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### FieldscapesVR: Virtual world field trips to extend and enrich field teaching

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Field teaching is an indispensable feature of geoscience education, at all levels. However, delivering effective field experiences is challenging under many circumstances – not least for distance students such as Open University (OU) undergraduates. Hence, OU geoscience modules over the last 25 years have featured virtual field trips (VFTs), exploiting a range of formats, typically delivered via CD-ROM, DVD or web browser. 2013 saw a dramatic reboot with the launch of *Virtual Skiddaw*, a field exercise framed in a multi-user virtual environment that was created using 3D gaming software (Unity 3D).



*Figure 1: A group at one of the geological sites in Virtual Skiddaw. The exposures to the right of centre, the main focus of study at this location, are 3D digital models created from high-resolution LiDAR scans and photogrammetry. Navigation, task and settings functions are accessed by clicking the coloured buttons (top left). Text chat panel is in the lower left corner.*

Virtual world field trips (VWFTs) offer a wealth of new opportunities for online field learning. Advances in scanning and photogrammetry make detailed observation possible, while the digital landscape and ambient audio foster immersion. Rather than merely trying to replicate an outdoor field trip, the VWFT can also go ‘beyond fieldwork’: users can access aerial perspectives; drape the digital landscape with different imagery (e.g. maps); teleport and fly to save time; call up subsurface cross-sections; even fade other avatars out if they are obscuring the view! The multi-user capability enables collaborative work, even among groups that are widely dispersed, as OU students are.

There are times when a VFT can replace physical fieldwork, for example for those who cannot access the outdoor locations. However, we regard their primary role as *support* for physical field teaching, so that students can make the most of their, often limited, time in the field: pre-trip familiarisation and orientation, followed by post-trip revision, reflection or extension – for both educators and students; introducing basic fieldwork concepts and logistics, risk assessment, and even some fieldwork skills – for instance to students with no prior field experience – to alleviate anxiety and build confidence. For example, in *Virtual Skiddaw* both mapwork and compass skills can be practised in the context of a 3D landscape. VWFTs also facilitate development of spatial literacy [1] skills by bridging the 2D/3D conceptual gap, promote active learning, foster collaborative skills and reinvigorate problem-solving exercises.

We report on the Fieldscapes system [2], a trial platform for creating and hosting VWFTs from multiple sources and locations, for use in schools and universities, or more widely. Fieldscapes incorporates a flexible authoring tool that facilitates everything from minor adjustments to existing teaching materials through to creation of entire new virtual landscapes. We also present analysis of feedback from OU students, schools and HE practitioners on this new generation of virtual field trips.

*References:*

[1] Ishikawa T and Kastens KA (2005) *J Geosci Ed* 53(2):184-187

[2] Fieldscapes (2016) <http://www.daden.co.uk/conc/trainingscapes/fieldscapes> [Accessed 27 Jan 2016]

