

Sediment core analysis of a post-glacial lake over a mineral prospect, eastern Newfoundland, Canada

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Geochemical analysis of lake sediment samples is often used in mineral exploration, and high values of key elements are used to identify prospects. However, these samples usually represent one random sample per lake near the surface. In order to study the optimal lake sediment sampling location and depth, we carried out a GPR-conducted bathymetric survey as well as geochemical analysis followed by sediment coring on a post-glacial lake, Grassy Pond, which is lying over a low-sulphidation epithermal style gold-silver system in the Big Easy Prospect, Eastern Newfoundland. The results show very high contents of arsenic (42–277 ppm) and molybdenum (4–23 ppm) appearing in four variable-length sediment cores captured from different locations of this lake, which could be associated with the natural erosion of iron oxide minerals in the underlying alteration zone. High arsenic and molybdenum contents are seen in all samples, indicating random sampling is sufficient as a first pass. However, the enrichment of these two elements is highly variable both with depth and location in the lake, which suggest detailed sampling could be a valuable next step. Particularly, the down-core geochemical and radiocarbon analysis of our longest sediment core show a major enrichment peak of several key elements (Fe, Mn, As, Mo and V) 2.5 m from the sediment sub-bottom, which could be related to the transition to the dry period about 5 ka ago in this region. In conclusion, climate and topography affect lake sediment sampling, and the samples with the highest As and Mo occur at deeper levels and are associated with climatic changes.