Candidates for Global Boundary Stratotype Section and Point (GSSP) for an Anthropocene chronostratigraphic unit

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The Anthropocene, as a potential new unit of the International Chronostratigraphic Chart, is assessed in terms of stratigraphic markers and approximate boundary levels available to define the unit base. The task of assessing and selecting potential GSSP candidate sections, a requirement in seeking formalisation of the term, is being actively pursued. Here, we review the suitability of different stratified palaeoenvironmental settings and facies as potential hosts for a candidate GSSP and auxiliary sections, and the relevant stratigraphical markers for correlation.

A marked upturn in ^{239}Pu and ^{14}C radioisotopes abundance, approximately in 1952 and 1954 respectively, broadly coincident with a downturn in $\delta^{13}C$ and $\delta^{15}N$ values, is applicable across most environments. Other airborne signals, such as fly ash, nitrates and to a lesser extent sulphur and sulphates, CO_2 and CH_4 concentrations and $\delta^{18}O$ are highly resolved, widespread and provide additional means of correlation.

Principal palaeoenvironments examined include settings associated with accumulations of anthropogenic material, marine anoxic basins, coral reefs and marine bivalves, estuaries and deltas, lakes at various latitudes, peat bogs, snow/ice layers, speleothems and trees. Many of these geographically diverse palaeoenvironments offer annual/subannual laminae that can be counted and independently dated radiometrically (*e.g.*, by ^{210}Pb) with the possibility of correlation at annual/seasonal resolution; anthropogenic deposits and peats lack such laminae, making them less suitable as a GSSP candidate, but still show high stratal accumulation rates and may provide potential auxiliary stratotypes. Decadal-scale lagged responses to environmental signals evident in speleothems and in some cases within deep waters associated with marine anoxic basins can limit their suitability as GSSP candidates. A time lag between the age of glacial ice and the included air bubbles affects CO_2, CH_4, $\delta^{13}C$ and N_2O values, but a broad spectrum of annually resolvable atmospheric signals including radionuclides, $\delta^{18}O$, sulphates, nitrates, $\delta^{15}N$, Pb and other metals are robust in ice. Lakes may show thin Anthropocene successions, but are advantageous as settling rates of key signals are minimal in relatively shallow waters, commonly there are few omission surfaces and in hypoxic sediments bioturbation is minimal. Anthropogenic deposits and estuarine and deltaic deposits may suffer from strong modulation by local influences, a lack of lateral continuity, and the common presence of omission surfaces. Although biotic organisms have not previously hosted a GSSP, very-high resolution records and relatively rapid growth rates present in corals and trees provide a potentially suitable medium.

From among such a range of palaeoenvironments, a small number of potentially representative sites require the acquisition of more systematic and comprehensive datasets, with correlation established between sections, to allow selection of a candidate GSSP and auxiliary stratotypes. In many circumstances the thickness of Anthropocene strata is limited to a few centimetres, but the signals of change are still clearly resolved and laterally extensive. This assessment suggests that a Holocene–Anthropocene boundary would be workable in practice across a wide range of environments, and this study aids finding optimal stratotype locations among these environments.