

Interactive comment on “Geo-locate Project: A novel approach to resolving meteorological station location issues with the assistance of undergraduate students” by Simon Noone et al.

Simon Noone et al.

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Anonymous Referee #1 Received and published: 11 August 2019 Review of Noone et al. 2019 This paper describes a new way of incorporating real world data quality assessment into undergraduate geography classes. This group have pioneered data rescue/citizen science activities in the tertiary education space and it's exciting to see another project of theirs. My suggestions are relatively minor, and mainly concern the quality of the writing. I believe the language in the paper could be tightened significantly, which would make it easier to understand. The suggestions are not exhaustive, and there are other edits the authors can make to improve the manuscript further.

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Response: We would like to thank Referee 1 for their helpful and constructive comments, which will help improve the manuscript.

General suggestions Referee comment: It needs to be made clear somewhere in the paper that the authors are talking about locating the general position of a station, to an accuracy of a certain number of kilometres, as required for reanalysis or gridding purposes. The authors need to clarify that the updated positions provided by the students are not suitable for homogenisation assessment for example, because the updated locations might not be correct in terms of exposure.

Response: We will make clear in the revisions that the student locations are potential approximations to the actual location (See line 274-275). That said, our experience in two- and a-bit years to date of dealing with the data is that, sadly, in the available archives knowing the true location of a station is the exception and not the norm. So, the student locations, while they may be a little more ambiguous than some other locations, are not in reality that different from the case for many of the sources we are dealing with. We would love to know the actual position, and rich metadata of all sites. The reality, unfortunately, is a lot messier. Anyone trying to assess homogenisation will, for many stations, need to grapple with stations of ambiguous location. At least following the student assessment, the locations are now sufficiently plausible that they can be used for certain applications. We would note that via the relational database approach the full provenance of the student location of the station shall be available to end-users.

Referee comment: In section 6, it would be nice to hear about how the authors plan to improve the experience of future students, or how other centres could incorporate a similar project in their curriculum. For example, do you think the students would have responded better to Dick Dee if he had attended the class in person? Do you need to provide more concrete examples of how the work helps climate research, or why so many stations have incorrect coordinates? Would the students benefit from exploring the climate of a particular station they are correcting? Would the task be more or

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less appropriate for earlier or later in a degree? Some of this may be covered in the introductory lecture given to the students, but it was not outlined in section 3.

Response: Thanks for the suggestions. We have redrafted and retitled section 6 to be more explicit. In particular since submitting the manuscript discussion with colleagues at NOAA CIRES has highlighted the potential to use 20th Century reanalysis products to identify dubious locations and verify potential relocations. It is too late to incorporate this in the 2019/20 class, but we are actively considering doing this for 2020/21 which would add a valuable data analysis aspect. This and other aspects are now touched upon in the expanded section.

Specific suggestions Line 16–17: land-based station meteorological data information feels very clumsy. Can you say information on data from land-based meteorological station instead? Response: Agreed, we have changed the text accordingly.

Line 20 and throughout: The article assumes that the reader knows what the Copernicus Climate Change Service is. I'm not sure that's fair to international readers – you might consider adding a few sentences about its purpose and significance in the introduction. Response: We have added a sentence briefly explaining the Copernicus C3S service and provided a link to the Copernicus webpage for further information.

Line 25: I'd add a colon after projects Response: added colon.

Line 36: please clarify what the 'this' is that you're enabling Response: Redrafted 'to enable other organisations to instigate similar programs.'

Introduction: It's not clear to me why the opening paragraph is about the contract logistics of the project. Why would a reader, or future implementer of this project, care about that? You'd be better to start with lines 67–71 about the value of observations, before providing this detail, if it needs to be provided at all. Response: Agreed. We will move this to somewhere more appropriate but it is required contractually that we outline this in the manuscript.

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Line 81: add 'of' between 'amount' and 'time' Response: added "of"

Line 103: why use 'utilized' when you can use 'use'? Response: Changed to "used"

Line 131: This sentence reads a little strangely – I know what you mean, but it sounds like Irish records go back 4000 years. Response: We have edited the sentence to say: "in excess of 4000 station years of early daily Irish rainfall records" adding in the word "station"

Lines 143–153: This section describing the paper outline could be shortened. For example, you don't need to say 'Therefore, we have undertaken to expand the curriculum activities in this area as described in the present paper'. You could just say something like 'That is the goal of this project'. Response: Agreed.

Line 159 and throughout: I think it's better to say 'stations with sub-daily data', 'stations with daily data' and 'stations with monthly data' rather than 'sub-daily stations', 'daily stations' and 'monthly stations'. Surely they are not independent. Response: we have edited the text as suggested.

Line 164 (and throughout): You don't need to say 'We present a map in Figure 1 that shows: : :'. You can just say 'Figure 1 shows'. Similarly in line 177–178 you could remove this sentence completely and just add (Table S1) at the end of the previous sentence. Response: Text has been edited as suggested.

Line 168: A word is missing between 'located' and 'the ocean' Response: Added the word "in"

Line 181 and 185: I'm not sure what you mean by 'the balance' Response: Changed balance to "the remaining"

Line 215: You say 'correct geographic location', but how do you know they are correct? It might be better to say improved. Response: edited text as suggested to "an improved location"

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Line 243: 'was', not 'has been' Response: edited text as suggested

Line 253: I'd split the sentence into two here, the second one starting with 'We also developed short videos: : : ' Response: edited text as suggested

Line 257: 'students' work' Response; added apostrophe "students"

Line 282: There should be a comma after project. Also, why are the students looking at 811 stations, not 880? Response: We have clarified that 69 stations were not attempted at all by students due to initial distributions problems: "For the pilot project students attempted to resolve location issues at 811 stations. There were some initial problems with the distribution of the station sheets to the students, so 69 stations were not attempted. In addition, not all the 811 stations were attempted by three different students (triple verification)."

Line 301: Why was it easier for the extra checks to be made? Sadly, I also worry that 'from scratch' might not be understood by all international readers. Perhaps you could say something like 'from the beginning of the process' instead? Response: We have added why these checks were much faster due to the information provided by students. We have also edit from scratch as suggested.

Line 304: Is that proverb Chinese? Response: You are correct it is an old English proverb from 1300.

Line 339: Comma after 'round two' Response: added comma.

Line 354: Comma after 'project' Response: added comma

Line 368–370: Why was the second round faster? Response: We are not sure why the second round was more efficient, but we did provide more National Meteorological agency station information sheets which may have been the reason. Many of the revised stations were also verified by two students which made checking much faster. We have added a sentence to the paragraph to clarify.

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Section 5 and 5.1: I think you could shorten this section. You don't need to provide a section outline. You could also think about picking out the key parts of the pedagogical aims and learning outcomes that the project addresses and providing readers with a link to the full set, rather than reprinting them. Response: This section was requested by the editor in his initial review comments prior to the article going online. We are reluctant to change it at this point.

Line 420: You don't need to say 'of this paper' Response: edited as suggested.

Line 432: Agreed or disagreed, not agree or disagree Response: edited as suggested.

Line 485: Comma after 'assignment'. Also, how long did the students get for the task, if some of them commented that they did not have enough? Response: We have added comma. Students were allocated 4 weeks to complete the task, we have added a sentence to clarify.

Line 487: OSCAR, not Oscar Response: Edited as suggested.

Line 531: remove 'for more information see' Response: Edited as suggested.

Line 550: Based on your results, I'm not sure I would say 'very positive'! Maybe 'generally positive'. Response: removed very from sentence.

Figure 1: It's quite hard to tell the dots apart if the image is in black and white. Could you make the blue dots empty as well? That could also show the overlap between stations with daily and monthly data. Response: We have replotted as a two figure panel for daily and monthly separately to address this. Figures 2 and 4: Make sure the font is not too small to read in the final version of these Figures Response: Yes we will make sure that the font is not too small. We have moved figure 6 to the supplementary material.

Figure 8: Why are the original locations not available for Mexico? Response: We are not sure why. The station inventory which was available with this data but showed missing values for the latitude/longitude/elevation for these stations. Once the data has

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been investigated further and if the geo-coordinates are in the station files the improved ones will be compared and checked.

Table 2: It might be better to reverse the order of this table. The first thing I noticed was that the Dick Dee video was the most popular for 'least important aspect', which is not discussed. Response: Agreed and the table has been revised.

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