

## Responses for reviewers#3

Jan 26, 2022

---

**Manuscript Number:** hess-2021-246

**Manuscript Title:** Saline groundwater evolution in Luanhe River Delta, China since Holocene: hydrochemical, isotopic and sedimentary evidence

**Authors:** Xianzhang Dang, Maosheng Gao, Zhang Wen, Guohua Hou, Hamza Jakada, Daniel Ayejoto, Qiming Sun

---

Thank you for your comments concerning our manuscript, we found these comments will help to improve its quality greatly. We have attempted to address each of the comments point-by-point. Detail explanations are as follows.

Author's response –Line numbers referring to the old and revised version manuscripts are preceded by L and RL, respectively

### **General Comment:**

This manuscript presents valuable data that should be published.

However, the presentation is terrible, compounded by very poor English with many incomprehensible sentences and sentences without verbs. Further, I am taken aback by clearly incorrect statements such as claiming that groundwater is the primary source of fresh water in coastal areas. The statement that 20 - 40% of the world's population lives in coastal areas is also not very accurate as most recent studies give a value of around 40%.

**Response:** Thank you for your general comments and valuable reminder. We are sorry for some unclear sentences, the manuscript has been further improved and polished carefully for readability and English language. We have changed “P4 L2 to 4” to “P4

RL2 to 5”, showing more accurate statements.

*P4 RL2 to 5:* “It is estimated that around 40% of the world's population lives in coastal areas. (UN Atlas, 2010). Groundwater is the important freshwater resource for domestic consumption and agricultural activities in this region (Cary et al., 2015; Jayathunga et al., 2020).”

### **Specific Comments**

1. It defines the brackish water as having a TDS between 1 and 3 g/L. In my field, it is up to 30 g/L.

**Response:** In coastal areas, water types in aquifers are often complex with varying characteristics. Similarly, there are diverse ways to classify these water types. In this study, groundwater samples were observed to have a wide range of TDS between 0.38-125.9 g/L. Therefore, we classified the groundwater into four types on the basis of TDS: the fresh water (TDS is less than 1 g/L), the brackish water (TDS between 1 and 3 g/L, representing salt water with relative low salinity), the saline water (TDS between 3 and 50 g/L, representing salt water with relative high salinity) and brine water (TDS is higher than 50 g/L).

2. Again, in my field it describes isotope values as heavier or lighter, not higher or lower.

**Response:** We are sorry for the inaccurate statements, we have rechecked and revised the text thoroughly.

3. It is not clear how DIC could be estimated based on pH and T. At least one more carbonate species is needed.

**Response:** Thank you for the comments, we have changed “P16 L7 to 9” to “P16 RL7 to 11”.

*P16 RL7 to 11:* “ $\text{DIC}_{\text{rech}}$  was mainly  $\text{HCO}_3^-$  in recharge water when pH value was between 6.4 and 10.3, and the carbonate equilibrium constant varies with temperature (Clark and Fritz, 1997).  $\text{mDIC}_{\text{rech}}$  was calculated from estimated pH and temperature conditions for the recharge environment, e.g., at pH = 6 and T = 15°C, the  $\text{mDIC}_{\text{rech}}=10$  mmol/L (Currell et al., 2010).”

4. It is not clear what it means by "stable isotopes are more enriched"?. H-1, H-2, O-18,

O-16, C-12, and C-13 are all stable isotopes.

**Response:** We are sorry for the unclear expression; we have changed “enriched” to “heavier” in the text.

5. The lines marked "dissolution" in Fig. 6 are not defined. In the text, it mentions mineral dissolution but does not say which mineral.

**Response:** Thank you for the reminder. Accordingly, we have added explanations in “P19 RL9 to 10” and “P20 RL6 to 7”.