

Physics and Physical Oceanography Seminar

Investigating radiocarbon variation in mollusk carbonates using materials science techniques: considerations for date calibration and uncertainty (Msc Seminar)

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DATE: Friday, Oct 9, 2020

TIME: 11:00 am

Place: Webex (link will be sent out)

ABSTRACT: Marine bivalve mollusks are complex hierarchical calcium carbonate materials that are frequently used in archaeological studies and in chronologies that study marine environment and climate change. Radiocarbon analysis of these materials is central to most of these studies. Here I take a materials science approach to studying and understand radiocarbon analysis of marine bivalve mollusk shells from British Columbia, Canada. We use radiocarbon analysis alongside infrared (IR) spectroscopy as a method to understand the variability in shell chemistry and structure and how the environmental conditions may be intertwined with these results. Using IR spectroscopy, we show that in archaeological samples of the butter clam (*Saxidomus gigantea*) from British Columbia there is a consistent difference in the structural order of the aragonite between the inner and outer shell portions. For three of our shell samples we obtained several intrashell radiocarbon measurements; one sample showed a variation in fraction of modern carbon (F14C) within the shell while the others did not. We highlight that radiocarbon measurements are meaningless without an understanding of date calibration and the choices that must be made when calibrating marine and mixed marine-terrestrial samples. Our results are a starting point for developing best practices for radiocarbon dating marine shell samples as well as highlighting the advantages of studying marine shell samples from a materials perspective.

ALL ARE WELCOME!