



Application of trace element and stable isotopes to reconstruct climate in Huangyan Island, South China Sea

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Tridacna gigas is an important member of reef ecosystems, whose trace elements and stable isotope can reconstruct the environment variations. In this study, a modern *Tridacna gigas* from Huangyan Island, South China Sea, was measured by $\delta^{18}\text{O}$ and Mg/Ca, Sr/Ca, Ba/Ca to find their correlation with sea surface temperature, as well as EL Niño-Southern Oscillation (ENSO). An age model of *Tridacna gigas* was established by shell $\delta^{18}\text{O}$ (nearly monthly a point), which had reproducible cycles of the yearly time-series. The $\delta^{18}\text{O}$ of *Tridacna gigas* was probably controlled by climatic parameters, for $\delta^{18}\text{O}$ had a good relation with the amplitude of sea surface temperature (SST). Analysis of $\delta^{18}\text{O}$ suggested that the ENSO could be observed and had a correlation with $\delta^{18}\text{O}$. Shell's Inner layer trace elements were also measured by means of LA-ICP-MS in line scan mode. According to the line scan mode records, yearly element/Ca variation could be seen, even monthly and daily variation. *Tridacna gigas* had an ontogenetic trend with increasing value of Mg/Ca, it might result from the specimens maturity. This maturity also brought increasing Mg/Ca, Sr/Ca amplitude, and more regular cycles could be recognized. However, Ba/Ca value was not influenced by maturity, but by the phytoplankton blooms. According to the time-series established by $\delta^{18}\text{O}$, Mg/Ca had a negative correlation with $\delta^{18}\text{O}$ through ontogenesis. Sr/Ca had a positive correlation with $\delta^{18}\text{O}$ after maturity. Our results demonstrate that *Tridacna gigas* can be a good indicator to reconstruct the environmental records in Huangyan Island, South China Sea.