

Interactive comment on “A distributed stream temperature model using high resolution temperature observations” by M. C. Westhoff et al.

Anonymous Referee #2

Received and published: 19 February 2007

General comments:

The paper presents a stream temperature model and its application in a first - order stream. The fibre optic temperature measurements used in this work are of great interest for hydrologic and hydrogeologic research. Therefore the paper is of high relevance for HESS. But the authors need to clarify what is the intention of the paper. The title implies that a stream temperature model is presented, in the abstract they state that they identify runoff components using temperature and in the introduction they state: “the lateral inflow is of major importance and subject of the study”. Further, they need to make more clear what is the difference to the work of Selker 2006 (Reference is given as Selker 2006b in the present paper). In general the sections 4 and 5 need elaboration. Please see the specific comments below. The manuscript is written in

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

flawless English.

Specific comments:

1. In section 2.1: The authors mentioned a “V-notch”, please inform the reader that it is a stream gauge.
2. In section 2.1: Please explain what is a “more or less constant” discharge, give numbers.
3. In section 2.2: What is the base of the wind velocity estimation? Give a reference.
4. In section 3.1: What is the grid size of the finite difference scheme, I guessed it is the spatial resolution of the temperature measurements.
5. In section 3.2: Is the streambed conduction and the alluvium temperature assumed to be homogeneous along the whole reach? If so, please justify your assumptions. The porosity of the streambed is not given. Which values were used? Add it to Table 2 if it is assumed to be constant.
6. In section 3.3: The amount and temperature of lateral inflow appears to be quite essential for the model and the study in general. It would improve the paper to use independent data. With small instrumentation effort the streambed temperatures could have been measured at the four inflow locations. Using piezometer or seepage meter tests the inflow could have been independently quantified. It needs to be discussed why you did not use additional data to verify your results.
7. In section 4, p. 138, lines 18-22: The sensitivity of the model towards the input parameters must be discussed in more detail. You have to provide a quantitative sensitivity analysis. The uncertainty of the input parameters needs to be discussed as well. A sensitivity analysis would also help to explain the differences to the observed temperatures. Potential users of the model will then know which parameters are most sensitive and should be estimated and/or measured with high accuracy. You have to discuss whether or not the calibrated parameters have reasonable values. For exam-

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

ple, the calibrated thermal conductivity of the sediments seems fairly high.

8. In section 5: Potential limitations of the model (and the method) need to be discussed, in particular regarding to the lateral inflows. What is the minimum amount of inflow that can be detected? What minimum temperature contrast between the inflow and the stream is required to quantify the amount of inflow?

9. In section 6: Tell the readers why it is so nice to have this high resolution spatial and time series data.

10. Figure 2: This figure provides hardly any useful information. Instead of a general scheme it is necessary to present a conceptual model including a discharge and temperature balance (see for example: Fig 3. in Becker et al., 2004, Journal of Hydrology) and all relevant heat transfer processes. Use the same symbols like in section 3. The lateral inflow must appear in the concept.

11. Figure 5: It is hard to distinguish between the graphs. Use dashed lines or colors instead of the grey - scale.

12. Table 2: The table is hard to read because you do not give a description of the symbols. Add another column with a description of the parameters. For each parameter you have to give a reference. It is not enough to state “the constants have been taken from literature”.

Technical comments:

1. In abstract, line 2: hyphenate “first - order”

2. In abstract, lines 5-7: add a comma “With the observations, four groundwater”

3. In section 2.1, p. 128, line 6: “the schist comes to the surface”: this is not what you want to say.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 4, 125, 2007.

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper