

## Depth Analysis Of Midway Atoll Using Quickbird Multi-Spectral Imaging Over Variable Substrates

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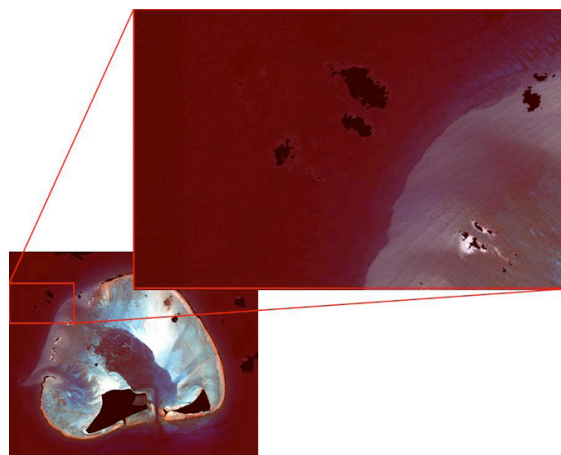
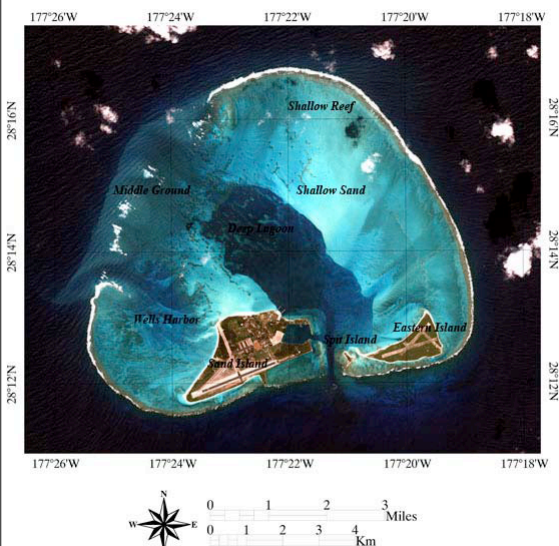
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Shallow water bathymetry is important for both safe navigation and natural resource management purposes. Extracting depth information from spectral imagery allows identification of benthic features and characterization of coral reef habitats, especially in remote islands. Techniques have been developed to extract water depth from multispectral imagery (Lyzenga, 1978; Philpot, 1989). These techniques can be difficult to apply in optically shallow waters with heterogeneous bottom types and varying albedo, and require tuning of multiple parameters. An improved algorithm to extract water depth from multispectral satellite imagery was proposed by Stumpf et al. (2003) to generate bathymetric maps with limited a priori information.

The algorithm is based on the ratios of transformed reflectance values in the visible bands, retrieving greater depths than previous algorithms and compensating for variable bottom type and albedo.

This research attempts to quantify the contribution of variable benthic substrates to the algorithm's accuracy by classifying the scene into its main bottom types and tuning the coefficients separately. The algorithm is evaluated using a QuickBird high resolution multispectral image of the remote Midway Atoll, in the Northwestern Hawaiian Islands. This result indicates that Stumpf et al. (2003)'s ratio method is not insensitive to variable bottom type, and that knowledge of the distribution and extent of different benthic substrates in optically shallow waters has the potential to improve bathymetric derivation in remote coastal areas such as coral reef environments in the Pacific.



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