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Interactive comment on "The Rofental: a high Alpine research basin (1890 m – 3770 m a.s.l.) in the Ötztal Alps (Austria) with over 150 years of hydro-meteorological and glaciological observations" *by* Ulrich Strasser et al.

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Author comment on

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Review of the manuscript "The Rofental: a high Alpine research basin (1890 m – 3770 m a.s.l.) in the Ötztal Alps (Austria) with over 150 years of hydrometeorological and glaciological observations" by Strasser et al., 2017.

Thank You very much for Your valuable review. All Your suggestions contribute to the improvement of our work. In the preparation of a revised version of the manuscript we consider Your specific comments as follows:

The manuscript by Strasser et al. introduces in detail a comprehensive (yet not fully available) meteo/snow/glacio/hydrological dataset from the Rofental area in the Ôtstal Alps in Austria. Releasing in such a comprehensive and harmonized manner this information to the scientific community is of critical importance to advance this scientific field in the context of climate change and the need to better apprehend its relationship with mountainous conditions. This manuscript belongs to a dedicated special issue coordinated in the framework of the GEWEX/INARCH initiative and must be applauded for this. I would recommend, if possible, to include more illustrations especially for the older datasets (including drawings and man-made graphics), so as to better illustrate the long history of this site.

We are re-writing the section on the long history of the site, and include new illustrations

A few specific points may deserve to be improved prior to final publication, and are listed below.

Introduction: Page 2, line 2: The Introduction starts immediately by introducing the institutions responsible for achieving this landmark contribution and then it focuses directly on the study area and the data. While such a data paper must of course contain such information and focus on the technical description of the dataset, I believe it would be useful for a less specialized audience that a small paragraph introduces the

main challenges and scientific investigations that such a data set can help addressing (framing the context of water ressources in mountain regions, climate change and snow/glaciers dynamics, relevant time and space scales etc.). This needs not be too long but would better, in my view, set the stage to better place in context the unique data set introduced.

We will add a paragraph introducing the challenges/investigations that such data set can help addressing

Page 2, line 13: "The glacier mass balance time series [...] are among the longest uninterrupted series worldwide" : this statement deserves a reference.

We added Fischer et al. 2013 and Mayer et al. 2013a

Page 2, line 11: "more than 150 years ago" ; Page 2, line 14, "Today," : Please check throughout the manuscript and remove potentially ambiguous time marks ; indeed, this manuscript may be read several years ahead in the future, and "Today" will then have a different meaning. While the date of the paper makes it possible to address this indirectly, I think it would be preferable to explicitely refer to dates, e.g. replace "Today" by "As of 2017"(or alternative more appropriate phrasing if need be). This will enhance the perennity of the documents and make it better understandable in the future.

We have checked the entire text of the manuscript and removed all ambiguous time marks

Page 3, line 20 and before : it is a bit unclear whether the last part of the Introduction is already a description of the Rofenthal catchement (descriptions of huts, entry points etc.). Maybe this would better fit in the Section 2 (Site description) and the Introduction could rather close on a brief and non-technical description of the type of data which are dealt with in the manuscript. More generally, I think the Introduction could also introduce the fact that the dissemination of the data is a work in progress, to be complemented in the future.

We are re-structuring the introduction and the site description sections of the manuscript; we have already added a description of the type of data available and the living data process aspect; in addition, we have added several dois with data from the Rofental which is available in PANGAEA so that the dois in the manuscript now match the dois in the Pangaea repository parent

Section 2 "Site description“: Figure 2 is a useful and well designed map, although it could be benefitial for the manuscript to also exhibit a map with the position of the catchment within the European Alps and its glacier bodies, making it possible to better highlight the climatological/environmental setting of the Rofenthal catchment.

We have improved the map

Page 4, line 3: "approximately 1/3 of its area still is ice-covered (Müller et al. 2009)". The term "still" gives the impression of a rapid change in time. It would then be preferrable to give the date (year) when this fractional coverage was estimated, and perhaps an order of magnitude of the pace of its evolution before and since then.

We have removed "still“ and added a reference

Page 4, line 8: "The characteristic water discharges (in m3 s-1,1971–2013) are NQ=0.09, MQ=4.6 and HQ=109" : The acronyms NQ, MQ and HQ should be defined explicitly.

We added "lowest discharge“, “mean discharge“ and “highest discharge“

Page 4, line 13: "The Vernagtbach catchment still is approximately 2/3 ice-covered." This statement deserves to be a bit more precise (data source, date of the estimate). Furthermore, it may be good to display the subcatchments on the Figure 2.

We added the source and references, and modified the map to illustrate the Vernagtbach subcatchment

Page 5, line 2 and other occurrences: Please consider replacing "mm" by "kg m-2"

as this is more accurately describing the physical quantity measured (quantity of total precipitation per unit surface area).

Since in the totalisators the water level is recorded in mm, and the manufacturers of the precipitation recording devices use this unit as well, we suggest to use "mm“ in the water balance context; then it is also consistent with the units of the streamflow and mass balance terms

Page 5, line 17 Please consider replacing "black sea" by "Black Sea".

Done

Section 3 "The data“: Page 5, lines 19 to Page 6, line 3 : This concise description of the data dealt with in the paper could be replicated almost as such at the end of the Introduction (see comment above).

We re-arrange the introduction to make this data description paragraph appear now there

Page 6, lines 5 to 13 : It is very valuable and very honest to describe the fact that the current article introduces only a fraction of the total potentially available data. I would recommend, however, that the status of the update of the data set can be monitored online using a dedicated website. Maybe the PANGAEA website/portal can be used for this, but this remains to be verified and clarified. It would be more perennial than pointing the interested reader to contact the authors, whose scientific carrer will inevitably cover a shorter time span than the upcoming fate of the catchment.

Yes, the Pangaea parent doi:10.1594/PANGAEA.876120 is the ideal interface to track the data availability status

Page 6, line 13 : Perhaps better to avoid terms such as "enormous" which have a limited quantitative added value. Same holds for line 5 "giant" on the same page.

We have replaced "enormous“ with "comprehensive“, and deleted "giant“

Page 6, line 24. "permanently registering pluviometer." Would it be possible to provide more information here ? Also, "pluviometer" could possibly be replaced by "precipitation gauge".

We have removed it, since there is no precipitation recording device in operation at the moment

Page 6, line 24: "In addition to the automatic recordings, 2014 to 2016 several AWSs" needs rephrasing : AWS also operate automatically. Maybe adding "at the fixed meteorological station" after "recordings" would improve the clarity of the sentence.

We have clarified this in connection with the period covered at the fixed meteorological station

Page 6, line 28 to Page 7, line 2: First of all, in the Introduction it is mentioned that the automatic lidar system has been installed in 2016 and not 2017 (this seems to be the date of the installation of the tower). Also, I would recommend to focus on existing instrumentation and not future plans (which may or may not materialize for a diversity of reasons) in the description of the data, which by definition is only generated by existing instrumentation. I would thus recommend removing this paragraph, unless the equipment is now in place.

We clarified that installation of the laser scanning device was in 2016, and the one of the tower sensors in 2017

Table 1: Please replace "M" by "m" for the unit of wind speed. Also, do I understand correct that the data is actually available only for years 2010, 2011 and 2012 ? If so, this must be explicitely stated.

Done

Page 7, line 16: "Fueß precipitation gauge in 1970“. As this is not a standard instrument, would it be possible to provide more info on this measurement device (principle, catching surface area etc.)

We have removed the type of precipitatin gauge, since it is of minor importance: data is available only after 2002, recorded with other devices (table 2)

Page 8, line 12 – 19: please clarify the functioning of the totalizing gauges. How can they be measuring 2-monthly accumulated precipitation quantities while being visited only once per year ?

This has been remarked by another reviewer already. We have added an explanation of the procedure

Page 9, line 10 : please provide the geographical distance between the old and new position.

Done: a "102 m horizontal displacement“

Page 10, line 19-21 : "During summer 2017, the station will undergo a general technical overhaul, and the pictures of an automatic camera which has the station in its view field will be available via internet (later in 2017)". Please consider updating this sentence according to operations which actually took place during the summer 2017.

Since the technical overhaul has no data related consequences, we have removed this part of the sentence, and we have added a picture of the automatic camera

As a general comment on the presentation of the meteorological/snow data, I would recommend that pictures of the corresponding meteorological stations are provided in the paper, so as to better understand the environmental setting of each station the distance/arrangement of the sensors.

Yes, we are collecting pictures of the meteorological stations

Page 15, line 10: "Annual recorded streamflow amounted to 1848 mm (1957/58) and 1770 mm (1958/59)". Does this correspond to the time integration of the stream flow (mass or volume) divided by the catchment surface area ? Please explicitly define what is this "annual streamflow" and the unit used. Similar question arises later on

regarding monthly or daily stream flow, expressed with the same unit, while actual stream flow data expressed in m3 s-1 are also provided, without explicit reference on how to compare the two types of reporting.

For discharge recordings with instantanous temporal discretization we use m3 s-1. For runoff as longer-term catchment water balance component we use mm, to better compare to the other water balance elements; see respective comment above

Page 16, Figure 6 : unit should be displayed on the legend of the graph, and not only in the caption.

Done

Page 20, line 2 : please check the consistency of the installation date for the permanent TLS (see comments above)

Done; it was installed in 2016

Page 20, line 14 : please replace "Currently," by a more time-invariant time stamp.

We removed "currently“, because this setting will remain

Page 22, line 10, please consider replacing "Virtual Observatory of the Alps” with "Virtual Alpine Observatory".

Done: thank You!

Page 22, line 25 : please consider adding "AWI PANGAEA" besides "Bremerhaven" (or any appropriate refined description) so as to better illustrate the contribution of PANGAEA staff itself to the dissemination of the dataset.

Done

Thank You!

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2017.