# C cycling at the Mid-Cayman vent sites: a fatty acid compound-specific isotope study of *Rimicaris hybisae*

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Since the detection of hydrothermal vents in the late 1970's, active sites on the sea floor have been in the focus of studies worldwide. Not surprisingly, given the fact that these sites harbor ecosystems which are thought to be mostly uncoupled from organic carbon (C) synthesized with the energy of sunlight but fed instead by the oxidation energy of reduced inorganic molecules: chemosynthesis.

Our study aims to disentangle the food chain at two hydrothermal vent sites in the Mid-Cayman Rise region which differ in depth and vent chemistry. We pay special interest to the source of organic C: chemosynthesis (local) or photosynthesis (external). We focus on the abundant shrimp species *Rimicaris hybisae*, which is thought to be a primary consumer taking organic C mainly from episymbiotic chemoautotrophic bacteria living on its specially adapted gill covers. These shrimps live mainly in dense clusters around vent chimneys but are also found sparsely distributed nearby, where their diet might include other crustaceans. Densely and sparsely distributed shrimps were sampled and dissected into abdominal tissue and paired exoskeletal membrane from the gill cover, containing associated bacteria. Shrimps from both sites showed much smaller proportions of external photosynthetic lipids than what has been reported for *R. exoculata* at the Mid-Atlantic ridge. Sparsely distributed shrimps contained slightly higher proportions of long-chain photosynthetic lipids compared to densely distributed shrimps. Shrimps from different vent sites rely on very distinct sources of local chemosynthetic C, since their lipid C isotope compositions ($\delta^{13}C$) differed significantly for non-photosynthetic lipids, while all but one photosynthetic lipid were very homogenous but depleted in $\delta^{13}C$. Our data suggests that this exception: C18:3n3 might actually be synthesized locally.

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