Answer to Anonymous Referee #3

This manuscript presents a study of the spatiotemporal variability of coastal currents in shallow coral reef environments of southern Singapore. The authors employ a robust methodology, utilizing eight tilt current meters deployed over a one-year period to analyze current patterns in the frequency domain. The research makes several significant contributions to the field. It quantifies the relative importance of tidal motions in driving current flow, demonstrating that they account for 14-45% of total variance across sites. The finding that diurnal currents exhibit similar or greater energy proportions compared to semidiurnal currents is noteworthy and contributes to our understanding of local hydrodynamics. The authors apply wavelet coherence analysis to examine the relationship between wind stress and current. This approach reveals important correlations at diurnal and subtidal frequencies during monsoon periods, with observed time lags of up to 6 hours in both phase and antiphase.

Overall, this manuscript presents valuable findings that advance our understanding of coastal current dynamics in coral reef environments that have valuable implications for port activities, coastal landform morphodynamics, and ecosystem functioning. However, the manuscript can be improved further with another revision to better contextualize this study.

We thank the referee for their kind words.

Specific comments:

1. Include a regional map highlighting the area's importance (transit between Pacific and Indian Oceans; trade routes) and presenting regional winds and hydrodynamics.

   Figure 1 is updated to include a regional map of Southeast Asia with important labels that indicate Singapore being situated in between the South China Sea and the Strait of Malacca. The winds and currents are depicted as wind roses and tidal ellipses respectively in Figure 3 of the revised manuscript.

2. Lines 132-135: Provide more detail on the WRF model setup.

   We provided additional details on the WRF model in the last paragraph of section 2.1. We specified the model version, the grid domain which covers Southeast Asia, the horizontal grid resolution of 10 km, and the centre coordinates of the grid.

3. Consider the location of each data collection point in the results analysis. For example, Kusu South, North, and East sites have different wind patterns throughout the year, which may explain the contrast in current patterns between Kusu South and North (line 254). Averaging wind stress over the four areas presented in Figure 6 may filter out their variabilities.

The downscaled wind data has a spatial resolution of 10 km. The scale bar in Figure 1 provides a good visualisation of the spatial scale, and from Figure 1 it can be estimated that both Pulau Hantu and Kusu Island measured from east to west is no longer than 1 km. As such, the wind rose for Kusu Island can reasonably be assumed to represent the wind patterns for all sites within Kusu Island, and similarly for Pulau Hantu.

Nevertheless, we acknowledge that current patterns within Kusu Island are different and we consider the local bathymetry as a possible factor behind these differences.

4. Lines 234-237: Clarify how the percentages 26-45% and 14-36% were derived in Table 2.

   We mentioned in section 2.2 that the quantification of variance was done by integrating the spectrum over each frequency band and assessed their relative contribution. We have now added the method of integration, which is rectangle approximation, and the expression of the relative contribution as a percentage of the total variance, to the main text for clarity. Additionally, we have also added the explanation to the caption of Table 3 in the revised manuscript.

Technical comments:

1. Line 40: Clarify whether current ellipse parameters are estimated in this study or can be estimated in general.

   Current ellipse parameters can be estimated in general using harmonic analysis, and the estimation is done in this study as described in section 2.2 of the revised manuscript primarily based upon feedback from Reviewer 2. The ellipses for major tidal constituents are then plotted in Figure 3 of the revised manuscript.

2. Line 236: Remove the duplicate mention of Hantu North.

   Thank you for spotting this duplicate error. The correct sites should be Hantu North, Hantu South, Kusu North and Kusu East.

3. Figures 5 and 7: Confirm whether the Y-axis represents period or frequency.

   The Y-axis represents period, already labelled as “Period (days)” on the left side of both figures.