Time scales of sediment source-to-sink process in East Asia: evidences from uranium $^{234}U/^{238}U$ disequilibrium

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Knowledge of sediment source-to-sink process leads to a better understanding of continent weathering and terrigenous input to the ocean. However, the time scale of this process is hard to determine because of the complex sediment cycling induced by hydrodynamic and topographic factors. The comminution age theory corresponds well with the sediment source-to-sink process and can be quantitatively determined by the particulate $^{234}U/^{238}U$ disequilibrium.

The East Asia continental margin links the Eurasian continent and the northwest Pacific Ocean, and is characterized by a broad continental shelf and huge terrigenous sediment input from adjacent rivers. The river-dominated marginal sea, e.g. Yellow Sea and East China Sea, witnesses the complicated sediment source-to-sink transport and sedimentary environmental changes. This study provides comminution age calculation based on $^{234}U/^{238}U$ of sediments from the Changjiang (Yangtze River) and the Huanghe (Yellow River), as well as Yellow Sea and East China Sea. The result shows that the comminution age for fine (<50 micrometer) lithogenic particles mainly ranges from 200 to 400 kyrs for both Changjiang and Huanghe, and 200 to 600 kyrs for Yellow Sea and Changjiang estuary sediments. This result reveals that the time scale of sediment source-to-sink process in East Asia is topography-dependent and quite distinguished from the South Asian rivers (e.g. the Ganges River) which are mostly less than 100 kyrs. Moreover, the long sediment comminution ages in the Yellow and East China Seas imply slow and complex sedimentary responses in continental marginal sea to the Tibet uplift in terms of sediment transfering. This study offers the first attampt of quantitative constraint on sediment source-to-sink process in terms of transport time in East Asia and sheds a new light on different mechanisms of sediment transfer processes from Tibetan Plateau to East Asia and South Asia.

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