



Facies Distribution of Borehole DC01 in the West Coastal Plain of Bohai Bay Since MIS3 Using Clayey Water Electric Conductivity and Grain Size Analysis

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Introduction

Coastal zones are strong sea-land interaction zones that are extremely sensitive to changes in the coastal plain environment. These areas also serve as important evidence records for studying the regional paleoenvironmental evolution (Li *et al.*, 2014). Since the Quaternary, huge thick marine and terrestrial sediments have been deposited on the west coastal plain of Bohai Bay, which has become one of the hot spots in the study of sedimentology and paleoceanology.

Methods

2.1 Clayey Water Electric Conductivity

Clayey water electric conductivity was measured according to the method described by Yokoyama (1993).

2.2 Grain Size Text

The grain size distribution was determined using a Mastersizer 2000 laser grain size analyzer (British Malvern Strumens Company) and tested by the Tianjin Geological Survey.

2.3 Foraminifera Identification

Samples were then passed through a 240-mesh (aperture is 0.063 mm) standard analysis sieve. The material was then dried on the sieve in an evaporation pan, after which they were observed under a binocular microscope to identify the number and species of foraminifera.

2.4 AMS ¹⁴C Age Measurement

The test was commissioned by Beta laboratory (USA). The oceanic curve was corrected based on the idiomatic age using Calib Rev 7.0.2.

Results

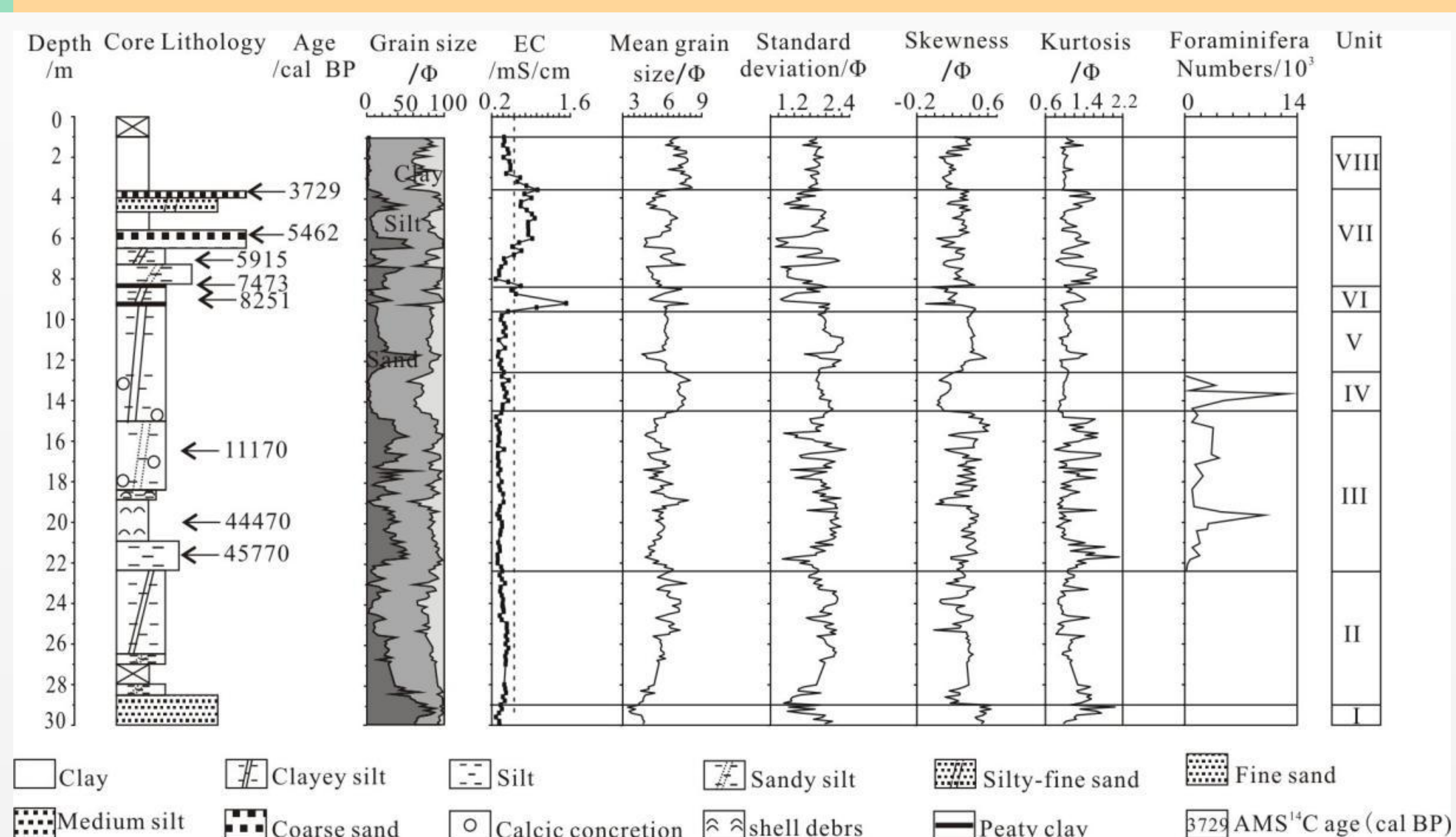


Figure 1. Clayey water electric conductivity (EC), grain size, and foraminiferous abundance of borehole DC01.

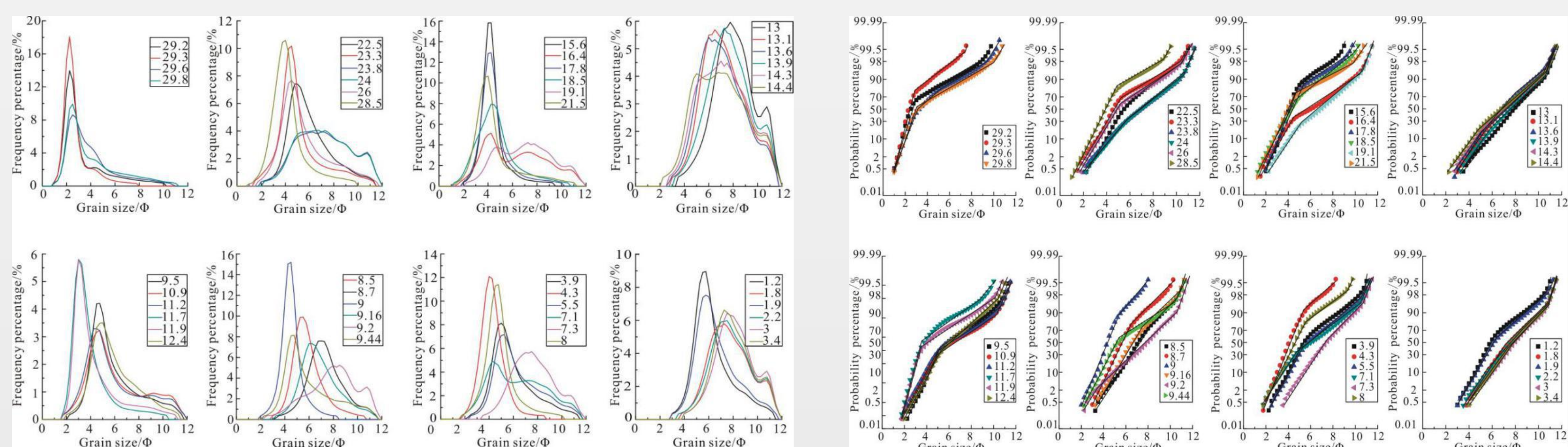


Figure 2. Frequency distribution curve and probability cumulative curve of borehole DC01.

Conclusions

From the bottom up, this area has experienced watercourse facies–flood plain facies–storm surge deposition–tidal creek deposition–watercourse–flood plain–salt marshes–watercourse–flood plain facies–continental flood plain. In stage MIS3, transgression occurred on the west coastal plain of the Bohai Bay and the second marine layer was formed. Additionally, 44.5 ka cal BP seawater intruded into the region about 20–45 km from borehole DC01. The sea level rose after the last glacial period, and water could reach the position of borehole DC01 along the tidal creek. From 8251–7466 a cal BP the area was a salt marsh environment, and this was the largest transgression period in the Holocene of borehole DC01.

A concentrated foraminiferal distribution unit was found at a depth of 12.6–22.4 m. The formation of foraminifera caused by storm surges and tidal creeks brought them to low-lying areas instead of marine environments. Thus, the presence of the foraminifera rich area alone does not represent the existence of a marine layer, and accurate conclusions can only be obtained by combining these data with the comprehensive analysis of clayey water electric conductivity and grain size.