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Determining the Impacts of the Anthropocene through Time-Calibrated Taphonomic Grading

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in North America are younger than the Gaskiers glaciation. The Ediacaran and Cambrian in North America are only rarely continuous, and many of these successions are non-Laurentian (e.g., Avalonia). Many of the Ediacaran successions in North America are composed of marine sediments and volcanics associated with island arcs that rifted from Gondwana during the early Cambrian and that were accreted onto the margin of Laurentia during the late Silurian to early Devonian. Although it is possible that global expansion of an intermediate resolution macrostratigraphic dataset for the Ediacaran will reveal an early-onset of marine sediment accumulation that is predicted by the snowball Earth 'bulldozer' model, the temporal lag between Neoproterozoic glaciation and reburial of the Great Unconformity will remain a prominent feature of the North American rock record.

DETERMINING THE IMPACTS OF THE ANTHROPOCENE THROUGH TIME-CALIBRATED TAPHONOMIC GRADING

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Global biodiversity loss threatens ecosystem integrity and related services for humans, but most communities lack baseline data to assess the magnitude of change. In marine conservation, molluscan death assemblages are increasingly being used as a proxy for baseline communities, and divergence between the live and the dead is assumed to reflect human impact. A drawback to partitioning an assemblage into live and dead is that inclusion of recently dead specimens in the baseline assemblage artificially reduces differences between before and after. In this study, we address this problem by using a radiocarbon- and amino acid-calibrated taphonomic grading scale to partition recently (post-1950) and long-dead shells from shallow shelf communities of the southwest Florida.

This calibrated taphonomic grading scale prevents recently dead (post-1950) specimens from being grouped with baseline assemblages, thus reducing temporal biases in live-dead comparisons. Preliminary data suggest that ecologically important species may have already experienced truncated ranges.

SURVIVAL OF THE SHARPEST: COMMUNITY TRENDS IN ORNAMENTATION AS A PROXY FOR PREDATION IN DEVONIAN STROPHOMENATE BRACHIOPODS

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Studies of predator-prey systems have shown prey animals have evolved antipredatory strategies to match the abilities of their predators through time. Due to a higher diversity of stronger predators in the tropics, predation pressure is greater in the tropics and so it may be expected that prey species near the equator would possess better antipredatory strategies than their temperate relatives. This hypothesis has been corroborated on a global level through several time intervals in the fossil record, but not on a finer scale. A common antipredatory strategy used by shelled prey is ornamentation of the shell, which increases the strength and effective size of the shell. We examined antipredatory ornament in Middle to Late Devonian brachiopod species of the Class Strophomenata across 30 degrees of paleolatitude in North America. We chose strophomenates as they are known to have been preferred prey for rapidly evolving fish and large arthropods, and would have benefitted more from antipredatory strategies than would have rhynchonellate or lingulate brachiopods. Taxa within Strophomenata display varying levels of ornamentation which may be organized into the categories: 1) none, 2) costae or lamellae, 3) plicae or rugae, and 4) spines. Abundance data on brachiopod communities at the species level were used and cross-referenced with the ornamentation level provided by species descriptions and visual examination of specimens to calculate the Weighted Mean Ornament (WMO). WMO is calculated by multiplying the abundance of each species in a sample by its respective ornamentation level, summing these values for all species, and dividing the result by the abundance of all species in the sample.. The WMO provides a value between 1 and 4 for each sample, and represents the relative degree of ornamentation, from the perspective of a predator, for the sample as a whole. Presence-absence data were also used to determine the proportion of spinose species within samples, as spinose ornament is thought to be much more effective in deterring predators than lesser degrees of ornament. Comparisons of samples across latitude showed that the WMO and proportion of spinose species increased across three trends: decreasing latitude, time, and decreasing water depth. The first result demonstrates that strophomenate ornament was used as an antipredatory strategy, and the degree of ornament between communities varied depending on the abilities and diversity of their respective