

## Changes in $^{230}\text{Th}$ -normalized flux of biogenic components recorded in the central Chilean margin over the past 22,000 year

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During glacial periods, strengthened productivity and an efficient biological pump in the North Pacific, Equatorial Pacific, and Southern Oceans may have contributed to reduce atmospheric  $\text{CO}_2$  partial pressures ( $\text{pCO}_2$ ). However, whether marine productivity was high during glacial periods at every region, especially the Last Glacial Maximum (LGM), and whether intensification of marine productivity resulted in a decrease of atmospheric  $\text{pCO}_2$ , are still controversial. The aim of this study was to identify changes in the  $^{230}\text{Th}$ -normalized export flux of biogenic components, namely total organic carbon (TOC),  $\text{CaCO}_3$ , and biogenic opal, which are commonly utilized as proxies for paleoproductivity recorded in a sediment core covering the past 22,000 years collected from the central Chilean margin (36S). The  $^{230}\text{Th}$ -normalized fluxes of TOC,  $\text{CaCO}_3$ , and biogenic opal were relatively low from 22,000 cal. yr BP to 15,000 cal. yr BP, including the Last Glacial Maximum (LGM). Marine productivity would decrease during this period due to the poor nutrient condition of the surface water, although this study site might have been affected by the Antarctic Circumpolar Current (ACC), associated with the equatorward migration of the Southern Westerlies. From 15,000 cal. yr BP to 10,000 cal. yr BP, the  $^{230}\text{Th}$ -normalized flux of biogenic components increased. It seems likely that marine productivity increased and main nutrient source for maintaining marine productivity gradually shifted from the ACC to the coastal upwelling, associated with gradual southward migration of the Southern Westerlies. During the Holocene, especially after 8000 cal. yr BP,  $^{230}\text{Th}$ -normalized flux of TOC and biogenic opal increased, while that of  $\text{CaCO}_3$  was almost same level as those during the LGM. The result of  $^{230}\text{Th}$ -normalized flux of TOC and biogenic opal suggests that marine productivity at this study site became the highest at 13,000 cal. yr BP during the deglaciation and the lowest at the LGM throughout the past 22,000 yr. It implies that the low marine productivity at mid latitude off Chile area did not contribute to reduce the atmospheric  $\text{pCO}_2$  during the LGM.

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