Cold seep mussel isotopic analyses

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Childressi mussel's shell growth can be directly influenced by methane concentrations from cold seeps. The aim of this study is to identify the source of nutrients to mussels shells collected from canyons off the U.S. east coast in Virginia (Norfolk and Baltimore Canyons) by measuring their stable isotope (carbon, oxygen, and sulfur) values. Eight mussels collected in May 2013 with the ROV Jason II from the Norfolk Canyon cold seep at 1600-1475 m were selected for sampling. There were also four alive *Childressi* mussels and three dead. Preliminary resutls yield a range of isotopic values from $-16.74‰ \leq \delta^{13}C \leq 1.61‰$ and $2.84‰ \leq \delta^{18}O \leq 5.13‰$. Mussels that were dead at the time of ROV collection have a lower average $\delta^{13}C$ value than those that were alive, due to either proximity of mussels to methane seeps or the concentration of methane at the time in which they were alive. The *Childressi* species had a lower $\delta^{13}C$ value than those of the *Boomerang* species. The *Boomerang* relies on different kinds of bacteria and not just methanotrophic bacteria. The $\delta^{18}O$ remains fairly consistent throughout the mussel shells within the Norfolk Canyon, which suggest constant temperatures. Despite our hypothesis that the Bathymodiolus species rely solely upon methane for their carbon within the Norfolk Canyon, our $\delta^{13}C$ data suggests this is not true. Instead other inorganic compounds and different bacteria species assist in providing carbon to the mussels.