# From Polyp to Drone to Satellite: Habitat Mapping of the Great Barrier Reef

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**Abstract:**
The Great Barrier Reef (GBR) is a globally unique and essential national resource for Australia. However despite its significance, no single map exists across its entirety showing its geomorphic zonation and benthic community composition. This has yet to be achieved due to the large area to cover, and cost of mapping the extensive and mostly submerged reefs. While satellite imagery and in-water field survey are commonly used to map individual reefs, under or above water drones have not been used yet to map these areas or provide calibration and validation data for any form of coral reef mapping. This presentation introduces how drones provide valuable calibration/validation data for a coral reef habitat mapping approach for the shallow offshore reefs of the GBR. These reefs are visible in optical remote sensing imagery to depths shallower than 20 m. The mapping approach for geomorphic and coral community zones combines a number of spatially explicit data sets including field data; reflectance and water depth derived from Landsat 8 OLI (15 m x 15 m pixel ); and measurements of disturbance impacts, slope, and wave exposure. To develop and validate the

modelling and mapping approaches, field data will be acquired to describe the composition and structural complexity at cm's to 100 m's spatial scale. A suite of approaches will collate georeferenced photos and airborne imagery captured by a combination snorkelers, divers, underwater and above water drones. The examples shown demonstrate the benefits of integrating different scales and information types, specifically from the cm scale provided by the drones. Our initial findings show that simple, off-the-shelf remotely piloted platforms can provide valuable information to produce and validate satellite image maps of coral reefs, which are required to support mapping, monitoring and management.

*Figure 1. Scales of observation – from underwater field survey to drone imaging*