Reply to reviewer #2

The article presents a mathematical derivation of a simple equation to model tidal wave propagation in different subsurface geometries when leakage may take place between an aquifer and its confining unit. After deriving this equation, the authors present a number of different tests where they compare tidal wave propagation in different hydraulic settings, to help understand qualitatively how the model behaves. Essentially, they carry out a sensitivity analysis to the different parameters in their equation. Personally I like this approach, as it helps to understand the equations qualitatively. I think therefore the most important merit of this paper is this sensitivity analysis.

Reply: Thank for the comments.

I missed some reflection of what the presented results would mean for real and 3d geometries for the characterization of leakage boundaries and aquifer properties. How can we use tidal amplitude and phase lag to identify where leakage boundaries are located? In the charts it could be an idea to normalize distance with the decay length.

Reply: The figures in our manuscript have been redrawn with the dimensionless inland distance defined as a ratio of inland distance to decay length. The present solution, Eq. (6), can be used to simulate head fluctuations in a heterogeneous aquifer system. If the number and location of leakage boundaries are unknown, they can be simultaneously determined in a manner like parameter identification problem (PIP). One can analyze the observed head-fluctuation data using the present solution coupled with an optimization algorithm. A similar PIP was presented by Ayvaz (2010) in which he gave several examples in determining the locations and optimal number of pollution sources based on a linked simulation-optimization model.

The paper is short and to the point. The paper needs to be revised for spelling and grammatical errors.

Reply: Thanks for the suggestion. The manuscript has been edited by our colleague who is very good at technical writing.

Reference

Ayvaz, M. T.: A linked simulation–optimization model for solving the unknown groundwater pollution source identification problems, Journal of Contaminant Hydrology, 117, 46-59, 2010.