Dear editor Dr. McLean,

First of all, we would like to thank you for the handling work of our manuscript as well as for your constructive reviews (also to the first draft), together with the ones of referees Kylander-Clark and Mottram. At the bottom of this letter, we have answered to the different issues you pointed out.

Now we attach the new manuscript, both the revised text and the version that tracks all the changes. The most significant changes are related to the methodology section, which has been considerably expanded after referees' suggestions, and the gathering of figures 3 and 4 in a single figure with different colours. The discussion has been slightly extended, and some of the sentences reformulated, following the reviewers' questions and advices. Likewise, the introduction has been reformulated in order to bring more attention to the study. Due to those changes, 5 new references were added. Finally, the revised manuscript has been also revised for the spelling.

All in all, we believe that the revised manuscript improves the first version and therefore, we hope that it is considered for publication.

Sincerely,

Aratz Beranoaguirre (on behalf of the authors)

Dear authors,

Thank you for your submission to GChron. Two reviewers agreed that your submission meets the scope and standards for publication in Geochronology and I agree -- this contribution will be of wide interest to geochronology practitioners and to sed/strat types interested in expanding their toolbox of dateable phases. The thorough, constructive reviews contained helpful suggestions that the authors have agreed belong in a revised version of this manuscript. I am particularly interested in the line of questioning advanced by Kylander-Clark, pointing out that pit depth is one of several concerns when attempting to matrix-match standards. Is there a visualization you can provide that illustrates similarities/differences in downhole fractionation behavior or the degree of U/Pb ionization/fractionation, beyond the broad agreement among predicted and measured results?

I recommend the authors adopt the reviewers' changes as minor revisions. In a revised manuscript and accompanying letter, please describe your edits and address several more minor suggestions of my own, outlined below.

Best wishes,

Noah McLean

Line 31 – remove the word 'and'

Beranoaguirre et al.: The word "and has been replaced by "in".

Line 71 – The semicolon here and all others throughout the manuscript should be replaced by a comma.

Beranoaguirre et al.: Changes performed as suggested.

Line 91 – remove the word 'the'

Beranoaguirre et al.: This is now corrected.

Line 103: Multipliers and SEMs should be plural. Also, these SEMs are not referenced in Table 2 and are instead referred to as MICs.

Beranoaguirre et al.: This is now corrected.

Line 121 – There is a double period..

Beranoaguirre et al.: This is now corrected.

Line 122 – do not capitalize concordia.

Beranoaguirre et al.: This is now corrected.

Table 1: Detection System – the methods text says that you stay in 'pulse' mode, but this box indicates that you use both analog and pulse modes.

Beranoaguirre et al.: The text has been modified, to match Table 1.

Table 1: Data processing – cPb should be Pbc

Beranoaguirre et al.: This is now corrected in both Table 1 and 2.

Table 1 and Table 2: Uncertainty – the Greek letter delta should be changed to the Greek letter sigma.

Beranoaguirre et al.: This is now corrected in both Table 1 and 2.

Line 135 – remove the hyphen in common-Pb here and elsewhere (e.g., line 205).

Beranoaguirre et al.: This is now corrected throughout the text.

Table 3 – the first five rows reference samples that are not described elsewhere in this paper. As written, this data just belongs to a lab-specific sample number and is not helpful to the reader. Please provide brief sample descriptions for these or omit them from the table.

Beranoaguirre et al.: Table 3 has been removed. The unsuccessful samples are only shown in Figure 2.

Line 147 – is the uncertainty in the date reported here as ±1σ or ±2σ uncertainty? The same goes throughout the paper. My strong suggestion is to indicate this for every reported data throughout the manuscript. That keeps confused readers from having to search the entire manuscript for the one place you specify this. So, the date reported on line 147 should read "… intercept at 6.01 ± 1.19 Ma (±2σ, MSWD = 1.07, Fig. 3).

Beranoaguirre et al.: All the data shown in the manuscript is ±2σ. Now it is indicated in the text.

Figure 3: This figure needs more explanation. Are date and y-intercept uncertainty reported as ±1σ or ±2σ? What are the two uncertainties reported in the 'age'? What is the level of uncertainty displayed for the regression line? I also find the dates (older than the age of the Earth) displayed on the visible segment of concordia to be distracting – there is no need to illustrate this concordia line segment. It can be helpful, perhaps as an inset, to display the lower concordia intercept in the same frame, to get a feeling for how far the regression line must be extrapolated. I also like Kylander-Clark's suggestion to combine the repeat analyses on the same plot, with a color-coded distinction, and would be interested in the best-fit age from a combined regression analysis.

Beranoaguirre et al.: This figure has been modified according to the referees' suggestions. Now the different sessions are combined in a single diagram for each of the samples. The rest of the suggestions have been also taken into account.

Line 170 – delete the word 'water' and correct the spelling of cyclostratigraphic.

Beranoaguirre et al.: The corrections are performed.

Line 208 – comma after fluids, change intergrowth to intergrown

Beranoaguirre et al.: The corrections are performed.

Line 213 – I'm confused at the use of cf, which means 'compare with' in the reference here. The Clauer et al reference here is just to document high Ca and SO2 concentrations, right?

Beranoaguirre et al.: "cf." is now deleted.

Line 234-235 – revise this sentence for clarity.

Beranoaguirre et al.: This sentence has been reformulated.

Line 248-249 – The sentence that starts “Regardless…” needs a new figure for illustration, comparing the age predicted by astrochronology with your measured data and uncertainty. The former might appear on the x-axis, the latter on the y-axis, and ±2σ uncertainty bars (identified as such in the caption) overlapping a 1:1 line (also identified in the caption) would illustrate agreement between the two. Any persistent bias between the two systems will appear as measured data appearing systematically above or below the 1:1 line.

Beranoaguirre et al.: We are aware that this type of figure is traditional when comparing analysis of the same reference material in two different laboratories or with different methodologies. But in the case of this study, the much larger uncertainty in the U-Pb analysis compare to the astrochronological data (a couple of thousands of years of uncertainty), will turn in a perfect alignment to the 1:1 line. Therefore, we believe that this figure is useless in our case. In any case, the assumed astrochronological ages are now shown in figure 3, so the reader can easily compare the data at a glance.

Line 253 – change evaporites to evaporite

Beranoaguirre et al.: This is now corrected.

Line 254 – change ‘alleged’ to ‘hypothesized’

Beranoaguirre et al.: The change is performed.

Line 258 – revise this line for clarity.

Beranoaguirre et al.: This sentence has been reformulated.

Line 266 – revise this line for clarity.

Beranoaguirre et al.: This sentence has been reformulated.

Line 269-270 – revise this line for clarity.

Beranoaguirre et al.: This sentence has been slightly modified.

Lines 271 and 272 – remove the hyphen from pit-depth

Beranoaguirre et al.: Changes performed in the whole text.

Line 274 – Please calculate the bias between the U-Pb and cyclostratigraphic ages as a weighted mean of the delta-t for the four samples that yielded interpretable ages.

Beranoaguirre et al.: The U-Pb data calculated here, are within the uncertainty of the cyclostratigraphic ages and therefore, the bias cannot be calculated.

Line 285 – remove the comma after both.

Beranoaguirre et al.: Change performed.