Mathematical models for the geochemical composition of foraminiferal calcium carbonate

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The isotopic compositions ($\delta^{11}B$, $\delta^{13}C$, $\delta^{18}O$) of foraminiferal calcium carbonate are used as paleo-proxies for pH, biological production, temperature or ice-volume. However, in order to interpret the observed isotopic values, one needs a process-based (`mechanistic´) understanding of the generation the proxy data. For this purpose, mathematical models have been developed. Because of missing detailed information about various processes involved in biomineralization these models were somewhat speculative despite their formulation based on physical and chemical principles. Application of these models in the framework of paleoceanographic simulations (generation of `simulated sediment cores´) can be used to test these models. I will discuss limitations of the models, open questions, and possible further developments.

Keywords: biomineralisation, foraminifer, geochemistry, numerical models

