

COral Reef Airborne Laboratory: A New Perspective on Coral Reefs

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An estimated 30-50% of coral reefs worldwide have already been severely degraded, and the rest are threatened with destruction by mid-century. Despite the severity of the problem, state-of-the-art coral reef assessment remains firmly diver-centric, with observations at the plot scale or smaller. As a result, quantitative data are very sparse, both within reefs and across regions, and there are some unexpected trends, for example, coral cover increasing with reduced aragonite saturation and with increased pollution threat. NASA's COral Reef Airborne Laboratory (CORAL) was conceived to provide a new perspective: conduct high-spatial-density observations of reef condition for a large, representative area of the world's reefs. In 2016 and 2017, CORAL acquired airborne hyperspectral imagery across the Great Barrier Reef, Hawaii, Mariana Islands, Palau, and Florida. These images have been processed into data describing benthic cover, as well as rates of metabolism and calcification, for ~10,000 km² of reef, or roughly 2% of the world's reef area. For the first time, these data allow for evaluation of reef condition at the ecosystem scale and larger, and — importantly — in relation to the major forcing factors presumed to influence reef trajectories.