

Interactive comment on “Quantification of the Beauce’s Groundwater contribution to the Loire River discharge using satellite infrared imagery” by E. Lalot et al.

Anonymous Referee #2

Received and published: 3 April 2015

General comments

This manuscript presents interesting results on how Landsat imagery in the TIR band can be used to map water temperature in a large river synoptically over hundreds of kilometers. This approach has been used in other large rivers, but the Loire River is particularly interesting because it is influenced by relatively high-volume groundwater inputs and is quite narrow (in places) for using satellite TIR imagery. Furthermore, the seasonal differences in river temperature provide an important perspective on thermal heterogeneity experienced by riverine biota. The paper could significantly improve our understanding of riverine thermal regimes and spatial patterns at broad scales,

C872

and it could be a useful contribution to the literature on thermal remote sensing of rivers, but unfortunately its presentation is quite poor. It is confusingly written from the standpoint of scientific English, and its organization requires significant revision to highlight the strengths and weaknesses of the study. For example, the data on the accuracy assessment need to be presented in more detail. The only data presented on the accuracy of the method are in Figure 2, which only presents means, which are not very useful. The authors need to present box and whisker plots perhaps to show the reader how variable the differences were. Furthermore, the authors mention that linear regression was used to evaluate kinetic and radiant temperatures, but these linear regressions and their statistics are not shown or reported. It would seem that the remote sensing part of this study would alone be a nice contribution but would require more more detail for the reader to truly evaluate the data. I am not qualified to evaluate the methods for estimating groundwater discharge, but it appears that this part of the manuscript is poorly developed. The main objectives of the paper pertain to the TIR data and how they can be used to locate thermal anomalies associated with groundwater at different times of the year. The authors may wish to reconsider how important the actual calculations of discharge are for this paper.

Specific comments

Title: Specify "thermal IR" not just IR. Also, write out Beauce Aquifer because most readers won't know what the "Beauce" is.

Throughout the manuscript, various words are capitalized for no reason. Please enlist the help of a scientific editor to help with the English.

Page 2048, Line 20: Throughout the manuscript, the authors write "Thermal InfraRed". Just write "thermal infrared (TIR)" and use standard terminology as in the papers that are cited in the references.

Page 2049: Check spelling of "Burckholder". I think it doesn't have a "k". Also, the word "evolution" doesn't make sense as it is used throughout this manuscript.

C873

Page 2050: The authors need to say something about the presence of large wood, boulders, and gravel bars because they can also be a cause for mixed pixels, not just the banks.

Page 2052, Line 18: This is confusing because the authors refer to the near IR data before they even describe the TIR data from the satellite. In fact, the authors don't identify the spatial resolution of the IR and TIR bands in the methods. Please check your methods. They are not presented in a logical order and they need to provide more detail.

Page 2053: The fact that the authors use data where there are only three pixels across the width of the stream is quite surprising, given what papers have described. It is really important for these data to be fully reported. After reading this paper, I am somewhat convinced that < 3 pixel may work in certain instances, but I need more data to be convinced.

Page 2056: Where are the results and plots for the regression analysis?

Table 1: What time were these temperature data collected? I think it says this in the methods, but you should probably have it in the table as well. Standardize the significant digits in these numbers.

Table 3: Which sections? All sections? How many sections?

Figure 1: The symbols on this map are difficult to see. The triangles and the crosses are too faint. Also, the river km numbers need to be moved slightly so they are not on top of other symbols. Note that the town of Saint Laurent has a symbol that gets in the way of other symbols, and it is hard to read the text of the name. The font size is generally too small throughout this figure. Need to show groundtruth locations if possible.

What is the light grey area? This needs to be stated in the caption.

Figure 2: The y-axis label is too long. Shorten and provided clarification in the text.

C874

Don't use "ones" in the label; this is not good scientific writing.

Are these mean differences? I think it would be better to have box and whisker plots of these so you can see variation.

Figure 3: State that these are derived from satellite imagery. What does "removed" mean in the y-axis label? Move the x-axis at the bottom of the figure.

Figure 4: I think it would be really helpful to have Figure 3 and Figure 4 be panels in the same figure.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 12, 2047, 2015.