



Inspiration from drones, Lidar measurements and 3D models in undergraduate teaching

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Three-dimensional models, photogrammetry and remote sensing are increasingly common techniques used in structural analysis. We have found that using drones and Lidar on undergraduate field trips has piqued interest in fieldwork, provided data for follow-up laboratory exercises, and inspired undergraduates to attempt 3D modelling in independent mapping projects. The scale of structures visible in cliff and sea shore exposures in South Wales is ideal for using drones to capture images for 3D models. Fault scarps in the South Wales coalfield were scanned by Lidar and drone. Our experience suggests that the drone data were much easier to acquire and process than the Lidar data, and adequate for most teaching purposes. In the lab, we used the models to show the structure in 3D, and as the basis for an introduction to geological modelling software. Now that tools for photogrammetry, drones, and processing software are widely available and affordable, they can be readily integrated into teaching. An additional benefit from the images and models is that they may be used for exercises that can be substituted for fieldwork to achieve some (but not all) of the learning outcomes in the case that field access is prevented.