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Interactive comment on "High-Resolution Meteorological Forcing Data for Hydrological Modelling and Climate Change Impact Analysis in Mackenzie River Basin" *by* Zilefac Elvis et al.

Anonymous Referee #2

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The data description paper entitled "High-Resolution Meteorological Forcing Data for Hydrological Modelling and Climate Change Impact Analysis in Mackenzie River Basin" describes a new gridded climate reanalysis data set (WFDEI-GEM-CaPA) and its application to correct biases in CanRCM4 data set over the Mackenzie River Basin. The data set consist of seven hydro-climatic variables that are required to run a distributed and process based hydrologic model over the basin. The original data sets used to generate the new gridded data are described briefly and the methodology followed in blending the original data as well as validating the resulting new data set is well described. The resulting bias corrected CanRCM4 data is also shown to preserve the climate projection signals while removing the biases on monthly basis. In general, the

manuscript describes very well the steps in preparing the new data sets as well as the added value gained from these new data sets.

However, I have also made the following few observations that may require some explanation to further improve the quality of the manuscript:

1. Page 14; Lines 270 – 272: I do not understand why the historical period for bias correcting the CanRCM4 data is chosen to be 1979 – 2008 instead of 1979 -2005. We all know that the CMIP5 standard is to apply the historical emission rate until 2005 and then use the various emissions scenarios from 2006 onward. That means the 2006 – 2008 period is a climate projections period, not historical climate period. I would like to ask the authors to provide a convincing argument for this discrepancy.

2. Page 14; Lines 278 – 281: the authors wrote "... the GEM 40 m variables are used directly to correct WFDEI surface level variables (2 m temperature, 2 m specific humidity, and 10 m wind speed). Therefore, the corrected WFDEI-GEM-CaPA data reflect 40 m elevations above the surface." These two statements seems to be contradictory and do not make sense to me at all. Other paragraphs (including Table 2) seems to suggest that the GEM 40 m variables are used to correct the WFDEI 40 m variables; not the WFDEI surface variables. The authors should correct or explain these discrepancies.

3. Page 17; Lines 318 – 319: the authors wrote "... the height differences preclude direct validation of other variables against the ECCC-S data which are measured at the surface." However, Table 2 shows at least other three surface variables (pressure, short and long wave radiation) that can be used for direct validation. Therefore, the authors have to explain why those additional surface variables were not used for validation.

4. Page 17; Lines 325 – 327: To compare station precipitation values against gridded products, the authors chose to interpolate the surrounding four grid cells. Knowing that averaging gridded products has under estimation (smoothing) effect; why didn't they choose to use only the closest grid to the station data for better comparison?

5. While the gridded data set produced and explained in this paper is aimed to be used by the MESH model that is capable of using climatic forcing data at 40 m above surface level, most other process based hydrologic models need forcing data near the surface (such as 2m for temperature and 10 m for wind). So, why not also produce the corresponding surface level WFDEI-GEM-CaPA and bias corrected CanRCM4 values for those variables.

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