

Holocene sea level history in the broad Yangtze River Delta derived from high resolution sediment archives

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The Lower Yangtze River region is one of the key areas of China cradling Neolithic cultures (including early rice domestication), the most representative sites including Kuhuqiao (8-7 ka B.P.) and Hemudu (7-5 ka B.P.) in Ningbo-Shaoxing plain (basin) along the east coast. Over the last few decades, a great deal of work has been carried out to understand how early human settlements coped with Holocene environmental and sea level changes in this critical region. However, reconstruction of sea level history in coastal China has often been hampered by lacking of high resolution records with diagnostic proxies. Existing data retrieved from different regions show great discrepancy and contradiction.

In this study, we chose Ningbo-Shaoxing plain (basin) as the target area for Holocene sea level re-construction. This is because the Ningbo-Shaoxing plain is sheltered to both the north and south by mountain ranges, minimizing the influenced from fluvial and tidal processes, as oppose to the nearby areas such as the Qiantangjiang estuary. This geographic setting would have enabled a relatively continuous and uniform sedimentation during the Holocene, as oppose to the delta and estuary region where sedimentation is often truncated and interrupted by facies changes. As a result, high resolution chronology in Ningbo-Shaoxing plain can be performed and diagnostic paleoenvironmental proxies can be applied.

Eleven core have been recovered from the basin, with lengths ranging from 20m to 40m.

High-resolution geochronology of the sediments is established by AMS 14C dating of seeds and plant debris. Dating results suggest that the cores covers age ranges from the Last Glacial Maximum to the present. Sedimentological, biological and geochemical analyses have been carried out to re-construct the environmental history since early Holocene. Of particular interest is the high-resolution sea level history. Combined with archaeological records nearby, the study provides critical information about 1) the timing when marine transgression first arrived in the Ningbo-Shaoxing basin; 2) the timing when sea level reached high stand; 3) the mode of sea level rise; 4) the timing and mode of land initiation, propagation and human occupation. Most importantly, our study sheds some light on the understanding of how Neolithic human beings coped with environmental changes, particularly with sea level changes in this coastal region.

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