



## AMS $^{14}\text{C}$ and $^{210}\text{Pb}$ dating on a 51-cm sediment core from Santa Barbara Basin, CA: old carbon source

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A 51-cm gravity core, SBB-8-2012, was collected from Santa Barbara Basin (SBB) of California in 2012. Lamination counting of the core yields  $\sim 160$  layers. A total of 17 horizons of the core have been analyzed for  $^{210}\text{Pb}$  dating through alpha spectrometry method which provides a mean sedimentation rate of 0.24cm/y. Thus, the 51-cm long core covers about 210 years of depositional history of the sampling site in the basin. Up-to-date, we have measured AMS  $^{14}\text{C}$  dates on TOC of the bulk sediments in 34 layers from the upper 40.1 cm of the core. Except the  $^{14}\text{C}$  date (2983 yr BP) at 35-35.2 cm depth, the 33 uncorrected  $^{14}\text{C}$  dates range from 508 yr BP to 2214 yr BP, and form two groups which give two linear lines: age = 417 + 35.9 depth (cm),  $R^2 = 0.976$  and age = 665 + 37.4 depth (cm),  $R^2 = 0.949$ . These equations allow us to observe the following phenomena: (1) TOC of the bulk sediments in the SSB contains old carbon. The old carbon may come from terrestrial input (allogenic/allochthonous) and/or from endogenic input (autochthonous) through photosynthesis in the water column. (2) The reservoir age can exist for both organic carbon of TOC and carbonate. At 35.5-37 cm depth, the AMS  $^{14}\text{C}$  date of a plant remain sample was  $520 \pm 12$  yr BP. If this age subtracts the reservoir age of 417 years, the corrected age is close to the result of  $^{210}\text{Pb}$  dating. A shell sample at 38.5 cm depth provides a  $^{14}\text{C}$  age of  $915 \pm 47$  yr BP, showing older reservoir age for carbonate. (3) The reservoir age for TOC may vary through time depending on water mixing rate in the basin. This is because the endogenic input may be a function of water mixing in the basin. When the mixing rate of the water column in the basin was slower, the reservoir age became older. Based on the chronology from the  $^{210}\text{Pb}$  dating, we are able to determine the  $\Delta^{14}\text{C}$  fluctuations of the TOC in the bulk sediments of the core. The variation of the  $\Delta^{14}\text{C}$  may let us evaluate basin mixing during the past 200 years.