Referee 4

General Comments

Comments	Responses
Huang et al. investigated the coupled shifts in soil-carbon stocks, sources, and stability across natural and restored mangroves and tidal flats under urbanization. This paper demonstrated that urbanization not only reduces carbon stocks and burial rates but also shifts the carbon source from mangrove-dominated to unstable phytoplankton-dominated inputs, while accelerating carbon turnover. This offers value for understanding the degradation mechanisms of blue carbon functions in the context of urbanization and provides new indicators for coastal blue carbon management.	We sincerely thank the referee for the positive evaluation of our manuscript and for recognizing our findings on changes in soil carbon stocks, sources, and turnover under urbanization. We greatly appreciate your encouraging comments and constructive support.

Specific Comments

Comments	Responses
lines 94–96: The article mentions that restored mangroves cover 2354.46 ha, but does not specify the planting years, species composition, or restoration methods. Such information is essential for understanding differences in carbon burial, especially given the higher SOC stock observed in restored mangroves in low-urbanization areas. It is suggested to add restoration history data in Methods section 2.2 or as an appendix.	Thank you for this important comment. We agree that restoration age, species composition, and restoration method can strongly influence sediment development, belowground biomass accumulation, and soil-carbon burial, and are therefore important for interpreting differences among restored mangrove sites. Before field sampling, we searched publicly available records from local governments, nature reserves, and forestry authorities and consulted local site managers. However, restoration projects in the three regions were implemented at different times and by different agencies, and complete, consistent, and independently verifiable records were not available for all sites. In particular, exact planting years and detailed restoration methods could not be reconstructed reliably for several restored stands. Because no consistent site-level restoration records could be verified, we were unable to provide a comparable restoration-history dataset across the three regions.

	We have revised the Discussion to acknowledge that unmeasured variation in restoration age, species composition, and restoration method may partly explain differences in soil-carbon stocks and burial among restored sites. We have therefore tempered the interpretation of the relatively high soil-carbon stock observed in restored mangroves under low urbanization and no longer attribute this pattern solely to urbanization. Instead, we interpret it as the combined outcome of urbanization context, site conditions, and potentially restoration history. Future studies should incorporate standardized restoration chronologies and stand-development metrics across sites to separate the effects of urbanization from those of restoration age, species selection, and restoration method.
lines 118–120: The study assumes that "under the same urbanization level, the same type of mangroves have comparable sedimentation rates," yet only one site per type was dated. This assumption may overlook within-site and between-site spatial heterogeneity. It is advised to discuss the risks associated with this assumption or provide preliminary evidence to enhance credibility.	Thank you for raising this important methodological concern. We agree that the use of one ^{210}Pb-dated core to represent the sediment accretion rate of a given habitat type within each urbanization region does not capture potential within-site or among-site spatial heterogeneity. We have revised the Methods to clarify that the sediment accretion rate obtained from each dated core was assigned to replicate plots of the same habitat type and urbanization context when calculating soil organic carbon burial rates. This procedure was adopted because the cost and analytical requirements of ^{210}Pb dating prevented the establishment of replicated chronologies for every site. We now describe this explicitly as an extrapolation assumption rather than as evidence that sedimentation rates are spatially uniform. Measurements of soil organic carbon concentration, bulk density, physicochemical properties, and stable isotopes were based on replicated plots and cores and therefore capture spatial variability in these soil properties. However, this replication does not resolve spatial variation in sediment accretion. Consequently, the estimated carbon burial

	rates should be interpreted as regional habitat-level approximations and may be overestimated or underestimated where local accretion rates differ from those of the representative dated core. We have added this uncertainty to the Discussion and tempered statements concerning differences in carbon burial among urbanization levels and habitat types. The results for carbon stocks and source contributions are supported by replicated soil sampling, whereas conclusions based on burial rates are subject to greater uncertainty because sediment accretion was not independently replicated. Previous studies have applied representative-core approaches in regional mangrove assessments, but we agree that such studies do not demonstrate spatial homogeneity in sedimentation within our study regions. Future work should therefore include multiple independently dated cores within each habitat and urbanization category and quantify the spatial variance of accretion rates before extrapolating them across sites.
lines 120–121: This study did not measure sedimentation rates on tidal flats, so SOC burial rates cannot be calculated, and only stocks are compared. However, in the discussion, the term "burial" is repeatedly used when comparing carbon dynamics between tidal flats and mangroves. It is advised to explicitly distinguish between stocks and burial rates in the title, abstract, and discussion to avoid conceptual confusion.	We sincerely thank the reviewer for this valuable comment. We agree that SOC stocks and SOC burial rates represent different aspects of carbon dynamics and should be clearly distinguished. In this study, ^{210}Pb-based sediment accretion rates were only determined for natural and restored mangroves, and therefore SOC burial rates were estimated exclusively for these vegetated ecosystems. Following the reviewer's suggestion, we have carefully revised the title, Abstract, Results, and Discussion sections to avoid using "burial" when referring to comparisons involving tidal flats. Specifically, descriptions of tidal flats have been revised to focus on SOC stocks and carbon source characteristics, whereas the term "SOC burial rate" is now used only when discussing mangrove ecosystems with available ^{210}Pb-derived estimates. These

	revisions improve conceptual consistency and prevent potential confusion between carbon storage and burial processes.
lines 175–178: The β value is used as a proxy for SOC turnover rate, but the cited literature supporting its validity in mangrove-tidal flat systems is limited, mainly citing Acton et al., 2013 on a temperate soil study.	Thank you very much for your valuable comment. In response, we have added additional references (Huang et al., 2025b; Xia et al., 2021; Zhang et al., 2022; Zhao et al., 2019) in the revised manuscript to further support the use of the β value as a proxy for soil organic carbon turnover characteristics. These newly included studies span mangrove, coastal wetland, and terrestrial forest ecosystems, thereby providing broader and more direct empirical evidence for the application of the β value across different ecosystem types. This strengthens the theoretical foundation for using the β value to characterize soil organic carbon turnover in coastal blue carbon systems within the present study.
lines 259–271: The authors propose that carbon stocks decline nonlinearly along the urbanization gradient, attributing this to connectivity and vertical accretion exceeding "habitat-specific thresholds." However, no specific threshold values or statistical evidence are provided. It is suggested to add a threshold detection method or rephrase "nonlinear" as a more qualitative "accelerated decline" to avoid overstatement.	Thank you very much for your valuable comment. We fully understand your concern regarding the use of the term "nonlinear." In this study, "nonlinear" is not based on formal nonlinear model fitting or threshold detection methods. Instead, it is used to describe the observed response pattern of soil carbon dynamics across the urbanization gradient. Specifically, our results show that carbon burial rates in both natural and restored mangroves do not change proportionally with increasing urbanization intensity; rather, they peak at moderate urbanization levels and decline significantly under high urbanization. In this sense, we consider the term "nonlinear" appropriate to describe the observed trend, without implying that a statistically derived nonlinear function has been explicitly identified. Regarding the term "habitat-specific thresholds," this interpretation was mainly derived from previously published studies cited in the manuscript and is used here as a mechanistic explanation rather than a threshold directly quantified in this study. To avoid potential misunderstanding, we will further refine and clarify these expressions in the revised manuscript to

	ensure accurate interpretation of our findings.
Figure 4 shows vertical profiles of SOC burial rate and sediment age, but age data come from only one site per type, whereas burial rates are averages of multiple sites. This combined presentation may misleadingly suggest that age and burial rate derive from the same spatial scale. It is recommended to clearly state the difference in data sources in the figure caption or to present them separately.	Thank you very much for your valuable comment. In response, we have further clarified in the caption of Figure 4 in the revised manuscript the differences in data sources and their spatial representativeness to avoid potential misunderstanding. We retained both datasets within the same figure to facilitate a more intuitive comparison of the relationship between sediment age and soil organic carbon burial characteristics across ecosystem types and urbanization gradients.