MERGING BATHYMETRIC AND PHOTOGRAMMETRIC DATA TO CREATE ORTHOMOSAIC AND DIGITAL SURFACE MODEL MAPS

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The study of water bodies necessitates the use of accurate bathymetric and topographic maps so that these hydrosystems can be better studied and managed. The creation of such maps has been facilitated using various technologies which include SONAR (Sound Navigation Ranging) for the water depth sounding (bathymetry) as well as LIDAR (Light Detection and Ranging) and photogrammetry (measurements using photographs) for the generation of topographic maps. The measuring equipment involved is also paired with a GNSS (Global Navigation Satellite System) to georeference each sounding or elevation. For a while now, SONAR-GNSS "chart plotter type" equipment such as those used by recreational fishermen (i.e., fish finders) can be mounted on small to large boats depending on the hydrosystem's accessibility and size to conduct bathymetric surveys. Multiple software is then available to extract the data and interpolate sounding spatially to generate the bathymetry. For terrestrial terrain mapping, however, one had to rely on satellite or airplane generated data through either LIDAR (most common) or photogrammetry (less common). The recent boom in recreational and commercial UAVs (Unmanned Aircraft Vehicle) commonly referred as "drones", however, has been a "game changer" as terrain could be surveyed at a lower cost and, depending on FAA (Federal Aviation Administration) clearance, on a more frequent and lower altitude bases. This presentation aims to demonstrate the potential and limits of the use of relatively affordable recreational equipment to conduct bathymetry using a Lowrance HDS LIVE 7 GNSS equipped SONAR for the bathymetry portion and a DJI™ Phantom 4 Pro UAV with the use of GCPs (ground control points) precisely georeferenced with Trimble™ type GNSS. LIDAR indeed remains too expensive for most. The data post-processing using software like Surfer™ 18 (www.goldensoftware.com), BioBase™ (www.biobasemaps.com), Pix4D Mapper (www.pix4d.com) and ArcGIS™ (www.arcgis.com) will be explained especially when the emerged and submerged data are combined and processed altogether. As an illustration of such processes, the mapping of an oyster reef including artificial reefs within the littoral zone (Naples Bay, Fl) as well as of a detention pond on the FGCU campus will be used.