Did sediment accumulation of 210Pb and 137Cs in mangrove forests of Vietnam (Ca Mau Peninsula) respond to sea level rise?

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Mangroves are highly productive forests built by a small group of trees and shrubs that have adapted to survive in the harsh interface between land and sea. Ecologically, they intercept land-derived nutrients and suspended matter. Geologically, mangrove forests serve as sediment sinks by the long-lasting accumulation of sediment trapped by their root system. The continued provision of these functions is dependent on the capacity of mangroves to adapt to projected rates of sea level rise (Mcivor *et al.*, 2013).

One of the most potential methods for estimating sedimentation rate on a time scale of 100-150 years is by means of ^{210}Pb. It has been popular in estimating the sedimentation rate of mangrove ecosystems. In common practice, ^{137}Cs is used as an independent tracer to verify ^{210}Pb method (Lu and Matsumoto, 2005). Ca Mau Peninsula is located at the southern tip of Vietnam, on the Mekong River delta that is one of the most low-lying river deltas in Vietnam. In a rapid assessment, Carew-Reid (2007) stated that 186km^2 of forest and natural vegetation in Ca Mau province will be affected by 1m sea level rise inundation. Recently, the Ministry of Natural Resources and Environment predicted that by the end of the 21st century, average sea level in the study area is projected to rise 59cm-75cm and 62cm-82cm along the East Sea and the Gulf of Thailand respectively (MONRE, 2012). While rapid assessment is useful for applying precautionary principle when faced with uncertainties on the precise location and nature of climate change impacts, historical studies are always valuable and as baselines for long-term planning and management. In Vietnam, the response of mangrove sedimentation to historical sea level rise has not been examined although ^{210}Pb accretion has been studied in the soil cores of mangrove forests in the Red River delta.

In this study, five 2m-cores were sampled in dense mangrove forests at both sides of the East Sea and Gulf of Thailand in Ca Mau Peninsula. These were used to examine whether sediment accumulation of ^{210}Pb and ^{137}Cs in mangrove forests responded to historical sea level rise. Then, mangrove sedimentation was predicted in the context of projected sea level rise scenarios caused by global warming. The results are valuable to assess impacts of sea level rise to mangrove forest and integrated in advanced planning for coastal zone management in Ca Mau.

References

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