

Interactive comment on “Assessment of open thermodynamic system concepts for fluviokarst temperature calculations – an example, the Cent-Fonts resurgence (Hérault, France)” by P. Machetel and D. A. Yuen

Anonymous Referee #1

Received and published: 3 March 2014

I have read the reply of the authors and would like to comment on a couple of issues:
some references to stream temperature models are:

Brown, G. W., 1969. Predicting temperatures of small streams. *Water Resour. Res.* 5 (1), 68–75.

[Full Screen / Esc](#)

[Printer-friendly Version](#)

[Interactive Discussion](#)

[Discussion Paper](#)

Kim, K. S., Chapra, S. C., 1997. Temperature model for highly transient shallow streams. *J. Hydraul. Eng.* 123 (1), 30–40.

Sinokrot, B. A., Stefan, H. G., 1993. Stream temperature dynamics: Measurements and modeling. *Water Resour. Res.* 29 (7), 2299–2312.

Boyd, M., Kasper, B., 2003. Analytical methods for dynamic open channel heat and mass transfer: Methodology for heat source model Version 7.0. Oregon Department of Environmental Quality, Portland, Oregon, <http://www.heatsource.info/HeatSourcecv7.0.pdf>.

Becker, M. W., Georgian, T., Ambrose, H., Siniscalchi, J., Fredrick, K., 2004. Estimating flow and flux of ground water discharge using water temperature and velocity. *J. Hydrol.* 296 (1-4), 221–233.

Roth, T. R., Westhoff, M. C., Huwald, H., Huff, J. A., Rubin, J. F., Barrenetxea, G., Vetterli, M., Parriaux, A., Selker, J. S., Parlange, M. B., 2010. Stream temperature response to three riparian vegetation scenarios by use of a distributed temperature validated model. *Environ. Sci. Technol.* 44 (6), 2072–2078.

Westhoff, M. C., Savenije, H. H. G., Luxemburg, W. M. J., Stelling, G. S., van de Giesen, N. C., Selker, J. S., Pfister, L., Uhlenbrook, S., 2007. A distributed stream temperature model using high resolution temperature observations. *Earth Syst. Sci.* 11 (4), 1469–1480, <http://www.hydrol-earth-syst-sci.net/11/1469>.

And several references herein.

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

Regarding point 3a:

C_p does not describe the storage of heat, but is a conversion factor to convert temperature into energy. Storage of heat is described as a $V_i T_i$ (eventually multiplied with ρC_p to have units in terms of energy). In Eq 3, a change in storage over time ($V \Delta T / \Delta x$) should equal the sum of $Q_{in} T_{in}$ minus the sum of $Q_{out} T_{out}$.

Regarding point 3c:

The LHS has units: $[m/s][K]/[m] = [K/s]$

The RHS has units: $[m^2/s][K] = [m^2 K/s]$

Regarding points 3d-f:

After having read the text in the manuscript again, I see that the authors are right. Nevertheless, to avoid this confusion, I recommend to give the normalized parameters a different symbol such as e.g. $T_{normalized}$ or add the normalization in the formula e.g. $T / \Delta T_{max}$.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 11, 169, 2014.

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

