



Fieldwork Skills in Virtual Worlds

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Virtual reality has an increasingly significant role to play in teaching and research, but for geological applications realistic landscapes are required that contain sufficient detail to prove viable for investigation by both inquisitive students and critical researchers. To create such virtual landscapes, we combine DTM data with digitally modelled outcrops in the game engine *Unity*. Our current landscapes are fictional worlds, invented to focus on generation techniques and the strategic and spatial immersion within a digital environment. These have proved very successful in undergraduate teaching; however, we are now moving onto recreating real landscapes for more advanced teaching and research. The first of these is focussed on Rhoscolyn, situated within the Ynys Mon Geopark on Anglesey, UK. It is a popular area for both teaching and research in structural geology so has a wide usage demographic. The base of the model is created from DTM data, both 1 m LiDAR and 5 m GPS point data, and manipulated with QGIS before import to *Unity*. Substance is added to the world via models of architectural elements (e.g. walls and buildings) and appropriate flora and fauna, including sounds. Texturing of these models is performed using 25 cm aerial imagery and field photographs. Whilst such elements enhance immersion, it is the use of digital outcrop models that fully completes the experience. From fieldwork, we have a library of photogrammetric outcrops that can be modelled into 3D features using free (*VisualSFM* and *MeshLab*) and non-free (*AgiSoft Photoscan*) tools. These models are then refined and converted in Maya to create models for better insertion into the *Unity* environment. The finished product is a virtual landscape; a Rhoscolyn 'world' that is sufficiently detailed to provide a base not only for geological teaching and training but also for geological research. Additionally, the 'Rhoscolyn World' represents a significant tool for those students who are unable to attend conventional field classes and really enhances their learning experience. This project is part of the larger Virtual Landscapes project, which is a collaboration between The University of Leeds and Leeds College of Art, UK. All our current virtual landscapes are freely available online at www.see.leeds.ac.uk/virtual-landscapes/