

The paper of Halsted et al. presents a statistical analysis of 624 samples from fluvial sediments where both  $^{10}\text{Be}$  and  $^{26}\text{Al}$  have been measured (among all samples, 121 new  $^{26}\text{Al}$  measurements are presented).

From these measurements and the determination of denudation rate for both nuclides, the authors state that when the two denudation rates are equal within uncertainties the sediment undergone a simple history and for more than 276 samples with denudation ratios below 1 the authors argue that burial must be involved.

This paper is well written and fairly present all calculations and tests performed on this dataset. I think it is worth being published in Geochronology providing some precisions and corrections.

- I think the title should be modified as the authors have only work on the denudation ratios, not on the concentration ratios as it is referred.
- Perhaps a nasty question; Except the dataset, how this paper differs from Wittmann et al. (2020)? It seems that the two papers have the same conclusion: in large floodplain the probability to have a discordant denudation ratio between the two nuclides is greater than in rapid eroding settings with fast transport.

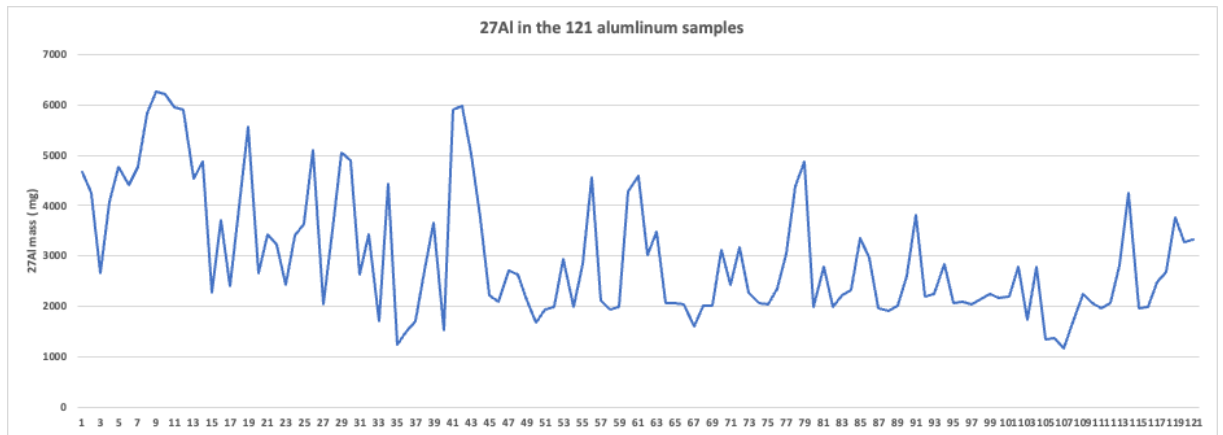
In the abstract it is mentioned lines 32-33 that the denudation ratio study will bring a deeper understanding of sediment routing and whether erosion rate assumptions are violated. I did not see this in the present paper; I think that the authors should work on this to propose a paper that will complement the work of Wittmann et al. . If there is a length limitation in the manuscript for this, the introduction and the background sections can be reduced.

- I have a major concern regarding the newly presented data. Line 221-222 you mention that you correct the ams ratios by subtracting the blank ratio.

-

$$\frac{^{26}\text{Al}}{^{27}\text{Al}_{\text{sample}}} - \frac{^{26}\text{Al}}{^{27}\text{Al}_{\text{blank}}}$$

This is not correct for  $^{26}\text{Al}$ . To do this the amount of  $^{27}\text{Al}$  in the samples must be the same as the one in the blank. This can be accepted for beryllium as the  $^9\text{Be}$  added is roughly the same for all samples including blanks. For  $^{27}\text{Al}$  the natural amount is highly variable as shown in the following figure presenting the  $^{27}\text{Al}$  variation in your 121 Al samples



Therefore, you must consider subtracting the  $^{26}\text{Al}$  atoms (determined from the amount of  $^{27}\text{Al}$  added in the blank and the corresponding measured AMS ratio), from the to the  $^{26}\text{Al}$  amount in the sample.

In Table 2S :

- precise the amount of  $^{27}\text{Al}$  added to each blank and potentially to the sample (precise if sample are spiked or not). As the methodology follows Corbett et al (2016) I have considered 2.5 mg of spike: ok?)
- Is the  $^{27}\text{Al}$  measurement in the aliquot recalculated for the total dissolved mass?
- Some blank ratios are missing (see the excel file, all red sheets are the modified ones and red cells the problematic ones.
- Some original batch ID have different UVM Original batch number

<b>SAP15</b>	<b>408</b>	<b>CH-16</b>	??
<i>SAP17</i>	<i>408</i>	<i>CH-13</i>	
			same
<b>BLK</b>	<b>408</b>	<b>CH-13</b>	

Batch 656 (CH-07) is present in the sample sheet, not in the blank one. Please harmonize these numbers.

Therefore, the corresponding blank is not easy to find.

Line 231: as you only compare cosmogenic data why do you add the production rate uncertainties?

Regarding the statistical analyses, I think you should move the “Morphometric and Climatological Basin Parameters – Detailed sources and procedures”. From the supplement to the main text as you are using many databased from different authors.

Figure 4: for erosion rate and basin area, adjust the x axis (crop after 2000m/myr and after  $2.5 \times 10^6 \text{ km}^2$ )

In supplement add the advantage of the tests you used (why Spearman's Rank correlation, etc...); this will help.

Figure 6 : Explain how you determined the outliers and try to mention the number of data selected per category ( in the supp file)

Line 379: are you sure that mean annual precipitation and aridity are presented in Table 1?

Section 5.2 : Here you can try to develop more how the denudation ration discordance may help. From this section one can only keep in mind that the “true” denudation rate may be given by  $^{10}\text{Be}$  ( $10^5 - 10^6$  years) and the denudation ratio (or the concentrations ratio, using a “banana plot”) discordance can be used to show potential sediment sequestration implying a decay in  $^{26}\text{Al}$  concentrations.

Reference : Wittmann et al (2020) is mentioned twice.