I completed the review of the manuscript" Long-term weather, hydrometric, and water chemistry datasets in high-temporal resolution at the La Salle River watershed in Manitoba, Canada". The authors described a long-term hydro-climatic and water quality dataset of the La Salle River watershed. Overall the manuscript reads well. However, I have concerns regarding the uniqueness and novelty of this work for the following reasons:

1. Long term hydro-climatic and water quality dataset are common in the Red River Basin and published in many articles. For example, South Tobacco Creek Watershed, Mauvais Coulee basin.
2. Section 6.2 need to be revised significantly. The scientific explanations are weak and not in touch with recently published research articles across the Red River Basin. The authors need to do a better job explaining Fig. 7d. I can see in Figure 7d: a hydrologic wetting period (91-98), a streamflow drought (02-04) and recent hydrologic wetting (2005-2013) with an occasional dry year such as 2007. This is consistent with other watersheds in the Red River Basin.
3. There are some interesting trends and features in C_Q relationship of Figure 9. These need to be analyzed in detailed and may be visualized in a different way.
4. What is unique about the La Salle River Basin? The authors should discuss the study in the context of the Red River Basin (northern) rather than a Canadian prairie basin.
5. What is the unique contribution of this paper and how this study is different or similar with other watersheds in the Red River basin?

Based on my literature review, there are lots of trend going on in Red River Basin to a recent change in hydroclimatic conditions (precipitation and streamflow since ~1990). Recent climate change in the form of increased precipitation in the Red River Basin is manifold and scale dependent (e.g. Coles et al., 2016; Mahmood et al., 2017; Todhunter 2016). Many studies reported the increased contribution of rainfall induced streamflow in the recent years at hillslope scale (Coles et al., 2016) and smaller watershed scale (Mahmood et al., 2017) while rainfall induced streamflow contribution is little at larger watershed scale. Likewise, Stefan and Novotny (2007) detected increased streamflow over last few decades in the eastern part of the Red River Basin to North. Ryberg et al., (2016) reported earlier snowmelt streamflow peaks in the northern NGP areas and delayed summer streamflow in recent years likely due to recent climate change.

Brimelow JC, Stewart RE, Hanesiak JM, Kochtubajda B, Szeto K, Bonsal BR. 2014. Characterization and assessment of the devastating natural hazards across the Canadian Prairie Provinces from 2009 – 2011. Natural Hazards 73: 761-785.

Ryberg K. R., Akyuz F. A., Wiche, G. J., and Lin W., 2015. Changes in seasonality and timing of peak streamflow in snow and semi-arid climates of the north-central United States, 1910–2012. Hydrological Processes, DOI: 10.1002/hyp.10693

Novotny E. V., Stefan, H. G. 2007. Stream flow in Minnesota: Indicator of climate change. Journal of Hydrology 334, 319-333.

Comments

Line 11: “La Salle River Watershed”: It is kind of awkward to introduce the watershed name at the first line of the abstract. Why should we care about the La Salle River? It is better to frame the area as ~northern part of Red River Basin” in which La Salle River Watershed is a representative basin.

Line 15: “physically-based modelling”. I think these datasets are needed in all kind of hydrologic models including physically-based models. Better to say hydrologic models.

Line 15-17: “The only hydrometric variable included in the dataset was stream discharge in a daily time-step, which is the usual time-frame for summarizing the results of long-term studies.” Really? Daily time step are not adequate to detect rainfall runoff events in several basins of the Red River valley. For example, the rainfall runoff events in 2002, 2005, 2011 and 2013 need a sub-daily level observations to summarize them.

Line 51-55: It is worthwhile to mention that Mahmood et al., (2017) developed a detailed physically based hydrologic model at an agricultural field level spatial resolution on CRHM platform in South Tobacco Creek Watershed. They evaluated the model against distributed snow observations as well as multi-scale streamflow measurements during 2000-2011 period. Note that they utilized hourly air temperature, relative humidity, wind speed (Deerwood station) and rainfall (Twin watershed) to force the model. However, winter precipitation are only available at daily time step.

Mahmood TH, Pomeroy JW, Wheater HS, Baulch HM. Hydrological responses to climatic variability in a cold agricultural region. Hydrological Processes. 2017;31:854–870. doi: 10.1002/hyp.11064

Line 71: This sentence “Hydrometric data comprise another important input for hydrological simulations.” does not mean anything. I am not sure what you intended to say here. Streamflow data is generally used to evaluate the hydrologic simulations. Delete or Revise the sentence.

Line 71 – 84: In this paragraph, the authors need also to introduce the uncertainty on the timing of the streamflow observations; when it starts and ends? Generally, streamflow measurements begin when the channel ice tend to break up during spring (~March), and ends with the development of ice cover at the onset of winter (~October).

Line 95-98: The authors need to write a much better rationale for selecting this watershed than the line “This watershed has been selected due to its importance as an object of recent hydrological simulations and its characteristics as an agriculturally-dominated tributary of the Red River, the primary nutrient source to Lake Winnipeg (McCullough et al., 2012; Yang et al., 2014; Corriveau et al., 2013).”

Line 84: Please add the citation Rasouli et al., (2014) and Mahmood et al., (2017).

Rasouli K, Pomeroy JW, Janowicz JR, Carey SK, Williams TJ. 2014. Hydrological sensitivity of a northern mountain basin to climate change. *Hydrological Processes* 28: 4191-4208.

Mahmood TH, Pomeroy JW, Wheater HS, Baulch HM. Hydrological responses to climatic variability in a cold agricultural region. Hydrological Processes. 2017;31:854–870. doi: 10.1002/hyp.11064

Line 170: Not sure what this "regards to extreme events or local effects" means? Elaborate on extreme events and local effects.

Line 173: In "R^2" R needs to in italic font (R^2)

Line 174: Is R^2 a good metric to determine mutual equivalency? Is there other coefficient or metric to verify this?

Line 167 -180: It seems like from Figure 1 that the stations in Winnipeg are ~40 km away from the study site station. Moreover, land use/cover and surface processes are drastically different between Winning and LaSalle. I wonder whether there is another site available near study site having similar land use/cover.

Line 182 – 189: Comparing/gap filling relative humidity with stations in Winnipeg in the summer seasons are a bit of stretch as the cloud cover and storm system is spatially isolated and small in size. There is a very good possibility of contrasting climatic conditions (convective system) at many instances between study site and Winnipeg in the summer season. We can also see that R^2 is lower than temperature. I think the AUTHORS NEED to clarify this issue and discuss them in this paragraph.

Line 201-211: I am concerned about the same issue of Line 182-189 in the summer season. The spatially variable cloud cover results in different solar radiation values in the summer seasons. I think the AUTHORS NEED to clarify this issue and discuss them in this paragraph.

The issues in Line 182-189 and 201-211 have direct and indirect consequences on physical based modeling.

Line 201-211: I am concerned about the same issue of Line 182-189 in the summer season. The spatially variable cloud cover results in different solar radiation values in the summer seasons. I think the AUTHORS NEED to clarify this issue and discuss them in this paragraph.

Line 212 and section 3.2.5.

1. I am concerned that all the precipitation stations are outside the watershed (Figure 1). This may be fine for winter precipitation and multi-days rainfall events. However, this is a big issue for spatial representation of precipitation and physical-based hydrologic modeling in the spring/summer season (event duration for few hours). Is one or two station enough for the summer hydrologic modeling? Mahmood et al., (2017) discussed the model failures at smaller due to the inadequate spatial representation of summer rainstorm events due to lack of rain gauges. Since, summer runoff events have recently

increased in the Red River Valleys (e.g. 2002, 2005, 2011, 2013 summers), the authors should discuss these issues and highlighted the limitations and challenges involved with this datasets.

2. The authors need to discuss how precipitation (particularly winter) was measured? What kind of precipitation gauge does it use and what kind of wind-shield (Nipher? Alter?) does it use in winter? Has the winter precipitation data been adjusted for wind under-catch? Is this a volunteer climate station (using ruler) by Environment Canada? Snowfall in the prairie region tends to be under-reported by 50% due to wind under-catch. Discuss the uncertainty involved with precipitation measurements and potential consequences on physically based modeling.

Line 244: It is unfortunate to see 2008 streamflow data is missing. To me, 2008 is an interesting year as high precipitation generates very little runoff. For example, in South Tobacco Creek watershed, 431 mm precipitation produced only 2 mm runoff which is consistent with other watersheds (such as Mauvais Coulee basin in North Dakota), in Red River basin.

Line 349-350: "This result is consistent with other studies in the Canadian Prairies that report an increase in the number of low-intensity events (Akinremi et al., 1999)." I am not what the "consistent" means here? However, the authors did not compare decomposed hourly data with any real dataset/observations? I know that hourly rainfall observations are available for twin sub-watershed of the South Tobacco Creek basin. There was a big summer storm having few heavy rainfall days (Jun 9-11, 2002) but I do not whether system extended up to LaSalle River basin. In addition, it looks like there are events June and July 2005 extended up to La Salle River basin. Without comparing any real data, it is hard to comment whether it would work for physically-based modeling or not?

Line 302: Please mention that relative humidity is one of the major parameters to physically simulate evapotranspiration (particularly in the summer season) which set antecedent soil moisture before the onset of the winter season.

Line 361-362: "This type of behavior is not expected and indicates potential issues with the hydrometric data since years with larger peak flows such as 2006 did not show these anomalies (Fig. 7c)." This does not make any sense. Fig 7c does not indicate something like what is stated in line 361-362. Streamflow data shown in Fig 7b and 7c are consistent with what we have observed in South Tobacco Creek, Mauvai Coulee Basin (North Dakota) and other basins in northern Red River Valley. The authors should not guess or speculate regarding this dataset. The main issue is a rainfall induced runoff in the summer has been increasing across the Red River Basin. The year 2005 is one of the prime examples of the dominance of snowmelt and rainfall induced streamflow. The 2006 winter is the warmest winter/spring in last 20 year.

Line 427-428: Long term dataset is usually available for many watersheds in Red River Basin. For example: South Tobacco Creek (MB) and Mauvais Coulee basin (ND).

Figure 6: What is in Figure 6c? It is not mentioned in the caption.

Figure 7d. What is annual water yield for 2002, 2003 and 2004. The legend is not consistent with the figure 7d.