Universal Remote Observation of Coral Health (UROCH): Studying the Efficacy of Extending Existing NASA Instruments to Detect and Monitor Coral Reefs

Sponsored by NASA

Lisa Pink, Matthew Johnson, Mohamad Ali Kalassina, Patrick Geitner, Thomas Durkin

---

Coral reefs - one of the most bio-diverse ecosystems on the planet - are facing the threat of extinction, which is projected to cause severe environmental damage on the fronts of climate change and marine life. NASA's Langley Research Center aims to support coral revitalization groups by creating a baseline framework for detecting coral reefs and monitoring their health. The goal of this project is to leverage NASA's satellite data - specifically MODIS-Terra and LandSat-8 - in addition to coral bleaching data sources, to identify regions where coral reefs exist and assess their vitality. To meet this objective, the team adopted a multi-faceted approach consisting of three classification methods applied on the Great Barrier Reef and Caribbean regions. Coral/algae were detected using an XGBoost classifier with an accuracy of 96.94%, coral was then distinguished from algae using a novel temporal rule-based classifier, and coral health was finally determined by using XGBoost to predict bleaching levels. The team also delivered a dynamic dashboard that allows users to determine coral presence, health, and characteristics at different locations.