

## 1. Responses to publisher remarks

**CE1:** On page 19, table A2, in the line for `surf_net_solar_rad`: The “Wm-2” does not have a space between W and m-2, while that seems to be the case elsewhere.

**CE2:** On page 25, table A9, in the lines for `gc_23_pavr`, `gc_23_vapy` and `gc_23_vbsr`: We noticed that the use of quotation marks has been switched. The abbreviation should not be in quotation marks.

The description column should be as follows:

Attribute	Description
<code>gc_23_pavr</code>	Fraction of pa with “subordinate volcanics” (vr)
<code>gc_23_vapy</code>	Fraction of va with “pyroclastics” (py)
<code>gc_23_vbsr</code>	Fraction of vb with “subordinate sedimentary rocks” (sr)

In the lines for `gbnew_fra`, `gbold_fra`, `gsnew_fra` and `gsold_fra`, the word “or” has been added, which is incorrect, see corrections as follows:

<code>gbnew_fra</code>	Basic and intermediate lavas: postglacial, historic, <del>or</del> younger than 1100 years
<code>gbold_fra</code>	Fraction of basic and intermediate lavas: postglacial, prehistoric, <del>or</del> older than 1100 years
<code>gsnew_fra</code>	Fraction of acid lavas: postglacial, historic, <del>or</del> younger than 1100 years
<code>gsold_fra</code>	Fraction of acid lavas: postglacial, prehistoric, <del>or</del> older than 1100 years

**TS1:** Once the paper will be issued a DOI, I will add a reference to the paper in the dataset, publish the dataset and the dataset DOI will be functional.

**TS2:** See TS1.

**TS3:** “H. B. Helgason and B. Nijssen: LamaH-Ice” is a good short running title.

**TS4:** Fine.

**TS5:** The change is fine.

**TS6:** In-text citation: Muñoz Sabater, 2019.

Reference list entry: Muñoz Sabater, J. ERA5-Land hourly data from 1950 to present. Copernicus Climate Change Service (C3S) Climate Data Store (CDS). <https://doi.org/10.24381/cds.e2161bac7> (last access: 5 June 2023), 2019.

**TS7:** Fine

**TS8:** See TS1

**TS9:** This code is our own. It’s included in the LamaH-Ice dataset on HydroShare, so perhaps there is not a need for a specific Zenodo repository for the code. Do you approve the following change:

“All code used to produce the LamaH-Ice dataset and plot the figures in this paper is included in [folder F in the LamaH-Ice dataset \(Helgason and Nijssen, 2024\)](#) as well as in the GitHub repository of the dataset (<https://github.com/hhelgason/LamaH-Ice>). ~~as well as in folder F in the dataset.~~”

**TS10:** A new version of the supplement is attached to this email.

**TS11:** This is correct.

**TS12:** We have checked this and found a missing citation regarding the Corine dataset. In our review of dataset citations, we noticed that we cited the original CORINE data set from the European Environment Agency. However, the dataset we used has been pre-processed by the National Land Survey of Iceland. We have thus added a new citation to the CORINE dataset to ensure that the right source of the data is being cited. Note these changes:

**On page 12, left column, line 8:** “The static version uses the most recent CORINE update for Iceland from 2018 ([National Land Survey of Iceland, 2018](#)), described by ~~Árnason and Matthíasson,~~ (2020). The dynamic version uses the CORINE classifications from 2000, 2006, 2012 and 2018, thereby reflecting the changes in land cover in Iceland since 2000.”

**On page 23, in Table A6:** The “Data source” citation in the first line should be National Land Survey of Iceland (2018).

New reference list entry:

National Land Survey of Iceland. CORINE Land Cover Iceland (2000, 2006, 2012 and 2018) [data set], <https://www.lmi.is/is/landupplýsingar/gagnagrunnar/nidurhal>, last access: 25 August 2023, 2018.

And the following reference list entry can be deleted:

CORINE: CORINE Land Cover 2018: European Environment Agency [data set], Copenhagen, Denmark, <https://land.copernicus.eu/pan-european/corine-land-cover>, 2018.

**TS13:** The article number is 523646

**TS14:** This reference list entry can be removed, see response to TS12.

**TS15:** ISBN-10: 0444413375

**TS16:** NASA EOSDIS Land Processes Distributed Active Archive Center

**TS17:** This URL functions within QGIS and other GIS applications and may not be directly accessible via a web browser. A revised reference list entry: “Google Maps: Google Maps Satellite imagery accessed through GDAL Web Map Service (WMS) in QGIS. Configuration specified via XML, [http://mt.google.com/vt/lyrs=s&x=\\${x}&y=\\${y}&z=\\${z}](http://mt.google.com/vt/lyrs=s&x=${x}&y=${y}&z=${z}) (last access: 15 March 2024), 2024.”

**TS18:** Jökull, vol. 70, pp. 1–34, 2020.

**TS19:** HydroShare

**TS20:** See TS1

**TS21:** doi:10.2788/94128

**TS22:** doi:10.2788/87286

**TS23:** No persistent identifier exists for this.

**TS24:** The paper reports a DOI (10.7158/13241583.2013.11465417) and is accessible at Taylor&Francis, but the DOI does not resolve correctly to the page (DOI not found). The web page is <https://www.tandfonline.com/doi/abs/10.7158/13241583.2013.11465417#2b85d6ca-6520-4a3d-8e4a-aa9f2ee3f33d-b6de7b7c-de82-45a5-9538-313dd15c6659>

**TS25:** Page range: 117–125, no DOI exists for this publication.

**TS26:** June 2, 2022.

**TS27:** No persistent identifier exists for this.

**TS28:** ISBN 0-520-24567-9. This book was first published in 1995 by Elsevier, as volume no. 22 in the series Ecosystems of the World. The version that I cite, from 2006, is a new print with an updated introduction, but the content of the book is unchanged. Does it matter which version is cited? A reference list entry for the original print from 1995 would be: Petersen, R. C., Gíslason, G. M., and Vought, L.: Rivers of the Nordic countries, in: River and stream ecosystems (Ecosystems of the world vol. 22), edited by: Cushing, C., Cummins, K., and Minshall, G., Elsevier, 295–341, 1995.

**TS29:** 15 February 2023

**TS30:** The correct DOI is [https://doi.org/10.1130/0016-7606\(1956\)67\[597:EODSAS\]2.0.CO;2](https://doi.org/10.1130/0016-7606(1956)67[597:EODSAS]2.0.CO;2)

## 2. Comments regarding affiliations and typesetter corrections:

**Author affiliations:** Are postal codes necessary? I'd suggest removing the postal codes, and if you'd prefer keeping postal codes, I'd suggest adding a comma after "Seattle" in the first affiliation.

**On page 5, left column, line 4:** We'd like to suggest adding the word "the" as follows: "The meteorological data in LamaH-Ice are from three different atmospheric reanalysis datasets: ERA5-Land, RAVII, and the Copernicus Arctic Regional Reanalysis (CARRA)."

**On page 2, right column, line 79:** Can you replace the word "on" for "into" and change the wording for clarity, as follows:

"We have incorporated 88 catchments from LamaH-Ice ~~that experience no or low natural or anthropogenic influence on into~~ the Caravan dataset, excluding any that experience strong natural or anthropogenic influence on runoff (Sect. 5.9)."

**On page 2, right column, line 108:** Please revert to the original wording as follows: "[...] the basin delineation methods are described in Sect. 3, ~~and~~ the compilation of hydrometeorological time series, remote sensing time series of snow cover, and glacier albedo and mass balance is described in Sect. 4., and the catchment attributes are described in Sect. 5."

**On page 4, right column, line 71:** We'd like to keep the original wording as follows: "All streamflow measurements are quality controlled in a consistent manner with quality codes and standard remarks."

**On page 7, right column, line 79:** The original wording was "The runoff coefficient is larger than one in 38 (ERA5-Land) and 31 (RAV-II) out of 54 catchments, [...]" But this has been changed to "The runoff coefficient is larger than 1 out of 38 (ERA5-Land) and 31 out of 54 (RAV-II) catchments, [...]" How about we set this as: "The runoff coefficient is larger than 1 in 39 (ERA5-Land) and 32 (RAV-II) out of 55 catchments, [...]" Note that the changes in the numerical values are explained in the next section ("3. Correction of Dataset Errors in Accepted Manuscript").

**On page 11, in the caption for Figure 6:** Please revert to the original text as follows: “Panels g, h, j, and k describe the frequency and duration of high- and low-flows.”

**On page 12, right column, line 25:** We’d like to suggest removal of the word “However” as follows: “~~However,~~ ~~t~~he CORINE glacier fractions were included for consistency with the LamaH-CE dataset.”

**On page 13, left column, line 28:** We’d like to revert to the original wording as follows: “Many rainfall-runoff processes take place ~~in~~ the subsurface.”

**On page 13, left column, line 32:** We’d like to revert to the original wording as follows: “At the end of the last glacial period, about 10 000 years ago, glaciers receded, and exposed erosion products that form most of the surface deposits ~~are~~ currently found in Iceland.”

**On page 13, right column, line 38:** We’d like to revert to the original wording as follows: “Soils in Iceland are mostly Andisols, which are a soil type found in active volcanic areas, characterized by having large proportions of volcanic glass (Arnalds and Óskarsson, 2009).” The reason is that we feel that the comma changes the meaning of the sentence. We want to say that the Andisol soil type is characterized by having large proportions of volcanic glass, but without the comma, it may be understood that the volcanic areas are characterized by having large proportions of volcanic glass.

**On page 17, line 23:** We’d like to suggest the following change: “With the inclusion of glacier mass balance observations and dynamic catchment characteristics, LamaH-Ice provides new opportunities to evaluate the effects of changes in climate, land cover and glaciers ~~s-extent, and mass~~ on streamflow.”

**On page 18, in table A1, in the line for VHM\_no:** We’d like to suggest the following change: “A numbering system of Icelandic streamflow gauges (used by the IMO). ~~The number~~ indicates the site being measured.”

**On page 20, in table A3, in the first line:** Please change as follows: “Catchment area as delineated by the Pysheds Python package (see Sects. 3 and ~~Sect.~~ S1 in the Supplement)”

**On page 21, in table A4, in the line for “Aridity”:** An unnecessary line break has been added between “mean daily precipitation” and “(p\_mean)”.

### 3. Correction of Dataset Errors in Accepted Manuscript

**As discussed with the topic editor, some minor updates to the dataset occurred while the paper was in production. To reflect these changes, please replace the indicated captions and text with the following:**

**Page 5, Figure 2 caption:** The mean temporal coverage of the 97 gauges is 24.~~1~~ years. d): The same analysis for filtered observations. The mean temporal coverage of the ~~71-72~~ gauges is 16.~~67~~ years. Basemap source: Hijmans, 2015.

**Page 4, right column, lines 81-83:** The number of actively (simultaneously) reporting gauges in LamaH-Ice increases with time up until ~~2008-2009~~, when it reaches a high of ~~8184~~.

**Page 3, right column, lines 103-104:** The mean number of valid years is 24.~~4~~ for unfiltered data (Fig. 2c) and 16.~~47~~ for filtered data (Fig. 2d).

**Page 6, left column, line 1:** “[..] for ~~5455~~ gauges that have a high temporal coverage [..]”

**Page 7, left column, lines 10-11:** “The modeled precipitation in both datasets seems to be insufficient, judging by the negative values of  $P - Q$  for a majority of the catchments, with means of ~~-1.44~~ ~~-1.38~~  $\text{mmd}^{-1}$  for ERA5-Land and ~~-0.63~~ ~~-0.58~~  $\text{mmd}^{-1}$  for RAV-II.

**Page 7, left column, lines 40-43:** “Omitting the ~~1819~~ basins with  $> 5\%$  glaciation results in mean  $P - Q$  values of ~~-1.18~~ ~~24~~  $\text{mm d}^{-1}$  for ERA5-Land and ~~-0.58~~ ~~63~~  $\text{mm d}^{-1}$  (no change) for RAV-II.”

**Page 6, Figure 3 caption:** “The total number of catchments analyzed is ~~5554~~.”

**On page 7, right column, line 79:** “The runoff coefficient is larger than 1 in ~~3839~~ (ERA5-Land) and ~~3132~~ (RAV-II) out of ~~54~~ ~~55~~ catchments, [...]”.

**On page 7, right column, line 103:** “Gunnarsson et al. (2019, 2021) produced ~~two~~ temporally continuous cloud-free datasets of MODIS observations for Iceland by merging data from the Aqua and Terra satellites and temporally aggregating the observational series.”

**Page 9, right column, line 30:** “Figure 6 shows the spatial distribution of hydrological signatures for the ~~55~~ ~~54~~ gauges in LamaH-Ice that have a high temporal coverage of streamflow observations (Sect. 4.1) and exhibit natural streamflow conditions (Sect. 5.9).”

**Page 11, figure 6 caption:** “The total number of gauges shown is ~~5554~~.”

**Page 10, right column, line 21:** “ $R = -0.8$ ~~12~~”

**Page 22, footnote at table A5:** “The total number of gauges included in the calculations is ~~743~~.”

#### 4. Other errors or corrections that authors have noticed in the manuscript during proofing

**On page 4, left column, line 22:** We’d like to suggest making the following changes: “The geographical coordinates of the gauges were obtained from the Icelandic Meteorological Office (IMO) ~~and Landsvirkjun~~ (the National Power Company of Iceland, NPC).”. The reason for this suggestion is that it may be unclear that Landsvirkjun and the National Power Company of Iceland is the same institution as it is never mentioned in the paper.

**One page 4, left column, line 45:** Can you make an edit to improve accuracy: “[...], and thus the catchments in delineation C exhibit natural ~~or near-natural~~ streamflow conditions.”

**On page 8, right column, line 92:** Please add further clarifications to the sentence: “Net radiation, another main driver of ET, is also higher in the north ~~(when computed with a hypothetical crop albedo of 0.23, see Suppl. Sect S3.3)~~.”

**On page 9, left column, line 16:** “High-precipitation-intensity events are common in the eastern fjords, especially in the fall, when extratropical cyclones approach the ~~country from the coast with~~ east~~erly~~ or southeaster~~ly~~ winds.

**On page 11, left column, line 9:** We noticed a typo that should be corrected as follows: “The magnitudes of high and low flows are described by calculating the 95<sup>th</sup> (“Q95”) and 5<sup>th</sup> (“Q5”) streamflow percentiles (Fig. 6i and ~~j~~!).”

**On page 12, left column, line 17:** We found a typo that should be corrected as follows: “In LamaH-Ice, the dominant land class within each catchment (“lc\_~~\_~~dom” in Table A6) is calculated [..]”

**On page 12, right column, line 28:** We'd like to add missing information regarding forested area and add a citation to the source as follows:

"As can be seen in Fig. 7a, ~~c~~ and f, this does not apply in Iceland, where agricultural areas are only 2.6% ~~urban areas are only 0.39%~~ of the area, urban areas only 0.39% ~~and agricultural areas only 2.6%~~ and forested areas only 0.87% (Árnason and Matthíasson, 2020)."

**On page 14, right column, line 23:** A wrong catchment attribute is mentioned, text should be changed as follows: "The spatial distribution of the dominant rock attributes from GLiM (levels 2 and 3, Fig. 10a) shows that basic volcanic rock (~~"gc\_vb\_fra"~~) is the most common type in Iceland, with variations depending on the catchment locations."

**On page 15, left column, line 14:** We'd like to correct numerical values: "Sixty-~~eight~~ five out of the 107 catchments in LamaH-Ice ~~are~~ were partly covered by glaciers in 1890."

**On page 15, right column:** We'd like to correct numerical values: "In ~~1890~~ 18950, the ~~567~~ catchments in LamaH-Ice with over 2 % glaciation had ~~a~~ ve a mean glaciation of ~~297.8~~ % (~~39372~~ km<sup>2</sup>), which was reduced to ~~24.26~~ % (~~3361~~ km<sup>2</sup>) in 2019. The highest decrease in percent glaciation is ~~18.69~~ % (~~274~~ km<sup>2</sup>), while the highest areal decrease is ~~137229~~ km<sup>2</sup> (~~23.51~~ %). ~~Six~~ Four catchments lost all their glaciated area between ~~18950~~ and 2019."

**On page 18, in table A1, in the row for "qobs":** We'd like to update the text to: "The measured (gauged) streamflow value"

**On page 19, in table A2, in the row for "surf\_net\_solar\_rad":** The text in the description column should be updated as follows: "Amount of solar radiation (shortwave radiation) reaching Earth's surface (direct and diffuse) minus the amount reflected by Earth's surface (governed by albedo); ~~upwards~~ downwards fluxes (radiation ~~from~~ to Earth) are positive."

**On page 27, in table A12, in the row for "I – low influence":** Please update the text as follows: "A low amount of water is drawn from the river for irrigation or revegetation (impact type ~~BC~~, two gauges)."