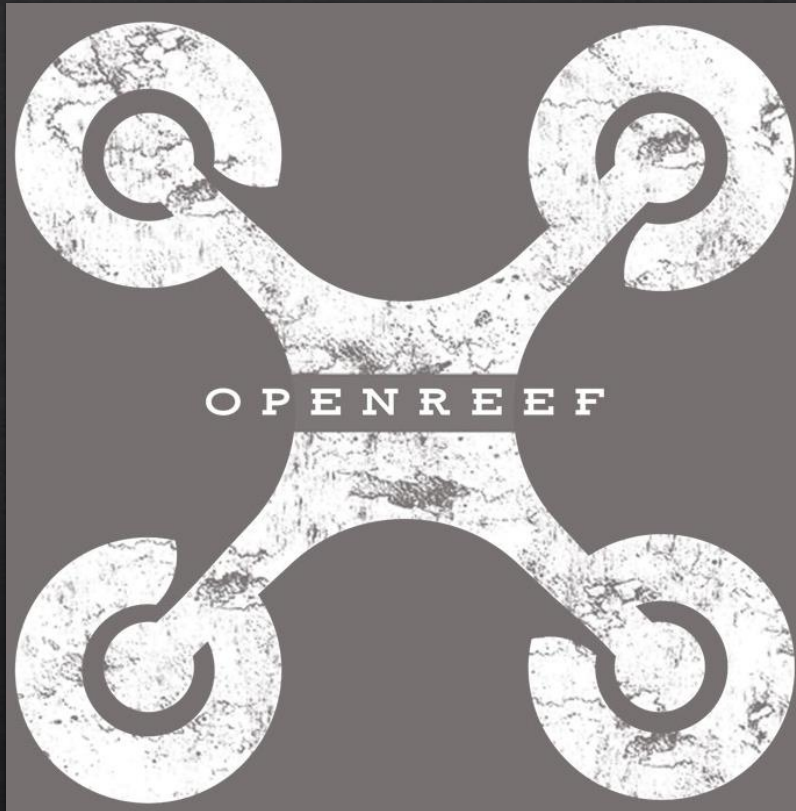


# Using Drones to Map the Belize Barrier Reef

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# The Open Reef Mission



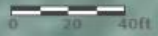
- ❑ Use drones to map all islands in the Belize Barrier Reef using high resolution, open-source imagery to stimulate citizen science initiatives.
- ❑ Encourage partnerships by publicly sharing our data
- ❑ Support youth education and engagement
- ❑ Foster scientific discussions on utilizing Open Reef data

# Developing World Imagery

- ❑ Outdated publicly available satellite imagery in developing world
  - ❑ Unclear development and damages over time
  - ❑ Poor resolution makes analysis nearly impossible
- ❑ Costly satellite imagery for purchase
  - ❑ Not publicly available

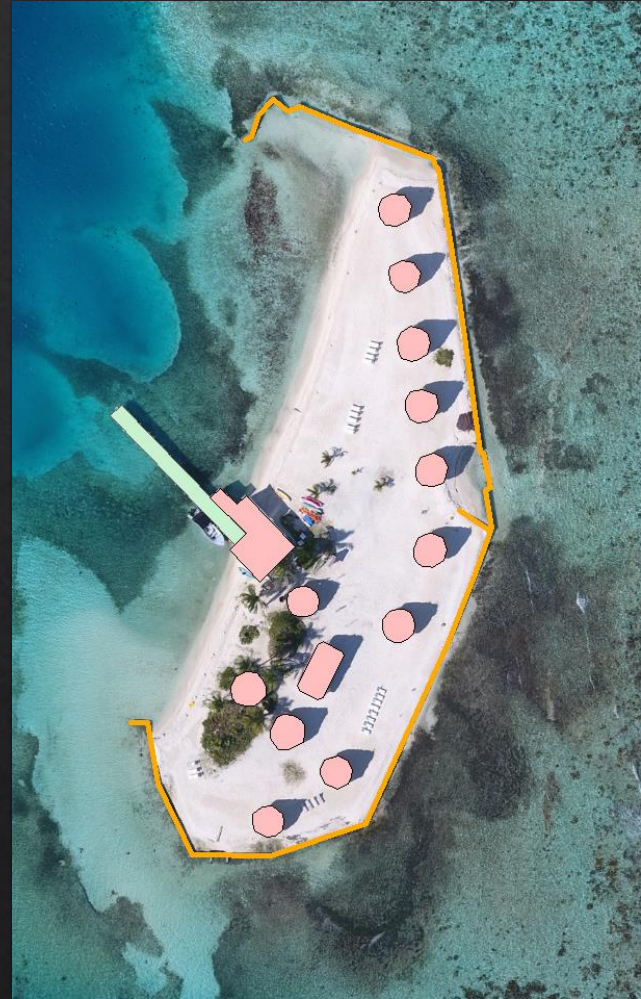






# Using Drones to Collect Imagery

- ❑ Imagery collected using DJI Phantom 4 quadcopters
  - ❑ Over 90 islands flown so far
  - ❑ Orthomosaics created using Esri's Drone2Map
  - ❑ Islands, structures, docks, sea walls digitized
- ❑ Raster and vector data publicly available on ArcGIS Online
- ❑ Shared through social media to stimulate discussion





# Processing Results

- ❏ [Drone2Map image]
- ❏ Average dataset size: 300 images
- ❏ Average processing time: 25 minutes
- ❏ Orthomosaic resolution from 6.5 – 7cm GSD
  - ❏ Satellite imagery roughly 1m GSD
- ❏ [expand]

[Smithsonian summer data]

[Smithsonian summer data]



[Smithsonian summer data]

# Climate Change Consequences

- ❑ Roughly 10% of the world's population lives on islands or in coastal settings
- ❑ Sea level rise
- ❑ Increased storm intensity from warming waters
- ❑ Loss of land due to sea level rise
- ❑ Deterioration of marine ecosystems

# Human Adaptation

- ▣ Ecosystem restoration
  - ▣ Mangrove recovery
- ▣ Engineering efforts
  - ▣ Sea walls



# References

- ❑ Nicholls and Cazenave 2010
- ❑ Arnell et al. 2016
- ❑ Courchamp et al. 2014
- ❑ IPCC 2014
- ❑ Holland and Bruyere 2014