UNIVERSITY OF LIVERPOOL

SEA LEVEL WORKSHOP

East China Normal University and the State Key Laboratory for Estuarine and Coastal Research, 10-16th September 2009

The workshop was funded by the "Sustainability of Water Resources in Estuarine and Coastal Environment" (SWARCE) programme, sponsored by the Ministry of Education and the State Administration of Foreign Experts Affairs, the People's Republic of China, with the objective of sharing research expertise and building capacity amongst new researchers in the area of sea-level studies over the historical period, aiming to link instrumental data from tide gauges to long-term trends in sea level preserved in the sediment record (Figure 1).

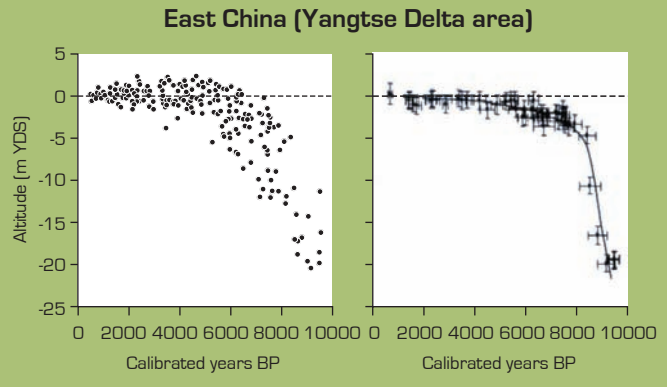

Figure 1: Data on long-term sea-level trends from the Yangtze region based on dating of Holocene sediment cores from the delta.

Training was delivered in the determination of sea-level trends using a palaeoecological transfer function approach (Gehrels, 2000), utilising the present ecological niche of diatoms and foraminifera in the intertidal zone as a means of determining past sea levels from saltmarsh and mudflat sediment records (Figure 2).

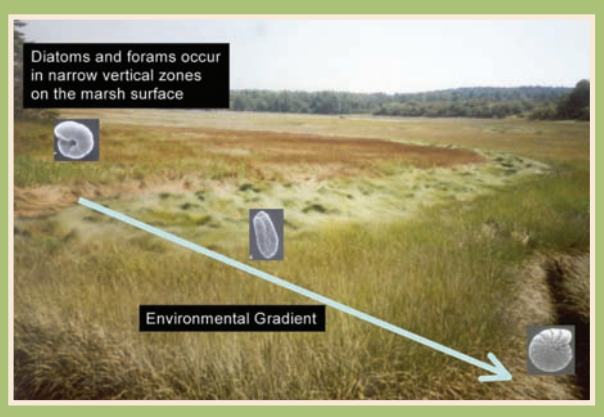

Figure 2: Vertical zonation of forams and diatoms in the intertidal zone as a basis for sea-level reconstruction from saltmarsh sediment records.

Research staff at SKLEC and ECNU with a sediment-based research focus (Zhang, Chen, Wang) joined with colleagues from the University of Liverpool (Plater, Mills), Liverpool John Moores University (Kirby), Penn University (Kemp) and Proudman Oceanographic Laboratory (Holgate, Woodworth) in class-, laboratory- and field-based training of over 30 postgraduates and research colleagues from universities and research institutes in China (Figure 3).

Figure 3: The workshop attendees

Training in the class covered the justification and approaches for sea-level studies, methods for sea-level reconstruction from Holocene sediment records, and the specific methodology of the foram- and diatom-based ecological transfer function approach. Field sampling on Chongming Island in the Yangtze estuary collected sediments from tidal flats and saltmarshes to establish the vertical distribution of diatoms and forams in the intertidal zone (Figure 4).

Figure 4: Sampling of sediments in the intertidal zone to establish the vertical zonation of forams and diatoms as a function of tidal inundation.

In addition, long sediment cores were collected from two sites that record the evolution of Chongming Island in response to sea-level change over the last 500 years or so (Figure 5).

Figure 5: Sampling of sediment core that preserves evidence of delta evolution in response to sea-level change over the last 500 years.

Laboratory-based micropalaeontology first delivered training the preparation and identification of forams and diatoms (Figure 6).

Figure 6: Laboratory preparation of samples for foram and diatom analysis.

The contemporary intertidal sediments were then analysed for their foram and diatom assemblages with a view to establishing the relationship between species distribution and altitude in the tidal frame (Figure 7).

Figure 7: Microscope analysis of contemporary intertidal sediment samples.

The foram assemblage proved to be dominated by low intertidal, planktonic and shelf species, whilst the diatoms showed evidence of mixing of fresh and marine waters but with promising indications of in situ species that are vertically constrained (Figure 8).

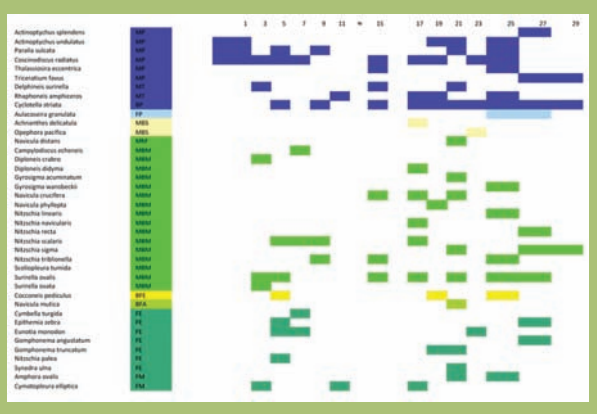

Figure 8: Diatom species distribution within the intertidal zone on the shore of the North Channel, the Yangtze Estuary.

These results were used in the final session of the workshop to identify further research questions that (a) will better constrain understanding of vertical zonation and (b) inform knowledge of Yangtze delta evolution in response to sea level, storms and sediment supply.

Reference:
Gehrels, W.R. (2000). Using foraminiferal transfer functions to produce high-resolution sea-level records from saltmarsh deposits. The Holocene, 10, 367-376.

CartoGraphics