How Do Foraminiferal Assemblages and ^{14}C Ages Inform Our Understanding of Bioturbation on the Juan de Fuca Ridge?

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Ocean sediment cores provide detailed paleoclimatic data through isotopic analysis of foraminifera, zooplankton with calcium carbonate shells that are preserved on the seafloor. The analysis of radiocarbon (^{14}C) is particularly useful to date these foraminifera at different depths of a sediment core, and thus can provide a calendar-year timeline for major climatic and oceanic events indicated by other isotope data in the core. However, the temporal linearity of these depositional layers can be confounded by bioturbation. As benthic organisms move within upper sections of the seafloor, they down-mix the sediment to bring younger foraminifera to older regions. The reverse also happens, with older foraminifera shifting to younger regions due to up-mixing. Because bioturbation redistributes foraminifera in the sediment column, a transient abundance peak may overprint the assemblage and stable isotope data from younger sediment layers. In addition, larger, older, and more delicate specimens may undergo preferential breakage due to the movement of bioturbators. This would bias the picking toward younger ages, as only intact individuals are selected for accelerator mass spectrometry (AMS) ^{14}C dating. In this study, foraminiferal assemblages and size-fraction radiocarbon dates were analyzed from a 40cm multicore from the crest of the Juan de Fuca Ridge in the Northeast Pacific. Faunal assemblages were performed along four different size fractions (150-212µm, 212-250µm, 250-300µm, and 300-355µm). Samples of *Globerigerina bulloides* displayed a 400% increase in flux around 20ka. As the most prevalent (>70%) and easily identifiable species, samples of *G. bulloides* were also picked for ^{14}C AMS analysis at size fractions of 212-250µm, 250-300µm, 300-355µm, and >355µm*. G. bulloides* dates contained an age plateau of 20ka in the upper 20cm, which suggests that an increased foraminifera deposit at that time has biased all subsequent radiocarbon dates to that age. Future work will obtain more ^{14}C ages from other species like *Neogloboquadrina pachyderma (sinistral)* and *Neogloboquadrina incompta* as well as temperature data from planktonic assemblages, which will better constrain interactions between the ocean environment, foraminiferal population changes, and the effects on ^{14}C. Improved constraints on these confounding factors will provide guidance for future studies utilizing foraminifera for dating sedimentary systems.