

Identifying opportunities for investigating the effects of temperature on infiltration and implications for modelling the hydrologic response of watersheds

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Abstract. This paper identifies opportunities to incorporate and model the effects of temperature on infiltration and, consequently, surface runoff at the watershed scale. A comprehensive literature review provides an overview of the state of the science and identifies some knowledge gaps. Previous research reveals that:

1. Watersheds respond to rainfall differently under different temperature regimes, even in the absence of phase-change effects.
2. Soil hydraulic properties are temperature dependent.
3. Pondered infiltration rates fluctuate in response to diurnal temperature patterns.

While the dependence of soil and water interactions on temperature has been identified for certain conditions and scales, it is difficult to quantify these effects at the watershed scale. This may explain why many watershed models neglect temperature when describing infiltration processes. A method to introduce temperature-dependent infiltration parameters into the conceptual watershed model HSPF is presented. Future work may include calibration of selected models with new temperature-dependent parameters.

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