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国立大学法人
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第140回 汽水域懇談会 & 地球科学科セミナー
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Physiographic controls on shoreline–shelf tides and implications for mangrove carbon burial
海岸線・陸棚域における潮汐の自然地理学的な制約とマングローブの炭素埋積における意味

日時：2018年 12月18日(火) 17:30–18:30,　18th Dec (Tue), 2018

場所：総合理工3号館301号室 (3F),　Room 301, Sogo-Riko Bldg 3

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Understanding the controls on tides is fundamental to predicting ancient shoreline–shelf processes and, in tropical systems, mangrove development. Existing predictive models of shoreline–shelf processes principally relate tidal potential to shelf width (10–100 km) and shoreline morphology (1–10 km), but do not fully consider larger-scale basin physiography (100–1000 km) or variability in tidal influence with changing shoreline morphology.

A review of modern shoreline–shelf processes and paleotidal modelling studies enabled development of a revised model for shoreline–shelf process prediction. The dominance of modern wave-dominated shorelines suggests that wave fetch is the first-order control on shoreline–shelf processes. Paleotidal models indicate the separate controls of (1) basin physiography (100–1000 km) on tidal inflow versus outflow and (2) shelf physiography (10–100 km) on shelf tidal resonance potential. Models also demonstrate the variability in tide influence in shoreline embayments (1–10 km) observed in the present-day. By considering the influence of the accommodation to sediment supply ratio in terms of shoreline morphology, the proposed decision tree considers the separate effects of basin physiography, shelf width and shoreline morphology on wave, tide and fluvial processes. Process prediction is limited to primary and secondary processes principally due to uncertainty in the process interpretation of several sedimentary structures.

Along tropical shorelines, the development of carbon-rich mangroves is principally related to both regional-scale (ca. 100–1000 km) and local-scale (ca. 1–100 km) controls on shoreline–shelf processes. We demonstrate regional-scale control by examining the long-term mangrove development in the Neogene South China Sea and the sensitivity to local-scale geomorphology by investigating back-barrier mangrove development in the Holocene northern Mekong River delta, Vietnam. These physiographic controls have an important impact on the burial and preservation of carbon-rich mangrove in space and time.

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