

Interactive comment on “Tidal resonance in the Gulf of Thailand” by Xinmei Cui et al.

Anonymous Referee #1

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General Comments:

Overall, the manuscript investigates the resonant period of the Gulf of Thailand (GOT) via numerical experiments and tries to establish a conceptual understanding of resonance in the gulf over two-channel model. The authors found that the resonant period of the GOT is closely related to that of the South China Sea body (SCSB) and is close to the period of the major diurnal tide, K1. They speculate that the resonance of the SCSB has a critical impact on the resonance of the GOT. On contrary, the resonance of the GOT has little influence on the resonance of the SCSB. I suggest that though this work seems to present interesting results speculating the interconnection of resonance between coastal bays and deep sea. However, the substantial analysis/discussion for convincing their findings/conclusions are inadequate and not up to the standard of the journal. For consideration of OS editor, some critical issues are addressed below:

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Specific Comments:

1. Theoretically, the characteristic of the effective region for the resonance of long waves in the semi-enclosed sea can be calculated via the phase speed. For the GOT, the effective length of the basin for resonance of the diurnal tides can be approximately 1700 km. Besides, the co-tidal chart for K1 tide in the gulf suggests more precision length such as 1500 km. From this information, the resonant periods for the fundamental and first mode would be calculated as 73.8 and 24.61 hours (based on semi-enclosed basin formula). From these numbers, we could say that the period of diurnal tides in the gulf can be predominated by influence of the first mode instead of the fundamental mode. The role of the quarter wavelength resonant theory on tidal resonance in the GOT is insignificant and is easy to prove. However, this issue tends to be highlighted in the abstract and conclusion of the manuscript. But, it does not represent a substantial contribution to scientific progress in oceanography.

2. I wonder why the length of the GOT system is limited by the 660 km. The mentioned length may represent only the territorial sea of Thailand but does not involve the effective resonator system for tidal waves in true nature. Contrary, the size of the effective system should be larger as the entire western shelf of the South China Sea or Sunda Shelf (see the previous comment). Therefore, I suggest that the perception of a basin resonance oscillator and the dynamics of tidal waves in the GOT, the division of the computational domain, especially, the judgment of the authors for the application of classic quarter wavelength resonant theory for determining a diurnal resonant period of the GOT are altogether possible misconceptions.

3. There are several resonance mechanisms (standing waves or basin mode and shelf mode) that might control oscillation of sea levels in the GOT system. Entirely, the impact of the standing waves modes associated with the period of approximately 24 hours is mostly accounted for. It is recognized that their modal structure distribution (nodal and anti-nodal bands) along the major axis of the system (the distance from the inner GOT to Kalimata strait, NS mode). Supported by the geometry defined by the

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distance from the Malaysia Peninsular to the eastern of the Taiwan Strait, the modal structure of mentioned period may also be fitted into the SCSB. But, it should have a different modal structure (East-West, EW mode). The existence of the mentioned modal structures revealed in the manuscript. Besides, the experiment in determining the effect of bottom topographies of the SCSB on the resonant response of the GOT is presented. As present in this part of the results, it seems that the consistency of the resonant periods are the main reason to judge that the GOT is not an independent sea area regarding tidal resonance. On the other hand, the amplification mechanism is not involved although the response (amplitude gain) of the GOT is probably higher than that of the SCSB (See Exp. 3 Result). The real phenomenon similar to the Exp.3 can be such as the resonance of M2 in the Bay of Bengal, Andaman seas and Malaca Strait.

The part of the deeper and shallow sea of the mentioned system may have the same resonant period but amplification become more intensified near the shelf zone. Indeed, the resonance of the Andaman seas and Malaca Strait are not independent from the Bay of Bengal. But, they have the locality regarding the modal structure and amplification processes. Importantly, we might explain dynamic of tidal waves in the mentioned area as an influence of a combined-role of basin and local resonance modes. I suggest that this concept would also explain the interconnection of the GOT and SCSB. Hence, I reject that judgment as mentioned above because the locality of the GOT and the SCSB are found in their results. Moreover, for the idealized model part, the authors only show preliminary results that mostly identical to the numerical experiment. They do not present some discussion showing the benefit of the model to gain more comprehension of the tidal resonance in the GOT.

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