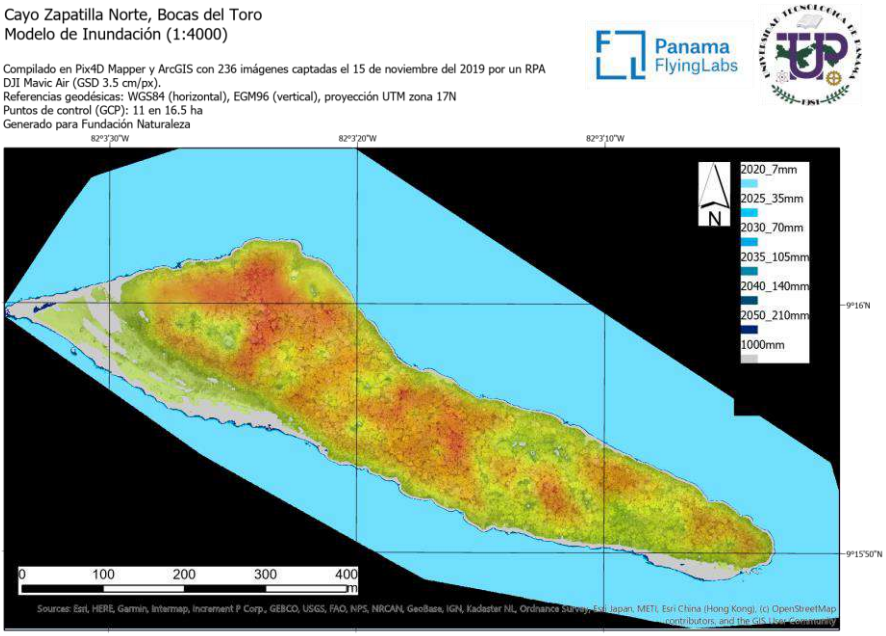
Sea level monitoring in the Zapatilla Islands

Orthomosaic of Northern Zapatilla Cay

Orthomosaic of Southern Zapatilla Cay



Preliminary simulation of flood model with linear method of Northern Zapatilla Island

OVERVIEW	
Flying Labs	Panama Flying Labs
Geographic area	Cayo Zapatilla North and South, Bocas del Toro (Panamá)
Date	November-December 2019
Sector program	EcoRobotics

SCOPE	
Stakeholders (clients)	Naturaleza Foundation
Challenge	North and South Zapatilla Islands are two uninhabited islands located within the Bastimentos Island National Marine Park in the province of Bocas del Toro, Panama. They consist of approximately 14 hectares and 34 hectares respectively and are considered protected areas. Naturaleza Foundation periodically carries out monitoring on these islands because they are being affected by the rise in sea level. Currently, it is achieved by taking samples at control points located directly on the site and comparing how much the sea level has risen. However, obtaining results between each stage with this process takes a long time.
Scope	Introducing drones for the monitoring of the islands to demonstrate how they can be used to complete the monitoring process quicker, more accurately and effectively. The project scope includes the creation of orthomosaics and digital elevation models (DTMs and DSMs).
Outcome	Phase 1: Placing and measuring the control points in collaboration with the Naturaleza Foundation (it was only possible to place ground control points on the Zapatilla North Island) Phase 2: Perform the survey drone flights over both islands Phase 3: Processing and analysis of the drone-captured data The flights performed within this project proved that the use of the drone to monitor the islands was indeed faster than the same process done on foot. There were some complications while performing the flights. In some areas, the drone was not able to establish a GPS connection, which delayed the start of the flights until the signal was found. Additionally, the hot weather caused the equipment to overheat and the team had to take necessary breaks to let the drone cool down before continuing the mission. An orthomosaic and digital elevation models (DTM and DSM) were generated for each island. These allowed to produce

	preliminary flood models giving a linear forecast using ArcGIS Pro.
Next steps	As next steps, the Panama Flying Labs team in collaboration with Naturaleza Foundation will continue to monitor the Zapatilla Islands, to generate more products and to compare how the islands are being affected by the rising sea levels. Naturaleza Foundation promotes mangrove reforestation as a natural barrier, and after this monitoring, their next step is to start the reforestation of both cays.

DATA ACQUISITION	
Size of area	89.21 ha (0.8921 km2)
Drone	DJI Phantom 4 Pro V2, DJI Mavic Air
Sensor(s)	RGB camera
Flight plan software	Pix4Dcapture
Flight height	120 m above ground level
GSD (Accuracy)	3.90 cm/pix
Number of images acquired	545
Number of flights	6
Time invested in data acquisition	2h 30min
Georeferencing	Ground Control Points and onboard GPS

DATA PROCESSING & ANALYSIS	
Processing software	Pix4Dmapper
Processing time	2 hr
Data products	Orthomosaic, DTMs, DSMs
Analysis tools	ArcGIS Pro
Analysis outputs	Preliminary simulation of linear flood prediction
Final outputs shared with stakeholders	Orthomosaic, DTM, DSM and flood simulation
Data sharing	Google Drive