

Authors' response to Anonymous Referee #3 interactive comment on "Daily temperature records from a mesonet in the foothills of the Canadian Rocky Mountains, 2005–2010"
by Wendy H. Wood et al.

Author comments are italicized and prefixed with AC:

General Comments:

This manuscript describes a dataset of near-surface air temperatures collected in, and adjacent to, the Rocky Mountains of southwestern Alberta. The network described covers a range of landscapes and elevations that are not well represented by existing meteorological networks in Alberta (or elsewhere, for that matter). As such, these data are potentially very interesting and useful to the scientific community. The reviewed manuscript fits well within the scope of Earth Systems Science Data, and the specific nature of this special issue. However, in my opinion, the manuscript needs some minor revisions prior to being accepted for publication. The main areas to revise are itemized here:

- RC: Overall, the writing could be more polished, and some specific phrases should re-worded to sound less informal.

- *AC: We have removed several informal words as suggested and rephrased paragraphs.*
- **RC:** The calibration of the sensors is not well described, relative to how they were actually operated. In practice, it sounds like these sensors sample once per hour (page 3 lines 13-14), yet they were calibrated using hourly aggregates of samples taken on 1, 2, or 5 minute intervals, and compared to a reference sensor (with an unspecified sampling interval). Of course, by aggregating numerous samples the associated random error will be lowered (central limit theorem). However, this doesn't have much relevance to the way that the sensors were actually operated. The authors need to provide much more clarification in this regard.
- *AC: Thank-you for pointing out that the calibration tests as described are not necessarily relevant to how the sensors were used in the field. We have attempted to address this concern by adding an additional paragraph detailing results where hourly measurements were used (p.5 ll.3-7). The average daily mean difference using hourly measurements was -0.2°C compared with -0.1°C using aggregated hourly measurements. Sensor calibration was also to determine if there was any systematic bias or drift in the sensors which needed to be compensated for. We used more frequent sampling which was then aggregated in order to reduce impact of once off erratic readings. The sampling interval of the reference sensor has been added to the text.*
- Figures 3 and 4 present mean absolute error as a function of space and elevation.

However, these figures actually only show the estimated error introduced by the gap-filling technique (whereas there are many other sources of error present). This needs to be better discussed in the relevant section and these figures need more representative captions.

- *AC: You are correct, the figures only show estimated errors for the gap-filling method. Section 4.2 is only discussing errors associated with gap-filling and the text has been modified to describe how errors were calculated. The figure caption has been altered to indicate these errors are only associated with the gap-filling method and not overall potential errors in the data.*

Specific Comments:

P2, line 13-14: don't use 'backcountry' (here and elsewhere in the manuscript)

AC: replaced with "remote"

P3, line 11: use 'sensors' instead of 'gauges'.

AC: replaced as suggested (p.3 l.12).

P3, line 17: is the accuracy of 0.25C referring to the sensor, the datalogger, or the

combined unit?

AC: text modified to refer to sensor (p.3 l.18).

P3, line24: replace ‘fabulously’.

AC: removed

P3, line 33: by ‘shootings’ are you more generally referring to vandalism? If so, then use that word instead.

AC: replaced as suggested (p.4 l.3).

P3, footnote 1: provide the model of the Vaisala replacement.

AC: added model DL2000

P4, line 32: replace ‘unventilated radiation shield’ with naturally ventilated.

AC: replaced as suggested (p.5 l.10).

P5, line 5-6: which ‘studies’ are you referring to. Provide some example references.

AC: references added (p.5 l.16).

P5, line 24: ‘but differences [are expected] to seldom exceed 1C’.

AC: modified as suggested (p.5 l.33).

P7, line 16: move the reference up to the sentence describing the Oklahoma mesonet.

AC: paragraph modified as suggested (p.7 ll.21-24).

P7, lines 18-19: provide a reference for the Chinook temperature step changes.

AC: reference added (p.7 l.28).

P7, lines 26-27: explain the ‘set amount’ that was subtracted to account for elevation differences.

AC: The extreme value test has been removed. On review of the qc tests we found that the spike test was identifying all extreme value violations.

P9, lines 28-29: This sentence doesn't seem complete: 'Because of missing data, different neighbours can be used to estimate the same station data for a given month or weather type'.

AC: paragraph has been rephrased (p.10 l.2-3).

P10, line 8: Explain how the seasonal cycle in weather variables was removed.

AC: The data was deseasonalized by using anomalies calculated from moving average daily data. The paragraph has been rephrased to better explain the process (p.10 ll.11-14.).

P 10, line 26: explain how the mean absolute errors were calculated. Aren't these just the estimated errors associated with gap filling?

AC: The paragraph has been rephrased to indicate how errors associated with the gap filling were calculated (p.11 ll.14-16).

Table 1: why is there no ‘crop’ land surface present, considering that this network extended into an agricultural area.

AC: Cropland is grouped with grass/shrub, this has been added to the table. Agricultural lands in this region are a mix of grasses/rangeland and cultivated crops.

Figs 3-4: revise captions as described in general comments section.

AC: Captions have been revised to indicate errors shown here are only those associated with gap-filling.

Figure 4: y-axis label is upside down.

AC: fixed

Figure 5: Describe what the whiskers and the individual points indicate.

AC: text added to figure caption