Absence of delta facies in the Holocene sedimentological record at the mouth of the Zhuoshui River on the west coast of Taiwan

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Taiwan is located between the two colliding tectonic plates, and receives the impact from the monsoon and the typhoons. All the factors contribute to the high sediment load delivered to the sea by small mountainous rivers on this island. The disproportionally large sediment load and the rising sea level constitute an important condition for the formation of river deltas. The sediment records of a fluvial system are expected to bear records of the changing sedimentary environment. This study hopes to resolve the deltaic developmental history during the post-glacial sea level rise. Furthermore, we hope to understand the patterns of past extreme events in the archived record.

The high sediment flux at the river mouth is expected to provide suitable conditions to preserve the information of the delta formation process. The FATES-HYPERS team drilled a bore hole (JRD core) on the upper part of the modern Zhuoshui River delta. The 100-m long core was obtained and then through AMS C-14 dating from over 70 samples the age model was established, which shows that C-14 dating limit (50000 BP) is reached at about -75 m. We estimates that the core deposit time across the late Quaternary (100000 BP) to the present. The preliminary results based on foraminifera assemblages and facies analysis indicate that there was a major shift from land to sea before 7500 BP. According to the conditions of delta formation, Zhuoshui River mouth should have developed a delta from the last deglaciation with sea-level rise. However, in our preliminary study we cannot identify the typical deltaic facies in the core. Why the delta sedimentological record was missing in the Holocene? We have to answer this question through the core and the adjacent seafloor topography.

The global sea level rose after the last glacial maximum. In 12000-10000 years BP, the sea level was 60 - 40 meters lower than present. The reconstructed sedimentary environments were river channels and floodplains in the JRD core during this time. The Zhuoshui River generated delta extended westward into the paleao-Taiwan Strait. In 10000-8000 years BP, the sea-level was 40 - 20 meters lower than present. The Zhuoshui River delta gradually retreated eastward/landward due to the rise of the sea level. At 8000 years BP, the sea-level was 20 meters lower than present. The sea level inundated the delta, seawater intruded landward quickly. The tidal and wave enargy affected the location where the JRD core was taken. Subsequently the JRD core recorded a major shift from fluvial facies to shoreface facies in this period. There was unconformity below the shoreface facies, suggesting an erosional gap within the shoreface facies. Between 7500-6000 years BP, the

sea-level was the highest. The JRD core records turned to offshore transitional facies. After 6000 year BP, the core shows facies of gradually shallowing sedimentary environments until the present day.

The modern-day Zhuoshui River mouth is classified as a mixed energy with tidal dominatance, so we speculate that the past river mouth was in the same morphodynamic condition. We speculate that the paleao-Zhuoshui River Delta was affected by tides and waves when it was formed. This effect is enhanced when sea level inundated the delta around 8000 years BP, and causes the absence of deltaic facies in the sedimentological record.