern and mounted there was the Royal Crown of Italy. Was it still there and could we see it?

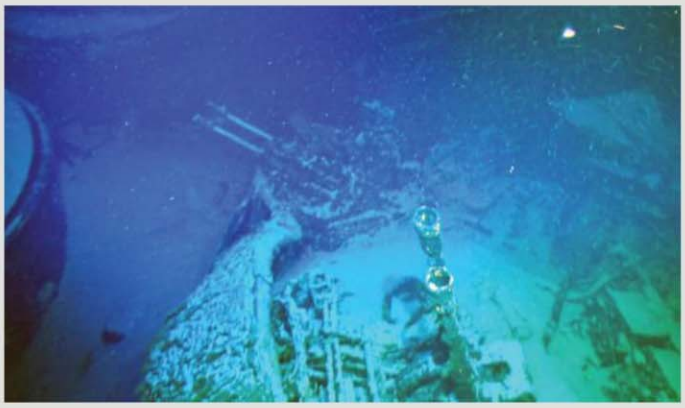

Image 7. Anti Aircraft Guns ready for action.

The last ROV mission dive was to explore the stern section of the Roma. The vehicle maneuvered down the starboard side, but it was found to be heavily embedded into the side of the canyon wall and the stern could not be accessed. The ROV worked across the fantail, and the remains of the airplane catapult launcher were clearly visible. On reaching the port side, the ROV worked aft and luck was with us, a scour around this section of the stern allowed the ROV to squeeze in for a look-see. There, under the illumination of the ROV lights, was the magnificent Italian Crown (Image 8).

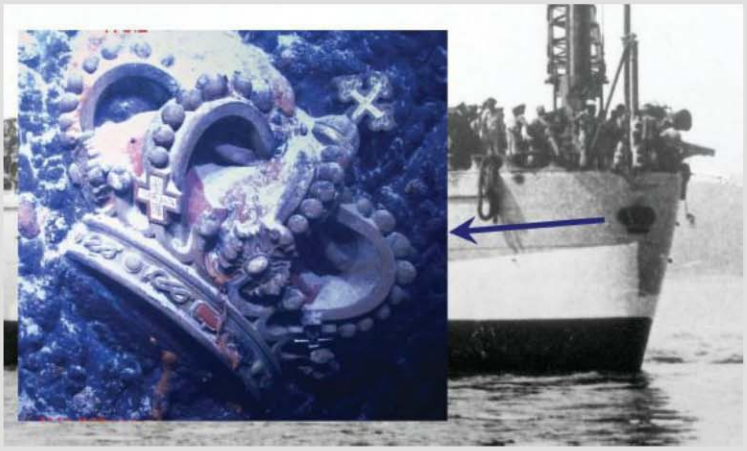

Image 8. Royal Crown of Italy Located.

Conclusion

The project set goals, and the end accomplishments exceeded all expectations. It showed how modern AUV and ROV technology can manage missions even in very difficult seafloor terrain. The Italian Navy came away with the most detailed map of the Roma site produced to date. Guido Gay came away with answers to his questions, which were the location of the stern and the airplane. Maria Pia had the final chapter for the book she is planning on writing, documenting the Roma. And the Octopus undersea operations team, managed by Rob Kraft, showed their proficiency in running a professional and first-class undersea operation. All in all, a win for everyone.