

“Treasure map” of the mid-Holocene sea-level highstand along the China coast

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The mid-Holocene highstand is a common characteristic of Holocene relative sea-level (RSL) reconstructions from regions distal from ice sheets. A highstand occurs when sea level was higher than present-day levels. The timing, magnitude and spatial pattern of the highstand vary due to the controlling processes ocean syphoning and continental levering. However, these highstand properties are poorly constrained along China coastline because of a lack of high-quality mid-Holocene RSL data.

Here, we ran an ensemble of Glacial Isostatic Adjustment (GIA) models with varying lithospheric thickness, upper and lower mantle viscosities (both 1D and 3D). We computed the mean and standard deviation of the GIA models and derived the highstand distribution pattern and magnitude range along China coast. We produced the “treasure map” to find the regions that have the highest probability of the preservation of a highstand record. We validated the highstand “treasure map” with published records showing evidence for the mid-Holocene highstand. The “treasure map” reveals that regions that are very likely (> 90% probability) to have the highstand preservation include west and northeast coasts of Bohai Sea, southwest coast of Yellow Sea, Yangtze River Delta, and Pearl River Delta. The “treasure map” can guide future RSL data collection efforts. Where possible, we compared GIA model predictions with accurate Holocene RSL data to assess the validity of using eustatic sea level to correct RSL data and derive the non-GIA signal (e.g., subsidence or uplift).

Keywords: China coast, Sea-level highstand, Mid-Holocene, Glacial Isostatic Adjustment, Treasure map