

Variations in sedimentary environments around the Ryukyu Arc since 25 kyr based on CNS elements

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In this study, we analyzed ¹⁴C dates, grain size, and CNS element contents using sediment cores collected at the eastern edge of the backarc and forearc of the Ryukyu Arc, and demonstrated different temporal variations in CaCO₃ contents and C/N ratios compared with previous studies of the Okinawa Trough cores. Increases in CaCO₃ contents and decreases in C/N ratios, from the Last Glacial Maximum to the Holocene, in the Okinawa Trough backarc basin correspond with sea-level changes. These results demonstrate that the sedimentary environment in the Okinawa Trough is influenced by sediment supply from mainland China, and reveal temporal variations reflecting changes in the Yangtze River mouth that accompany sea-level changes. In contrast, CaCO₃ contents of cores in this study are double those in the Okinawa Trough cores, and show an increasing trend at 7.5-6.0 cal kyr BP. Additionally, in the forearc core, the profile of CaCO₃ content decreases at 11.5-8.1 cal kyr BP. These variations of CaCO₃ contents suggest that marine productivity changed with trophic conditions in sea surface. In addition, the lateral transport of terrigenous sediment by the Kuroshio and Ryukyu currents might contribute to an increased CaCO₃ content by reducing the influence of dilution. Variations in the C/N ratio after 7.8 cal kyr BP suggest that the Kuroshio Countercurrent has varied in strength at 1-2 kyr intervals since the early Holocene, influencing the deposition of terrigenous organic matter from the Okinawa Islands in the deeper parts of the east backarc.

Keywords: CNS elements, deposition process, sea level change, Kuroshio Current, Ryukyu Islands