A Cost-Efficient Method for Detecting Unexploded 122mm 9M22U Rockets Using Remote Sensing

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Tiny drone-based magnetic sensors can cost-effectively detect unexploded rockets

INTRODUCTION

The BM-21 Grad is a Soviet multiple rocket launcher with a high failure rate (over 4%) that may result in up to 1,640 explosive fragments in a 640m x 640m lethal area.1

METHODS

1. The UMT MFAM MagPike was mounted on a Cicada drone (see figure 2).
2. Flew the MFAM over multiple sites that had simulated UXOs and live 9M22U rockets.
3.Parsed and de-striped Raw magnetics data to remove directional interference.
4. Removed the takeoff, landing, and line leveling errors from the data using Arc Map.
5. Removed the total magnetic field from each data set.
6. Created Power Spectral Density (PSD) plots to analyze site-wide background noise.
7. Visualized each data set using Kriging interpolation, and a low-pass convolution filter was used to remove signal noise for data analysis.

REFERENCES


RESULTS/CONCLUSIONS

1. Magnetometry is an effective method for visualizing large unexploded ordnances.
2. The methodology is less effective for detecting small munitions.
3. Magnetometry reduces false positive rates by being highly accurate.
4. The effectiveness of MFAM tapers off as the distance of the drone increases from the target (see figure 3).