

Review of “Climate change overtakes coastal engineering as the dominant driver of hydrological change in a large shallow lagoon” by Huang et al.

In this study, the authors systematically investigated the responses of tidal hydrodynamics in terms of water retention time (including the water age and bulk flushing time), salinity and stratification to the drying climate trend (decrease in river flow inputs) and the opening of a large artificial channel. The obtained results are of particular importance for developing the corresponding sustainable water resources management strategies in such a large shallow lagoon system. However, there are still some major concerns that should be carefully addressed in order to improve the quality of this manuscript.

Major concerns:

1. It should be noted that the Peel-Harvey lagoon (or estuary) is a typical tide-dominated system although it experiences a micro-tidal regime with tidal range generally less than 1 m. This is mainly due to the large estuarine surface area (133 km²) and hence the large estuarine volume (187.5 GL). This indicates that the tidal hydrodynamics is generally featured by both the seasonal change and the spring-neap change. For the time being, the main results only focus on the seasonal change in tidal hydrodynamics, while the spring-neap change did not investigate at all.
2. For the spring-neap change in the water retention time, it would be worth exploring the impacts of residual water currents on spatial-temporal variation in the water age and bulk flushing time. For instance, the difference of the residual water currents during the spring tide period before and after the opening of the artificial channel can be used to show the underlying mechanism of the change in water retention time. Similar results can be obtained for the neap tide period.
3. It is noted that the morphological change during the study period 1970-2016 is neglected in the hydrodynamical model. It is better to clarify that such an assumption is reasonable.
4. Meanwhile, it is worth noting that the water quality (such as salinity and stratification) in the Peel-Harvey estuary was dramatically impacted by the urban

development and the agricultural development in the upstream catchments. It appears that the authors also neglect these two factors in the hydrodynamical model. Some explanations can be provided in order to support the current results.

5. With regard to the riverine flow rate reduction, to what extent the river damming affects the river flow? As we know, both the Serpentine and Harvey Rivers are dammed in the upstream catchment.

Some Minor concerns:

1. In the title, 'hydrologic' → 'hydrological'?
2. It is better to use the SI units for the whole paper. For instance, replacing GL with m^3 for the volume.
3. Figure 1: Add the north arrow and define the 'mAHD' in the main text.
4. Line 150: It is better to define the water age τ before mentioning it.
5. Lines 252-253: Why using 1990 and 1998 for a comparison? It is better to clarify the choice.
6. Figure 8: It is better to show some contour lines indicating the exact numbers.
7. Figure 9 and Figure 11: the color is not easy to distinguish.
8. Lines 471-472: It is better to define the TN and TP before using the abbreviations.