The application of "natural" growth rates of Heterostegina depressa to infer timing of reproduction events

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To explore applicability of the natural laboratory approach (sensu Hohenegger) on population dynamic studies of recent larger benthic foraminifera, this relatively new experimental method has been applied on Heterostegina depressa populations from Sesoko Jima, NW Okinawa, Japan. It is used to gain an averaged chamber and diameter building rate, as well as the average longevity of H. depressa based on monthly samplings at fixed sampling stations. Samples were collected by SCUBA in 16 monthly intervals around 20 and 50 meters water depth, wherefrom live populations were dried and investigated by microCT. The specimens were measured regarding chamber number and maximum diameter. This biometric data has been tested for the presence of multiple generations of H. depressa megalospheres. In case of skewed or bimodal frequency distributions, they were decomposed into normally distributed components. Means and standard deviations of each component of every month were extracted and could be used to calculate the maximum values of chamber number and diameter for all sampling intervals. Based on these maximal values, the natural chamber/diameter growth rate was fitted by Michaelis-Menten functions. By inversion of this growth functions the birthdate of every specimen was calculated. Frequency diagrams of these dates reveal a continuous background reproduction throughout the year, yet show distinct reproduction peaks in late spring and late autumn. Further, sinusoidal regression analysis support these two main reproduction cycles, one short-term cycle ∼70 days and a one long-term cycles around ∼180 days. Surprisingly, similar cycles have been found in different studies on volumetric growth of larger benthic foraminifera.