The authors demonstrated that the empirical Van der Burgh coefficient is spatiotemporally varying. By using a modified equation, the authors calculated this K along the estuary. Additionally, different situations during spring and neap tide in the dry and wet season were considered. The issue in a salt plug estuary is interesting. And it is indeed very interesting to test whether K functions in an inverse salinity gradient. However, the manuscript has several major issues.

1. To distinguish between density- and tidal-driven dispersion, the authors used the empirical Van der Burgh coefficient. Their trick is to use an exponential transformation in $K \in (0, 1)$. However, the relation between a certain K range and the dispersion mechanism is vague. For instance, K~0.8 is considered gravitational circulation, and during the dry season, $K \in (0.65, 0.74)$ is also considered density-driven. While $K \in (0.7, 0.8)$ is considered both density and tidal driven matter (e.g., Line 253, Page 12).

And why do you consider that gravitational circulation in the upper part of the estuary corresponds with weak mixing processes? (Line 214-215, Page 10). Could you please discuss this more?

The authors mentioned that the ‘salt transport mechanism varies’ or ‘the K values describe the spatial variation of the salt transport mechanisms well’ (e.g., Line 109, Page 5. Line 313, 319, Page 14. Line331, Page 15. Line 347, Page 16) which are unconvincing. Basically, the K varies (slightly) along the estuary and in time, but the mechanism is almost entirely density-driven gravitational circulation (besides from Harbaria 10 km upstream in wet seasons). Could you please discuss this more?

2. Line 253-259, Page 12. From Harbaria to 10 km upstream, K ranged from 0.7 to 0.8, both tide and density drive the mixing during the wet season. And you made another conclusion that gravitational circulation is dominant in the next sentence, which is not consistent. Moreover, you explained the tide effect by introducing tidal amplification, which happened from Hiron Point to Mongala Port (34 km from Harbaria where the salinity intrusion limits).

3. The conclusion the authors made about wet/dry season and spring/neap tide effects is not strong. The number of

events is small. Moreover, the author just compared dry/wet periods and spring/neap tides separately. Whereas in reality, those two parameters define the stratification together. Also the discharge varies a lot between the dry and wet season while the difference between neap and spring tide is small. The effect of neap/spring variation may be affected by the discharge even during the same season.

4. In the manuscript, the authors used words like 'density-induced gravitational circulation induced by the tide', 'discharge-induced', 'tidal-induced density-driven circulation'. Density-driven or tide-driven, or something else? It is really confusing. Density differences (stratification) result from the balance between river discharge and tide. It is the Richardson number that determines it (the ratio of potential energy of buoyant fresh water to kinetic energy of the tide). In well-mixed estuaries tide-driven dispersion is dominant. In more stratified estuaries density-driven dispersion is dominant.

5. Line 234-238, Page 11. Did you use an error-bar for describing the depth-averaged salinity range? And what

causes the error in Figure (4a)? You mentioned that during neap tide in the wet season the gravitational circulation is enhanced, but from the figure (4c), the water is almost fresh from Harbaria to upstream. How does the gravitational circulation happen?

Minor comments:

1 The modified equation to account for the exponential variation in estuarine widths, especially in a small, narrow estuary (e.g., Line 76, Page 4). But in narrow estuaries, the exponential varying of width is not strong. Could you please discuss this more?

2 Line 80, Page 4. What do you mean by mentioning '…a time-independent factor…and geometries'?

3 Line 184-195, Page 8-9. The tide-driven dispersion is $D_t \partial S/\partial x$ (Savenije, 2005) instead of $D \partial S/\partial x$. And why S (=S_0) is constant in equation (4)? In addition, could you please derive (5) in detail?

4 Line 200, Page 9. If the PRE is partially mixed, is the equation in Line 199 still working?

5 Line 217-218, Page 10. The calculating equations are

different, so there is no need to mention the range with other results. Also Line 278 and 290, Page 13. Line 329, Page 15.

6 Line 259-261 and 272, Page 12. The difference between spring and neap tide in the wet season is smaller than that in the dry season. But the author stressed the former one and mentioned that the latter one is not significant. Could you please discuss this more?

7 Line 311, Page 14. ‘r^2’ should be ‘R^2’.