

Improving the effectiveness and safety of mine detection

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Summary

Geographical research into soil magnetism has allowed new maps of soil properties to be developed for England and Wales, aiding unexploded mine detection by the Ministry of Defence and international humanitarian organisations.

Challenge

Approximately every 30 minutes a landmine explodes somewhere in the world, with an estimated 7,000 people killed or severely injured each year. Landmines hold entire communities hostage: they render agricultural land useless, prevent food and medical aid from reaching people in need, hinder the return of displaced communities, and hamper already difficult relief operations and reconstruction efforts in many affected countries. Although their use is now banned, the United Nations estimates that around 80 countries worldwide are still affected by up to 50 million unexploded mines.

Solution

Electromagnetic induction is the dominant detection method for identifying and clearing landmines by the Ministry of Defence and international humanitarian organisations. However, due to the soil's own magnetic properties, highly magnetic soils may produce a signal similar to that of metal objects which makes it impossible to distinguish between landmines and the soil itself.

Professor John Dearing (University of Southampton) developed a method to distinguish these signals, which began by mapping the magnetic properties of soils across England and Wales. Reasons for variations in magnetism, such as local geological variables and weather, are now better understood. From this a mathematical model has been developed to predict likely soil magnetism without further sampling needed.

Benefits

Solving problems / managing risk

New maps of soil magnetism for England and Wales will allow the Ministry of Defence to develop and test better designs for mine detectors and will be especially useful for developing detectors for use in highly magnetic soils. More effective detection is expected to reduce the high rate of maiming and death amongst mine clearance staff, which currently stands at one person for every 2,000 to 3,000 mines cleared.