

Interactive comment on “StreamFlow 1.0: An extension to the spatially distributed snow model Alpine3D for hydrological modeling and deterministic stream temperature prediction” by Aurélien Gallice et al.

Anonymous Referee #2

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Overall comment

The authors have done an excellent job preparing this manuscript and in their revision of the StreamFlow model for this application. I feel that this will be a valuable contribution to the stream temperature literature and do not have any major concerns with the current version of the manuscript. However, I do suggest minor revisions to the current draft in order to better make use of this excellent work within the broader stream temperature field. I also agree with the points made by Reviewer 1; therefore, will not reiterate.

C1

Introduction

Page 2 - Line 25 - The authors mention there is a strong correlation between stream temperature and air temperature. This is true; however, this does not always imply causation (Johnson, 2003). Recent work has demonstrated how important this fact is in terms of modelling and in understanding stream temperature response to environmental change. It would be useful to expand this discussion within the context of this particular model.

Page 3 - Paragraph 2 - I am not sure why this paragraph is here. It seems out of place.

Section 2

The use of the term "subsurface runoff" has been applied throughout. This is a strange use of the word runoff given that it typically applies to shallow or overland flow. Perhaps consider using the word "flow" rather than "runoff".

The Tsubw description is fairly vague. I imagine sub watershed temperature plays a substantial role in the overall stream energy balance, yet it is not well described. Further explanation is required.

Overall, the manuscript would greatly benefit from a more formal sensitivity analysis so that the reader can understand how each of the terms used can influence stream temperature in this model. It is not clear how each of the terms is being simulated and what their relative influence on temperature is. For example, the authors suggest that the underestimation of the diurnal temperature pattern is likely due to stream width and depth, or subsurface temperature. There is no discussion of how the influence of the radiative balance (by far the largest term). It's also not clear how hyporheic fluxes play a role. Quantifying these various fluxes and their role in governing stream temperature would be an excellent use of this modelling tool.

C2