

UAS-enabled assessment of geohazards on coastal cliffs at Dawlish, UK

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The last few years have seen the widespread availability of Unmanned Aerial Systems (UAS) – remotely-operated aerial vehicles which are being developed for use in a variety of commercial and recreational applications. The combination of these systems with off-the-shelf digital cameras and image processing software using well-established Structure-from-Motion techniques can produce 3D models with centimetric resolution and accuracy for sites covering several square kilometres. The geo-engineering community has been exploring the use of these systems for collecting data in environments where it may be hazardous or impossible to use more conventional means. Advantages of deployment of UAS have already been identified, which include cost, ease of survey in terms of access, rapid acquisition of data and repeatability, and reduction in the number of personnel directly exposed to geological hazards during site visits. As such, the technology continues to be an exciting tool to explore.

At Dawlish, UK, weathering and erosion of the sea cliffs has resulted in numerous serious slope failures, with some notable examples over the last decade that were the focus of national media attention. This poses significant risk to Network Rail's Western Route: a stretch of rail built by Brunel in 1840, situated at the foot of these cliffs. CH2M was commissioned by Network Rail to explore options for improving the resilience of the line, but access constraints meant that sections of the cliff were difficult or impossible to access during site visits. As such, this paper describes the use of UAS to capture and assess this system. We find that the UAS technology offers new insight to the site, allowing for finer-resolution mapping and interpretation of sub-vertical cliffs. This has been an important study within a wider assessment of the site, and the survey has supplemented recommendations on how to best manage the coastal asset in order to ensure the operation of a safe and reliable railway.