# sUAS usage in GIS Mapping

Edward Miller

South Dakota State University

Introduction to Small Unmanned Aircraft Systems

Mr. Ric Stephens (Instructor)

The use of sUAS within Geographic Information Science has become a modern world wonder and has started to improve the operation process in the world of mapping and remote sensing. Using sUAS while conducting GIS operations, has allowed a safer and more economical process for organizations within this field. sUAS is a steadfast process of gaining ortho imagery and detailed geospatial data at a faster rate, than those that can be obtained through crewed aircraft and satellite imagery, or ground crew operation.

Though in recent years, the use of sUAS has become one of the hot topic items on the market for the scope of Geographic Information Science, the use of these operations does come with their positives and negatives for assorted reasons. In recent, the positives have started to outweigh the negatives when it comes to the usage of sUAS. Most of the negatives of using sUAS come in the terms of duration of the sUAS, the cost of sUAS, and the fact that most come with small payload capabilities. Organizations have seen that the use of these products has created a result of nearly five times faster, in conducting operations such as aerial surveying. These operations also reduce the number of workforces needed, as compared to when using on-the-ground operations, and the sUAS allow for establishments to obtain data from locations that would normally be more difficult to reach if ground crews were being sent in to obtain the same needed information. The sUAS can be launched and recovered from many various locations, thus this will allow for fewer restrictions when trying to access more remote locations. The use of sUAS will allow for eyes in the sky, so to speak. This ability allows for the sUAS to reach and hover over locations and retrieve the data that is needed in creating GIS masterpieces. Also, the data that is collected usually can be directly downloaded to cloud base storage, thus allowing for instant retrieval of the material, compared to when ground-level equipment is being used to

obtain the same material, which must be taken back to office settings to download the needed information.

Using sUAS within GIS projects, allows assorted types of operations to be conducted, and the ability to gain feedback within a reasonable turnaround time for projects. The use of sUAS can allow organizations to conduct projects such as photography, photogrammetry, orthophotography, multi-spectral imagery, and land survey. Groups have found that using sUAS enables them to conduct projects over various landscapes and sizes, with more effectiveness in gaining the needed data. The ability to use sUAS has reduced the cost and effectiveness of retrieved data, compared to other means of gaining the needed data.

In recent, construction management has been able to use sUAS, along with Geographic Information Science (GIS) and the platforms that are associated with ESRI to help with the process of construction of larger developments, seeing the progress in real-time, and allowing the management teams to update and process the data, to which is allowing the construction to be completed at more timed rates. Geospatial and imagery technology have become key components of the leading industries. When combined imagery from the sUAS, and data precision of global navigation satellite systems, this helps to create imagery that can be resourceful and beneficial in numerous ways.

While there are many sUAS products on the market, to be used within the GIS world, there are a few that stand out and are being used to gain the needed information and data sets. For example, the Sensefly eBee + is a fixed-wing aircraft that is capable of operating over larger tracts of land (upwards of 500 acres), while supporting longer flight times of about 60 minutes giving proper weather conditions and capturing photogrammetric mapping imagery. The DJI Phantom 4 Pro, has a flight time of roughly 28 minutes but has the capability of capturing video

imagery in a 4K, thus allowing details in a video to be seen more clearly. Lastly, looking at systems that would be beneficial for running Lidar, one could look at using the Snoopy A system. The Snoopy A series has two options that can be looked into. The first one to look at is the Snoopy A 120 Series. This series allows for 200+ Points per square meter, 100+ acres of flight coverage, and a flight AGL of 100 to 150 meters or roughly 328 to 492 feet AGL. The other series that Snoopy supplies are the Snoopy A series HD. These series allow smaller flight times and smaller coverage areas. The series can allow for 200 + Points per square meter, a coverage around 60+\- acres, 50-80 meters AGL or roughly 164 to 262 feet AGL. This series is roughly 0.78 heavier than the 120 series, thus this would allow for an operator to see different results in handling during the flight operations.

In today's market, most of your sUAS come with a built-in Global Positioning System (GPS) which allows for precise tracking location. Also, this ability allows for aerial photos to automatically become what is known as "Geotag". These geotag that are associated with the photos precisely place that photo in an exact location. Making sure that the proper sUAS camera is crucial when conducting these operations. Using a 4K HD video and at least a 12MP or higher camera will make a stark difference in making sure that your work is precise and clear for your client's needs and making sure that you have great clarity for capturing photogrammetry.

The use of sUAS is becoming more useful in many markets throughout the world. These operations have proven to be beneficial to not only the organizations that use them but also to the client that is receiving the finished data. Clients can receive the requested material in a timelier manner, as compared to the operations that are conducted on the ground. Geographic Information Science and sUAS combined are continuing to gain more popularity and with the continued success rates, we will continue to see more of these operations work hand and hand.

# Work Cite

Geocgi. (2022, January 12). *Geocgi and Suas*. ArcGIS StoryMaps. Retrieved August 2, 2022, from https://storymaps.arcgis.com/stories/4ce6c4f4d96c4fa2a0bfb8253324f1f9

Drone Map LLC. (n.d.). Retrieved August 2, 2022, from https://digital-mapping.net/

*GIS and drone imagery Boost Construction Management Efficiency*. GIS and Drone Imagery Boost Construction Management Efficiency. (n.d.). Retrieved August 2, 2022, from https://www.esri.com/en-us/lg/industry/aec/stories/la-cima-case-study

*UAV and Lidar Services*. tigersgis. (n.d.). Retrieved August 2, 2022, from https://www.clemsongis.org/uav-at-clemson

SA, F. (n.d.). *What is a lidar drone?* Flyability. Retrieved August 2, 2022, from https://www.flyability.com/lidar-drone

., S. (2022, April 19). *Types of aerial mapping drones & how should you choose one*. GeoDrones Aerial Services. Retrieved August 2, 2022, from https://geodrones.ae/aerial-mapping-drones-how-should-you-choose-one/

GEO Jobe. (2018, November 8). *10 benefits of UAV for GIS Mapping and Data Collection Projects*. GEO Jobe. Retrieved August 2, 2022, from https://geo-jobe.com/drones-uav/benefits-of-uav-data-collection-projects/