

To Look Down Like a Frigate Bird

The satellite imagery of Nikumaroro recently obtained especially for TIGHAR by Space Imaging of Thornton, Colorado (www.spaceimaging.com) has provided The Earhart Project with a search and search management tool of unprecedented value and utility. Blessed with minimal cloud cover over the island and virtually no sun-glint to obstruct our view into the water we now, for the first time, have the ability to look down on the atoll like one of the frigate birds who live there.

Of course, from the beginning of our investigation in 1988, we've used historical aerial photos of the island to research and document its features and search for any sign of Earhart, Noonan, and the Electra – and we've found some. It was forensic imaging analysis of 1941 photos by Photek, Inc. of Portland, Oregon in 1995 that led us, the next year, to the artifacts at what we call the "Seven Site." Descriptions in British files describing the finding of a skeleton (Earhart's?) on the island in 1940 now lead us to strongly suspect the Seven Site as the place where that discovery occurred. Forensic analysis of aerial photos taken in 1938 has revealed the presence at that site of features which appear to be worn footpaths at a time before the first settlers arrived on the island. We'll be taking a hard look at the

Seven Site when we return to Nikumaroro later this summer.

As valuable as these old photos have been in documenting the past and providing clues for the search, they are of limited use in planning and managing search operations in the present. The island's vegetation and man-made features have changed over the years. What was once open forest is now dense underbrush. Orderly coconut plantations have become jungles. Houses and administrative buildings have come and gone like the people who built them, while the SS *Norwich City* has steadily deteriorated from stranded wreck to scattered wreckage.

What we've always needed is high-quality color imagery that shows us exactly what is on the ground and in the water today. The Royal New Zealand Air Force was kind enough to give us copies of photos taken during routine fisheries patrol flights, but they were casual snapshots. We looked into hiring an aerial photo mission but Nikumaroro's remote location made such a venture prohibitively expensive. During



Gardner Island, April 30, 1939. U.S. Navy photo.



The chartered Gulfstream I used on TIGHAR's Kanton Mission in 1998. TIGHAR photo.

Niku II in 1991 we tried a video camera-carrying kite, but stability in the strong trade winds was a problem (just watching the tape made everybody sick.) We brought along an ultralight aircraft on the 1997 Niku III expedition (no small undertaking, that) but the seas were so rough and the wind so strong that we were never able to fully assemble the airplane, much less launch it. In 1998, during our flying expedition to Kanton Island, we hoped to

make a photo run over Nikumaroro in our chartered Gulfstream I but low rain clouds and fuel concerns made it too dangerous to try.

Satellite imagery was an option we explored on several occasions, but the only existing picture of the island from space was a conventional photograph taken through a window of the Shuttle, and ordering a special mission from one of the few commercial outlets was far too expensive – until we learned about Space Imaging. Through close coordination with the company's management and a cooperative arrangement with the National Oceanographic and Atmospheric Administration (NOAA) we were able to tailor an affordable mission that acquired data for TIGHAR's use in The Earhart Project and NOAA's use in its study of the world's endangered coral reefs.

The black and white photo reproduced here does not begin to convey the spectacular multi-spectral image acquired on April 16, 2001 by the Lockheed/Martin IKONOS 2 satellite. The

Satellite imagery by Spaceimaging.com.



color photo shows a brilliant turquoise lagoon surrounded by the green island, bordered by white sand beaches, and matted by the tan reef framed in white surf, all set in a blue/black sea – a true jewel of the planet. But this is more than a pretty picture. The image is made up of thousands upon thousands of little squares (pixels), each representing four meters and each of a very specific color. We can look at each of those pixels and ask the computer to show us every other pixel of exactly that same color. If it's a naturally occurring color – the green of a Buka tree, the tan of dead coral – there'll be lots of other pixels just like it. If it's something else – something anomalous to the island – it will stand out as unique. Once we've identified something on the ground or in the water that is of an "unnatural" color, we can find it in our Panchromatic (black and white) imagery, in which each pixel represents one meter on the ground, and see more detail about its shape. If it still looks interesting we can target it for in-person investigation when we get to the island later this summer.

How do we find it on the ground? There's another beauty of satellite imagery. Because every point in the photo is georeferenced, (that is, mapped according to latitude and longitude) we can use a simple hand-held GPS (Global Positioning System) instrument to guide us to within a few meters of the spot. We'll first need to "tweak" the lat/long in the photo by going to known points on the ground,

logging their actual coordinates, and entering a correction factor, but that's easy. For the first time we'll have a way to navigate the island, whether on the lagoon or deep in the bush, with confidence and precision. We'll be able to mark off on a map places we know we've searched, places where we've found things, places we want to check out – and be sure it's correct. Basic as that sounds, we've never before been able to do it.



"We're right here." "No, we're right here." TIGHAR photo by P. Thrasher.

It will truly be ironic, not to say poetic, if this imagery from a Lockheed/Martin satellite makes it possible for us to at last find a conclusively identifiable, if much older, product of the same company. Let's hope so.

Niku, Niku on the wall, Fairest island of them all...

TIGHAR members who have made a contribution of \$100 toward the acquisition and analysis of satellite imagery of Nikumaroro have been delighted with the 8x10 color print they have received in appreciation. Many report that they've framed the photo and hung it on the wall. Their contributions, generously matched by Jim Thompson (TIGHAR #2185) of Select GIS Services, have more than covered the cost of the imagery and we can now apply further contributions to the cost of forensic analysis and processing of the data to be sure we get the maximum benefit from it.

Please note that copyright restrictions prevent us from releasing the raw data for amateur analysis but we can guarantee that you'll be hearing a lot about the results of the professional work being done.

Please use the form on the back of this *TIGHAR Tracks* to make your contribution today.