Reviewer 2

In this Brief Note, the authors developed a more complete solution for the water level response to Earth tides in a leaky aquifer with aquitard storage and compressibility. The derivation of the solution is clearly given and easy to understand. On the other hand, there are some important points in the paper unclear to this referee, as detailed below:

First, it is unclear why the two Leaky & Storage models in Figure 2 are so very different. Both the amplitude ratio and phase difference for the model "Leaky & Storage (present study)" are functions of frequency at frequencies lower than that for the O1 tide, but both the amplitude ratio and phase difference become constant for the model "Leaky & Storage (present study') with K'=1e-14 m/s". Why are there such differences between the responses of the two models?

First of all, the "Leaky & Storage (present study') with K'=1e-14 m/s" was warried out with very low aquitard hydraulic conductivity so that the pressure and water transfer between aquitard and aquifer is unsignificant. Thus, it looks like the horizontal flux model and validate our model in such conditions.

For frequencies lower than O_1 using the parametrization of the study, amplitude is nearly equal to one, while phase shift is about zero for "Leaky & Storage (present study') with K'=1e-14 m/s". This constant behavior is the signature of the absence of well impact on groundwater level fluctuations and the absence of phase shift between the Earth tide strain and the aquifer level fluctuations. It means that the groundwater fluctuations of the aquifer are the same as the groundwater fluctuations in the well (absence of amplification/attenuation and phase shifts) and that there is no phase shift between the strain and the water pressure variations inside the aquifer.

For the "Leaky & Storage (present study)" model, the leaky conditions do provoke a phase shift and an amplitude modification as compared to purely confined conditions as observed in the new figure 4b. Such values of phase shift and amplitude modification do vary with the frequency because of the water pressure transfer between the aquitard and the aquifer.

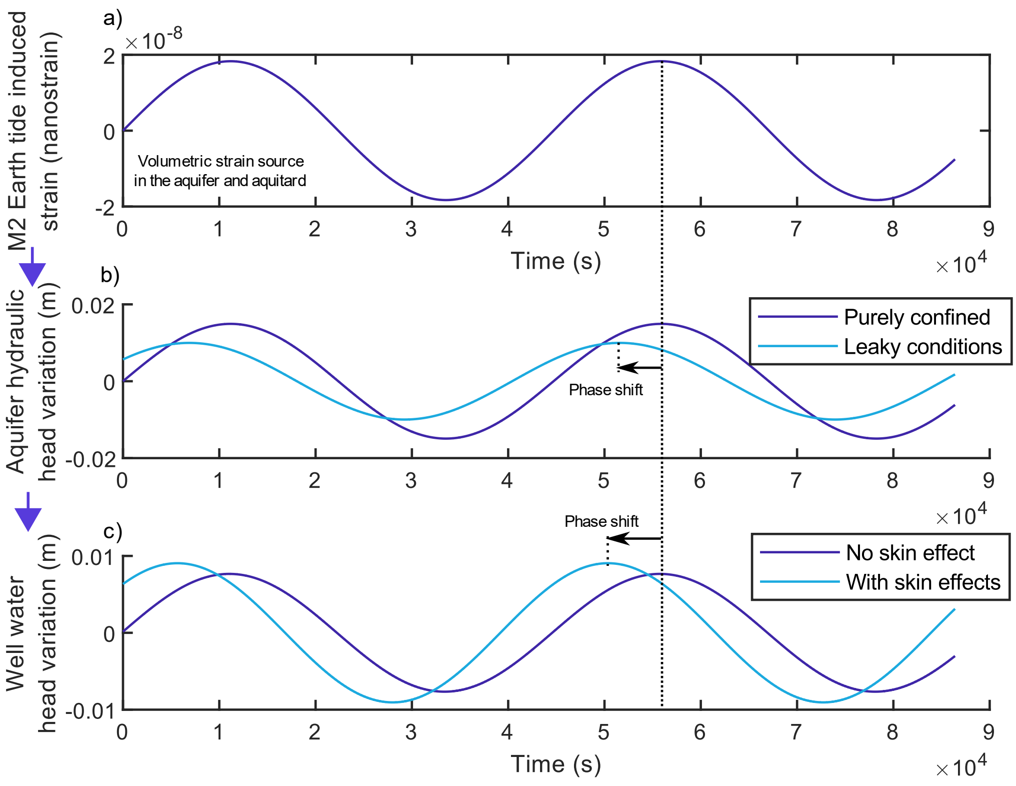

Figure 1: Example of the volumetric strain time series generated by the M2 Earth tide in a), which creates aquifer hydraulic head variations in b), resulting in well water level variations in c). The transmissivity (T) is 10^{-6} m²/s, storativity (S) is 7 10^{-4}, hydraulic conductivity of the aquitard (K') is 10^{-6} m/s, aquitard hydraulic diffusivity (D') is 10^{-4} m²/s, skin factor (sk) is -5 m, z_i to -10 m, RKuB to 0.3, well casing radius (rc) and screen radius (rw) is 6.03 cm. B is set to 0.8 and K_u to 10 GPa.

Second, the captions of some diagrams are too brief that made the figures unnecessarily difficult to read. For example, the caption for Figure 5 states that the results are from 'using two aquifer models' without explaining which two leaky models. The caption also did not define the crosses or circles, which kept this referee guessing. Given the authors' comparison between their model and the model of Gao et al (2020), could the circles be that for the solution of Gao et al.?

We did a mistake in figure 5 caption, because only the present model developed in this study is presented. The red circles represent the best-fit. The comparison with the Gao et al solution is in appendix.

We corrected the captions in the new figure 6.

Finally, given the greater number of unknown parameters in the new solution, it is natural that the new solution may better reproduce the observed amplitude and frequency responses than previous models. The authors correctly pointed out that the solution is prone to non-uniqueness and *a priori* information is needed to reduce the number of unknows in the solution.

Thanks for this relevant comment.