Reviewer 1

1. **The author needs to compare previous related studies. For instance, I have listed some studies, including those on the impact of water extraction on salinity intrusion. Could the author elaborate on the differences and innovations compared to these earlier studies?**

   Thank you for the suggestion. We have included some paragraphs comparing our study with these early studies. It has been included in line 460- 478 as follows:

   "The relationship between saline intrusion, freshwater flows and the effect of water withdrawals is consistent with findings from other estuaries where changes in freshwater flow regimes have been shown to directly influence saline intrusion. For instance, Alcérreca-Huerta et al. (2019) demonstrated an increase in saline intrusion, with high salinity reaching up to 46 km in the Grijalva River estuary, as a result of reduced freshwater discharge due to dam construction. Similarly, using a model to analyze the relationship between salinity and freshwater flow in the Yangtze River estuary, Webber et al. (2015) showed that reduced freshwater flow leads to greater saline intrusion. In essence, the lower and more prolonged the freshwater discharge, the greater the probability of more intense and prolonged saline intrusion. Huang et al. (2024) in the Changjiang estuary, showed that salinity intrusion into the Changjiang estuary could be limited by controlled and sufficiently high freshwater flows from the Three Gorges reservoir. Extrapolating these findings to the GRE, it is clear that under high flow regimes, or if enough freshwater is released, salinity intrusion could be halted by the substantial volume of freshwater flowing down the estuary, counteracting tidal forces.

   The effect of water withdrawals, although not in the exact form presented in this study, has been proposed by Huang et al. (2024). These authors analyzed the effect of water withdrawals through three experiments where the volume of water withdrawn was increased from 0 to 500 m^3/s and finally to 1000 m^3/s, resulting in an increase in saline intrusion of approximately 6-7 km (at flood and ebb tide, respectively) further into the estuary. These withdrawals directly affect the freshwater flow, reducing its volume. These results are consistent with the findings of this study, where water withdrawals are made directly from the channel under low flow conditions, leading to excessive salinization of the Guadalquivir. It is shown that the greater the volume of water withdrawn, the greater the salinity intrusion into the system.

   Therefore, this study highlights the importance of establishing a much higher ecological freshwater flow to mitigate saltwater intrusion, alongside strict control of water withdrawals in the estuary."

2. **Why can the Guadalquivir River Estuary (GRE) be simplified into a onedimensional model for study? What is the structure of the vertical circulation, and how does it affect salinity intrusion?**

Thank you for the question.

The possibility of simplifying the Guadalquivir model to a one-dimensional (1D) channel is mainly based on its geometric and hydrodynamic characteristics. This estuary is considered a semi-closed system due to the presence of the Alcalá del Río dam and is characterized by homogeneous mixing (Álvarez et al., 2001; Diez-Minguito et al., 2013). With a length of 110 km, its depth and width are reduced compared to its length. According to our bathymetry, based on the 2019 nautical chart provided by the Hydrographic Service of the Spanish Navy, the depth ranges from 5 to 18 m and the width varies between 100 and 400 m. This configuration favors the channeling of the flow along the estuary and makes that longitudinal transport processes dominate over the transversal ones.

Under low freshwater flow conditions, the estuary is dominated by tidal influence (Diez-Minguito et al., 2012), resulting in minimal variations in the transverse direction (perpendicular to the flow). Thus, the incoming flow is characterized by a predominant longitudinal direction, where transverse variations are small and insignificant for representing the hydrodynamic behavior of the estuary.

The Guadalquivir is a meso-tidal estuary, with a tidal range of about 3.5 m during spring tides, with the M2 tide as the main component (TM2 = 12.42 hours). The propagation of the tide under normal conditions (low freshwater flow) is due to reflection, friction and convergence of the main channel (Díez-Minguito et al., 2012). In terms of the vertical structure of salinity, the estuary is predominantly characterized by intense mixing (Díez-Minguito et al., 2013), which results in a homogeneous distribution of water properties, such as salinity, with minimal vertical differences in this aspect. Similarly, vertical circulation is characterized by a relatively uniform current pattern during low flow periods, with no significant variations in flow velocity or direction at different depths (Sirviente et al., 2023).

These conditions allow the equations describing the hydrodynamics to be reduced to those of a one-dimensional channel. 1D hydrodynamic models have been shown to be effective in representing the hydrodynamic behavior of natural systems, such as rivers, and significantly reduce computational time compared to 2D and 3D simulations. Previous studies have validated the effectiveness of 1D hydrodynamic models in the Guadalquivir estuary (e.g., Álvarez et al., 2001; Siles-Ajamil et al., 2019).

Furthermore, a thorough validation of the applied one-dimensional model is detailed in Sirviente et al. (2023). In this study, the good performance of the hydrodynamic model is demonstrated by validating the simulations with numerous observations collected over six years of oceanographic campaigns. The 1D simulations are validated against observations from current meters moored at different points in the estuary. In addition, data from surface tide gauges provided by *Puertos del Estado* are used. The results show that the model is in good agreement with all observations, supporting the conclusion that the 1D model can be effectively used to study tidal dynamics in this estuary, where the simulations show high reliability.

The vertical mixing and the reduced salinity gradient are evidenced by the data recorded by the CTD during each campaign. CTD profiles were performed at the different sampling points shown in Figure 1 of the manuscript, allowing us to analyze the vertical behavior of the salinity. The figures below correspond to the vertical salinity profiles measured during the MG1, MG2 and MG3 campaigns.

For MG3 (Fig. R1), CTD profiles were taken at 1-hour intervals over two tidal cycles, for a total of 25 hours at each site. For the MG1(Fig. R2) and MG2 (Fig. R3) campaigns, measurements were taken at 1-hour intervals for a maximum of 10 hours. The sampling points for MG3 are the same as those shown in Figure 1 of the manuscript, as is the case for MG2. However, for MG1 there are more CTD sampling points than shown in the figure. The points for MG1 shown in the CTD plots correspond exactly to the positions of MG2 (see Figure 1a of the manuscript). It should be noted that there are no vertical profiles available for MG1-1 and not all sampling stations have 10 profiles.

When analyzing the behavior of the vertical profiles, it can be observed that in MG3 the water column always remains mixed, showing only very slight vertical salinity gradients during certain hours. Fig. R1 shows that vertical mixing prevails during the tidal cycles. Similarly, during the MG2 and MG1 campaigns, a strong vertical mixing is observed throughout the water column at all CTD profiles in all points of the river.

This observation was essential in simplifying our approach, allowing us to adopt a one-dimensional (1D) model, assuming that the salt concentration is homogeneous throughout the water column.

Motivated by the reviewer comment, we have included these figures in the supplementary material and added a few lines in the methodology and results section to reflect that the estuary has a practically homogeneous vertical behavior for the periods analyzed in this study.

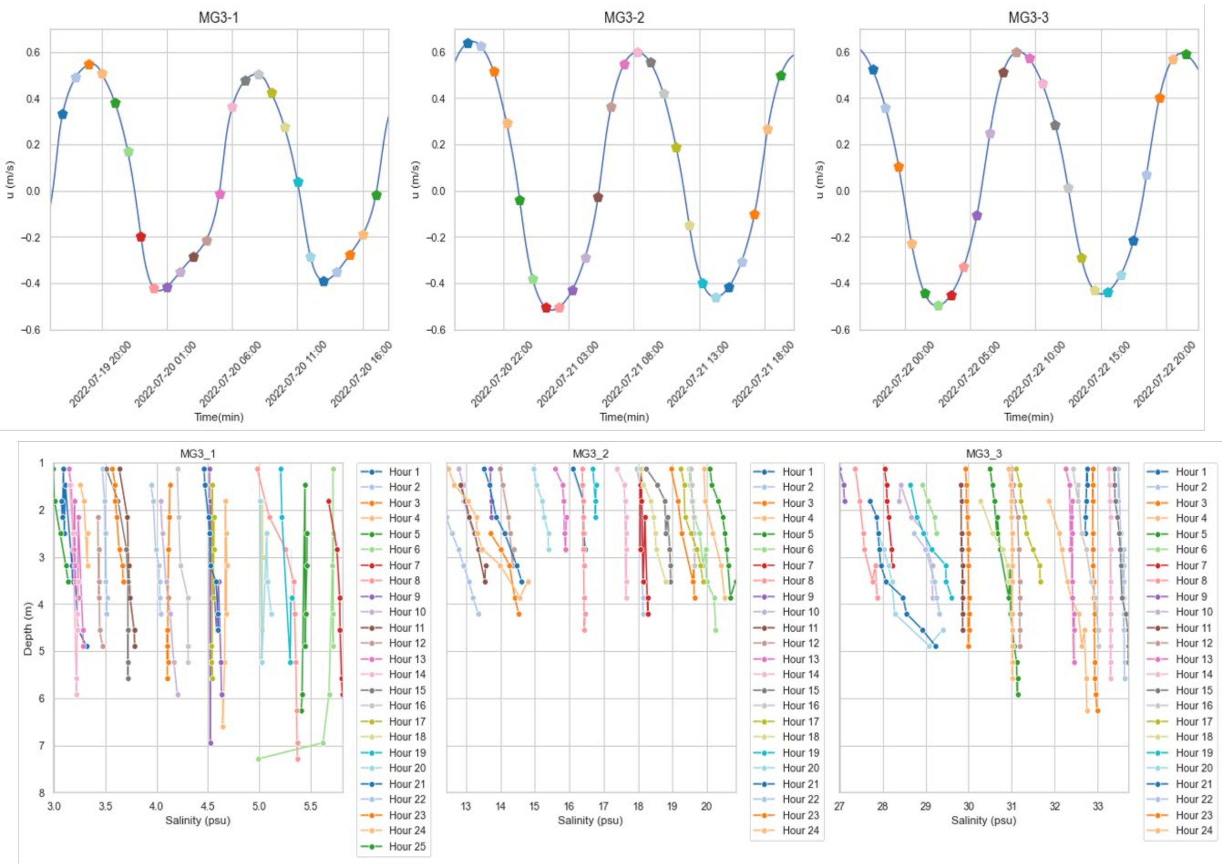

Fig. R1. Top panel corresponds to the tidal current velocity at each sampling station during the MG3 campaign, with different colors indicating the tidal phases during which each CTD profile was taken. The bottom panel displays the CTD profiles at each sampling point along the Guadalquivir River during the MG3 campaign.

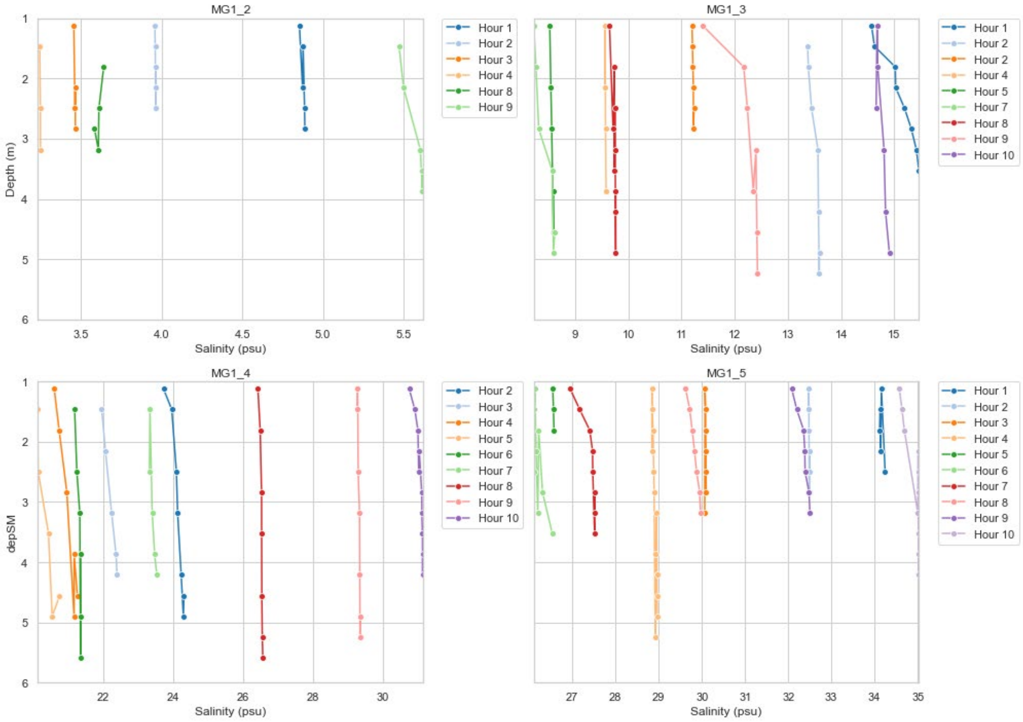

Fig. R2. CTD profiles at each sampling point along the Guadalquivir River during the MG2 campaign.

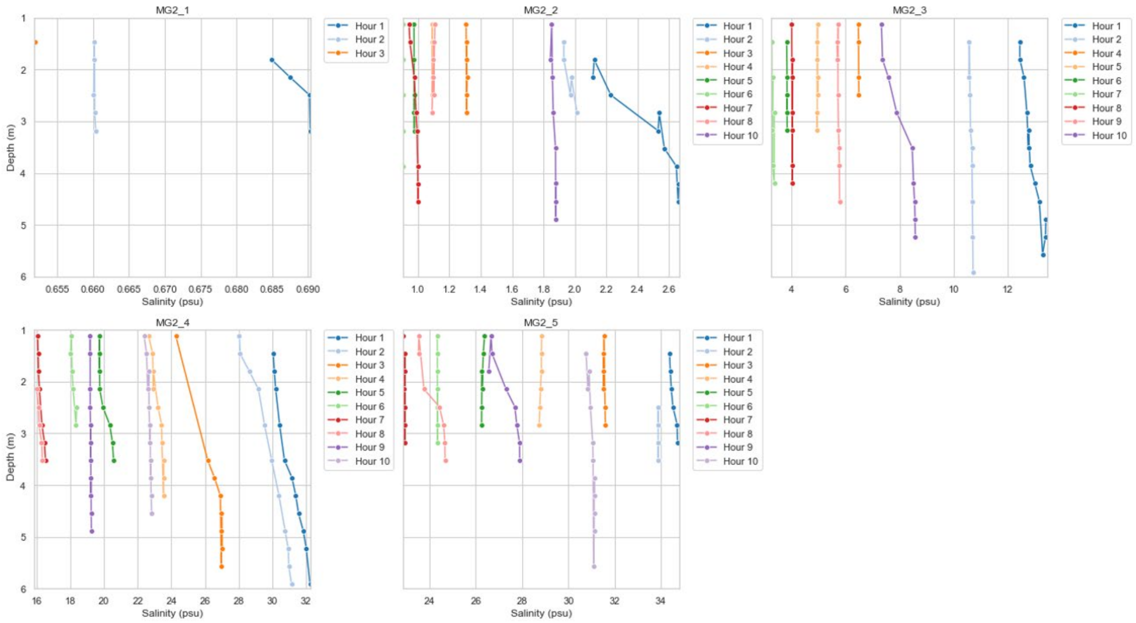

Fig. R3. CTD profiles at each sampling point along the Guadalquivir River during the MG1 campaign.

3. **The tuning of the δ parameter was adjusted to match the observational data. Could the model be influenced by other factors, such as the bottom friction coefficient or the horizontal diffusion coefficient D? How should the δ value be determined when studying other estuaries? In other words, what insights does the δ value used in this study offer for applications to other estuaries?**

Thank you for the question.

The parameter δ is a key factor in quantifying the effect of extractions and minor contributions to water volume along the river. In other words, it represents all the natural and anthropogenic processes that can affect the volume of water, such as agricultural abstraction, industrial use, small side channels and evaporation. δ should be interpreted as a bulk value that characterizes the balance between inputs and outputs of water in the estuary. In our study was positive, indicating that on average extractions exceed the contributions from smaller channels that drain into the main channel.

However, there is an inherent uncertainty in this parameter due to the complexity of accurately quantifying the amount of water extracted from the channel. The Guadalquivir system is heavily influenced by human activities (high levels of agriculture, industry, dense population in nearby areas, port activities, etc.), and it is also documented that numerous illegal extractions take place. This makes it difficult to obtain accurate data on abstraction within the estuary, as both the specific locations and volumes of water taken are unknown.

The main idea of this study is to show that these actions have a significant effect under low flow conditions, because without them the observed salinity levels would not be reached.

Thanks to the comments of the reviewers, we have reviewed the parameterizations and adapted the code to use higher dispersion values while maintaining the numerical stability of the model. This allowed us to perform a sensitivity analysis using a higher dispersion coefficient (150 m^2/s) to evaluate whether the system could reproduce these observed salinity conditions with horizontal dispersion alone. All this information has been included in the new manuscript version as a new section: “3.1. Effect of Horizontal Dispersion and Water Withdrawal on the Horizontal Salinity Gradient in the Estuary”.

In this article, the horizontal dispersion coefficient was calculated using the equation proposed by Bowden (1983) for estimating the horizontal dispersion coefficient. This calculation was carried out for all the campaigns considered in the analysis to ensure the use of a constant dispersion appropriate to the system. The results indicate that the maximum constant dispersion, based on speed and depth, is 150 m^2/s (this has also been added and explained in detail in the new version of the article). In addition, a sensitivity analysis was carried out with different dispersion coefficients to optimize this parameter as much as possible. In our 1D model, which simplifies the equations governing the balance forces, volume conservation, and advection-dispersion processes, a dispersion coefficient exceeding 200 m^2/s leads to numerical instabilities.

If we analyze the behavior of the horizontal salinity gradient along the estuary, taking into account only the horizontal dispersion, we can see that the system would never reproduce the observed salinity concentrations in the different campaigns. Even when the dispersion coefficient is increased to 190 m^2/s, the behavior remains the same (Fig R4). It can be observed that, over time, the salinity concentration increases slightly from 10 km to 40 km. However, it is evident that the observed values are not fully reached. Therefore, it can be said that horizontal dispersion alone does not achieve the high salinity values observed along the channel, which opens the hypothesis that some additional effect is likely to cause a greater penetration of saline intrusion into the estuary.

If the same experiment is carried out but the parameter δ (representing all the processes that reduce the volume of water in the estuary) is included (Fig. R4), the results show that the system reaches the observed salinity values over time. This shows that this term must be included in order to reproduce the salinity concentrations observed in the different campaigns.

Figures 4c and 4d present the experiments that include water withdrawals as a constant value in time and space (δ = 0.005 mm). As shown, as the simulation time progresses, the system achieves the salt concentrations range presented in the observations. This contrasts with the previous cases, where only the dispersion term was included in the experiments (Figures 4a and 4b), and the observed range could not be achieved.

On the other hand, Figures 4e and 4f show the experiments employing time-varying δ. In this simulation, a stronger sink is applied during the first three days (δ = 0.01 mm), which is then reduced and held constant for the remainder of the simulation (δ = 0.001 mm). In this case, the obtained values closely match those recorded in the observations.

These experiments highlight the necessity of including this term (δ) in the simulations, as otherwise, the horizontal salinity gradient would never reach the observed values. As illustrated in the figure, a certain duration of sink activity is required for the simulated salinity concentrations to approach the range observed. Therefore, it is essential to define an initial condition that considers this progression, allowing the simulation to adequately capture the evolution of the water withdrawals and their impact on salinity over time. This is particularly justified by Figures 4e and 4f, where using a stronger δ during the first three days followed by a weaker δ reproduces the observed behavior.

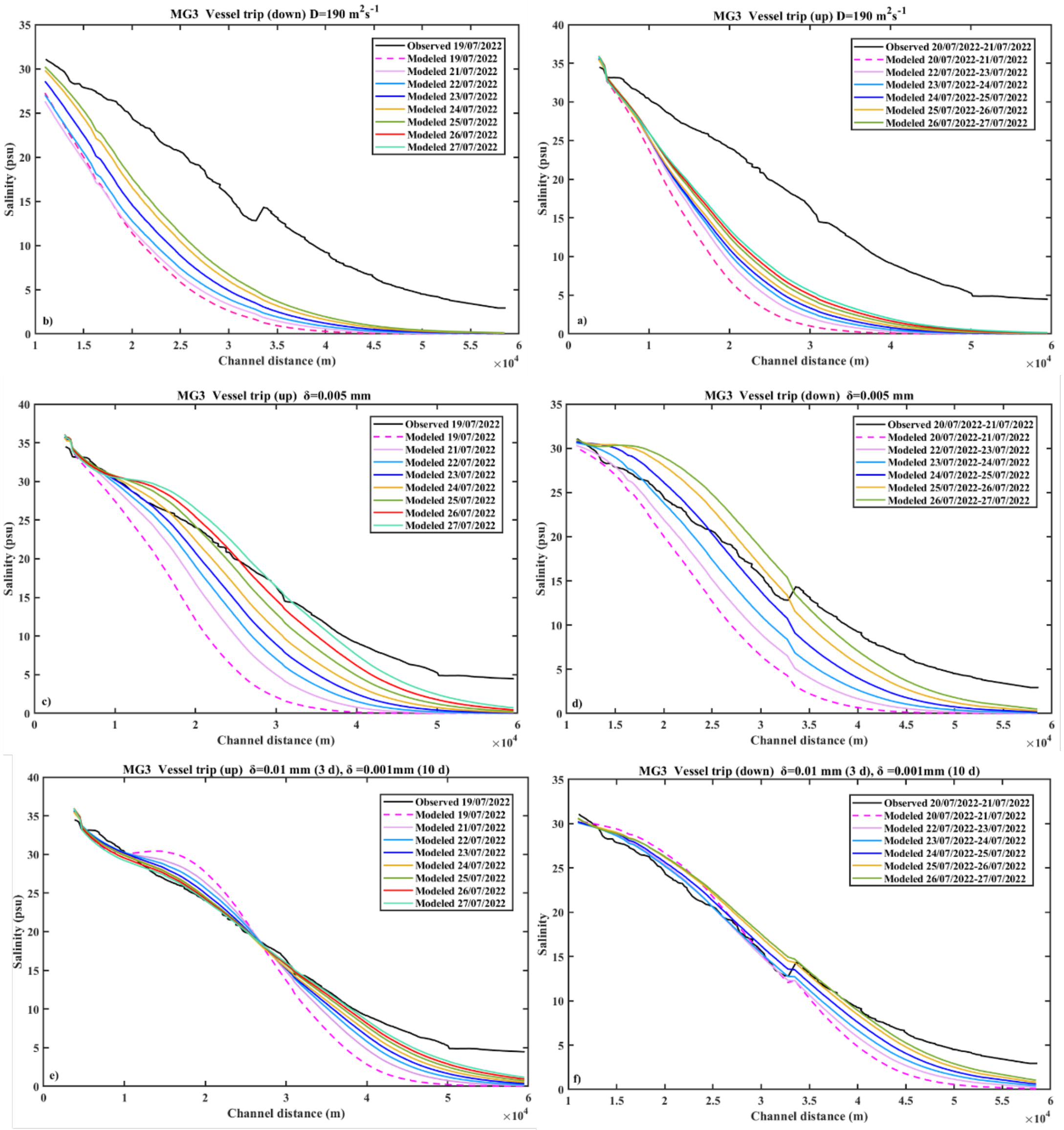

Fig. R4. Comparison of simulated (temporal behavior of the simulation at the corresponding observation points) and observed salinity over the MG3 vessel trips: (a) and (b) show simulations including only the horizontal dispersion for the MG3 vessel trip upstream (a) and downstream (b), with the observations in black. (c) and (d) show simulations incorporating δ term (δ) for the entire simulation period as constant value, and (e) and (f) are the simulation including a time-variying δ, compared to the observations (in black) for the MG3 vessel trip upstream (c and e) and downstream (d and f).

The δ value was determined empirically during the calibration process, through a sensitivity analysis in which different δ values were tested in simulations to identify the one that produced concentrations within the observed range while maintaining the temporal and spatial stability of the model.

Once the δ value was identified, experiments were carried out to analyze its behavior. These included constant use of the parameter over time, and experiments including them at specific time intervals, as well as spatial distribution experiments where δ was applied to specific points (e.g. high areas of the river) and regions. However, due to the limited understanding of the true behavior of these processes, and to avoid introducing assumptions or speculation that could affect the validity of the results, it was considered more appropriate to use a constant value ~~rather than~~ instead of other assumptions.

As observed, when sinks are included in the model, a certain amount of time is required for the system to reach the salinity concentrations observed. This behavior is represented in the model by an initial condition, designed as a logistic curve, which describes how the effect of the sinks manifests and evolves over a given period of time. This curve makes it possible to simulate the gradual adaptation of the system until it reaches the observed concentrations, providing a useful tool for evaluating and validating the model.

The choice of a logistic curve is justified by its ability to model gradual processes, which makes it suitable to reflect the temporal behavior of the sinks and their impact on the estuarine system. Therefore, the use of this parameter (δ) is an efficient way to quantify the inflows and outflows of water from the main channel, largely due to anthropogenic activities. This approach can be extrapolated to other estuaries with excessively high salinity concentrations in the estuary interior that cannot be explained by dispersion alone. Similarly, this method can be applied to systems under high anthropogenic pressure and similar environmental conditions.

In estuaries with behavior similar to that of the Guadalquivir River, especially in low flow conditions where the tidal action dominates the hydrodynamic behavior, the omission of the anthropogenic effect may lead to an underestimation of salinity concentrations. Therefore, including these effects through the δ parameter allows for more realistic simulations and helps to understand the impact of these activities. This understanding is essential for effective estuary management, both from a socio-economic and environmental perspective.

4. **What is the basis for determining $D = 0.5$ m²/s? Would using other parameterization schemes for D across the entire area significantly affect the salinity intrusion?**

Thank you for the question.

We have reviewed and adjusted the parameterization used in the advection and transport module implemented in our model. In the previous version, we used a very low parameterization coefficient obtained from a sensitivity analysis to ensure that no numerical instabilities were introduced into the model. However, we agree with the reviewers that this coefficient is particularly low. We have therefore reviewed the implemented parameterization and adjusted it to allow the use of more realistic dispersion coefficients in line with the literature.

We particularly appreciate this comment as it has allowed us to improve the parameterization while maintaining the numerical stability of the model. In the new version, we have been able to increase this coefficient, which does not change the results or objectives of the study but allows a more effective analysis of the behavior of the salinity gradient in terms of horizontal dispersion. It also gives us the opportunity to check the model's configuration and improve the model parameterizations.

As discussed in the previous comment, based on the definition proposed by Bowden (1983), we have consistently calculated the coefficient from the tidal current amplitude range and the mean channel depth, thereby yielding a more physically based dispersion coefficient average to be implemented in the model.

The dispersion coefficient D was assumed to be constant in this study for several reasons, as outlined below. Primarily, the simplicity of a constant value ensures numerical stability and facilitates the interpretation of results. This selection of a constant dispersion coefficient is based on the assumption that lateral dispersion is homogeneous and that strong currents will induce vertical mixing, thereby rendering advection the dominant process in the behavior of the salinity intrusion. The Peclet number (Pe), defined as uL/D, measures the relative contribution between the nonlinear advection and horizontal dispersion, where u is an averaged (in time and along the whole estuary) absolute value of the along-channel gradient of velocity, L is the estuary length, and D corresponds to the horizontal dispersion coefficient (Deng et al., 2024). Taking a value u= 0.5 ms^{-1}, extracted from realistic simulations performed with the hydrodynamic module and the values L= 107 km and D=150 $m^2 s^{-1}$ yields a value Pe=356, clearly indicating a dominance of the advective transport rate over the diffusive one. To understand this better, we analytically evaluate the result for the Pe corresponding to the current velocity of each campaign (MG3 is shown as an example, but the result is the same for all campaigns), for the entire modelled estuary and with a dispersion coefficient D=150m. This results in an advection dominance exceeding 90% (7-day simulation).

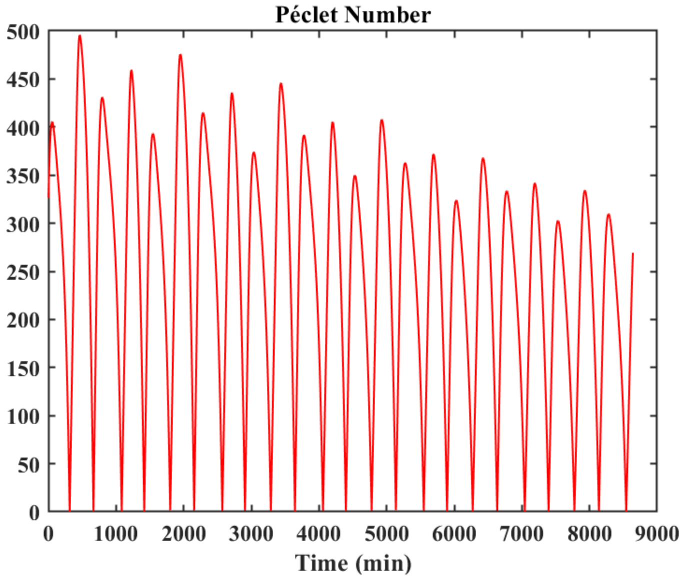

Fig. R5. Péclet number calculated for the MG3 campaign. The results represent a 7-day simulation of the MG3 campaign, with the Péclet number computed at each time interval (in minutes) for the hole channel as an average.

Once it has been determined that advection is the dominant process in the estuary for this specific period (low discharge regime), it can be concluded that horizontal dispersion will play a secondary role in the estuary.

Furthermore, given the lack of comprehensive data on the coefficient's variability across the estuary, it was determined that a constant value would be an adequate representation of the general conditions. Finally, model validation with observational data has demonstrated that employing a constant coefficient is an effective method for accurately reproducing the essential characteristics of the system, thereby supporting this approach within the context of the present study. Furthermore, numerous studies in the literature have demonstrated that models with a constant dispersion coefficient are capable of accurately reproducing salinity distributions (e.g., Lewis and Uncles, 2003; Brockway et al., 2006; Gay and O'Donnell, 2007, 2009; Xu et al., 2019; Siles-Ajamil et al., 2019; Biemond et al., 2024). This choice not only maintains the stability of the model, avoiding numerical instabilities, but also ensures that the results are consistent with theoretical expectations and experimental observations.

Regarding parameterizations, in this case, as mentioned, it is constant, but we agree with the reviewer that an alternative parameterization could be evaluated and perfectly feasible, such as one that is variable in time and space, as has been done in previous studies (e.g. Diez-Minguito et al., 2013). However, due to the dominance of advection, we believe that the use of an alternative parameterization would not lead to a significant change in the salinity intrusion results.

The available observations are not long enough or rich enough to allow a detailed analysis of the behavior of horizontal dispersion. However, this will be addressed in future work, where we have planned numerous sampling campaigns that will allow a more precise evaluation of the spatial and temporal behavior of horizontal dispersion in the Guadalquivir estuary.

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5. **How can the impact of human pressure on salinity intrusion be quantitatively assessed based on the 1D diffusion equation in this study? Is it through its effect on advective transport or horizontal diffusive transport, thereby influencing salinity transport? Which of these two processes contributes more?**

Thank you for the question.

The quantitative assessment of the impact of human pressure on salinity intrusion in this study is carried out by introducing a sink term (parameter δ) in the hydrodynamic model, which reduces the volume of water. This has a direct effect on advection transport, as water withdrawal reduces the total volume of water, which has an effect on flow velocities (causing a slight intensification of incoming currents) and thus increases salinity intrusion. Although dispersion transport may also be affected, advective transport is the process that contributes most, as it is the primary mechanism controlling salinity movement in the estuary.

A reduction in water volume can be caused by natural processes such as evaporation. However, in light of our results and as discussed in the response to question 3, achieving the observed salt concentration along the river requires considering this reduction in volume, which cannot be attributed solely to natural processes like evaporation or small secondary channels. Modifications to the estuary due to port activities, the reduction of marshlands, water extractions for legal crops, illegal water withdrawals, the creation of new channels, etc., combined with natural processes, are what are causing this reduction in water volume and, consequently, a greater penetration of saline intrusion.

Comparing the temporal average magnitude of advection and dispersion transport in salinity (for MG3 campaign), it can be understood that advective transport is significantly more substantial and is the dominant transport mechanism (Fig. R6).

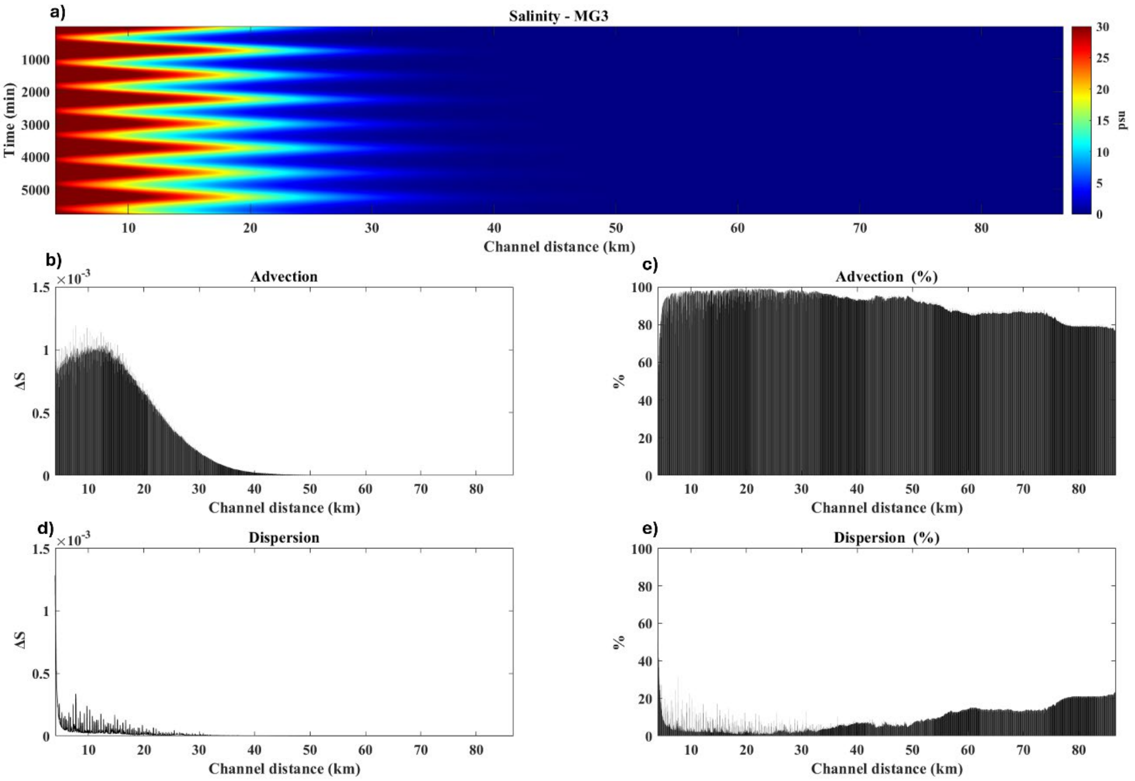

Fig. R6. (a) Simulated salinity concentration along the Guadalquivir Estuary for the MG3 campaign without incorporating the water volume reduction parameter. (b) and (d) show the time-averaged salinity concentration variations in each section due to advection and dispersion transport, respectively. (c) and (e) present the time-averaged percentage of salinity concentration variations in each section due to advection and dispersion transport, respectively.

Fig.R6 shows a contour plot of salinity concentration over time in all sections of the channel, with the highest concentration located at the mouth of the estuary and decreasing as the fluid moves through the channel, reaching values of 0 at the head. This corresponds to MG3 salinity simulation just including dispersion (water withdrawals (δ) are not included). A temporal average has been calculated for both advection and dispersion transport to provide a representative measure over time. Advective transport dominates over dispersion transport, reinforcing the idea that the movement of salinity is primarily controlled by current flow rather than dispersion.

6. **There are three tributary estuaries in this study, but they don't seem to be marked on the figures. Additionally, how was the runoff distributed among these three estuaries? In the experiments with increased or decreased runoff, was the flow rate adjusted simultaneously for all three tributary estuaries?**

Thank you for the question.

In this study, the Alcalá del Río dam is considered the main source of freshwater discharge, contributing approximately 80% of the flow received by the estuary (Diez-Minguito et al., 2012). The remaining 20% comes from small tributaries flows. All tributary flows that discharge into the estuary were examined, selecting those that had a significant flow for the study periods. This resulted in the inclusion of two additional tributary flows, in addition to the flow from the dam.

These tree tributaries flows are included in the upper part of the estuary as they discharge close to this area. Therefore, the sum of these three flows is considered to be the freshwater input to the estuary, specifically at its head, which is indicated in Figure 1 by a black triangle marked "dam".

Thanks to your comment, we have realized that this information was not clearly defined in the manuscript. For greater clarity, the exact location of these tributaries is indicated in lines 161-165.

In the experiments where the freshwater flow is modified, all three tributaries are considered. The model incorporates a single freshwater flow from the dam, which is the sum of the three tributaries (Alcalá del Río, Rivera de Huelva and Zufre). Therefore, when a change in freshwater flow is mentioned in the experiments, it refers to this combined flow.

Hourly flow data for each of the tributaries (Alcalá del Río, Rivera de Huelva and Zufre) were obtained from the *Confederación Hidrológica del Guadalquivir* database (Guadalquivir SAIH, https://www.chguadalquivir.es/saih/, last accessed: March 25, 2024). The average flow for each tributary was calculated and the sum of the three flows was determined. The resulting total flow was then used as a constant overtime in the final part of the hydrodynamic model. The decision to use the average value for each tributary was made because the flow rates during these campaigns are very low and there is minimal difference between using the average or the exact value at each time step (with hourly data extrapolated to seconds). In order to avoid introducing unnecessary uncertainty, it was decided to treat the flows as constant over time.

This methodology was the same used in Sirviente et al., 2023, where the high reliability of the hydrodynamical model is presented.

7. **How is the fact that water withdrawal does not occur throughout the entire estuary, but at specific locations, taken into account? This localized withdrawal will also lead to a reduction in the overall runoff of the estuary. Would this have any impact on the study's results?**

Thank you for the question.

In our study, water withdrawals are consistently integrated in both time and space. As mentioned in question 3, these water volume reductions are accounted for by the parameter δ, which is present at all dt and in dx of the estuary. However, in certain locations, depending on the season analyzed (MG1, MG2, MG3 or MG4), they have a higher δ than the rest of the sections. The fact that some campaigns show a higher δ in the first 20 km can be attributed to the presence of marshes in the Doñana Natural Park. Similarly, the use of a higher δ between km 30-70 can be explained by the presence of agricultural fields.

These withdrawals will affect the total volume of the estuary, which, given the very low freshwater flows, will be compensated by saline water due to volume conservation, resulting in an increase in saline intrusion in the estuary.

8. **How is the water withdrawal process represented in the governing equations? In other words, how is the dynamic process of water withdrawal parameterized in the governing equations?**

Thank you for the question.

The process of water withdrawal is represented by the parameter δ, which represents the thickness of a water slice that could be removed from the estuary at each integration time step Δt. It is implemented into the continuity equation in the following way:

$$b\frac{\partial \eta}{\partial t} = \frac{\partial}{\partial x}[Au] - \frac{b\,\delta}{\Delta t}$$

Where b is the width of the channel. Note that the second term on the r.h.s. of that equation represents a loss of volume per unit of channel length and unit time. The action of this term is translated, through the numerical integration of this equation along with the momentum balance equation, into the corresponding sea level and current velocities variations in order to compensate these volume losses. All this give arise to the creation of a mean net transport directed towards the head of the estuary that promotes the penetration of the saline front more and more inwards while the volume losses are maintained.

9. **In the introduction, could you add some related studies on the impact of human activities on salinity transport in other estuaries?**

Yes, thanks for the suggestion. We have added some related studies of other estuaries in the Introduction section. We have modified lines 65-80 adding this paragraph:

“The detrimental effects of anthropogenic activities have been demonstrated in other estuaries around the world. Alcérreca-Huerta et al. (2019) show that the construction of a dam system in the estuary of the Grijalva River (Mexico) in 1959 altered the hydrological regime, reducing the seasonality of water discharge and decreasing the amount of available freshwater. This, together with changes in land use (more agricultural land, less mangrove cover and less vegetation), leads to variations in salinity concentration, with saline intrusion observed up to 46 km upstream, with salinity levels reaching 32.8 PSU. Studies such as Huang et al. (2024), based on numerical simulations using a 3D model, show that anthropogenic activities, in particular the regulation of freshwater flows by infrastructure projects, are drastically changing the dynamics of saline intrusion in the Changjiang River estuary (China). This study shows how an increase in freshwater flows (due to releases from the Three Gorges Reservoir) counteracts the advance of saline intrusion. However, water withdrawals in the city of Yangzhou as part of the implementation of the East Route of the South-to-North Water Transfer Project will inevitably lead to a reduction in inflow during the dry season, resulting in an increase in salinity intrusion in this system by approximately 6-7 km. This relationship between salinity and freshwater flow was also observed by Webber et al. (2015) in Yangtze River Estuary (China), who assessed the effects of the Three Gorges Dam, the South-to-North Water Transfer Project, and local water withdrawals on the probability of intrusion in the Changjiang River estuary. They conclude that these projects will increase the probability of saline intrusion and suggest that water management should be adapted to mitigate the risk.”