Using aerial imagery to assess hurricane damage recovery across the St Maarten island and capture geospatial data for building resilience

Image showing orthomosaic of an area in St Maarten

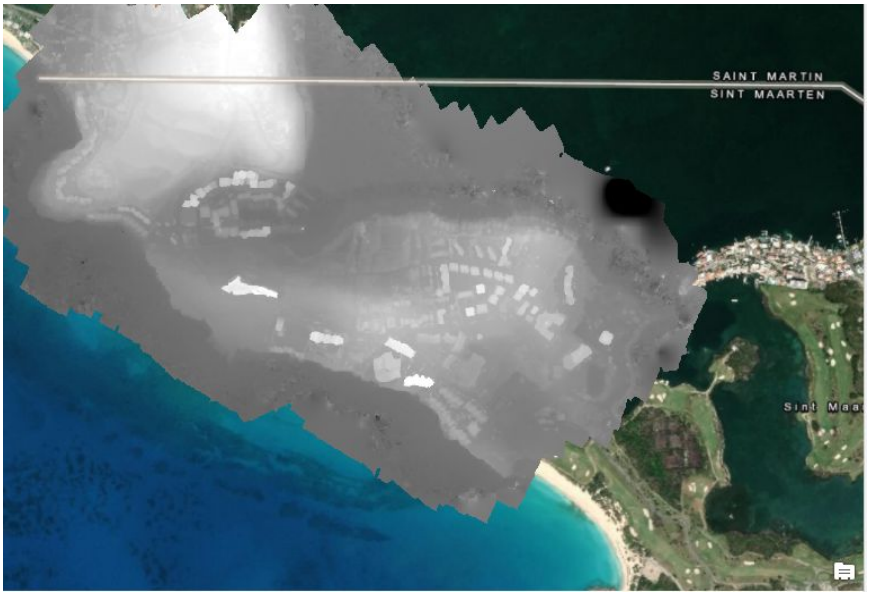

Image showing Digital Surface Model DSM raster data for area in St Maarten

OVERVIEW	
Flying Labs	Jamaica Flying Labs
Geographic area	St Maarten (Dutch side), Caribbean region, Jamaica
Date	May - July 2020
Sector program	Aid Robotics
Main SDG	Goal 11: Sustainable Cities and Communities

SCOPE	
Stakeholders (clients)	Government of St Maarten, World Bank
Challenge	The island of St Maarten was hit by a hurricane causing severe damages such as tearing the roof off of its new international airport. Rains that followed flooded the floors below which resulted in mold and the end result of the terminal being declared a public health hazard. Many houses, businesses and tourism sector assets such as hotels were damaged badly or destroyed. The total destruction totalled 3 billion dollars. Government needed to assess how much of the island had yet not recovered and needed assistance by utilizing aerial imagery due to the fact that regular satellite imagery was not accurate enough to estimate the recovery rate across the island. The other incentive of executing aerial imagery was the resilience aspect of the project. The data collected would help plan and prepare for events of this nature in the future and minimize the damage as best as possible.
Scope	The scope of this project was to utilize drone technology to collect high resolution aerial imagery. This imagery was to be collected and then processed to give outputs such as Digital Terrain Models (DTM), Digital Elevation Models (DEM) and orthomosaics. This information would have helped the government and other stakeholders with improving the island's resilience against further hurricanes and disasters. The data collected would provide maps to understand areas that are most at risk and create models that could anticipate the environmental effects of different scale disasters. The data would also assist in creating Building information Models. This would assist the government in visualizing geospatial data better. Most importantly the imagery could let the government see communities that would've recovered with reconstruction etc vs those that had not.
Outcome	This project has expanded our experience in aerial surveying for disaster management and the lessons learnt have allowed us to improve on our project execution for future projects.
Next steps	Utilizing data to create models and do environmental analysis.

DATA ACQUISITION	
Size of area	20 km2 (2000 ha)
Drone	Sensefly eBee Plus
Sensor(s)	SODA
Flight plan software	eMotion 3
Flight height	60 - 90 m above ground
GSD (Accuracy)	4-6 cm per pixel
Number of images acquired	Approximately 16 000 images
Number of flights	9
Time invested in data acquisition	10 days
Georeferencing	RTK/PPK

DATA PROCESSING & ANALYSIS	
Processing software	Pix4Dmapper
Processing time	144 hours
Data products	Orthomosaic, DTM, DSM
Analysis tools	ArcGIS Pro
Analysis outputs	Building heights
Final outputs shared with stakeholders	Digital Surface Model, Digital Terrain Model, orthomosaic, building heights
Data sharing	Microsoft One Drive