

RE: egusphere-2023-1783 (author) - manuscript accepted with corrections

Author's Response

Tom Coulthard

Comments to the author

Dear Violeta and co-authors.

I am delighted to inform you that your paper has been accepted for final publication in ESurf - subject to some technical corrections. This is a minor editing stage before proof reading and with no need for any reviewing process - the AE has identified a few minor changes and it would be great if you could make these please. Its likely they would need to be done in the proof reading process itself, so this also saves time and effort there.

Finally, I would like to thank you for all your hard work with the paper and I look forward to seeing the final typset and formatted paper published!

All the best, Tom

Dear Editor,

We are very glad to have received acceptance of our manuscript. We have made the required modifications, which details are presented bellow.

Associate editor decision: Publish subject to technical corrections by Veerle Vanacker

Public justification (visible to the public if the article is accepted and published):

This study from the Chilean Coastal Range nicely illustrates how anthropogenic disturbances (such as forest cover change or fires) alter catchment hydrology and sediment export. The authors used 10-Be derived denudation rates to benchmark modern erosion rates, and obtained modern erosion rates that are of the same order of magnitude as benchmark denudation rates. These results are unexpected and remarkable given the land use history of the region.

The revised manuscript nicely addressed the comments that were raised in the previous review rounds, and the revised discussion now provides more background on changes in the mechanisms of sediment production, transport, and export after forest plantations.

Veerle Vanacker

Thanks very much for all the improvements you made in our manuscript. We really appreciate your timely and dedicated review.

Additional private note (visible to authors and reviewers only):

A few minor suggestions

L17: hydroclimatic drivers

Corrected

L91: "if anthropogenic soil erosion is high"

Corrected

L97: as the timeseries is exceptionally long, you could state "over a 42-year period"

Modified

Figure 4 caption => C. Mean annual (?) suspended sediment concentration at....

Since the plot is showing the annual mean value of hydrometric data separated by seasons, we reworded the caption as follows:

Mean seasonal streamflow, baseflow and suspended sediment concentrations at "Purapel en Sauzal" station on an annual basis. Main monotonic trends are tested with Mann-Kendall and LOWESS smoothing for 1986–2018 (purple) and 2000–2018 (green). Unfilled circles are discarded data. A. Mean seasonal streamflow at "Purapel en Sauzal" station. B. Mean seasonal baseflow at "Purapel en Sauzal" station. C. Mean seasonal suspended sediment concentration at "Purapel en Sauzal" station.

L172: convert

Corrected

L175: you chose '4 at/g/yr' for the SLHL production rate. Can you provide a reference here to justify the choice of 4 at/g/yr ?

Done:

...where $P_{SLHL} = 4$ at/g/yr is the sea-level-high-latitude total production rate of the considered nuclide (Martin et al., 2017). f_{sp} , f_{sm} and f_{fm} are the fractions of this production rate due to spallation, slow muons capture and fast muons averaged over the catchment area, respectively (Braucher et al., 2011). S_{sp} , S_{sm} , S_{fm} are scaling factors depending on latitude and elevation averaged over the catchment area (Stone, 2000), and $\rho = 2.6$ g/cm³. No geometric shielding correction for topography was applied (horizon < 20° in all directions). The uncertainty in the denudation rate is the propagation of the analytical uncertainty and an assumed uncertainty of 15% in the production rate....

Table 1: Can you include the 10Be concentration that was measured in the blank in the caption of the table or in the text?

We incorporated this information in the supplementary table S1.

L241: Not entirely clear to me what you mean with "precision" and "recall" here. Can you add a sentence that briefly explains or describe how "precision" and "recall" are obtained, or what they represent?

We added the lines 239-240:

Precision is the amount of correct positive predictions (true positives / (true positives + false positives)) and recall is how many positive predictions the model made over all positive cases (true positives / (true positives + false negatives)).

L320 & 442: "at the earth surface" -> probably no need to capitalize the nouns here

modified

L383: "composed of" might be better here than "built by"

replaced

L413-415: this observation is very interesting, and similar to what was reported by Mediterranean basins in Spains where short-term and long-term erosion rates are also very similar (despite evidence of strong disturbances in the past such as e.g. during Roman times)

Thanks for this observation. It would be nice to have quantification of centennial-millennial erosion in those landscapes to better understand the evolution of degraded soils.

The CRN data are now summarized in Table 1. As they do not contain information on blanks, scaling and shielding factors, and production rates, they cannot easily be reused in further studies. Therefore, I suggest to add a table as supplement, or in Zenodo where all physical parameters are given that are needed for eventual reanalyses of the data. See e.g. Table 1 in Frankel et al. (2010) EOS 91(4).

Reference. Frankel et al. (2010). Terrestrial Cosmogenic Nuclide Geochronology Data Reporting Standards Needed. Eos 91(4). <https://agupubs.onlinelibrary.wiley.com/doi/pdf/10.1029/2010EO040003>

Thanks very much for this observation. We included all the analytical information of our samples in the supplementary table 1.

References

- R. Braucher, S. Merchel, J. Borgomano, and D. Bourlès. Production of cosmogenic radionuclides at great depth: A multi element approach. *Earth and Planetary Science Letters*, 309(1-2):1–9, 9 2011. ISSN 0012821X. doi: 10.1016/j.epsl.2011.06.036. URL <https://linkinghub.elsevier.com/retrieve/pii/S0012821X11004079>.
- L. Martin, P.-H. Blard, G. Balco, J. Lavé, R. Delunel, N. Lifton, and V. Laurent. The CREp program and the ICE-D production rate calibration database: A fully parameterizable and updated online tool to compute

cosmic-ray exposure ages. *Quaternary Geochronology*, 38:25–49, 3 2017. ISSN 18711014. doi: 10.1016/j.quageo.2016.11.006. URL <https://linkinghub.elsevier.com/retrieve/pii/S1871101416300693>.

J. O. Stone. Air pressure and cosmogenic isotope production. *Journal of Geophysical Research*, 105 (B10):23753, 2000. ISSN 0148-0227. doi: 10.1029/2000JB900181. URL <http://dx.doi.org/10.1029/2000JB900181>.