

Enhanced supply of fossil organic carbon to the Okinawa Trough since the last deglaciation

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Abstract

Significantly older ¹⁴C-ages (by 2500-7900 yrs) are found for sedimentary total organic carbon when compared to ages of co-deposited surface-dwelling foraminifera in the southern Okinawa Trough since the Last Glacial Maximum. This age discrepancy increases with rising sea level. At the same time, $\delta^{13}\text{C}_{\text{TOC}}$ shifts toward the terrestrial endmember. During the Holocene when sea level is above -40 m, $\delta^{13}\text{C}_{\text{TOC}}$ values stabilize within a narrow range while age discrepancies continue to increase. Less chemically weathered sediments are deposited within this period. A progressive shift in $\delta^{13}\text{C}_{\text{TOC}}$ towards more negative values with rising sea level indicates an increasing fractional contribution of terrestrial organics (soil organics, plant-debris and/or fossil organics), which are pre-aged on land, to the buried organic pool. Organic matter previously stored on the East China Sea shelf during sea level lowstand and riverine material from Taiwan may be sources that drive the $\delta^{13}\text{C}_{\text{TOC}}$ shift to more terrestrial values. An increase in age discrepancy between TOC and forams in the Holocene may be due to enhanced bedrock incision on land as a result of wetter climate leading to greater fluxes of fossil organic carbon (FOC) as much as a 2-fold variation in FOC content driven by climate change through a glacial-interglacial cycle may have occurred.