Lead Concentration and Isotopic Compositions in the Central Tropical North Pacific Ocean

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One of the key GEOTRACES trace elements, lead (Pb) in the ocean is highly influenced by human activities. During a cruise (GEOTRACES GP15) along a Pacific Meridional Transect (152°W) in the central Pacific basin in 2018, seawater samples were collected for Pb concentration [Pb] and Pb isotope ratio profiles at stations 18 (22.5°N), 19 (17.5°N), 21 (11°N), 25 (5°N), 35 (10.5°N), and 39 (20°S). At most stations (except the most southerly ones) [Pb] increased from the surface to a maximum at ~300m (the highest being 67 pmol/kg for station 18) and then decreased with depth to 1-5 pmol/kg near the seafloor. The [Pb] maximum is usually a minimum for $^{206}Pb/^{207}Pb$, $^{208}Pb/^{207}Pb$, and $^{206}Pb/^{204}Pb$, ranging from $^{206}Pb/^{207}Pb$ = 1.151 at southernmost station 39 to 1.162 at station 18. Below 300m, $^{206}Pb/^{207}Pb$ increased towards the bottom (to 1.190 at station 39 and 1.185 at station 18 At stations 18 and 19, $^{208}Pb/^{207}Pb$ shows a decrease below ~4500 m which we attribute to the flow of eastward flowing Pacific Bottom Water passing through the deep passage south of Horizon Guyot as described by Edmond, Chung, & Sclater (1971, JGR 76:8089-8096). Comparison of the near-surface GP15 data, from the upper 160m of South Pacific Zonal Transect (GP16), and from the surface waters of the HOT time-series station north of Hawaii shows significant evolution of Pb isotope ratios in recent decades.