

# VR Glaciers & Glaciated Landscapes

<https://vrglaciers.wp.worc.ac.uk/>

## SPRING 2020

### KEY FEATURES

- » **On-demand, virtual fieldwork**  
Virtual field trips to both present-day glacial environments and deglaciated ones – whenever you want! And all for free!
- » **Supporting, not replacing, 'real' fieldwork**  
Virtual fieldwork can be used in many ways, including the support of 'real' fieldwork – for which there is no substitute.
- » **Easy to use**  
It will run on most mobile devices (including iPads), as well as PCs and Macs. All you need is internet access and a browser. No need to install software or browser plug-ins.
- » **Flexible use for schools, colleges and universities**  
Resources are provided without integrated interpretation, so they can be used flexibly at a range of academic levels. Worksheets are available for some venues.

### INSIDE

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## **VR Glaciers and Glaciated Landscapes provides on-demand, ground-level virtual fieldwork to glaciers and glaciated landscapes. It supports class- and lab-based teaching in schools, colleges and universities.**

Anecdotal evidence suggests that many students – and some teachers – find the topic of glaciers and glaciation challenging to engage with, at least initially, because these environments are relatively unfamiliar and may seem remote. This can be addressed through fieldwork, of course, but for a variety of reasons this is likely to take place at a different time of year from when students are studying the topic in class.

The role of VRGGL is not to replace real fieldwork, for which there is no complete substitute. Rather, VRGGL aims to: (i) provide timely, immersive ground-level virtual fieldwork to support class- and lab-based teaching and learning activities; (ii) prepare students for real fieldwork; and (iii) support outreach activities.

VR Glaciers and Glaciated Landscapes was launched in April 2018. It received a significant upgrade in March 2019 (new website, more virtual fieldwork, more data). The next development will be the inclusion of 360° videos, as well as additional virtual tours. Watch this space!

Finally, I am grateful to the following organisations for funding this project to date: *University of Worcester* (School of Science and the Environment Learning and Teaching Fund), the *Quaternary Research Association*, and the *British Society for Geomorphology*.

*Des*

**Dr Des McDougall**  
University of Worcester

## **FEEDBACK ON PREVIOUS VERSION**

“ ... a fantastic resource and so intuitive to use. I look forward to sharing it with my colleagues.

“ ... next year our pupils will use the virtual fieldwork in both the UK and the Alps when they study glaciation within their Higher Geography course.

“ ... I have just had a look and it is going to be such a fantastic resource to use for my students.

“ The Löttschental one is super useful for us ... – we take our students on that very hike, so having a virtual version available both for revision and for anyone who can't attend the trip is just fantastic.





“ ... the imagery and the exploration have really caught their attention and caused them to dig deeper. And that in and of itself is a really good outcome. Building curiosity and excitement about a subject is definitely a big part of our job.

# A MORE INTERACTIVE APPROACH

The virtual fieldwork approach is a more interactive and engaging approach than simply presenting static images, and provides the basis for a range of learner activities and challenges. Some examples are listed on the right.

- » landform and landscape interpretation exercises
- » field sketching
- » 'field-checking' of geomorphological maps (produced using orthoimagery and elevation datasets in a GIS)
- » student-produced field guides (as a form of assessment)
- » preparation for real fieldwork (whether or not to these specific locations)
- » follow-up to fieldwork, or when real fieldwork does not take place for some reason (e.g. poor weather, illness)

## FEATURES

	FEATURE	BENEFIT
	High-quality, full-screen 360° interactive panoramas ('panospheres').	<i>This provides an immersive experience. You can look all around you, and zoom in on features of interest.</i>
	Closely-spaced, linked panoramas so it is possible to travel through the landscape.	<i>Provides a sense of scale and orientation. Helps you to understand how the landscape changes from one location to the next.</i>
	Integration with Google Maps, and geolocation data available for use in Google Earth and other GIS software.	<i>This allows you to compare ground-level views with imagery acquired from satellites, aeroplanes, drones etc.</i>
	Can be viewed on any modern device with an internet connection, including phones and tablets. There is no requirement for any browser plug-ins or other proprietary software.	<i>Easy to use.</i>



# VIRTUAL FIELD COURSE VENUES



## Arolla Valley, SWITZERLAND

- alpine landscapes • glacier retreat • paraglacial reworking • Little Ice Age • moraines • supraglacial environment and processes • glacial erosion • weathering and mass wasting • human impacts •



## Ferpècle Valley, SWITZERLAND

- alpine landscapes • proglacial environment (rivers, sediment, lake) • human impacts • Little Ice Age • moraines • proglacial meltwater channel • paraglacial reworking • glacier terminus •



## Grande Dixence, SWITZERLAND

- HEP • dam • alpine landscapes •
- This tour only has 6 stops. It will be developed further when time and finances allow.



## Lötschental, SWITZERLAND

- alpine landscapes • meadows • glaciers • moraines • Little Ice Age • debris cones • snow avalanche tracks and deposits • river • rock slope deformation • cirques • glacial troughs • forests • Little Ice Age •



## Moiry Valley, SWITZERLAND

- alpine landscapes • glacier retreat • Little Ice Age • moraines • paraglacial reworking • talus • debris cones • icefall • supraglacial sediment and ablation • supraglacial meltwater • striae • ice-moulded bedrock • HEP scheme •



## Roseg Valley, SWITZERLAND

- alpine landscapes • braided river • moraines • debris cones • alluvial fans • glacier • talus • avalanche tracks • slope failure • Little Ice Age •





### Big Pine, CALIFORNIA, USA

- semi-arid / arid climate • till • moraines
- talus • talus cones • snow avalanche (evidence for) • ice-moulded bedrock • rock glacier •



### Lyell Canyon, CALIFORNIA, USA

- forests • floodplain meadows • river • glacially-transported boulders • glacial trough • talus • snow avalanche tracks
- bedrock (granite) • bedrock joints • unloading and exfoliation • ice-moulded bedrock • Matthes glaciation / Little Ice Age • moraines • cirques • glacier • striae • chattermarks •



### Tuolumne Meadows, CALIFORNIA, USA

- granite landscapes • roche moutonnée
- meadows • meandering river • bars • islands • bank erosion • point bars • scroll bars • cutoff meanders •



### Helvellyn Range, NW ENGLAND, UK

- granite landscapes • roche moutonnée
- meadows • meandering river • bars • islands • bank erosion • point bars • scroll bars • cutoff meanders •



### Keskadale, NW ENGLAND, UK

- moraine • headwall • Younger Dryas • solifluction



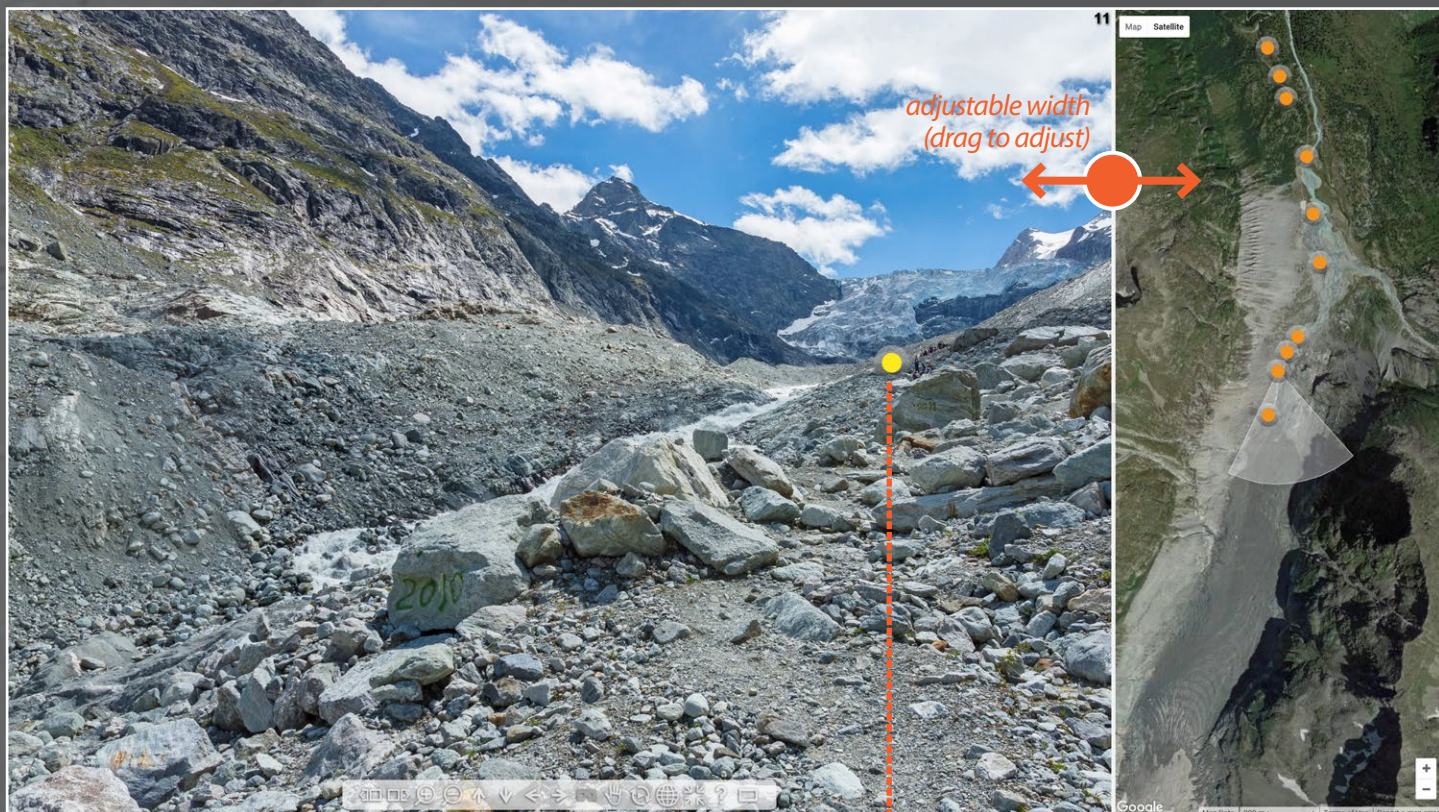
### Mosedale, NW ENGLAND, UK

- rivers • talus • debris flow tracks • debris cones • moraines • Younger Dryas • glacial troughs •



# INTERACTIVE PANORAMAS

This is the default view when opening any virtual field trip. The left-hand pane, which fills most of the window, is the interactive panorama. It shows you what the ground-level view looks like. To the right is the map pane, although satellite imagery is shown as standard.

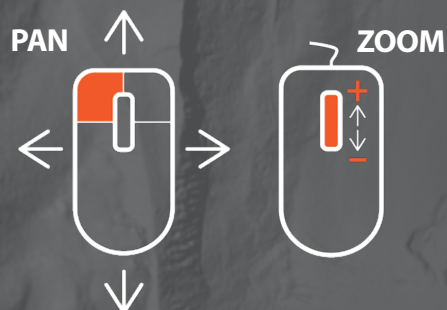


**interactive panorama**

**map pane**

## PAN AND ZOOM

Keeping the left mouse button depressed, drag your mouse in the direction you want to face. You can look all around you, as well as straight up and straight down. If you want to zoom in or out, use the mouse wheel.



## GO TO NEXT STOP

To navigate to the next stop, click on the yellow hotspot.

## TOOL BAR

The tool bar at the foot of the main window can mostly be ignored. However, the 'Enter Fullscreen' button is worth knowing; it will make the virtual tour fill the entire screen, creating a more immersive experience. To get back to the default view, either press the Esc key or click the 'Exit Fullscreen' button. Note that the option to go fullscreen is not currently available on iOS devices.

## MAP PANE

The right-hand pane shows your location and the direction you are facing. You can alternate between 'Map' and 'Satellite' views.

## PAN AND ZOOM

You can pan and zoom around this imagery using your mouse.

## NAVIGATION

You can click on any of the orange hot spots on the map pane in order to go directly to that panorama.

## REMOVE THE MAP PANE

Click on the 'hide map' icon (the globe) on the menu bar.



# GEOLOCATION DATA



Google Earth file (.kml)



Spreadsheet (.csv)

Each virtual field trip includes coordinate data for each stop, provided in both .kml and .csv file formats for maximum flexibility. Although the locations for each stop are shown in the map pane, you may wish to view these locations in Google Earth or some other GIS software / service (e.g. QGIS, ArcGIS online).

## DOWNLOAD

To download the files, simply click on them. They will download to the default location, which is typically the downloads folder.

## Other GIS software / services

The spreadsheet (.csv) file format has been provided for use in GIS software, such as ArcMap and QGIS, as well as online GIS services (e.g. ArcGIS online).

## Google Earth

Both files can be dragged into Google Earth, but the native .kml file is easier to use. The location of each stop is shown. This is a great way to relate ground-level view with remotely-sensed imagery. You can also do some landform mapping!

# swisstopo

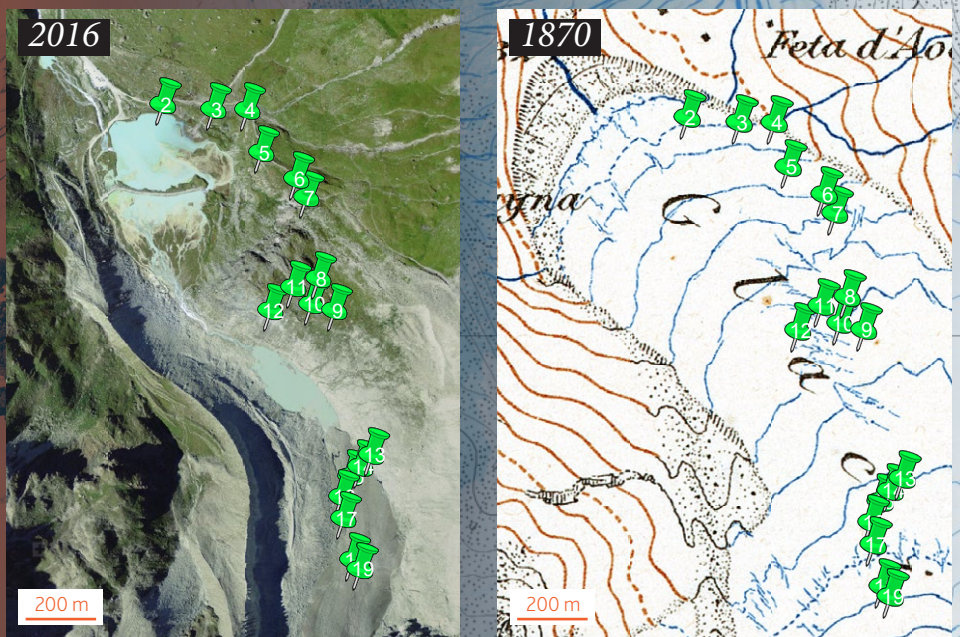
This is a comprehensive online GIS service run by the Swiss national mapping service. The link on each virtual field trip home page loads the swisstopo website at the correct location. You can explore the maps, including those produced in the nineteenth century when glaciers were at or near their maximum Little Ice Age extents. These maps can be compared with the present-day landscape using the virtual fieldwork resources.

## VIEW VIRTUAL FIELD TRIP LOCATIONS

Drag-and-drop the .kml file from your computer onto the swisstopo web page. Each stop will then be displayed, including site numbers (see screenshots to right).



Moiry Glacier virtual field trip (Stop 7). Imagery acquired in 2017.



Moiry Glacier virtual field trip sites shown on satellite imagery (left) from 2016 and the Siegfried First Edition Map (right), c. 1870. © swisstopo

## **VR** Glaciers & Glaciated Landscapes

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