Interactive
comment

Interactive comment on "Direct U-Pb dating of carbonates from micron scale fsLA-ICPMS images using robust regression" *by* Guilhem Hoareau et al.

Anonymous Referee #2

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This is an interesting manuscript that shows the first application of a fs LA system to U-Pb dating of carbonates. While a method using an imaging approach similar as in Drost 2018 is used, a direct comparison including differences and improvements is only partly given and should be improved. To show that the robust regression works similar or better than the approach by Drost 2018, a direct comparison on the same data set using both approaches should be given. Generally, the improvements and new findings compared to existing and published methods should be more emphasised, including the use of fs LA, its possibility of high repetition rates, fast scanning, and the ease of use of the robust regression of individual points. Please provide the "raw" data of your images so that the interested scientist can look and play with the data

themselves. Please be consistent and always us ICP-MS or ICPMS. Abstract: Quite a few carbonate ages are published using quadrupole ICP-MS, I suggest to generally talk about ICP-MS in the abstract. Line 57-58:" Additional examples of the interest of this new approach are provided in Roberts et al. (2019)." This sentence does not fit here.

Line 87: Please clarify where the age with poor statistics is coming from.

Line 105: mixing of He aerosol flow with Ar "in" the ICP-MS ? Please be more precise.

Line 110: I do not think it is relevant that the ICP-MS used is a HR instrument, but a sector field.

Line 116: The First image: No pre-cleaning pulses? How do you recognise surface Pb contamination?

Line 132: If you apply the robust regression that puts the lowest weight to the outliers, why is in your procedure a second step necessary rejecting 2.5% outliers? What is the difference to the results without rejection?

Line 141: Each pixel of the image consists of 8 measurements (average) it should then be possible to calculate an uncertainty, and a different regression approach might be possible for comparison with the robust regression presented here.

Do you do the first and second image on the same day, same sequence? How long does it take to analyse image 1 get the image as presented in Figure S2? What is the criterion to select the region for image 2? (I would guess highest U/Pb variability or highest U concentration). Based on Figure S2 this is not clear or rather random especially for Sample ETC2 as the image 2 is outside image 1, Why?

Drift correction with RM measured only every 38 to 76 minutes? No Drift correction for the U/Pb ratio? Please describe your approach in drift correction and its influence on uncertainties in more detail.

All Figures with the robust regression have a white to blue, 0.x-1 colour scheme indicated on the right (I assume the weight as described in section 2.3.3?), but nowhere explained what it means. There are also open circle symbols likely the outliers that are not described. Please give this information either directly in the figures, or the figure caption, or leave it and just have points. Light blue to white points are hardly visible on white background.

Section 7.1 Please give the sensitivity of your instrument as % of # ions detected of # of atoms ablated, e.g. for a volume measured crater in NIST 610 and a measurement of U only.

Please mention what kind of ablation cell is used, single volume, 2 volume, manufacturer, size, shape etc.

What is the possible sample throughput of your system per day with the described method?

Out of curiosity, what kind of cones (Jet sampler and H or X skimmer) do you use in combination with the Jet Interface of your Element XR? (this does not need to be part of the manuscript)

Figure S2: mn should be min. Please indicate what is plotted either in the figure itself or the caption (238U/206Pb)?