Interpreting Remotely Sensed Data on Coral Reefs

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Increased interest and concern about the health and of coral reefs has led to initiation of new efforts by Federal agencies and academic institutions to map coral reefs using remote sensing instrumentation. Satellite images, conventional and multi-to hyperspectral aerial photography, and high resolution laser imaging systems have all been recently employed in pilot mapping efforts. We have found that the most information is obtained through combination of remotely sensed data and direct field observations.

In our studies of the extensive coral reef off south Moloka'i, we have used regional-scale (1:35,000) aerial photography, complemented by high-resolution (1:10,000) photography and laser bathymetric measurements. The laser images (SHOALS lidar) provide depth information at a resolution (15 cm vertical; 4 m lateral) not previously available for reef mapping. Individual channels, reef holes, and spur-and-groove features are clearly delineated down to depths of 35 m and greater. Combined with the aerial photography, the data sets provide an unparalleled definition of the coral reef morphology.

Remotely sensing images by themselves are not adequate. Reliable interpretative maps require direct field mapping, accomplished by direct observation and photo/video documentation, onto the image. Our mapping efforts on Moloka'i include walking/snorkeling along transects, boat tows, and spot dives with SCUBA, all correlated to the aerial and laser images using high-resolution navigation (DGPS). We collect information on sediment cover and thickness, distribution of algae and grasses, presence/absence of live coral, percentage of live coral cover, and abundance estimates for dominant coral species. This type of information can be used to provide interpretive maps against which to assess future change.

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