

The Role of the North Pacific in the world ocean circulation

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The North Pacific is known as a terminal region of Ocean Conveyor and abyssal circulation from the south flows into the North Pacific, and upwells to mid-depth and returns south as the Pacific Deep Water (Schmitz, 1996). No deep water forms in the North Pacific in the present ocean because the surface water of the North Pacific is not dense enough to sink into the deep basin (Warren, 1983). Instead, the North Pacific Intermediate Water (NPIW) originated from the Okhotsk Sea lies at depths of 300 to 800 m (Talley, 1993).

The glacial Pacific Ocean had two water masses: well-ventilated and nutrient-depleted glacial North Pacific Intermediate Water (GNPIW) above ~2000 m and less-ventilated and nutrient-enriched deep water below ~2000 m (Keigwin, 1998; Matsumoto et al., 2002). GNPIW is a thicker and more deeply penetrating water mass than the present NPIW. The possible source of GNPIW was possibly in the Bering Sea inferred from microfossil (Ohkushi et al., 2003) and neodymium isotope evidence (Horikawa et al., 2010). A switch of meridional overturning circulation between the North Atlantic and the North Pacific during the last glacial termination was suggested by a collaborative study of sedimentary proxy data and climate modeling (Okazaki et al., 2010).

The North Pacific appears to have played an active role in global ocean circulation, not always passive during the last glacial cycles. The Role of the North Pacific in the world ocean circulation of the past will be discussed.

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