Overcoming Vegetation Challenges in Drone-Based Digital Terrain Modelling for Hydrodynamic Applications

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SUMMARY

Accurate Digital Terrain Models (DTMs) are critical for hydrodynamic modelling, particularly in complex terrains with dense vegetation and drainage channels. This study explores the use of drone-based technologies, including Structure from Motion (SfM) photogrammetry and LiDAR, to generate high-resolution DTMs. Optical cameras mounted on drones were utilized for SfM photogrammetry, while drone-based LiDAR was employed to create dense point clouds. Additionally, RTK GPS systems were used to collect ground-based elevation points for validation and refinement.□□One of the primary challenges encountered was the removal of vegetation in areas with near-complete grass cover (close to 100%). Overhanging vegetation and standing water in drainage channels further complicated the surveying process. These factors highlighted the limitations of automated vegetation filtering algorithms and the necessity of incorporating ground-based measurements for accurate terrain representation.□□The results demonstrate that while drone-based LiDAR outperforms SfM photogrammetry in generating DTMs in vegetated areas, supplementary ground-based measurements and extensive data cleaning are essential for producing hydrologically sound DTMs. Such refinement ensures the terrain models are suitable for high-resolution inundation modelling and hydrodynamic simulations.□□This presentation will discuss the methodological challenges, insights from comparative analysis of the techniques, and recommendations for improving DTM accuracy in similar environments. By addressing these challenges, we aim to enhance the reliability of hydrodynamic models and their applications in tidal inundation assessment for Blue Carbon projects and water resource management.