Responses to Referee #1's comments

The manuscript investigates the impact of aquifer geometry on seawater intrusion in annulus shaped aquifer typical for islands using analytical solutions based on the Ghijben-Herzberg solution and hillslope-storage Boussinesq equation. The analytical solutions are validated by comparison with data from laboratory experiments, and then used to investigate the interface under different geometries (convergent, rectangular, divergent). The results are interesting and give some insight in the role of aquifer geometry on the seawater-freshwater interface. I have a few comments the aquifer as described in the following.

We thank you for the constructive and helpful comments.

Comments:

line 145: "interface tip" and "tip location" should be defined.

The term "interface tip" is defined as the junction point of the freshwater-seawater interface and no-flow boundary (Figure 2b) or the junction point of the freshwater-seawater interface and bottom boundary (Figure 2c), whereas the term "tip location" is defined as the horizontal distance from the sea boundary to the interface tip. The definitions of these two terms will be clarified in the revision.

line 168: The underlying assumptions should be clarified here.

The underlying assumptions are Darcy's law and the Dupuit-Forchheimer approximation. We have mentioned this in Line 165.

Eq. (3): Different symbols phi should be used in the integrand and integration limit. What is phi in the upper integration limit?

Since we want to calculate the freshwater flux in the aquifer segment between the seaward boundary and interface tip, ϕ in the integrand and integration limit should be the same. Note that ϕ in the upper integration limit is the watertable.

Eq. (6): Some more explanation is required on how this equation is obtain and what are the assumptions.

To obtain equation (6), Dupuit-Forchheimer approximation and Ghijben-Herzberg equation are used.

Based on Dupuit-Forchheimer approximation, equation (4) becomes,

$$-\frac{1}{2}\left[\left(L_0+l_2-x\right)^2-\left(L_0+l_2\right)^2\right]N=-\left(L_0+l_2-x\right)\int_{h_c}^{\phi}K_s\frac{d\phi}{dx}dz$$
$$=-\left(L_0+l_2-x\right)K_s\left(\phi-h_c\right)\frac{d\phi}{dx} \quad \text{(R1)}$$

Based on Ghijben-Herzberg equation, we have,

$$h=\phi-h_c=\left(1+\alpha\right)\left(\phi-H_s\right) \quad \text{(R2)}$$

Combining equation (R2) with equation (R1) gives equation (6). We will add this explanation to the revision.

line 292: The authors use the term “extent of seawater intrusion” repeatedly in the manuscript, but it is never defined. The authors should clearly quantitatively define, which are the diagnostics/observables that are used to assess aquifer vulnerability.

The term “extent of seawater intrusion” is defined as the area below the freshwater-seawater interface in our revision, and the interface tip location is used to assess aquifer vulnerability. These definitions will be added to the revised manuscript.