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Keynote Lecture:

Technology and Geoforensics

Ruffell, Alastair. B.Sc HONS, PhD, FGS

School of Geography, Archaeology & Palaeoecology, Queen's University, Belfast, N.Ireland, BT7 1NN a.ruffell@qub.ac.uk

From the landscape-scale of searching for buried objects using Global Navigation Satellite Systems, through the challenge of finding sunken objects in water, to the non-destructive analysis of trace evidence, technology is fundamental to recent advances in Geoforensics (the use of Earth Science techniques in legal enquiries). At the macro-scale, wearable devices that allow both the remote direction of personnel, as well as recording their location and tracks, can be used to plan, carry out and review searches in featureless areas (moorland, forest, deserts). At the medium (tens of metres) scale, the search and inspection of water bodies is a major challenge for both serious crime as well as engineering and archaeology. Combined side-scan/forward-facing sonar and boat-operated ground penetrating radar (more correctly, water penetrating radar) has proven very effective in the search for victims of drowning, suicide and homicide, as well as bridge and quay/jetty inspection: both use the same technology. When recovered (sometimes using the above technology), trace (less than 2g of material) geological evidence is often critical in establishing a case, in the absence of DNA, blood, fibres or fingerprints. A major issue is what to do with such samples? Incorrectly deployed destructive analysis will preclude other investigations. A suite of new devices, from digital colormeters, Fourier Transform Infrared Spectroscopy, Portable XRF and the in situ analysis by x-ray diffraction are now available to the forensic investigator, to better inform what the trace sample is, and thus the most appropriate method of further, probably destructive, analysis.