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Comment on gc-2021-9

Alexander Lusk (Referee)

Referee comment on "Virtual mapping and analytical data integration: a teaching module using Precambrian crystalline basement in Colorado's Front Range (USA)" by Kevin H. Mahan et al., Geosci. Commun. Discuss., <https://doi.org/10.5194/gc-2021-9-RC2>, 2021

General comments:

Overall, the manuscript is clearly written and does a nice job of outlining and documenting the authors' 'ready-to-go' virtual field module. I have worked through several parts of the module and am impressed by the amount of material the authors have compiled and included in the exercise. In the manuscript, I appreciate that the authors clearly state the learning objectives. In the module, the questions at the end of each exercise in Part II do a nice job of getting students to think about how different types of data (e.g. mapping and lab) can be integrated. The questions prompting students to address sources of uncertainty are especially valuable in promoting higher-order thinking.

I think the manuscript could be improved by addressing the following:

First, I manuscript would benefit from a section discussing how effective the module is in achieving some of the discipline-oriented learning objectives (e.g. 1-4 from Table 1). My understanding is that a version of this exercise has been used several times, which means the authors may have some insight into how an exercise like this translates to students who then work in the field? A further discussion of student survey results would also be interesting and provide useful information for instructors who are considering this exercise in their curriculum.

Second, the text would be clearer with slight reorganization or addition of a 'module outline' or something along those lines. Excluding two sentences in the paragraph at the end of the introduction (lines 35-38), the authors provide no indication of the module structure or content until Section 4. In my opinion, an outline of the project early in the text would serve the reader well. For example, throughout Section 2, the authors refer to different aspects of the module without having explained the overall module structure (line 74 refers to a 'Part III', which is the first mention of this as far as I can tell. Also, Section 2.1 – Learning Objectives – refers to specific parts of the module which have not been clearly explained).

In terms of the module, I have a couple of comments and/or points of discussion:

From working through parts of the module, in my opinion, the main strength comes from the integration of different data types (i.e., Part II). My main issue is not so much a critique of this project as it is a perceived shortcoming of attempting to have students 'map' virtually – and this is coming from the perspective of someone who supports the use of virtual exercises in the classroom. I suspect that in an exercise like this where students pick stations that already have units identified, measurements, and interpretations, they potentially miss out on developing many of these field skills that are necessary to produce a map. Admittedly, these skills are not listed by the authors as learning objectives.

Regardless, I am curious to hear the author's thoughts on how effective Part I of the project was in teaching students how to map in the field (related to my first comment above). To the credit of the authors, they do add the exercise of picking out new stations on a daily basis and ask students to provide justification of their choices. While this certainly helps encourage students to think critically and strategize, it does not capture the real-time decision making that is an important field skill. I wonder if releasing stations to students multiple times throughout the day and requiring them to choose stations within a restricted geographic region relative to their most recent selection could be an alternative way to run this exercise that would help students develop these skills?

Specific comments:

Many of the station files have interpretations already included. Maybe it would be

beneficial to student learning to prompt this sort of interpretation from the student (e.g., show the shear sense indicators and ask students to determine the sense of shear)?

Section 2 - As mentioned in the general comments section, at this point in the manuscript the reader has only a rough idea of what the module comprises. So the discussion of how learning outcomes are achieved, what materials are provided, etc. is difficult to follow.

74 – What is 'part III'? Also, you never properly defined parts I and II.

80 – What is the 'google earth web project'?

307 – Personally, I would be interested in seeing a summary of the pre- and post-course assessment forms.

Technical corrections:

16 – COVID-19 in abstract, Covid-19 in introduction

17 – 'on-line' should be 'online'

41 – no hyphen in 'pre-requisite'

79 – should be StraboSpot

81 – '3-d' here, but '3-D' in the latter sections of the manuscript. '3-dimensional' is used in places.

85 – I am not sure if 'set-up' should be hyphenated?

124 – is 'fieldwork' the appropriate term?

125 – The first 'when' is unnecessary.

229,285 – Should be 'these data' (may be more instances throughout)

240 – Personally I would prefer 'mylonitic quartzite'

Dataset2microstructure – questions to answer #2. 'quartzite' misspelled

Dataset6detritalzircon – questions to answer #3 is vague and may be better framed as a question.