# U/Th dating of pteropod rich layers in marine sediment

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Marine sediments are valuable archives for past climate conditions and changes in ocean dynamics and sedimentation. However, in contrast to other climate archives such as corals and speleothems, marine sediments are far more difficult to be dated precisely and accurately by means of U-series dating [1]. Previous successful attempts have focused on aragonite rich sediments and U-series open system models [2,3].

Here we explore pteropod shells, consisting of aragonite, which is assumed to have an elevated Uranium content. These marine organisms are embedded in hemipelagic carbonate rich sediments, from which they can be easily identified and extracted due to their size. Moreover, the state of preservation (i.e. aragonite - calcite recrystallization) can be assessed. Due to the advent of modern U series mass spectrometry, solely small amounts of pteropods (<10mg) are required for isotopic analysis. In 2016 during R/V Meteor-cruise M125 a gravity core was taken from the continental slope off north-east Brazil near Rio Doce (19°35.9′ S, 38°36.1′ W, 644 mbsl), which revealed numerous pteropod rich layers. On the other hand, the sediment bears abundant sandy layers. Pteropods reveal a U concentration of average 0.118 ± 0.038 ppm, with an initial $\delta^{234}U$ ranging between 128.3 to 190.7 ‰.

Apparent U-Th ages range between 42 and 65 ka, which is close to stratigraphic and sedimentological constrains. Overall, pteropods reveal far lower U and Th concentration compared to the embedding sediment. For example the $^{232}Th$ content indicative of detrital and seawater $^{230}Th$ sources are reduced by a factor of 500 to 1000. We further explore the U-Th systematics and its implication for dating using additional mineralogical (XRD and trace elements) and geochronological constrains ($^{14}C$).

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