



## UAS / UAV LiDAR Coastline Flood Zone Mapping

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### INTRODUCTION

- A startling three inches have been added to the relative sea level along the northeastern North Carolina coast since 1999. In the coming century and beyond, Pasquotank County might be impacted by a rise in the sea level. Homes and livelihoods of Pasquotank County residents along numerous NCDOT-maintained public roads will be in danger as seal levels increase. The precision of flood danger maps depends on the availability of scattered measurements of inundation contours. Unfortunately, aerial photographs and satellite images are expensive, and the weather has a significant impact on their temporal resolution. Due to its versatility and continuously declining costs, UAV-based remote sensing is becoming critical in use.
- This poster demonstrates how UAS / UAV can deliver exact, current georeferenced data regarding the location of North Carolina Department of Transportation roadways, bridges, river shorelines, tributaries, channel shape, and vegetation.
- Incorporate LiDAR sensor to fixed-wing in addition to electric vertical take-off and landing (eVTOL) aircraft that are capable of beyond visual line of sight (BVLOS).



### METHOD

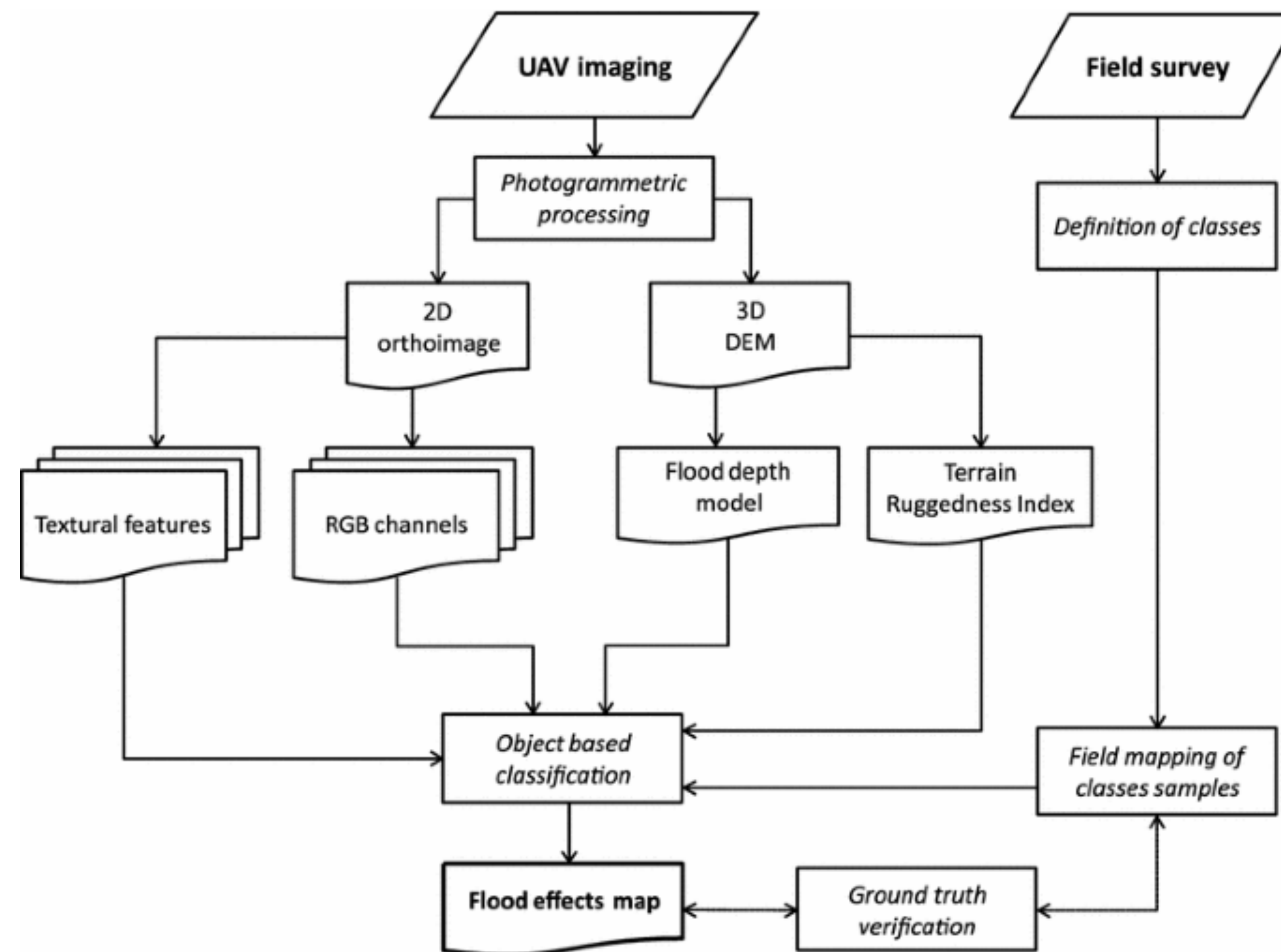
- Mapping standards
- Test sites
- Image flight tests
- Structure from motion (SfM) software for data processing
- Aerial triangulation results
- Forward and side lap
- Corridor mapping
- Orthoimage
- Point cloud profiles
- LiDAR flights
- Safety factor

Recommended specifications for using UAS / UAV with LIDAR system to generate high accuracy mapping.

- Fly with 60% overlap.
- Fly at least two cross flights per project to aid in system calibration.
- Clip data with a scanned angle of more than 40 degrees.
- Use surveying grade inertial measurement unit (IMU) system with dual frequency global navigation satellite systems(GNSS).
- Collect GNSS data 20 minutes before and after data collection and during battery changes. This will improve the precise point positioning (PPP) processing.
- Cover the project boundary by LiDAR look and buffered by at least 25 m or 82.021 ft.
- Operate 3D mission planning software for terrain with large height relief to ensure the LiDAR scanner range will not be exceeded.
- Check if vertical shift will give the required accuracy before using geometric correction software.

### TIMELINE

- Over the course of nine months, February 1<sup>st</sup> through November 31<sup>st</sup>, 2023, It is the goal to implement this research with the existing curriculum at Elizabeth City State University.



### ADVANTAGES

- How can UAS / UAV LiDAR assist with flood mitigation to improve Elizabeth City and the North Carolina Department of Transportation?
- Safety is paramount: UAS / UAV LiDAR improves staff safety.
- In order to locate and identify the affected areas and carry out the necessary damage mitigation during floods, the disaster management authorities must receive timely and thorough situation reports; this is the most delicate management category because it involves recovery efforts and the safety of people and property.
- Remotely inspecting the designated flood area, relieving safety risks by allowing the drone to fly over the area of interest.
- A complete survey can be finished in a matter of hours and analyzed the same day, giving quick results.
- Provides important information for the well-informed planning of future flood control projects.
- UAV / UAS LiDAR data collecting is time efficient, extremely accurate, less expensive, and safe.

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