

Sediment supply to the Shikoku Basin by the Kuroshio Current during the latest Cenozoic era

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Sr-Nd-Pb isotope ratios of detrital mud of the late Cenozoic hemipelagic succession cored from the IODP site C0011 in the Shikoku Basin suggest that the Kuroshio Current had initiated at 5 Ma and gradually increased its strength toward 3Ma around this site. The combination of $^{87}\text{Sr}/^{86}\text{Sr}$, $^{206}\text{Pb}/^{204}\text{Pb}$, $^{207}\text{Pb}/^{204}\text{Pb}$, and $^{208}\text{Pb}/^{204}\text{Pb}$ of detrital mud in the period between 4.2 and 5 Ma at this site is fairly close to that of the Okinawa Trough sediments, and that of $^{87}\text{Sr}/^{86}\text{Sr}$ and $^{143}\text{Nd}/^{144}\text{Nd}$ resembles that of the Yangtze River sediment. Although $^{87}\text{Sr}/^{86}\text{Sr}$ and $^{143}\text{Nd}/^{144}\text{Nd}$ in this period are also close to sediments in inland China, where the Asian dust originates, $^{208}\text{Pb}/^{204}\text{Pb}$ of C0011 samples are significantly higher than those of inland China in relation to $^{206}\text{Pb}/^{204}\text{Pb}$. Isotopic values from 5 to 0 Ma of C0011 samples can be explained by the mixing of those sediments around the East China Sea (ECS) and the sediments derived from the Honshu Island. Sediments should have been transported from the continental shelf of the ECS to the Shikoku Basin as suspension of the Kuroshio Current. Transportation by underflows or gravitational flows is unlikely because the Kyushu Palau Ridge should have obstructed their accession to the Shikoku Basin.

Assuming the sediments from the Okinawa trough and those from the landward rises of the Nankai Trough as the end members, the ECS area supplied 60 to 100 % of siliciclastic mud deposited on the Site C0011 during the period from 5 to 4.2 Ma. Then, the proportion had gradually decreased to less than 40 % by 3Ma. Before 5 Ma, the proportion ranged from 30 to 70 %. After 3Ma, the proportion was no more than 50 %. Contribution from the ECS significantly decreased also in quantitative aspects after 3Ma judging from the sudden decrease of bulk sedimentation rate at this site from 6.7 to $2.8\text{g cm}^{-2}\text{ kyr}^{-1}$ at 3Ma.

The Late Cenozoic History of the Kuroshio Current around the site C0011 is inferred as below. *5-4.2Ma*: An ocean current that was strong enough to transport particles from the ECS to the Shikoku Basin is established. From *4.2-3Ma*: the ocean current had grown up, and the increasing capacity of the flow lowered the settling flux from the current. On the contrary, migration of the site C0011 toward the Honshu Island increased the terrigenous flux. *3Ma*: The strong, modern Kuroshio Current had established, and had prevented particle settling from the sea surface to the floor around C0011.

Keywords: the Kuroshio Current, hemipelagic mud, Sr-Nd-Pb isotope ratios, Shikoku Basin