**Reviewer Comments**

The manuscript entitled *"High current speed events in a harbor channel driven by resonant sub-hourly sea level dynamics: an example from Varna, Black Sea"* presents a valuable observational and numerical investigation of high-current-speed events associated with resonant sub-hourly sea-level oscillations in the Varna harbor–channel–lake system. The high-frequency measurements and the combination of spectral, coherence, wavelet, and modeling analyses provide a solid basis for identifying resonant barotropic modes and assessing their hydrodynamic consequences. The manuscript is generally well written and scientifically sound.

However, the study's main objective, practical relevance, and broader applicability are not sufficiently emphasized. Although the authors briefly mention implications for navigation safety, harbor operations, sediment transport, and coastal management, these aspects remain largely generic and are not fully developed. As currently presented, the findings appear somewhat site-specific. I therefore recommend strengthening the Introduction and Conclusions by clearly articulating the study motivation, intended applications, and the extent to which the results may be transferable to other harbor–navigation channel–lagoon/lake systems.

**Major Comments:**

**1. Operational relevance of the study area**

The operational context of the Varna harbor–channel–lake system should be described in greater detail. Information such as harbor traffic intensity, vessel types and drafts, navigation frequency through the channel, and the extent of traffic between Varna Lake and the harbor would help readers better assess the practical significance of the reported current events.

If available, the authors should also discuss ship-generated waves (typical amplitudes and frequencies) and their possible interaction with the observed water-level oscillations. Even a qualitative assessment would provide useful context regarding the relative importance of vessel-induced and naturally forced hydrodynamic variability.

**2. Hydraulic structure and forcing mechanisms**

The manuscript would benefit from a short subsection, placed after the Study Area section, describing the hydraulic functioning of the channel and the dominant forcing mechanisms (barotropic and/or baroclinic).

In particular, the authors should clarify:

- Whether the channel flow is generally vertically homogeneous or stratified;
- The role of density gradients between the lake and the sea;
- Under which conditions stratification breaks down, if relevant;
- The relationship between water-level gradients and current velocities.

Since the water-level difference between the two ends of the channel appears to be the primary driving mechanism, it would be useful to present this parameter together with the measured currents. For example, the water-level difference (Stn3–Stn1) could be included as an additional axis in Figure 2 to facilitate interpretation of the current response.

**3. Numerical modeling**

Several aspects of the numerical model require further clarification:

- The justification for representing the two channels as a single equivalent channel by summing their widths should be explained in greater detail. Potential impacts on frictional losses, local hydraulic effects, and resonance characteristics should be discussed.
- The rationale for examining the alternative geometries listed in Table 4 should be clarified. Why was the realistic geometry not used as the primary reference configuration?
- The assumption of a linear barotropic system should be supported with information on typical salinity conditions in both the lake and the sea.
- The choice of grid resolutions (12 m in the channel and 30 m in the lake) should be justified, preferably with reference to a grid-sensitivity analysis.
- The manuscript does not clearly indicate whether the model was calibrated and/or validated against observations. Additional information is needed to assess the reliability of the numerical results.
- The statement that oscillations did not propagate significantly into the lake requires further explanation. The authors should clarify whether this behavior reflects physical processes or numerical limitations.

**Minor Comments:**

1. **Instrumentation**: Please provide additional technical specifications of the Hydromast instruments, including sampling frequency, blanking distance, number of measurement cells, and other relevant parameters.
2. **Velocity measurement range:** The statement that the instruments provide reliable velocity estimates in the range of 0.06–0.6 m $s^{-1}$ appears inconsistent with reported current velocities reaching 0.8 m $s^{-1}$. Please clarify the instrument limitations and the uncertainty associated with measurements exceeding the nominal range.
3. **Current direction convention:** The sign convention for current velocity should be explicitly defined in both the text and the figure captions (e.g., positive and negative flow directions).
4. **River inflows:** Please indicate whether significant river inflows enter Varna Lake and discuss their potential influence on the lake–channel system. Although likely negligible at sub-hourly timescales, river discharge may contribute to seasonal water-level gradients and extreme conditions.
5. **Operational thresholds:** The discussion of current velocities reaching 0.8 m $s^{-1}$ would benefit from comparison with existing navigation or harbor-operation criteria, if such standards or guidelines exist. This would help quantify the practical significance of the reported events.

**Recommendation**

The manuscript can present an interesting and valuable contribution to the understanding of high-frequency hydrodynamics in harbor–channel systems and is suitable for publication after revision. Addressing the comments above would significantly improve the manuscript's clarity, practical relevance, and broader scientific impact.