Using Drones to Map the Belize Barrier Reef

Nicholas Altizer
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- Outdated publicly available satellite imagery in developing world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