The Nexus of Ground Sampling Distance Optimization and Uav-Based Engineering Surveys

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SUMMARY

Abstract

Ground Sampling Distance (GSD) is a cornerstone in modern engineering surveys, setting the level of detail we can achieve in mapping and measuring the world around us. At its core, GSD tells us the “resolution” of an image, directly affecting the accuracy and detail captured, whether from drones, satellites, or ground-based sensors. This paper dives into how GSD impacts real-world engineering projects—like tracking volumes in mining or monitoring structures in construction—and explains how fine-tuning GSD settings can lead to more precise data for planning, monitoring, and decision-making.

We cover the basics of how GSD is calculated, including factors like the camera’s resolution, the height of the flight, and the lens used. Practical examples show the balancing act surveyors face: for instance, a very detailed (small) GSD provides sharp and accurate data, but it comes with trade-offs like higher costs and larger data files. With technology advancing rapidly, the demand for sharper data at lower costs has led to innovations in AI, adaptive sensors, and automated data processing, all reshaping how we approach GSD.

This paper ultimately sheds light on why understanding and managing GSD is crucial for survey engineers who want to capture the most reliable and usable data without over - extending resources. As we navigate challenges like increased data demands and evolving tech, GSD remains central to achieving quality, efficiency, and precision in engineering surveys.