Tracing carbon fixation by ^{14}C and ^{13}C in a cold seep community in South China Sea

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Abstract

Studies of carbon fixation in ocean previously focus on the photosynthesis. However, the chemosythesis is also importan in oceanic carbon cycle, which is not fully understood. Many cold seeps have been found in South China Sea, which are typical chemotrophic ecosystem. We analysis the ^{14}C and ^{13}C signature both in the organic and inorganic carbon (OC and IC) of different organisms from a cold seep in the northern South China Sea.

The preliminary results show $\Delta^{14}C$ values of OC ranging from -450‰ to -900‰ and $\delta^{13}C$ from -47.7‰ to -69.3‰. This suggests a mixed model of food supply mainly from two endmembers: CH_4 (^{13}C-deleted, dead carbon) and surface derived organic matter (average $\delta^{13}C$ at -22‰, modern carbon) [1,2]. The average carbon isotopes value varies among different species, implying the various diets. Mussels highly depend on the CH_4 in fluids (>85 %), and the Crustacea has a high proportion of primary production from surface waters in the diet (up to 50%).

On the contrary, $\Delta^{14}C$ values of IC are mainly around -220‰ and $\delta^{13}C$ values are more positive than those of OC. Thus, the dissolved inorganic carbon (DIC) in the ambient water is likely the main source for the shells of these organisms, which differs substantially from the formation of authigenic carbonate in cold seeps[3,4].

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