

A LOW-COST IMAGE ACQUISITION SYSTEM FOR THE SYSTEMATIC OBSERVATION OF TRACES OF BURIED ARCHAEOLOGICAL STRUCTURES

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The determination of the best period for image acquisition is of major importance for research in aerial and remote sensing archaeology. This will facilitate enhanced research results by enabling the identification of large numbers of traces that would be otherwise unidentified. To determine the best period for satellite image acquisition in the extensive archaeological plain of Philippi (Eastern Macedonia, Greece), a systematic observation of change of intensity over time, at known places of buried archaeological structures, was performed. A low-cost image acquisition UAV was developed, which was used to acquire images every month for the period of one year.

La détermination de la meilleure période pour l'acquisition d'images est d'une importance capitale pour la recherche en archéologie aérienne et de télédétection. Ceci assurera l'amélioration des résultats de la recherche en permettant l'identification d'un grand nombre de vestiges qui, autrement, ne seraient pas identifiés. Pour déterminer la meilleure période pour l'acquisition des images satellites dans la vaste plaine archéologique de Philippi (Macédoine orientale, Grèce), une observation systématique des changements d'intensité au fil du temps a été effectuée dans des endroits où l'on sait qu'il existe des structures archéologiques enterrées. Un véhicule aérien sans pilote permettant l'acquisition d'images à faibles coûts a été développé et a été utilisé pour acquérir des images tous les mois durant une période d'un an.

1. Introduction

A buried monument can be a 'concrete construction,' such as the boundaries of a building, or an 'open construction,' such as an ancient trench. The interaction of a buried monument with the ground or the vegetation is complicated and results in the appearance of marks, or traces, on the ground or on the vegetation (Figure 1).

The categories of marks and their intensity depend on a series of factors, such as the type, size and depth of the buried monument, the quantity of ground humidity, the air temperature, the ground and the upper ground type, the vegetation type, the period and intensity of rainfall and so on. These factors cause differing ground humidity and temperature, plus variances in quality (height, density, colour) and temperature of the vegetation, not only in the material that covers the monument, but also in the material surrounding the monument. Thus, the quantity of electromagnetic

energy that is reflected or emitted from the ground or the vegetation is different, and this is recorded by the remote sensing systems, allowing observation of the buried construction's marks in the images. Since the best period, in terms of identifying the marks, is not a-priori known, a systematic method for observing the positions under study that possibly contain buried archaeological structures is indispensable.

The frequency of image acquisition should be at least once per month over a duration of at least one year. In this way, the intensity of the marks observation can be evaluated in a large number of overlapping images taken during different time periods. It is of course quite clear that the collection of such imagery, either by airplane or by satellite, at such frequency is prohibitively expensive. Thus, the use of a low-cost image acquisition system is indispensable.



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