

Unmanned Aerial Systems for Environmental Assessment Applications

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Background/Objectives. The use of unmanned aerial systems (UAS) has expanded dramatically in recent years, including in the field of environmental site assessment and monitoring. Semi-autonomous aircraft have many advantages over traditional tools for many environmental applications. They can access areas that would be difficult or dangerous to reach directly, and perform frequent revisits inexpensively. While unmanned aircraft are powerful platforms for image capture, they can also be used for many other environmental applications, such as direct sampling. There are many challenges to using semi-autonomous systems, however, both regulatory and practical.

Approach/Activities. Since 2017, Arcadis North America has performed hundreds of UAS flights on behalf of clients. Many of these flights are focused on collecting 3D models and topographic data, using either photogrammetric approaches or lidar. Others have been flown to collect specialized imagery, such as multispectral data for vegetation assessment, or thermal imagery to detect groundwater seeps or the extents of underground fires. Arcadis has also developed methods of direct sampling using UAS, and other novel applications of the technology.

Results/Lessons Learned. Arcadis has carefully documented methods and standard operating procedures for UAS technology to more efficiently collect and disseminate assessment and monitoring data. Some of the domains studied and documented by Arcadis include procedures for accurate and efficient image and topographic data collection. We have also learned many important lessons about the management of the very large datasets commonly collected by UAS. Most importantly, Arcadis has maintained a strict set of internal regulations for safety, as well as adherence to any national and local regulations. We present a set of factors to consider for anyone planning to develop their own UAS fleet for environmental applications, or for those planning to contract the work from vendors.