



Temporal and spatial variation in the $\delta^{15}\text{N}$ and $\delta^{13}\text{C}$ of coral tissue and zooxanthellae in *Montastraea faveolata* collected from the Florida reef tract

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ABSTRACT: Tissues were collected from *Montastraea faveolata* at five locations on the Florida Reef tract representing both nearshore and offshore environments. The tissue and zooxanthellae were removed from the skeletons, separated, and subsequently analyzed for $\delta^{15}\text{N}$ and $\delta^{13}\text{C}$. The mean $\delta^{15}\text{N}$ value in the coral tissue was $+6.6$ ($\pm 0.6\text{‰}$) while the $\delta^{13}\text{C}$ was -13.3 ($\pm 0.5\text{‰}$) ($n = 197$). The $\delta^{15}\text{N}$ and $\delta^{13}\text{C}$ of the zooxanthellae were $+4.7$ ($\pm 1.1\text{‰}$) and -12.2 ($\pm 1.0\text{‰}$), respectively ($n = 147$). The differences in the $\delta^{15}\text{N}$ and $\delta^{13}\text{C}$ between the zooxanthellae and the tissue were statistically significant. No statistically significant differences were observed between nearshore and offshore stations in either $\delta^{15}\text{N}$ or $\delta^{13}\text{C}$. The absence of a difference casts doubt on both whether the $\delta^{15}\text{N}$ of the coral tissues is related to anthropogenic influences and/or whether the $\delta^{15}\text{N}$ value itself can be used as an indicator of sewage contamination in corals. Between 1995 and 1997, there was an increase of 1‰ in the $\delta^{13}\text{C}$ and a decrease of approximately 0.8‰ in the $\delta^{15}\text{N}$. The increase in the $\delta^{13}\text{C}$ of the organic material was mimicked in the $\delta^{13}\text{C}$ of the skeletal material from corals from two reefs in the area. There appears to be clear seasonal variations in the $\delta^{13}\text{C}$ of the coral tissue at certain locations with $\delta^{13}\text{C}$ of the coral tissues and the zooxanthellae becoming more positive between July and August. The difference between the $\delta^{13}\text{C}$ of the zooxanthellae and the coral tissue varies seasonally with the maximum difference occurring in July of each year. In contrast, the maximum $\delta^{13}\text{C}$ in the skeleton appears to occur later in the year, between September and November.

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