Re-Review of "Using MODIS estimates of fractional snow cover extent to improve streamflow forecasts in Interior Alaska" by K. E. Bennett, J. E. Cherry, B. Balk and S. Lindsey

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Summary:

In this paper, the authors employ daily Moderate Resolution Spectroradiometer (MODIS) fractional snow cover extent (SCE) data to improve streamflow simulations in several Alaskan sub-watersheds of the Tanana River. The study period covers 2000-2010 with simulations with the SAC-SMA conceptual rainfall-runoff model that also incorporates the one-layer SNOW17 model for the representation of snowpack conditions. Runoff simulations that include MODIS-derived snow areal depletion curves (ADCs) in SNOW17 are compared with baseline simulations with the standard model formulation for ADCs in the five sub-basins of the Tanana River. The authors conclude that the assimilation of the MODIS SCE data leads to better representation of snow conditions and runoff simulations in Interior Alaska.

This paper presents interesting results on the potential application of MODIS SCE data in operational models for improved runoff simulations in Interior Alaskan watersheds where in situ data remain sparse. The revised paper is much improved and the authors have addressed satisfactorily the comments provided by all referees including those I submitted in my report. Prior to publication, the paper requires some additional (minor) revisions prior to publication. The following provides a list of suggestions that may be helpful to the authors in revising their paper:

General Comments:

1) The paper still includes non-metric units including feet for elevations, millibars for pressure, and inches for snow water equivalent (SWE). Please convert all remaining non-metric units to metric and adjust Equation (1) accordingly. Note that Equation (1) can be converted easily to metric units as follows:

$$C = 0.9 - [(elev - 304.8) \times 0.000353]$$

where *elev* is now in meters.

2) The journal may prefer using superscripts for all units, e.g. $m^3 s^{-1}$ instead of $m^3/s$. Please consult the authors' instructions on the format used for units in the journal.
3) On p.10, Section 2.5 describes the metrics used in the evaluation of the model but it is unclear at what temporal frequency the model results are for this evaluation – are these daily or monthly values? For instance, results of NSE scores tend to improve when the temporal averaging periods are monthly rather than daily. Please clarify this within the text and the appropriate figure captions.

Specific Comments:

1) P. 8, line 24: Replace “mb” with “hPa”.

2) P. 12, line 10: What are the units for snow density here?

3) P. 12, line 11: Replace “northern” with “north”.

4) P. 13, line 19: Change to “data have”.

5) P. 13, lines 20 and 21: Why are SWE data reported in inches here?

6) P. 13, line 21: Change to “sub-basin to sub-basin”.

7) P. 13, line 32: Revise to “data improve”.

8) P. 13, line 33: Change to “while they perform”.

9) P. 14, line 5: Change to “results shown in Figure 3 illustrate”.

10) P. 14, line 13: Change to “discharge plotted”.

11) P. 16, line 9: Change to “as noted in results”.

12) P. 21, line 21: The “Clark et al.” reference is not in the proper alphabetical order.

13) P. 22, line 13: Abbreviate the journal name.

14) P. 23, line 4: Change to “reprojection tool”.

15) P. 25, line 15: Abbreviate the journal name.

16) P. 27, line 8: Insert a space in “G.: Processes”.

17) P. 28, lines 13-14: The article title has all upper case letters.

18) P. 34, Table 4: What temporal frequency is used to compute the error statistics and model evaluation? Please include the probability values for the correlation coefficients, or at least denote those that are statistically-significant at a certain p-value.

19) Figure 7: At what temporal frequency are the correlation values and RMSEs computed?

20) Figure 9: The length of the x-axes should match that of the y-axes to better interpret day-to-day variations in the simulated discharge for the six study basins. Consider also changing the presentation of the results from units of discharge ($m^3 s^{-1}$) to specific discharge ($m^3 s^{-1} km^{-2}$) to allow easier comparisons between the basins of different areas, while keeping the range of the y-axis values identical on all six panels.

21) Supplemental, p. 2, lines 22-23: Insert spaces in “1000 m” and “1200 m”.