

Inundation Mapping Using UAVs: Fixed Wing Vs. Multirotor

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SUMMARY

Accurate flood-risk mapping is curtail for supporting emergency-response planning during a flood event, developing land use plans and regulations with regard to the construction of structures and infrastructures, and providing damage assessment in both spatial and temporal measurements. The technological development of Unmanned Aerial Vehicles (UAVs) has created a new tool for surveying and geospatial data collection. The advantage of UAVs, in comparison to traditional data acquisition approaches, is the ability to quickly deliver high spatial resolution imagery for a temporal event (e.g., the extent of flooding at a particular flood stage). They provide flexibility, enabling multiple sensor configuration including non-metric cameras and various LiDAR sensors to detect a variety of potential data requirements. These advantages allow revisits (multiple flights), expedient emergency response planning and flood monitoring at a low cost affordable budget with enhancing overall safety on inundation areas. This research studies and evaluates applying small UAVs, both multirotor and fixed wing, to produce survey grade geospatial products for flood mapping. We investigate 1) flight control, flight modes and flight planning, 2) GSD or image resolution and data accuracy requirements necessary to meet the needs of flood mapping, 3) optimal ground control density and placement for accuracy requirements, 5) optimal weather conditions for gathering data 6) image overlaps and processes for exterior orientation, and 7) the use of real time kinematics (RTK) and virtual reference systems (VRS).

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