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The Ca Isotope Ratio in Bivalve Shells as a Proxy for different climatic Scenarios

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In an international and interdisciplinary project (CASIOPEIA) the relation between calcium (Ca) isotope fractionation (δ^{44}Ca) and climate parameters during biomineralization and inorganic precipitation of calcium carbonate ($CaCO_3$) are investigated. Recent findings indicate that the Ca isotope system represents a new and powerful proxy for the reconstruction of past seawater temperatures and for variations of Ca concentrations in seawater throughout Earth's history. Both aspects are crucial for paleo-oceanography and -climatology because they interact with the global carbon cycle influencing the concentration of important greenhouse gases like CO_2 through time.

Our contribution to this project is the investigation of the influence of temperature changes and other climate change parameters such as salinity and pH on biomineralization, namely bivalve shell formation. Model species are the epilithic blue mussel *Mytilus edulis* and the endopsammic bivalva *Arctica islandica*. The effect of temperature on bivalve shell formation rates may interact with 3 other main factors: pH, salinity and nutrition. To reveal individual effects, the bivalves will be grown under constant nutrient conditions in different temperature – pH or temperature – salinity combinations. The objective is to establish a reliable relationship between δ^{44}Ca isotope ratio and temperature for different pH and salinity situations for the two species and – possibly – different age classes. In doing so, we examine the Ca isotope proxy's sensitivity (and therefore its usefulness) towards climatic changes.