The Search For AE1

I arrived in the Rapopo Plantation Resort, an idyllic spot situated on the beach at Kokopo to be greeted by the strumming of ukuleles and a frangipani lei on Tuesday, 10 November 2015. A pleasant start to the serious business of searching for the 35 long lost sailors of AE1!

The program quickly turned to the matter at hand. The survey crew of Mark Matthews and Owen Friedlieb, two highly experienced surveyors and technicians had arrived the day before and already begun to transform the 17m catamaran, Deepstar, operated by Taylored Offshore Services into a state of the art surveying vessel.

Figure 1 -Taylored Offshore Services Pty Ltd Vessel Deepstar off Kokopo

The vessels' skipper Benny seen on the left above, and local crew, Benny (B1 & B2) assisted with fitting the multi beam echo sounder and high precision survey systems to collect and analyse the data streaming in from the sonar. This technology is similar to that used to undertake a marine survey, with positional accuracy of 10 cm on the surface, the sonar transmits 512 beams, typically every half second, using software to process this into a 3D map, able to detect a bump of 12 cm on the bottom at 200m depth.

Figure 2 – Deepstar with MBES transducers on the right hand end of the raised pole

The volunteer historians, submariners and search experts of the Find AE1 Ltd team had considered a range of possibilities for the loss of AE1 and concluded that, on the balance of probabilities AE1 was lost with all hands after damaging her pressure hull by striking one of the many reefs in the area. We believe AE1 was enroute from its last seen position SE of the Duke of York Islands, back to her sister ship AE2 alongside their depot ship SS Upolu in Rabaul. We are reliant on the report of her consort, HMAS PARRAMATTA that made the last sighting of AE1 at 1430 on 14 September 1914, for this position.

Figure 3 – Last seen position and areas of possible grounding. RAN Hydrographer chart AUS 679

This analysis led to development of a primary search area off the southern shores of the Duke of York Islands. The area stretched from the sheer walls of the fringing reefs out to the 1,000m depth contour. Strong currents sweep the area during the annual SE monsoon, making it a hazardous place for the crew of AE1.

Our technology would provide the bottom topography down to 1,000m and a 95% chance of detecting AE1, assuming she is still intact, in a water depth of 200m or less and a progressively reduced capability in deeper waters. In general we confined our search to water depths of 300-400m or less – recognising that the deeper waters would require different technology and were best left to a second search.

On late Wednesday, having completed the installation, we were able to undertake sea trials on the equipment – something was not right! After

analysing the initial data the survey team concluded that a transducer had been installed incorrectly and we returned to the anchorage to recover the sonar and correct the problem.

Sea trials the next morning brought smiles all round and we began the process of calibrating the sonar for the local conditions; when you are dealing with accuracies of such fine detail the slightest difference in alignment or change in the water conditions must be allowed for if the 3D picture of successive passes is to fit together seamlessly.

Figure 4 – Isolated beach Credner Island.

The search began on the afternoon of Thursday 12 November – half a day early as we swept around the reef fringed, picturesque Credner Islands, with sandy beaches and swaying coconut palms and made our way, in marginal weather conditions into the security of a remote anchorage in Mioko Harbour before last light.

Figure 5 – Sunset Over the Rabaul Volcanoes from Mioko Harbour

The next day – Friday 13th November established the routine for the remainder of the search, up at 0430 for an early breakfast, before weighing anchor and exiting the anchorage at first light, 0530, ready to start the first search line by 0600. Up and back we went, with a line spacing of 150m providing a comprehensive overlap and building up a highly refined 3D picture of the bottom beneath us. By the time we completed the survey we were to cover over 480 Km at the sedate pace of 5 knots, collecting precise details of the sea floor beneath us. Picturesque sandy beaches and villages fringe the shores of the islands and the offshore reef provides a bountiful sea garden for the locals before dropping precipitously to 100m.

Figure 6 – Mioko Island Fringing Reef

Our regular procession backwards and forwards provided a welcome diversion for the fishermen in their small dugout canoes.

Figure 7 – Canoe Fishermen off Tamanbalana Point, close to AE1's last seen position

Boulders and rubble fields lying at the bottom of the reef on the north eastern end of Duke of York islands provided the first points of sub surface interest. These will need to be examined with a magnetometer during the next search to ensure that AE1 is not lying hidden amongst them.

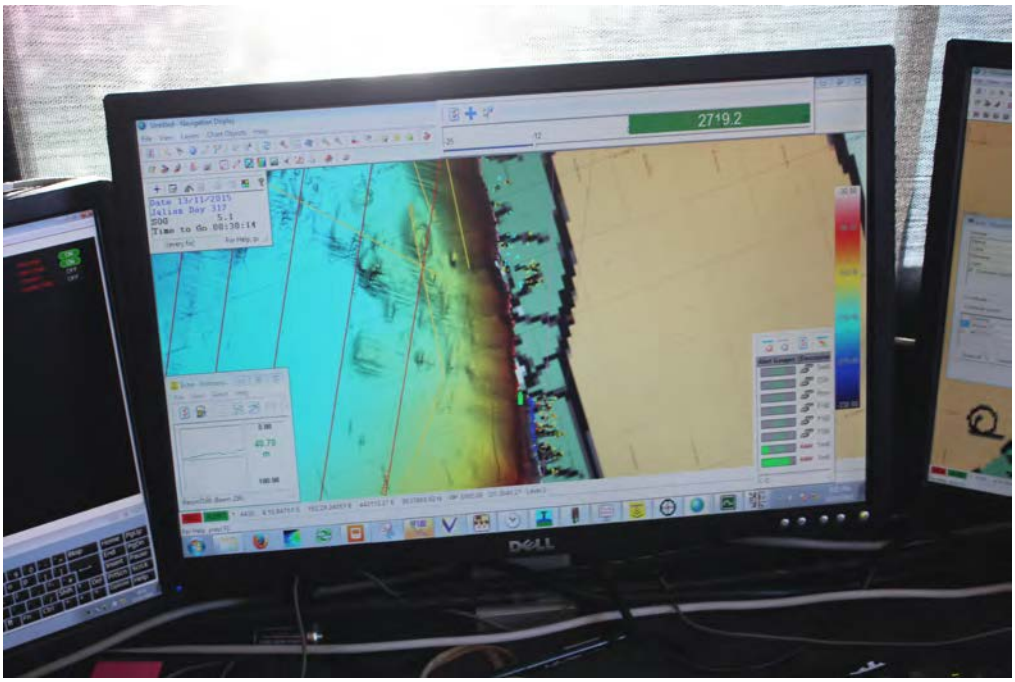

Figure 8 – MBES Sonar Display of Bottom features.

In the far north of the area we came across a spectacular underwater cone perhaps the remnant of an old volcano and one of the few indicators of their active cousins lying to the west, around Rabaul. In most areas the sonar painted a picture of benign serenity – we were confident that if AE1 were here we would find her!

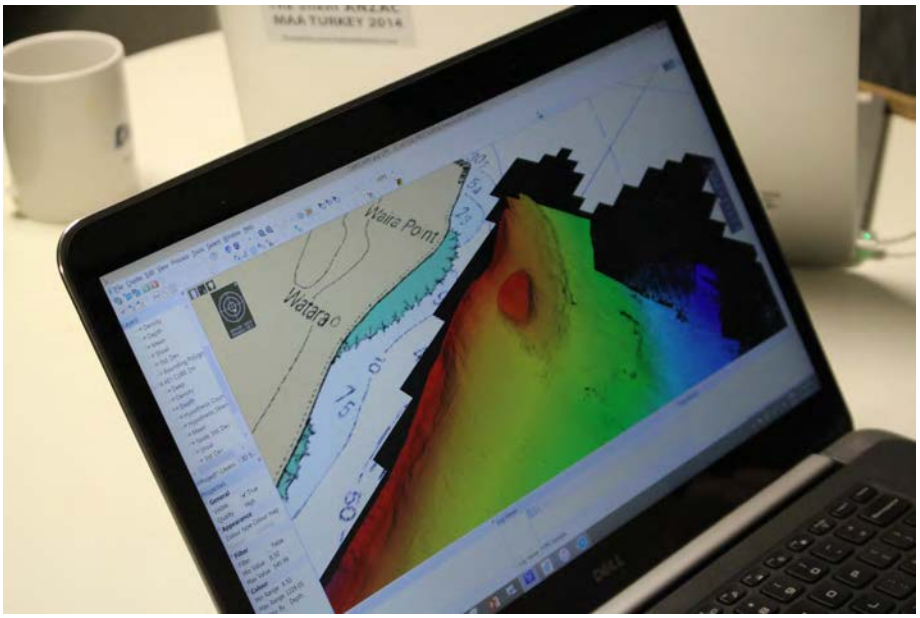

Figure 9 – Image of volcanic cone processed by CARIS analysis software

A large whale shark gliding slowly along just beneath the surface gave us a start on Saturday – all too quickly it passed astern as we rolled on with our search.

By the time we anchored in Mioko Harbour on Saturday after another long day's searching we had covered the Primary Area, without sighting the 'devil fish', last seen by the locals sheltering in a cave on the SE tip of Mioko Islands - possibly the last sighting of AE1 - eyewitnesses to the grounding 101 years ago?

Figure 10 – SE Corner Mioko Island, Site of Shelter Cave, with fringing reef

To cover the possibility that the damaged submarine had been able to make ground towards Rabaul before being overtaken by her fate we extended our search along the route back, again confining our efforts to water depth of less than 400m.

Excitement mounted when a wreck was located on Sunday morning off Credner Island. But a check of the dimensions and chart showed this to be a known dive wreck, that had slid out of position down a slope into deep water – all the information we gathered will be provided to the RAN Hydrographer to enable the chart to be brought up to date.

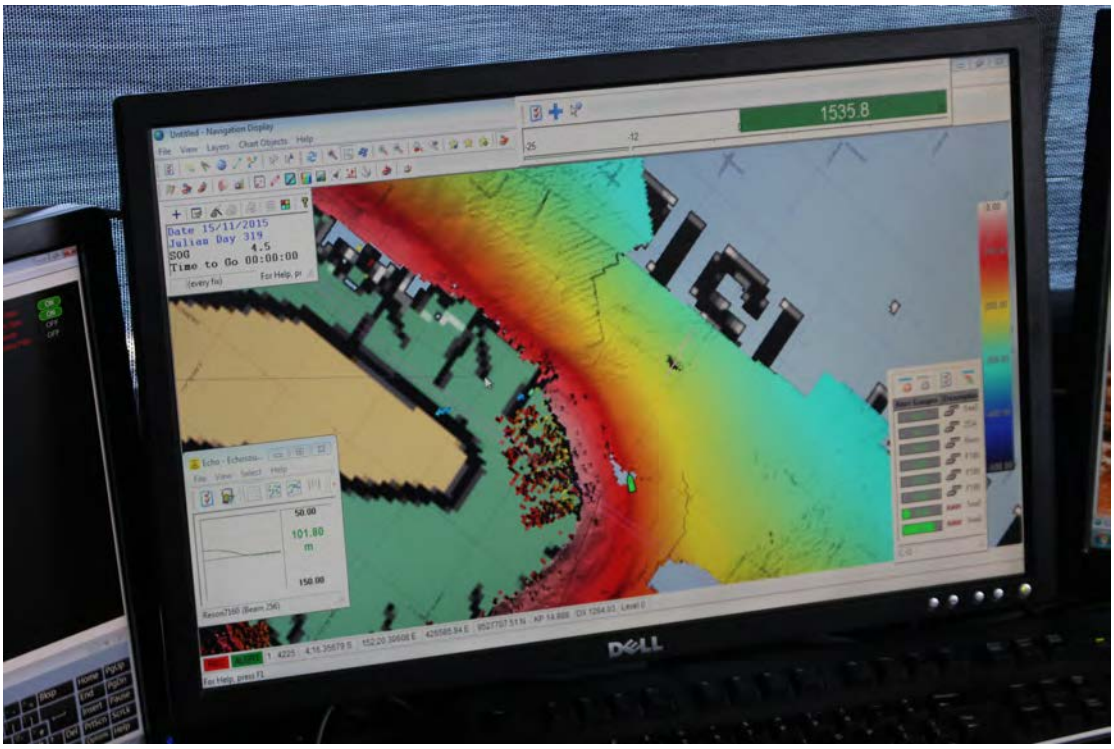

Figure 11 – Image of contact DS 01 MBES Display

Deepstar is shown as the green ship shape in the lower centre, with DS01 the black object in the centre of the display. The shading represents the depth of water, red the shallower waters off the fringing reef of Credner Island shown as the landmass centre left. Contact DS01 is lying in 217m of water.

The nearest suitable anchorage was at Kokopo lying on the Peninsula to the south - making our way there on Sunday evening also enabled us to search this route. Perhaps the damaged submarine headed towards the nearest friendly anchorage? In worst case it was also the nearest suitable, reef free beach to save the damaged submarine by deliberately running it ashore?

On Monday at first light as we made our way north away from the overnight mooring searching as we went, the excited cry went up – 'what's that' and pulses rose on the bridge! We had located a wreck, identified as DS 03 in our database. Could it be that AE1 reached within half a mile of safety at Kokopo?

The dimensions were right. Reluctantly we headed off to complete the search of the route back to Rabaul, resolving to examine the contact further on our return to the anchorage that evening. Checks with the RAN Hydrographer drew a blank; there was no known wreck in that area.

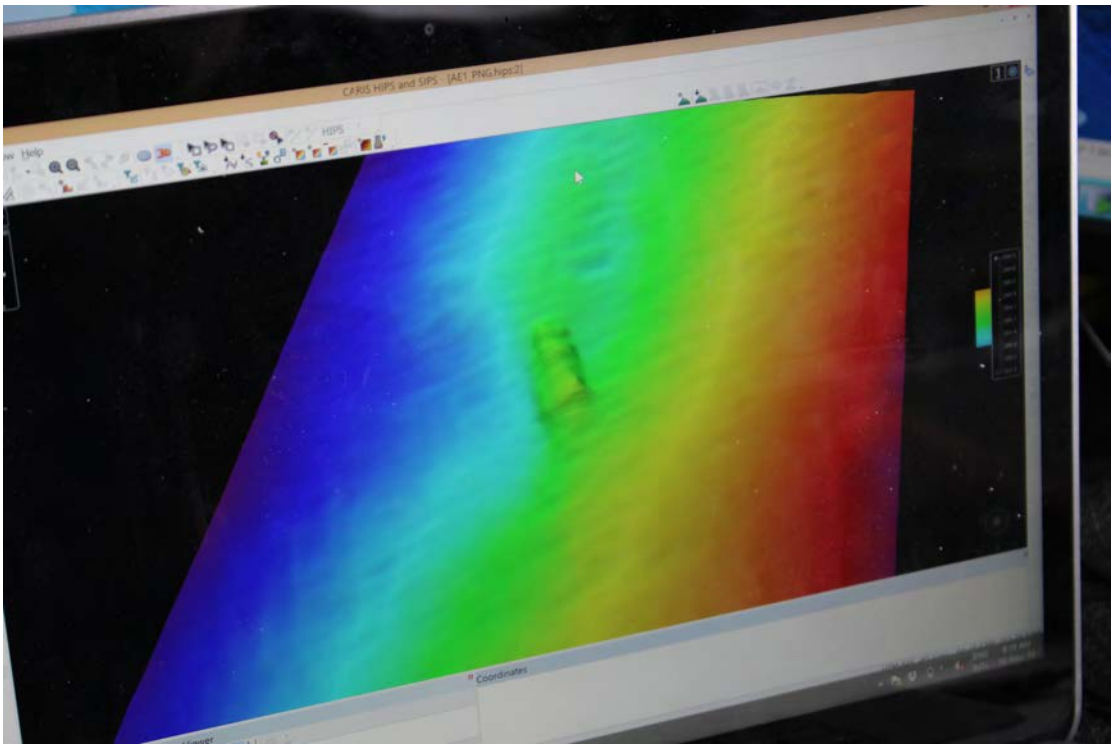

Figure 12 – A CARIS analysis image of Contact DS03

Monday was the last day's searching an enabled us to complete the return route to Rabaul within the depth limits.

Contact DS03 proved interesting, it had the right dimensions and an encouraging high spot in the centre as shown in the bottom image below.

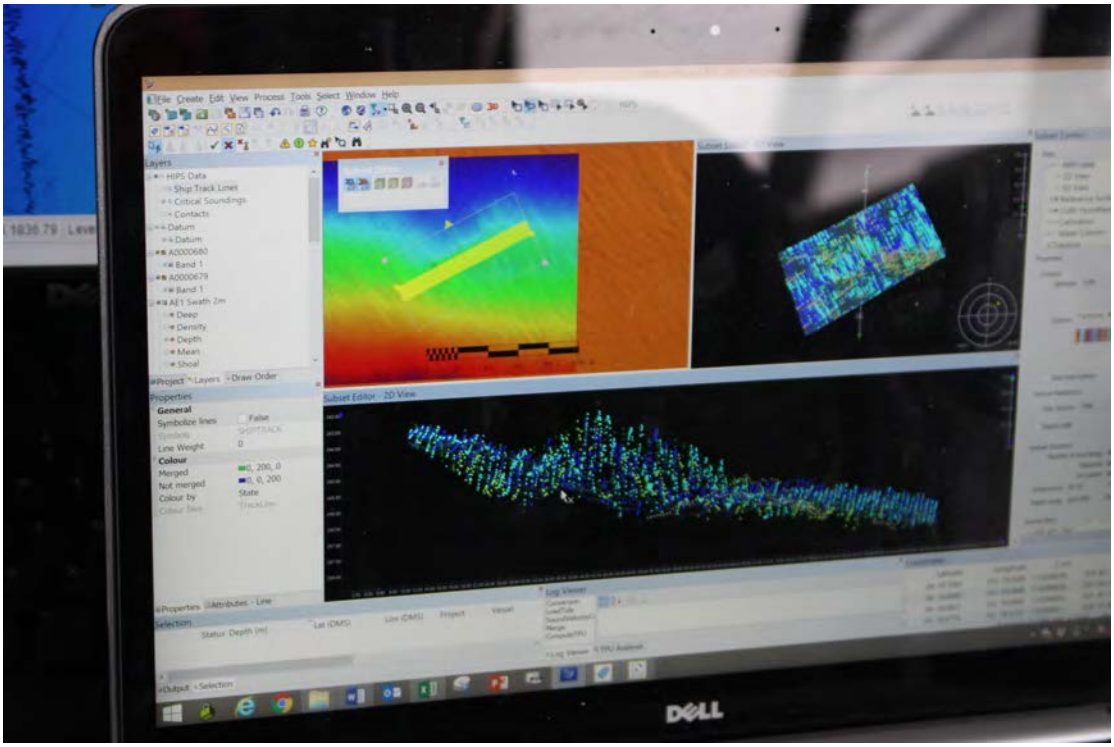

Figure 13 – CARIS Images of Contact DS03 showing high point in centre

With the help of IXSurvey's head office in Brisbane we began making hasty arrangements to bring in an ROV capability to examine it in detail. A drop camera loaned by the Erias Group was embarked on Monday evening once we got back to Kokopo. Initially it failed to work and the team put on their technician's hats to trouble shoot and worked into the night to rectify the problem.

Figure 14 – Drop Camera showing two lights and lense

This camera gave us a basic capability to examine the bottom. To do so the vessel had to manoeuvre so that the camera hanging beneath us on 250m of umbilical would pass directly and slowly over the contact. The fully extended 250m umbilical was only just long enough and required us to be stationery for sufficient time for the camera to settle close to the bottom. The camera's limited visibility of 1-2m added to the complexity. With a great team effort coordinating the operation of the winch, camera and some dexterous ship handling we made 5 camera passes, drifting over the contact in the early morning calm.

As anticipated we were unable to categorically classify the contact – but the brief glimpses were not encouraging. There were no positive clues, it lacked the straight edges and angular surfaces we would expect to find if it were AE1 – reluctantly we concluded that it did not justify the expense and dislocation of an immediate ROV examination. DS 03 may yet prove interesting, but it will have to await a check during the follow up search with towed Side Scan Sonar and magnetometers and ROVs that will now follow.

So after 5 days hard work we have a handful of contacts for further examination and no confirmed sightings of AE1. Was it worth it? Whilst it is disappointing not to have found our 35 missing submariners we are able to conclude that their submarine does not lie intact within the 200m contour in the area we searched. Finding the smaller dive wreck in deeper water gives us confidence that our technology and skills were up to this task.

The 126 square Km or 482 Km of linear soundings area searched will update the hydrographic charts and provide an excellent starting point; the scene is now set for the more expensive and better resourced deep-water search that will follow.

We will return to locate and solve the mystery of AE1.

They have no grave but the cruel sea,
No flower lay at their heads,
A rusting hulk is their tombstone,
Afast on the ocean bed.
We will remember them.

Peter Briggs
Kokopo
17November 2015