Earth Syst. Sci. Data Discuss., referee comment RC1
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Comment on essd-2022-188

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Referee comment on "The PANDA automatic weather station network between the coast and Dome A, East Antarctica" by Minghu Ding et al., Earth Syst. Sci. Data Discuss., https://doi.org/10.5194/essd-2022-188-RC1, 2022

General comments:

This is a valuable paper, as it introduces a data set that will be of interest to the wider Antrarctic climate and weather research community.

It gives an overview over data from an AWS transect from the coast of East Antarctica to the interior of the continent near Dome A. Basic meteorological statistics are presented for the indivual stations, showing temporal and spatial variability. This data set is to my knowledge unique, and, I am sure, will provide an excellent resource for future scientific research.

In its current form the manuscript contains some inconsistencies between the text and the underlying data, that the authors should address in their revision.

All comments regarding the data, refer to the data as presented in this manuscript, not necessarily fo the actual measurements or the underlying data.

Specific comments:

Title and throughout: „transect‟ is more appropriate than “network”, given the locations of the AWSs. "Network" implies a distribution along longitude and latitude, while the AWSs in this paper are mainly aligned along a north-south gradient.

L33: “capability” may be better in this context than “capacity”

L119: What do the authors mean by “survived”? They should clarify here, that subsequently AWSs have been installed close to their locations to extend the measurements. This is not entirely clear in the current wording.

L143: “all the climate types” is very vague. What are the climate types of East Antarctica? What do the authors mean with that expression?

L153: In this context it is important to mention how often it is being dug up and brought to the surface again.

L185: That Zhongshan is built on rock does not exclude snow accumulating at the site and the sensor height above surface changing as a consequence.

L197 ff: Please add a brief description of the pressure sensors that are being used, and where they are installed at the beginning of chapter 2 alongside the description of temperature sensors and wind sensors.

I would find a diagram very useful which should indicate which AWSs cover which period.

L224: So far south, in an area of polar day and polar night, an approximately sinusoidal curve for daily temperature is NOT that obvious!

L227: Why is this? Could the authors expand on this?

L228: What do the authors mean by “coreless winter”?

The authors explain this with the words “there is no distinctive minima during austral winter”. But is this true for these AWSs? I see a distinct minimum at each AWS in Figure 4.

Some of the AWS measurements go back over twenty years. Are calculated means over such a period meaningful? Would it not make sense to detrend these time series first?

L233: The authors say that the surrounding ocean may bring warm, moist air masses. How far inland would the authors expect such a signal to be detectable? Weather systems may bring maritime air land inwards, but without such systems the maritime influence won't reach further than 50 to 100km, I would say.

L277: Earlier (L141 - 142) the authors say that the inland section of the transect is influenced by katabatic wind! Which one is it?

As the Relative Humidity is dependent on the Air Temperature, it would be more meaningful to calculate and analyse the Absolute Humidity. Many of the phenomena that the authors describe in this section are likely caused by changes in the temperature rather than by changes in the actual humidity content of the air.

Can the authors give an explanation why Panda S is on average more than 10K warmer than Kunlun, which is at a similar altitude and further north? This seems a bit dubious to me.

Have the authors considered how the latitude, particularly of the southern most AWSs, influences the wind direction? There is no southerly wind at the south pole. It would make more sense to split the wind direction into the meridional and longitudinal components and analyse them separately?

L327: This section really needs a surface pressure chart or similar for the reader to properly understand the processes.

L346: The presented case study does not show that these AWS observations can play an important role in weather forecasting on the Antarctic ice Sheet. The case study shows that the mesoscale circulation is reflected in the measurements, but how this aids weather **forecasting** in the region remains unclear.

Data availability should come after the Conclusions!

Technical corrections

L110: Either "The first stations were deployed…" or "The first station was deployed…"

L118: I would find a reference to table 1 here useful.

L132: “site” usually refers to a single location, i.e. one point. “area” or “region” would be better.

L133: Data “pre-processing” seems more appropriate here.

L138: remove “highly”

L146: Please introduce what LGB stands for directly here.

L151 replace the second “has” with “been”.

L152: Put a full stop at the end of this sentence, and start a new sentence “It gets buried … “

L153: add “by snow accumulation”

L153 Rephrase the sentence “This area also has….”. Can the authors please clarify what they mean by “ice movement”, and please provide a typical accumulation rate.

L156: Insert “km from the coast and *is* considered….”

L157: “during the CHINARE 21th” Do the authors mean “during the 21st CHINARE”?

L158: Start a new sentence after “coast”

L158: The sentence about the lowest temperature does not belong in this chapter.

L162: “only intermittently”

L162: Maybe rephrase: “The other AWSs were manufactured by … and were deployed during 2012 (AWS a, b and c), and 2019 (AWSs d, e, f..) respectively.”

L 165: I would suggest swtarting a new sentence: “The data is not stored internally.”

L174: This sentence needs rewriting, as it does not make sense at the moment. I would also suggest splitting it to make it clearer.

“The AWSs that were designed by … use a HMP15 … to measure … and relative humidity. Panda S and ??? use a Weed wire bridge….and Vaisala HMP35A. Eagle and Dome A use …. . ”

L 177: “Eagle and Dome A AWSs … “

L178: “freeze” is more accurate than “stall”.

L179: Start a new sentence: “The other AWSs are equipped …”

L180: Which AWSs do the authors refer to with “some of them”? This shouldd be made clear.

L181: Start a new sentence: “Further details of the sensors …”

L183: replace “super” with “extremely”

L183: What do the authors mean by “fieldwork”? Do the authors mean the AWS deployment?

L190 “… may lead to duplicated records or time dislocation.”

L190: In what way is Figure 2 is relevant at this point? I suggest removing the reference to Figure 2 here.

L192/193: This assumption does not allow for temperature inversions that are quite frequent over snow and ice!

L196: The authors say that the height of the sensors above the snow surface is not measured. How can they correct for it then?

L197: Should that say "… the logger boxes were buried", as the authors are talking about more than one AWS?

L200 "Similar to …"

L204 I would replace "the" with "this"

L206: no comma after 18:00

L207: What do the authors want to say with "for consistency"? This is not clear. I would remove it, or clarify.

L207 better "monthly and annual values …"

L209 replace "spans" with "periods". To use the plural of "span" is very unusual.

L216: ".. at 6 m and 2 m height …" It seems counterintuitive, but in such a sentence this would be the correct way to say it in (British) English.

L217: "… the anemometers with a vertical axis at Eagle, Dome A and Panda S often froze, which leads to … "

L219: "We used a different type of anemometer…"

L220: "…. wind speed and direction data for these three AWSs."

L223: "The mean diurnal …"

L225: what does "LST" stand for?

L229 "minimum" not "minima"

L232: "… the Antarctic Ice Sheet …"

L245: The authors mention trends here. I recommend to only explicitly mention significant trends in the text, and then also give their level of significance.

L251: Please explain the gap shown in the Panda S data in Figure 6!

L256: The data from Dome A shows a clear double maximum, so NOT a clear seasonal cycle.

L257: Trends in Figure 7: When adding trend lines to a plot, please always give the trend value and its significance either as inset in the plot or in the caption.

L259: The auhtors say here that RH is well correlated to air temperature – which is exactly why it makes more sense to analyse absolute humidity!

L264: "… the seasonal cycle becomes clearer."

L267: "submerged" is not an appropriate word here. Maybe use "hidden"? Or "The annual oscillation is superimposed on this"

L272: "shown" not "showed"

L286: The atmosphere is stably stratified, it's not the wind.

L290: I suggest to rephrase this to "There is evidence … at all AWSs except x, y and z."

L293: "… along a slope… "

L296: I suggest: "… the wind speed decreased …"

L298: "exception: "

L299: "… where the katabatic efect is weakened."

L300: This sentence in its current form is unclear. I do not understand what the authors are trying to say here.

L304/305: End the sentence after "2020", and remove the entire text in line 305.

L306: What about other long data sets such as Eagle, Dome A and Panda S?

L309: I suggest rephrasing: "We only analysed wind direction for the months from September to February".

L312: "regular" is here probably better than "stable"

L312: "determine the wind speed on the ice sheet"

L313: remove "which is thus mainly from NE to SE".

L314: I suggerst rephrasing: "… dominates, alos resulting in winds from NE to SE (…)."

L317: I suggest reordering to: "16 years of observations result in no prevailing wind direction."

L322: Depending on what the authors are trying to say, I suggest either "The local weather conditions are reflected in the meteorological surface measurements." Or "The local weather conditions can be deduced from the meteorological surface measurements."

L324:_"… which indicates the occurrence of a prominent blocking event."

L326: "…was analysed using the Panda AWS transect dataset."

L333: replace "with" with "at"

L334: As the figure clearly shows, the pressure drops at Eagle on August 1st, not before Augus t 1st.

L336: Eagle shows clearly a drop in pressure!

L338: "…reaching the highest values at local noon."

L338 – L340: These lines really need to be removed! To give changes of temperature and wind speed in percentage is absolutely meaningless!

L342: What does "became flat in the geopotential field" mean? Please rephrase!

L342: "… and the blocking event moved … and eventually dissipated along …"

L343: Where did the blocking high dissipate? Over the coast or over the ocean?

L344: "… warming event at Dome C (..)."

L349: What do the authors mean by "other AWSs"?

This whole section should be rephrased for clarity.

At the time of the review the AWS data does not come up when using the map tool to search for data sets, so I cannot ascertain whether or not the data are already available or not.

L355: "..from the coastal Zhongshan AWS to Panda S in the interior of the Antarctic continent …."

L359: The observed parameters are not enough to derive the surface energy balance. There are no radiation measurements nor measurements of latent and sensible heat flux or of the ground heat flux! Please remove this claim.

L361: "… diurnal, monthly and annual averages as well as long term changes have been…"

L363: if the differences are statistically significant, then this should be mentioned in the manuscript. Currently this is not the case. Alternatively I suggest using "dsistinctly" instead of "significantly" to avoid implying statistical significance.

References: The manuscript cites Allison et al 1998, which is currently missing from the References.

Figures: Add trends and significance level (or lack of significance) to all plots that show trendlines!

Figure 7: Caption: Interannual variation of Relative Humidity

Figure 11: Why is the plot for Taishan included here? It does not add any information.

Figure 12: “Time series of … “

I suggest that the authors rearrange the plots in Figure 12 to have one column per parameter, and then arrange the AWSs from top to bottom in rows according to their latitude.

Table 2: Please include a column with the number of values that have gone into calculating these values, as this will vary from AWS to AWS.