Stratigraphic expressions of the Holocene-Anthropocene transition revealed in sediments from remote lakes

Stratigraphic boundaries are ideally recognized by distinctive lithological, geochemical, and paleobiological signatures, to which a chronological framework can be applied. We present a range of observations that illustrate how the Holocene-Anthropocene transition meets these criteria in its expression in sediments from remote arctic and alpine lakes, far removed from direct, catchment-scale, anthropogenic influences. In glacierized lake basins, the retreat of glaciers has commonly led to lithological successions from proglacial minerogenic sedimentation to non-glacial organic deposition. Sediments from the majority of lakes record marked depletions in the nitrogen stable isotopic composition of sediment organic matter, reflecting anthropogenic influences on the global nitrogen cycle. In all cases, siliceous microfossil assemblages (diatoms and chrysophytes) change markedly and directionally, with regional nuances. These stratigraphic fingerprints begin to appear in the sediment record after AD 1850, but accelerate in pulses between AD 1950-1970 and again after AD 1980. These changes are ongoing or accelerating. Recent environmental changes associated with humankind’s dominance of key global biogeochemical cycles are sufficiently pervasive to conclude that the Holocene has effectively ended, and that the concept of Anthropocene more aptly describes current planetary dynamics.

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