

**Determination Of Water Depth From Ikonos And Quickbird
Satellite Imagery**

Donald FIELD^{*1}, Amit MALHOTRA²

¹NOAA Center for Coastal Fisheries and Habitat Research, Beaufort, NC, ²NOAA Center for Coastal Fisheries and Habitat Research, Beaufort, NC

IKONOS and QuickBird multispectral images were used to create bathymetric maps for an area of approximately 100 sq. km. in the Dry Tortugas. A previously described algorithm utilizing a ratio of the blue and green bands for deeper areas and the blue and red bands for shallow areas was applied to both image sources. A georeferenced database of nearly 25,000 soundings was used to develop the algorithm and assess the accuracy of the final bathymetric maps. Initial application of the algorithm to the QuickBird imagery yielded much lower accuracies than with IKONOS. Closer examination of the QuickBird imagery revealed two issues: 1) radiometric miscalibration in the green band; and 2) an irregularity referred to as the "circuit board pattern", that was most obvious over areas of deep water. While the initial algorithm was based on a linear function, an additional ratio algorithm was developed for the QuickBird imagery based on a second order polynomial regression curve. The final bathymetric maps for both image sources were able to compensate for variable bottom types and albedo (sand, seagrass, colonized hardbottom). Both image sources were also able to predict depths up to 15 m, but past that depth, error between the bathymetry estimates and known depths increased rapidly. While the overall accuracies for both image sources were similar, the more variable, noisy nature of the QuickBird data may be inadequate for some uses.