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## Surface Sediment Grain Size Characteristics and Their Response to the Hydrodynamic Conditions of Qiantang River Estuary, China

Shi, Y.-X., Dai, X.-R.\* , Liu, Z., Wu, Z.-Y., He, S.-S.

School of Geographic Sciences, East China Normal University (ECNU), Shanghai 200241, P. R. China

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The *Qiantang* River, an east Chinese river with the world's largest tidal bore, has a 287km-long estuary from its tidal limit down to the outer border of Hangzhou Bay. The estuary can be divided into three portions according to its hydrodynamic conditions and riverbed features. They are: (i) the river-dominated upper estuary 83km long from *Luci* to *Wenyan*, (ii) the mixed fluvial and tidal middle estuary 122km long from *Wenyan* to *Ganpu*, and (iii) the tide-dominated lower estuary (i.e. *Hangzhou* Bay) 82km long with links to the East China Sea [1]. Our purpose is to understand how these different sedimentary environments are expressed by their surface sediments with respect to the grain size characteristics and whether there are any specific sedimentary signatures of each portion?

In 2013, 68 samples of underwater surface sediments (within a depth of 5cm) were carefully collected. Grain size analysis is conducted by using the LS13320 system with measuring range of 0.02~2,000 $\mu$ m. Data were processed and parameters calculated according to Folk & Ward [2]. Conclusions can be drawn as follows:

(1) In general, the grain size of the sediments ranges between 1 $\phi$  and 14 $\phi$ , mainly between 4.5 $\phi$  and 8 $\phi$ . Silts and clayey silts are two dominant components, reaching 47.1% and 44.1% respectively, while sandy silts, sandy-clay silts and clayey-sand silts occupy only 4.4%, 2.9% and 1.5% respectively. Besides, over 90% of the sediments belong to the suspension components and less than 10% are saltation components.

(2) There are significant differences among the three portions of the Qiantang River estuary as summarised in *Table 1*. The middle estuary has the strongest sedimentary dynamic environment as its sediments have the largest grain size and the best sorting. The differences in parameters could indicate the distinct hydrodynamic condition of each of the portions.

*Table 1 Grain size characteristics of surface sediments from Qiantang River, Zhejiang Province, China*

Portion
Upper estuary
Middle estuary
Lower estuary
Frequency curve
Multi-peaked
Single high thin peaked
Single low thin peaked
Suspension component segment of cumulative probability curve

No sub-segment
3 sub-segments
2 sub-segments
Mean grain size / $\phi$
6.52
5.46
6.60
Sorting coefficient ( $\delta_i$ )
1.99~2.61 (2.24)
1.21~2.19 (1.73)
1.49~2.21 (1.93)
Skewness (Ski)
<hr/> -0.12~0.56 (0.20)
nearly symmetric
<hr/> -0.04~0.58 (0.42)
positively skewed
<hr/> 0.13~0.56 (0.31)
positively skewed
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(3) Judging from the Pejrup triangulation [3], the hydrodynamic strength of the *Qiantang* River are generally strong, especially in its middle estuary, indicative of a sedimentary environment subject to both riverine and marine influences.

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*References:*

- [1] Changming L. (2014) *Chinese Hydrogeography*: Science Press, 258-260
- [2] Folk R L, Ward W C. (1957) *Journal of Sedim Res* 27(1): 3-26
- [3] Flemming B W. (2000) *Cont Shelf Res* 20: 1125-1137

