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Holocene transgression of the Taipei Basin, northern Taiwan

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The Taipei Basin, a Late Quaternary rift basin in the collapsing northern Taiwan mountain belt, is situated 10 km away from the ocean and has only passage connected to the Taiwan Strait through the Dan-Shui river. Though the present Dan-Shui river is microtidal with a maximum tidal range around 2 meters, borehole facies characteristics show that the Taipei Basin was mainly occupied by tide-dominated environments during the Holocene transgression.

Based on the facies analysis of sediment cores from 5 boreholes aligned in a NW-SE dip section provided by the Central Geological Survey, the Upper Pleistocene and Holocene deposits of the Taipei Basin can be divided into 5 facies associations, namely fluvial channel, floodplain, tidal-fluvial plain, bayhead delta and estuarine central basin, in which fluvial deposits dominate in the Pleistocene. Vivianite shows up widely in floodplain facies as an indication of fresh water and tranquil environments. About 9ka, the Holocene transgression caused the northwestern part of the basin to become a tide-dominated estuarine central basin, and the marginal area of the estuarine central basin forming bayhead deltas. Sporadic occurrences of shell fragments (especially Placuna sp.) and foraminifera (mostly Ammonia sp. and Elphidium sp.) in the estuarine deposits vindicate a brackish-water environment, in which heterolithic beddings and rhythmic sand-clay laminations indicative of tidal influence can be observed. Above the maximum flooding surface dated around 8ka, the depositional environments gradually returned into river dominated from inland out to the sea until the present. These sedimentary features show that wave influence was inhibited in the Taipei Basin during the early Holocene transgression so that tidal processes dominated in the basin sedimentation and built a well developed estuarine central basin and marginal bayhead deltas. Such a dramatic change in depositional environments in the late Holocene remains an intriguing subject to be investigated.