



The Impact of the Geothermal Heat Flux on the Oceanic Abyssal Circulation

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Geothermal heating of abyssal water masses is commonly regarded as a rather minor driver of the large-scale oceanic circulation. Numerical experiments carried out with a coarse resolution Ocean General Circulation Model suggest, however, that the impact of geothermal heat fluxes on the deep ocean circulation is not negligible. Geothermal heating contributes to an overall warming of bottom waters by about $0.4\text{ }^{\circ}\text{C}$ decreasing the stability of the water column and enhancing the formation rates of North Atlantic Deep Water and Antarctic Bottom Water by up to 10 and 33%, respectively. In addition, a stronger and deeper Atlantic meridional overturning circulation cell results in a warming of the deep western boundary current in the North Atlantic by about $1.4\text{ }^{\circ}\text{C}$. Increased influx of Antarctic Bottom Water leads to an enrichment in radiocarbon of Pacific Ocean waters, increasing $\Delta^{14}\text{C}$ values in the deep North Pacific from $-269\text{ }/\text{oo}$ when geothermal heating is ignored, to $-242\text{ }/\text{oo}$ when geothermal heating is included.