Solid Earth Discussions

Solid Earth Discuss., referee comment RC1
https://doi.org/10.5194/se-2021-110-RC1, 2021

Comment on se-2021-110

Lidia Lonergan (Referee)

Referee comment on "Virtual field trip to the Esla Nappe (Cantabrian Zone, NW Spain): delivering traditional geological mapping skills remotely using real data" by Manuel I. de Paz-Álvarez et al., Solid Earth Discuss., https://doi.org/10.5194/se-2021-110-RC1, 2021

Review of de Paz-Álvarez et al., *Virtual fieldtrip to the Esla Nappe (Cantabrian Zone, NW Spain): delivering traditional geological mapping skills remotely using real data*

General comments:

This paper provides a detailed description of a virtual field mapping course designed to replace a pre-COVID-19 mapping exercise in the Cantabrian mountains for second year undergraduate Geology students from the University of Cardiff, Wales. Importantly it also assesses and discusses the efficacy of the virtual field course in achieving learning objectives, and teaching field mapping skills. While not a research article it fits very well with the remit of the special Issue on "Virtual geoscience education resources" and is a very useful method-style article.

The course was designed to allow students to continue to develop their field-mapping skills and to gain practise in employing the same methodology as that used in in-person mapping. It was set in the same area as the previous pre-COVID-field course and designed to allow students to work independently as they would if they were in the field. In response to the pandemic, university instructors have been developing remote field trips of varying levels of complexity and different technologies ranging from virtual courses with extensive recorded video content to field trips in immersive video-gaming environments. This particular example is purposely designed to be a 'low-tech' solution using Google Earth. The ease of installation and good performance on average computers, allowed for maximum inclusivity for students working remotely from the university, and reduced the need for specialist software which would require more training for effective use by the students. The course is delivered via Google Earth with all necessary data (e.g. outcrop description, bedding data, photographs, fossil images) provided via links to an online repository embedded within the Google Earth locality stop information (.kmz file). Most helpfully the authors provide all the links to the web-based data repository (a GitHub repository) and the .kmz files allowing others to gain further insight, reuse the material, of take the course themselves.

The aim of the course is to construct a geological map on a hard-copy topographic map, with accompanying stratigraphic column, cross-section and structural data. Thus, while the delivery of the course and materials was virtual the final map 'product' to be produced was traditional hardcopy. This appeared to work well, and if a fully digital map is required, though the use of GIS software the course participants could equally well produce a digitally designed map.

An important and valuable part of this paper is the attempt made to evaluate the success of the virtual field trip in terms of whether learning objectives were met and to report student feedback. This is done via questionnaires (for feedback) and comparison of grades achieved in the virtual course with five years of historic data for 'traditional' mapping. The fact that the virtual course was designed to cover the same area as the previous in-field course, with similar learning objectives allowed this to be done effectively. One interesting result was that the reports produced from the virtual field mapping exercise had a lower mark than the 5-year average from physical trips; various reasons for this are discussed thoroughly. Although the low number of responses from students to the questionnaires precludes drawing representative conclusions, I think the data from the questionnaires is still worth including in the paper as it provides valuable context on participants' assessment of how well the course prepared them for future mapping. Ultimately the authors conclude that while the virtual course was successful in training several field geology skills, other key skills (e.g. gathering geological data at outcrop scale, using a compass for measuring structures) cannot be learnt in a virtual environment.

While virtual field trips have been designed to solve an immediate need to teach fieldworks skills during a pandemic, they do have important potential applications for the future when in person fieldwork can resume; and the authors discuss the potential benefits thoroughly. One example is that the participants learn valuable digital skills from using Google Earth topographic data and aerial imagery that complement traditional geological fieldwork. The course could easily be modified and be usefully employed by students to prepare for a residential field mapping course, as noted by the authors. Importantly, virtual field courses make field geology more accessible to those unable to attend residential trips for health reasons. This is increasingly important as educators strive for more inclusive learning opportunities.

Another important point made in the paper is that the authors’ detailed geological knowledge of the area including the wealth of existing field data collected by them throughout the years was key to the successful delivery of course. I can concur with this from my own experience in delivering virtual field courses in the last 18 months.

The paper is very well-written, logically structured with detailed information on how the virtual field course is constructed, the materials provided and what is expected of the students. I briefly tested the online resources through the Google Earth kmz file and all worked very well and could be followed easily. The supplementary material includes the links to the data repository and the manual for the course.

I am impressed with the amount of field data included and the design of a successful virtual field mapping course, that succeeds in teaching many important mapping skills. I enjoyed reading the paper; and have no major changes to suggest.

Specific Comments

At several points in the paper it states or infers that 5 days/ 40 hours were allocated to the virtual course -to replicate 8x 5 field days; elsewhere it is stated that students had 20 days before electronic submission (p. 10 line 206); it would help to clarify how long the students were expected to spend on the virtual fieldwork (e.g. 5 consecutive timetabled days?) and how long was allocated to ‘writing up’ results, including drawing sections, finalizing map etc.

Reference to existing literature is thorough and provides a very valuable background information for those seeking an introduction to virtual field work; I am not an expert in geoscience educational research but references cited seem recent and appropriate.

Technical corrections

Line 29 – replace 'transversal' ; should it be 'transferrable' ?

Line 73 -replace 'these trainings' training not generally used in plural; 'these approaches' or these courses might be appropriate

Line 95 'sub-greenschist' add hyphen.

Line 299-300 'During year 2020-2021, students…." Rewrite – during the 2020-21 version of the course

Line 318 "In our view, this data and material abundance is a crucial bottleneck decisive for a successful implementation"   Rewrite – I don't fully understand.

Figure 5 – Violin plots. Is label on first histogram correct? "How did the time to complete EMP adjusted to the students?" Likewise blue label on final histogram needs word order changing and spelling correction- "How useful an extra mapping day wold have been to improve the map?" and grey label on same histogram (word order).

Lidia Lonergan. Imperial College London. 28 September 2021