

($^{234}\text{U}/^{238}\text{U}$) indicates erosion in tropical islands during glacial periods comparable to present-day conditions

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Earth's surface erosion process not only shape landforms but also affect the development of critical zones, chemical weathering processes, and the atmospheric CO₂ cycle by controlling the exposure and fragmentation of rocks. The general view is that the dry and cold climate during glacial periods is not conducive to erosion. However, weathering models show that the intensity of erosion on the global land surface is not uniform. The sediment core located in the eastern slope of the Sunda Shelf was employed to assess the erosion intensity during the glacial periods. Provenance analysis of the core sediments indicated that the glacial deposits originated from southern tropical islands and the exposed Sunda Shelf. During the Last Glacial Maximum, sea levels in the South China Sea were 120 meters lower than present-day levels. The Sunda Shelf was exposed as a vast, flat land, named "Sunda land". Large paleo-river systems developed across this continent, directly linking the islands to the South China Sea.

This study analyzed the ($^{234}\text{U}/^{238}\text{U}$) values of core sediments. By combining with precipitation data of the southern South China Sea during the glacial periods, it is revealed that during the glacial low sea level period, precipitation on the tropical islands in the southern South China Sea was comparable to or slightly weaker than that during the Holocene. Materials that had been eroded or remained on the island for a long time were flushed away and transported via paleo-river channels to the slope. Additionally, erosion by paleo-rivers on the exposed shelf or the migration of paleo-river channels caused older deposits to be locally re-mobilized, with these materials being transported to the slope. Therefore, sediment from the slope during the glacial period recorded smaller ($^{234}\text{U}/^{238}\text{U}$), which represent the sediments has been eroded for a long time. This study indicated that erosion on the tropical islands still active during the glacial periods, the erosion intensity was comparable to present-day conditions.