This manuscript presents a comprehensive data set for three research sites in the Upper Rofental. The time series presented comprise data from 2017 to 2023 and come from three meteorological and snow-hydrological stations. The manuscript extends a ESSD paper published in 2018. Since 2017, the observation network has been extended with a new automatic weather station and has been complemented by sensors continuously recording snow cover properties. The manuscript documents these extensions and presents the new data sets that have been recorded between 2017 and 2023.

The Rofental research catchment is a very well-instrumented high Alpine environmental research basin, combining glaciological, hydrological, and meteorological observations. The dataset presented here is very valuable, especially concerning new sensor technologies measuring snow properties and certainly merits publication in ESSD. The dataset is easy to access and well documented.

The manuscript presents interesting exemplary use cases of data analysis, but I think several points must be clarified:

We thank you very much for the thorough review of our manuscript and the valuable suggestions! We answer your questions in the following and describe how we will improve the manuscript accordingly.

Line 174: 'temperature correction for longwave radiation…', specify sensor temperature to correct for the longwave emission of the sensor (I suppose)

Yes, we missed to specify the procedure precisely. We will change the sentence as suggested.

Section 6 'Meteorological data'

Is the wind speed following seasonal changes?

Indeed, wind speed shows a seasonal pattern with higher values occurring in the winter months. This reflects the general situation of a higher storm frequency in winter caused by frequent distinct low-pressure systems and Foehn events. We will add an explanation in Sect. 6.

Specify how wind gusts are measured, what does 'wind gust' mean?

Wind gust means the maximum wind speed measured in a certain interval (here within 10 minutes). It is measured by logging the maximum wind speed in the 10 min. interval (prior and including the time stamp) from measurements performed in a resolution of 1 second, as opposed to the average when referring to average wind speed. We will clarify this in the manuscript in Sects. 5.1 and 6.

Rather than discussing outgoing solar radiation, present and discuss albedo values.

Correctly calculating albedo from incoming and outgoing solar radiation needs careful assessment of the terrain and solar incident angles to perform a slope and sensor tilt correction. This entails its own uncertainties specifically when radiation values are very low. We are generally not presenting secondary analysis of further processed data in this *manuscript but focus on providing the measurements. We would leave that as a potential application to users of the data.*

The precipitation gauge under-catch is a serious measurement problem and may explain the maximal amounts of precipitation recorded in summer. Further analysis is required. The under-catch can be quantified (at least approximately) by comparing the measurements from different types of rain gauges and the snow scale in winter.

We fully agree on this. However, this is a common issue with precipitation measurements – specifically in high-mountain regions - and many investigations and correction methods exist in the literature. We focus on providing the data and potential users can perform further analyses depending on their use case. However, as suggested, we investigated the under-catch issue in the data for the Proviantdepot station. The table below shows precipitation totals in mm for the four winter seasons 2019 – 2023 (each Oct to Jun) and maximum SWE on the snow scale. Precipitation is filtered using threshold air temperatures 1°C and 2°C to assess snowfall totals. This simple approximation includes uncertainties such as intermittent SWE decrease, uncertainties in phase separation by threshold temperatures, precipitation under-catch, wind-driven redistribution on/off the snow scale, and the small-scale variability between precipitation gauge and snow scale. Results show a strong variability between the four winter seasons. The strong deviation in the first two winter seasons is probably a combination of deposition of wind-blown snow on the scale (see description in the manuscript Sect. 7.2 and Fig. 8 / comment below) and at the same time under-catch at the gauge. We will add a respective explanation to the manuscript.

	Oct 19 – Jun 20	***Oct 20 – Jun 21***	***Oct 21 – Jun 22***	***Oct 22 – Jun 23***
Precip. mm	*685.47*	*417.73*	*551.04*	*503.96*
Precip mm (T <= 1°C)	*593.92*	*317.21*	*337.98*	*390.61*
Precip mm (T <= 2°C)	*633.01*	*337.05*	*366.76*	*426.27*
Max. SWE mm w.e.	*927.5*	*792.6*	*453.1*	*429.5*

Lines 248-249: No explanation for the differences in HS measurements a few meters apart from January to May 2022 (panel (e))?

This was most probably caused by very small-scale wind-driven snow redistribution. We could clearly observe such a case in the season 2019/2020 on webcam images where the melt out date obtained by the SWE scale was significantly delayed compared to the HS measurement (see Sect. 7.2 and Fig. 8). In the season 2021/2022 however, the melt out date is almost identical despite the differences in HS. Therefore, we cannot clearly show it in the webcam for that season. We will add further clarification and explanation on this to the manuscript.

Section 7.2 and Figure 8 are not clear.

The mismatch between SWE and HS measurements is worrying and should be analyzed further. As the sensors used are not sufficiently specified (see other comments), it is difficult to understand if the measured variables are at the same site and the interpretation of the data remains unclear. For instance, the legend of Figure 8 mentions 'SWE melt out date is two weeks later than HS', but we don't not if these variables are measured at the same location. Furthermore, temperature measurements in panel (b) should be used to estimate the melt out date (before HS melt out date?). The different temperatures in panel (c) are not visible (use different colors).

We *agree on this, and we will extend the given explanation for the mismatch including a better specification of the exact sensors and locations. We will also present additional seasons here to show that the mismatch is not a persistent pattern and strongly varies interannually (see also Figs. 6 and 7). In addition, we will change the colour scheme of the temperature panel so that melt out date is clearly visible in the 0 cm and surface temperature measurements.*

Section 7.3

The two configurations of the flat bands (in diagonal or horizontally) should be described before (in Section 4.3).

Yes, we will add the description of the flat bands configuration to Sect. 4.3.

The comparison of snow density values derived from S1, S2 and the snow scale is unclear (lines 314-321). Should the density derived from the snow scale (total SWE and HS) only be compared with the S1 diagonal flat band measurements, since the S2 measurements concern snow density at the base of the snowpack? The interpretation of density measurements needs to be clarified.

Yes, for a direct quantitative evaluation it makes more sense to compare the HS/SWE derived density (average for the whole snowpack) to the diagonal band. However, this holds true only for the case where HS does not exceed the height of the diagonal band and the band is sufficiently buried. Therefore, we decided to show the density of both flat bands (diagonal and base of snowpack) in the figure to see the differences. We will add a clarifying discussion to the manuscript.

Section 7.4

Lines 326-328: 'The measurement principle… with different results'. As the uncertainty of acoustic snow drift sensor seems quite high, could the authors be more specific? Give an estimation of the uncertainty range, the main measurement problems… The following sentence states that 'it is still the only way to continuously measure and detect drifting snow events with a certain reliability'. What about optical snow particle counters?

We will further elaborate on the uncertainties and measurement problems of the acoustic snow drift sensor. We will also add optical snow particle counters to the discussion here.

The analysis of a snow drift event based on different measurement instruments is interesting but I see two main problems:

- the SWE is measured with different types of sensors in the exposed and sheltered sites (snow pillow and snow scale). As SWE measurements by different sensors can be quite different (for instance Figure 7), the analyze of SWE differences between the exposed and sheltered sites require a better comparison between snow pillow and snow scale measurements (a comparison at the same location for instance).

Unfortunately, we do not have a side-by-side setup of snow pillow and scale and therefore we cannot perform such a comparison. We are planning to replace the snow pillow by a scale as soon as the funding is available. We will add a statement to the added uncertainties induced by different types of SWE sensors to the manuscript.

- The blowing snow flux measured by acoustic sensor can be perturbed by snowfall. Thus, with this sensor (and due to the difficulty to measure the snowfall rate in strong wind conditions), it is difficult to quantify the blowing snow flux during a precipitation event and to relate it to a wind speed threshold for snow erosion. Thus, the interpretation of snow particle fluxes and changes in SWE is problematic. It would be more convincing to analyze a snow drift event without precipitation.

We agree on the added difficulty of flux quantification during a snowfall event. We will look for an event without precipitation and subsequently analyze and present it here.

In panel (a), snow depth in the sheltered site shows little deposition compared with the large deposition recorded in SWE (panel (a)). This shows a discrepancy between SWE and HS measurements at the sheltered site during the period of the main blowing snow event?

Yes, this observation shows the large heterogeneity even at a very small scale for the same station location. However, we will further investigate on the persistence of this issue when we look for more blowing snow events (see comment above) and add a respective explanation to the manuscript.

Figures:

The text in the figures is often too small and difficult to read (Figures 4, 5, 6, 7, 8, 9 and 11, axe titles in particular). The legend should clearly state from which sensor is derived each variable (for instance from which sensor is derived precipitation in Figure 5 or 11?). This is an important point.

We will revise the figures to enhance readability and enlarge the axis titles. The presented data are all from the most recent sensors. We will state this clearly in the manuscript and highlight the respective sensors in Tabs. 1, 2, and 3.

The map in figure 1 should clearly highlight the three stations discussed in the paper.

We will revise the map and highlight the three stations.

Figure 3 is very useful but should clearly highlight the new instruments (compared to the 2018 publication).

We will highlight new instruments compared to the 2018 publication in Fig. 3 and in Tabs. 1, 2, and 3.

Legend of Figure 4 ‘Narrow bars indicate a second sensor for a variable’: not clear to me.

We agree that this is not clear. We will add more explanation in the caption and add information in the figure legend.

Figure 6: SWE in mm w.e. The scale of HS should go to 200 cm in (c) to be coherent with (b) and (e). In (e): 'USH-9' is not clear.

We will change the unit of SWE to "mm w.e." throughout the manuscript. We will change the scale to a coherent value of 200 cm and add explanation for the presented sensor (USH-9) in the legend and in the caption.

Figure 7 is interesting but not clear. Specify from which the sensors are derived HS and SWE. The yellow line is not sufficiently visible (chose another color).

Fig. 7 shows all available HS and SWE measurements. We will clarify this in the caption and in the Sect. 7.1. Furthermore, we will revise the color schemes for all figures to enhance readability and we will avoid the too bright yellow color.

Figure 9: explain S1 and S2 in the legend. Panel (c): SWE in mm w.e.

We will add the specification of S1 and S2 in the legend and we will change the unit of SWE to "mm w.e." throughout the manuscript.

Tables 1, 2 and 3: better highlight the new sensors installed since 2018

We will highlight the new sensors in the tables.