

# A COMPARISON BETWEEN THE RANDOM AND ORIENTED GROWTH PATTERNS OF THE SERPULID WORM AGGREGATES IN BAFFIN BAY, TEXAS

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Serpulids are sessile filter feeding worms that secrete calcareous tubes. Individually growing serpulids are common in a range of environments, however, aggregate-forming serpulids are rare. Aragonitic serpulid aggregates have grown occasionally within the past 3000 years in Baffin Bay on the southeast coast of Texas. The Bay is part of a backbarrier lagoon/barrier island complex that allows for dramatic variations in environmental conditions. Average salinity is 40-60‰, but can range from 0-100‰, whereas temperatures can vary from 0°-38°C. The Bay is shallow (average depth of 1.5m) and has a small tidal range. Serpulid aggregates within Baffin Bay have grown in two different styles (Andrews, 1964). Patch reefs near the mouth of the Bay display a distinct stratified pattern with layers of small, randomly oriented intertwining tubes alternating with layers of larger vertically oriented serpulid tubes. Reef fields, found within the Bay, consist mainly of intertwining randomly oriented tubes with small areas of more straight tubes. To better understand the conditions under which these varying serpulid growth styles occur, high resolution stable isotope analysis was performed on seven tubes from Baffin Bay: one from each of the three reef fields sampled, and from each of the uppermost four layers of one patch reef. These samples are about 720 to 400 ± 30 years old.

Stable isotope analysis reveals a narrow range of  $\delta^{18}\text{O}$  values (<2‰) along the length of any single serpulid tube, but more variation in  $\delta^{13}\text{C}$  values (~3-4‰), with no systematic variations or covariance between  $\delta^{18}\text{O}$  and  $\delta^{13}\text{C}$  values. The  $\delta^{18}\text{O}$  range reflects changes of up to 8°C in temperature or 8-10ppt in salinity, whereas the  $\delta^{13}\text{C}$  variations suggest significant fluctuations in the extent of vital effect and primary organic productivity within the Bay. There is a substantial overlap of  $\delta^{18}\text{O}$  and  $\delta^{13}\text{C}$  values for the entire suite of the sampled serpulid tubes suggesting similar conditions during their growth. However,  $\delta^{18}\text{O}$  and  $\delta^{13}\text{C}$  values of individual serpulid tubes from the patch reef display less overlap and a wider range of values ( $\delta^{18}\text{O} = -3.5$  to  $+1\%$  VPBD;  $\delta^{13}\text{C} = -7.5$  to  $0\%$  VPBD). In comparison, the values for the reef field serpulids show clustering over a narrower range ( $\delta^{18}\text{O} = -1.75$  to  $+0.5\%$ ;  $\delta^{13}\text{C} = -6$  to  $-0.75\%$ ). This indicates greater variation in environmental conditions at the mouth of Baffin Bay than in the Bay interior during serpulid aggregation, and may reflect longer growth periods of oriented tubes (months to over a year) relative to random tubes (1 to 4 weeks). As the stratification observed in the patch reefs may reflect a change in serpulid growth pattern from random to vertically oriented as they reach maturity (Behrens, 1968), a unique set of conditions existed at the mouth of Baffin Bay that allowed more individual serpulids to grow over a large area for a longer period of time. These unique conditions may be related to differences in the dynamics and rate of environmental change between the Bay mouth and the more restricted Bay interior.

## REFERENCES:

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