Interactive comment on "A novel approach for the assessment of morphological evolution based on observed water levels in tide-dominated estuaries" *by* Huayang Cai et al.

Mick van der Wegen (Referee)

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Dear Authors;

Last weeks I read with great interest your work on inverse modeling to determine the waterdepth from hydrodynamic parameters such as tidal amplification and wave propagation. This is an intriguing technique with many potential and important applications. I am thinking of determining a representative bed level for 1D (morphodynamic) models of long tidal river systems (such as the Yangtze or Ganges) based on local water level observations, particularly usefull in (bed)data scarce environments.

The authors present a first step of such an inverse model since their model approach is based on (explicitly mentioned) assumptions like absence of river flow or head reflectance and a constant bed level in the model domain. The work presented is nice straighthforward and reads quite gently. The analysis makes use of earlier analytical methods to describe tidal propagation in estuarine systems based on few and easily derivable parameters such as estuarine shape and wave attenuation. The approach requires quite rough schematizations that may oversimplify local conditions but are necessary to come to an analytical solutions that can explain tidal dynamics in a straightforward manner.

In the attached document I suggest some (very few) minor changes and typos. Here I address my major considerations: - Figure 12 gives a depth development over time. How did you determine the observed depth? Is that depth constant along the transect that you consider? This is important since one of your assumptions is that the depth is constant along the transect and you could simply test this assumption from data. - In line 351 you refer to the analytically computed tidal amplitude and phase. As far as I can oversee the equations the determination of the phase depends on the mean waterdepth, via eqs 9, 21 and 20. What waterdepth value did you use to determine the phase in figure 9? Is that the waterdepth dteremined in section 4.3? - One of the assumptions that you implicitly make is that the tide in the Bay propagates along the channel. but is this actually true? Or does the tide propagate in a different way? You do not mention this, but I think it is important to note that explcitly.

I can accept if these minor comments are properly addressed with kind regards Mick van der Wegen

Please also note the supplement to this comment:
https://www.hydrol-earth-syst-sci-discuss.net/hess-2019-661/hess-2019-661-RC1-supplement.pdf

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