In this paper, the authors implement 1D modelling to investigate salt intrusion in the Guadalquivir River Estuary. They validate their model using observations from four different campaigns and attribute any discrepancies to water withdrawals related to human activities around the estuary. They also do further experiments by changing the freshwater input. The topic is interesting, and the paper is well written. However, there are a few concerns regarding their approach and methodology.

1. The authors will need to justify better the use of an 1D model for salt intrusion as this neglects the effect of vertical salinity gradients which contribute to salt intrusion. In this case, a constant diffusion coefficient is not enough to account for any unresolved mixing. In addition, Figure 1b and d show that both the width and the depth of the channel can be significant and so it is dubious if averaging can be justified. Have the authors considered the use of a 2DV model instead?
2. There is an inconsistency in the terminology. In some instances, the authors refer to salt intrusion and in others to salt wedge or even salt front and it seems they don't distinguish between these terms. I would advise to remain consistent throughout the manuscript and give an explicit definition. Salt intrusion is usually measured as the landward penetration of a bottom isohaline while the salt wedge is defined as a bottom layer of denser than the surface water. Consequently, I reckon that what is seen in the figures is rather the salinity horizontal gradient (or salinity front) instead of salt intrusion or wedge. Furthermore, the model results are compared with observations taken at 2m below the surface, but the depth can be much deeper in certain sections as it can be seen in Figure 1b. Therefore, I think it is possible that the discrepancy observed between model results and observations without the sinks may be due to the depth averaging which may moderate higher bottom salinity.
3. In continuation to the previous comment. The authors assume that the salinity deficit in their uncalibrated model is exclusively due to water withdrawals. I appreciate that this is an important parameter and even more true for this specific study case, but I believe that the assumption neglects all the other complex physical processes and mechanisms taking place in an estuary. The authors already mention in their manuscript tidal amplification and channel deepening. Don't these two also account for an upstream increase in salinity?
4. The salt transport module was run for the periods when observations from the measurement campaigns that took place between 2021-2023 where available but the hydrodynamic model is forced with data from 2019! How is this justified? This could be already a source of errors.

Minor comments

1. I understand the notation used throughout the manuscript as km 60, km 40 etc. but it doesn't read very well. It is better if it is written as 60 km from the mouth, 40 km from the mouth etc.
2. Please use superscript numbers when giving units (e.g., lines 48, 50 ,197 etc.)
3. Where are the river flows implemented?
4. It is implied that there is no freshwater input from the upstream boundary which is set at the dam. Is this realistic? Is it true for every season?
5. In Line 90, I think the authors of this paper refer to salt intrusion length and not duration.

6. There is a confusion in the manuscript. In some instances, the authors write that the maximum salt intrusion corresponds to the flood and in others to the ebb tide. For example:
   Lines 324-325 the authors write *' The maximum and minimum extent of the saline wedge within the channel coincided with moments just before high and low tides respectively'*. In the next paragraph they write ' *during the flood tide the wedge demonstrates minimal intrusion in the estuary ..... during the ebb tide, the maximum saline intrusion occurred'*.
   Line 375-376 ' *the maximum ebb current and the maximum flood current which closely correspond to the maximum and minimum salt wedge intrusion, respectively'*.
   But then a few lines further down:
   Line 380 ' During maximum ebb current (just after low tides), when minimum salt wedge intrusion occurs.....during flood tides (just after high tides), the maximum salt intrusion is present'.
   In the legend of Figure 5 '*The solid lines represent the time of maximum salinity (F,Flood) and the dashed lines represent the time of minimum salinity (E,Ebb).'*

   At least, Figure 4a shows that the maximum salinity corresponds to the flood tide which is reasonable for a well-mixed estuary.

7. The term 'salt wedge intrusion' is not right. It is either salt intrusion or salt wedge, not all together.
8. Figure 3, indicate where km 30 , 40, 50 etc. is
9. Line 323-324 what do you mean '*a gradual decrease in salinity values upstream can be seen*' . Do you mean gradual decrease during neap tide?