

Review of the manuscript entitled “Assessment of near 0°C temperature and precipitation characteristics across Canada” by Mekis et al. 2019

This paper presents climatology and trends in near 0°C temperature and precipitation conditions at 92 sites across Canada for 1981-2011. This is important because climate events such as freezing rain can have significant impacts on infrastructure and environment; however, the period 1981-2011 (31 years) is relatively short to detect any trends that are statistically significant. Wang (2006) has presented the trends in freezing rain over Canada for a longer period (1953-2004) and the results of this 2006-paper should be at least mentioned here.

1. **Table 1.** 12 weather types were retrieved from the climate archives and the list is provided in Table 1. It would be informative if a short description of each type were provided in bracket. For example, what is the difference between rain and rain showers? Snow and snow showers? Are all observations made by human? What is “all weather types above” (any of the 12 weather types above)? “The fraction of  $-2 \leq T \leq 2$  conditions associated with freezing rain, with any of the 12 types” is not clear. Maybe instead “the percentage of time when freezing rain occurs, when any of the 12 types occurs during  $-2 \leq T \leq 2$  conditions” would be clear.
2. **Methods**, lines 98-99. The indices represent “the number of days per year” and not “the average number of days per year” ... if not, please clarify.
3. **Trends**, line 175. It might be informative to mention at the beginning of the section that the period 1981-2011 is short to detect any statistical significant trends, there is considerable variability (or not) from one year to another, and the significance of the trend was assessed at the 5% level (this should also be mentioned in the caption). In addition, we expect trend significant at a few stations (5% of the stations) but this does not mean significant change in climate. Why is there no figure showing the trends in the precipitation types (same precipitation types as in fig. 4)?
4. **Figure 6.** It is difficult to see the distinction between the lines associated to Winnipeg, Cambridge Bay, Calgary and Vancouver because they are all blue. Maybe using fewer colors but full and dotted lines can be helpful. Why does Calgary experience the largest number of events while Cambridge has the least?
5. **Table 2.** What are “average trend values”? Are they averages or trends over 1981-2011? It seems that Table 2 presents the trends for 1981-2011 (if not, please explain). Trends significant at the 5% level?
6. **Table 3.** It seems that table 3 also presents the trends (not the average trends values). What is “n/a”: this condition does not occur at the station or there is no sufficient data to compute a trend?
7. **Figure 8.** What are the “Average monthly occurrences”? Are these calculated for the 12 months separately? For the winter months only? Maybe a sentence can be added to explain this.
8. **Figure 9.** This figure is too small and it is difficult to get the information. The units on y-axis should be “1980-81” instead of “80-81”. The vertical dashed line is not visible.
9. **Concluding remarks.** This is a very important section of the paper. Key findings should be about what has been found (shown/demonstrated) in the paper. For example:
  - There are 3 general regions of high occurrences of near 0°C temperature conditions: BC extended to Saskatchewan, southern Ontario and Atlantic region...

- Maximum values of the precipitation types are concentrated in the eastern half of the country...
- Trends were found in ...

Key findings should not be about potential explanation. For example:

- *“The longest duration events are associated with prolonged cloud cover”* – this might be true but there is no results showing this in the paper.

A sentence should be added in the key findings related to change in the frequency of freezing rain and in the frequency of any of the 12 weather types (because this is important to the reader).

Something such as “This study shows that there is no change over 1981-2011 at most stations; however, the period is short to detect any statistically significant change, and it is important to continue to monitor these precipitation types. A previous study has shown that there are some areas in Canada with increasing trends in freezing rain events over 1953-2004... (Wang 2006)”.

Good work!

#### Reference

Wang, X. L. (2006), Climatology and trends in some adverse and fair weather conditions in Canada, 1953–2004, J. Geophys. Res., 111, D09105, doi:10.1029/2005JD006155.