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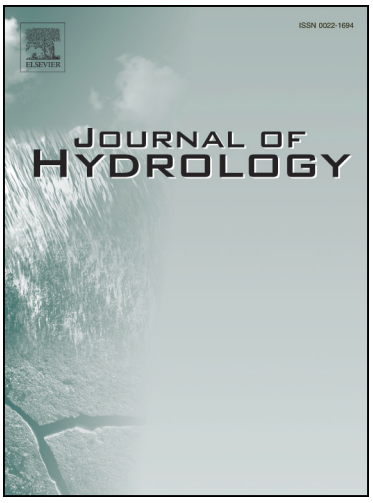

Research papers

Towards Validation of the Canadian Precipitation Analysis (CaPA) for Hydrologic Modeling Applications in the Canadian Prairies

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PII: S0022-1694(17)30388-8
DOI: http://dx.doi.org/10.1016/j.jhydrol.2017.05.059
Reference: HYDROL 22050

To appear in: *Journal of Hydrology*

Received Date: 16 March 2016
Revised Date: 3 April 2017
Accepted Date: 29 May 2017

Please cite this article as: Boluwade, A., Zhao, K.-Y., Stadnyk, T.A., Rasmussen, P., Towards Validation of the Canadian Precipitation Analysis (CaPA) for Hydrologic Modeling Applications in the Canadian Prairies, *Journal of Hydrology* (2017), doi: http://dx.doi.org/10.1016/j.jhydrol.2017.05.059

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Towards Validation of the Canadian Precipitation Analysis (CaPA) for Hydrologic Modeling Applications in the Canadian Prairies.

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Abstract

This study presents a three–step validation technique to compare the performance of the Canadian Precipitation Analysis (CaPA) product relative to actual observation as a hydrologic forcing in regional watershed simulation. CaPA is an interpolated (6h or 24 h accumulation) reanalysis precipitation product in near real time covering all of North America. The analysis procedure involves point-to-point (P2P) and map-to-map (M2M) comparisons, followed by proxy validation using an operational version of the WATFLOOD^{TM} hydrologic model from 2002 - 2005 in the Lake Winnipeg Basin (LWB), Canada. The P2P technique using a Bayesian change point analysis shows that CaPA corresponds with actual observations (Canadian daily climate data, CDCD), on both an annual and seasonal basis. CaPA has the same spatial pattern, dependency and autocorrelation properties as CDCD pixel by pixel (M2M). When used as hydrologic forcing in WATFLOOD^{TM}, results indicate that CaPA is a reliable product for water resource modeling and predictions, but that the quality of CaPA data varies annually and seasonally, as does the quality of observations. CaPA proved most beneficial as a hydrologic forcing during winter seasons where observation quality is the lowest. Reanalysis products, such as CaPA, can be a reliable option in sparse network areas, and is beneficial for regional governments when the cost of new weather stations is prohibitive.

Keywords: precipitation forcing, precipitation data quality, Hydrologic modeling; Canadian Precipitation Analysis; Bayesian change point analysis; spatial autocorrelation; interpolation

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