river-density current, wind-driven current; among these, tidal current governs the general flow pattern. Although, the magnitude of tidal current is very large, the tidal residual current velocity is very small, almost none of significance. The river-density current is an important component flow in the study area, it is the main factor creating the flow stratification in the estuary region and supplies the suspended sediment for the coastal zone. The wind-driven current in the study area is small in magnitudes. However, wind-induced currents are the main factor, which causes the uni-directional current directing north or south of the study area according to the wind direction. The magnitude of the wind-driven current in the rainy season is bigger than in the dry season.

The transport of suspended sediment in coastal zone of Hai Phong-Ha Long is closely related with river discharge, tidal oscillation and wind stress. The roles of factors depend on the season, and the locally of the study area. However, the temporal variation of suspended sediment concentration shows the influence of tidal oscillation; the zone with high-suspended sediment concentration in the rainy season is wider than in the dry season and it influenced on the west of Ha Long Bay. Tidal oscillation augments the transport of suspended sediment to the east of the study area, both in the rainy and dry season. Although the wind-induced current is not large as compared with the other current factors, it is important for the transport of suspended sediment. River discharge is the most important factor for the transport of suspended sediment in the coastal zone of Hai Phong-Ha Long. It varies with the season, and governs the spatial and temporal variations of the suspended sediment in the study area.

Weathering indicators of sediments of the Huanghe (Yellow river), Changjiang (Yangtze River) and Zhujiang (Pearl River) to the sea, their comparison and influential factors

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Semi-quantitative analysis of the quartz, feldspars contents of the 36 bulk sediment samples with 258 size-fractionated sediment samples from the Huanghe, Changjiang and Zhujiang to the sea were conducted by X-ray diffraction. The feldspar/quartz ratio F/Q, K-feldspar/quartz ratio Fk/Q and P-feldspar/quartz ratio Fp/Q as weathering indicators were used together with the percentage contents of carbonate minerals to evaluate and compare the weathering intensities of the above three rivers. Their influential factors were discussed.

The results show that the ratios of the quartz percentage contents of the Changjiang, Huanghe and Zhujiang are 1/1.2/2.6/2,The ratios of feldspar contents from the Huanghe, Changjiang, Zhujiang bulk sediments are 1/0.7/0.3. This ratio revealed clearly that the weathering intensity of the three rivers is followed by a sequence of Zhujiang > Changjiang > Huanghe and this sequence of the F/Q ratio of the three rivers sediments is consistent with the sequence of their chemical weathering intensity level.

The difference of the F/Q ratios of the Huanghe, Changjiang and Zhujiang sediment vary significantly with the sediment grain size. It increases with the decreasing of the grain size in general. The F/Q ratio of the 2-4μm fraction of the Huanghe sediment is 3.4 times of that of the Changjiang. The F/Q ratios of the 2μm-4μm and 16μm-32μm fractions of the Huanghe sediment are 6.2 and 6.8 times of that of the Zhujiang, respectively. The F/Q ratios of the 16-32μm, 32 - 63μm fractions of the Changjiang sediment are 3.7 and 4 times of that of the Zhujiang. The F/Q ratios of above grain size fractions are the weathering sensitive grain fractions, which are much higher than that of bulk sediments from the rivers, and can be used to distinguish the weathering intensity of three rivers basins as proxy indicators.

The weathering indicators of sediments of the Huanghe, Changjiang and Zhujiang to the sea are closely related to the source rocks and the climate environment of the three river drainage basins reveal the causes of the difference in the sediment compositions of the three rivers. The weathering indicators of the three rivers can be used to identification of the sediment sources from the rivers on the shelves and evaluate the weathering history of the river basins in the past.

Sea surface temperature changes in the southern East Sea, Japan Sea and northern East China Sea during the last 15000 years

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