

## ***Interactive comment on “Principle components of thermal regimes in mountain river networks” by Daniel J. Isaak et al.***

**Anonymous Referee #2**

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This manuscript provides a nice analysis, characterizing the spatial and temporal characteristics and controls of thermal regimes of stream water. The work is based on a novel application of Principal Component Analysis, including the highly interesting differentiation of T-mode and S-mode PCA to illustrate both, temporal and spatial consistency of the stream temperature pattern.

The paper is very well and concisely written, including a clear and complete description of the data and methods used.

However and despite the flawless implementation of the analysis, the interpretation of the results and their implications remain somewhat superficial. After reading the manuscript, it seemed to me that the authors contented themselves with demonstrating how a well-known statistical tool can be applied with stream temperature data. The

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one finding that I found most interesting to demonstrate the value of PCA was that the authors could pin down the timing of the phase transitions.

I may not see the forest for the trees but apart from that I am not sure what can be learned from the analysis. As far as I understand, the results essentially suggest that (1) stream temperature is mostly controlled by temperature magnitudes and lengths of winter periods (which again is related to temperature magnitude one would assume) and (2) stream temperature is more spatially homogeneous in winter than in summer. While the first does not really come as a surprise, it seems that the latter can also be inferred without PCA (or in other words: how is the information content of Figure 2 different to that of Figure 6?).

I would thus be glad if the authors could invest a bit more effort in (1) highlighting the benefits of PCA with respect to other methods and (2) providing a somewhat stronger synthesis of their results – what are the novel aspects that can be learned from these results?

Technical comments:

p.7,l.204: what is a “Princomp procedure”?

p.7,l.212: is there a specific reason to run the T-mode PCA on the 5-year mean values of the daily mean temperatures? In other words, why use 365 days (i.e. columns) and not the full data set of 1826 as in the S-mode analysis?

p.18,table 1: the values for reach slope seem excessively small. Should the unit perhaps be [m/m]? Please check.

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