

Impacts of volcanic events on the terrigenous sedimentation in the northern Okinawa Trough since the last glacial maximum

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The Okinawa Trough (OT) is an incipient back arc basin that receives tremendous terrigenous sediments from the Changjiang, Huanghe and small rivers surrounding the East China Sea. However, since LGM, volcanic activities have exerted a more pronounced influence on the northern OT relative to the middle and southern OT, leading to uncertainties regarding detrital provenances and their influencing factors. To determine the provenances and the paleoenvironment variations in the northern OT, a comprehensive analysis was conducted on the sediments of Core GHN007 in the continental slope, using AMS ¹⁴C chronology, grain size and geochemical composition indicators based on previous studies. Results show that three sedimentary units (Unit 3-Unit 1) with a hiatus have been identified in GHN007 since LGM. These units correspond to three distinct periods: the LGM and last deglaciation, the early Holocene, the late Holocene. The hiatus between 16.1 and 12.8 cal kyr BP was caused by slump due to the Sz-S volcanic event. Around the LGM, the detrital materials in Unit 3 were sourced from the Huanghe River, forming as deltaic distal muddy deposits along the western slope. During the period of 12.8-7.3 cal kyr BP, the rapid rise in sea level caused a gradual retreat of the paleo-Huanghe River mouth, leading to an overall decrease in accumulation rates of sediments. After 7.3 cal kyr BP, fluvial sediments from eastern Taiwan become dominant for Unit 1, attributed to intensification of the Kuroshio Current. In particular, we have found an abrupt shift in the geochemical compositions within the K-Ah and Sz-S tephra layers, and a gradual change in their overlying strata. This observation indicates that volcanic materials originating from Kyushu can undergo multi-cyclic transportation to the northern OT, resulting in a continuous geochemical influence lasting for 3-4 kyr. Furthermore, considering the hiatus in GHN007 and turbidite deposits associated with tephra layers, it is evident that volcanic events have significantly influenced the development of sedimentary sequences. This study highlights the perturbation of volcanic-related events on the continuous sedimentation in the continental margin, which deserves more research attention for future studies on high-resolution palaeoceanographic and paleoenvironmental changes.