EGUsphere, referee comment RC1
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Comment on egusphere-2022-833

Howard Wheater (Referee)

Referee comment on "Deriving transmission losses in ephemeral rivers using satellite imagery and machine learning" by Antoine Di Ciacca et al., EGUsphere, https://doi.org/10.5194/egusphere-2022-833-RC1, 2022

Overall this paper makes a useful contribution to an important issue – the quantification of channel transmission losses, which is often a dominant process in ephemeral streams. The combination of remotely sensed and in situ data provides a useful database, and points to the more general applicability of remote sensing data in this context.

The paper would benefit from clarification of several points of detail, as noted below. Also some more incisive discussion of aspects of the observed data would strengthen the paper, and associated discussion of the potential physical causes of variability in the results over different periods (as discussed in the comparison with other studies). Recommendations fir further work would be useful.

The abstract does not indicate how transmission losses can be derived from a wetted river length. An additional sentence is needed for clarification.

Line 18 typo McMahon (also line 50)

l46 downstream of

l94/95 similar to

l106 flows for

l110 ‘inland plains’ is unclear. Is coastal plains what is meant, or is there some differentiation intended between an inland plain and a coastal plain? If so, some explanation is needed.

Fig 1 typo ‘losing’

l143 derivative

l148 discussion about time before peak unclear at this point

l152 similar to that adopted….

l153 for clarity, recall what Walters did – i.e. use the volume gauged upstream to estimate the lost discharge

l171 explain what is the difference between the river bed and the active river channel – how are these identified?

l181 the linear model fitted in App C masks some interesting aspects of the data, which need discussion. For example there are segments that show both strong gains at some times and strong losses at others. What are possible explanations and how do these effects reflect on the very simple assumption of a linear model? We need some process insights here.

l186 what is meant by the transmission loss time series? Given the spatial complexity and the multiple measurements, this phrase is ambiguous without further explanation.

l215 The ‘estimated transmission losses vary in time’ is unclear. They also vary in space as well as time, so some clarification is needed.

l224 need to explain where the peak flow that is referred to occurred – presumably this is at the permanent gauging station (clearly a) peak flow is very different when downstream points near the wetting front are considered, and b) there is transmission time for peak flow to propagate downstream)

l227 ‘transmission losses were maximum’ is unclear. I assume that what is meant is ‘transmission losses estimated using the modelled relationship with flow at the gauging station’. Above, this was described as estimated, but not here?

l232 fig 4 caption needs some qualification. These are estimated transmission losses based on the stage at the gauged hydrograph location. (similar comment for Fig 6 caption)

Fig C1 shows some sections (below 750m) change from losing to gaining – so complex surface water groundwater interactions

l301 differ in

l314 how could hydrological variability be expected to affect the results? Presumably this relates to groundwater effects? Some thought/discussion is needed, perhaps linking to the observed variability in response shown in App C.

l395 – concluding comments – some thought should be given as to how to further develop insights into the response of this system. It seems to be crying out for some basic monitoring of groundwater. Is there really no data and no monitoring planned?

l411 developed