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TEMPORAL BEHAVIOUR OF MINES AND OBJECTS SIMILAR TO MINES

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ABSTRACT

The overall objective of the present mine project is to investigate the possibility of using airborne infrared (IR) sensors for detecting minefield features. In this paper a method is proposed for temporal thermal analysis, based on the extraction of relevant temperature information from diurnal IR images and utilising a combination of thermal modelling and signal and image processing. The paper focuses on the temporal thermal behaviour of relevant objects, *e.g.*, land mines, and how the heat transfer simulations can enhance the possibilities to extract information from airborne collected IR images.

Airborne data were acquired using an IR sensor mounted on an unmanned aerial vehicle (UAV), in this case a helicopter (CAMCOPTER ™), from a real field test performed in May 2003 of suspected mine-polluted areas in Croatia. At the same time, a weather station was used in order to provide actual weather data, and a temperature logger recorded a number of temperatures in the soil and in reference markers on the soil.

A numerical model with a set of relevant data, such as geometry, material properties, and surface coefficients is used for predicting the temperatures on the surfaces during the diurnal cycle. The actual weather conditions set the boundary conditions at the surface. The output from the simulations is an estimation of the temperature contrasts between the investigated area and the local background. The predicted contrasts are then compared with the acquired images from the real minefield. The result of the comparison will give essential information for detecting objects and minefields.

The paper also includes some results of temporal thermal behaviour extracted from measurements and analysis of different objects in a real minefield in Croatia. The relevance of the method and possible future development are discussed.