

Using Elemental Concentrations to Isolate Layers Likely Bearing Pelagic Foraminifera in a Hudson River Sediment Core

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Pelagic foraminifera are rare within Hudson River sediments, especially ones coated in material containing high amounts of Sn (tin) and Ni (nickel). Foraminifera of this type have been identified within Hudson River core CD02-23, which was taken in 2002 near Yonkers, NY. We are interested in using the core to investigate the questions of 1) where do these pelagic foraminifera come from and how did they end up being deposited within the Hudson, and 2) what is the origin of their unique Sn-rich, Ni-bearing coatings? The hypothesis for the origin of the Sn coatings is that the material came from cosmic dust infall when Earth passed through the debris left behind by a comet or asteroid. In order to begin attempting to answer these questions, a total of 200 subsamples were taken from the core, freeze dried, and crushed by hand to prepare for XRF analysis. XRF analysis and magnetic susceptibility measurements were done on each sample and used to inform which samples might be of further interest to look closer at by sieving. A total of 24 samples were sieved and looked at using a plain light microscope – the samples were picked for foraminifera and cosmic spherules. We have determined that elemental ratios, such as Sr/Ti, Ca/Ti, and Ni/Cr, are good indicators of foraminifera and cosmic spherules within Hudson River sediments. Specifically, Sr/Ti and Ca/Ti ratios closely follow each other in the core. We found that layers where both ratios are high are more likely to contain foraminifera. A total of 5 depth intervals which had peaks in both ratios contained pelagic and/or benthic forams. This is important to the current study because there was previously no known method to find these interesting stratigraphic layers. Additionally, this could help us potentially find more of the Sn-coated forams in the future to continue our attempts in answering the questions about their origin.