



EGUsphere, community comment CC1
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Comment on egusphere-2022-252

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Community comment on "Technical note: On seasonal variability of the M_2 tide" by
Richard D. Ray, EGU Sphere, <https://doi.org/10.5194/egusphere-2022-252-CC1>, 2022

This is a nice paper which clarifies the seasonality of M_2 tide. For a long time, I am puzzled about the use of H_1 for a semi-diurnal wave and it seems that no one (except this paper) can give me the answer. I have few suggestions which may further improve this paper.

First, I strongly suggest the author to also discuss the seasonality of S_2 , K_1 and O_1 tides. In most previous studies, they only focus on the seasonality of M_2 but ignore S_2 , K_1 and O_1 . In fact, there are also lots of confusion on the seasonality of S_2 / K_1 / O_1 tides. Du and Yu(2021) only clarify some confusion on the seasonality of M_2 . When I discussed with them, I was surprise that they did not know the seasonality of S_2 , K_1 and O_1 tides at all. The frequency of the K_2 (P_1) tide is equal to that of the S_2 (K_1) plus (minus) the frequency of the semi-annual cycle. When we explore the seasonality the K_1 and S_2 tides, we need to remove P_1 and K_2 tides first via harmonic analysis (HA). However, HA is a frequency-depend method, it can extract the amplitude and phase of one specific frequency, thus, HA cannot distinguish different origins of a constituent which means that partial semi-annual cycles of K_1 and S_2 tides are also removed. How to solve this problem?

Second, section 3 shows three nice examples of M_2 seasonality. Maybe you can add some maps/tables of tide gauges and tidal information which can help readers know more about local environment and tidal dynamics.

Finally, the nonlinear interaction between K_1 and O_1 tides can generate KO_2 tide which has the same frequency as M_2 . Since K_1 and O_1 tides show clear seasonality, thus, KO_2 should also have clear seasonality which means that the energy of K_1 / O_1 seasonality is transferred to M_2 seasonality. Also, the nonlinear interaction between P_1 and O_1 tides can generate OP_2 tide which has the same frequency as MSK_2 . Thus, the energy of P_1 / O_1 seasonality can be transferred to M_2 seasonality. I think above processes may occur in some coastal areas where diurnal tides are very strong and can be added into the paper.