



Progress in the investigation of a potential Global Boundary Stratotype Section and Point (GSSP) for the Anthropocene Series

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The task of researching potential GSSP candidate sections for the Anthropocene Series, a requirement in seeking formalisation of the term as a potential new unit of the International Chronostratigraphic Chart, is being actively pursued. Nine locations are under investigation, with lead institutes/universities co-funding core collection and analysis alongside a major transdisciplinary 2-year funding initiative, financed and managed by the Haus der Kulturen der Welt, Berlin, which commenced January 2019. The sites are chosen to be geographically widespread and in diverse environments that will best preserve the extensive range of proxies to be analysed across the prospective Holocene–Anthropocene transition. All sections will be in borehole/drill cores, most showing annually resolved laminations that can be independently dated radiometrically to confirm a complete succession extending back to pre-Industrial times.

The studied locations include: 1) one from a marine anoxic basin, the Gotland Basin of the Baltic Sea collected in 2018 (lead investigators: Leibniz Institute for Baltic Sea Research Warnemuende); 2) two within coral reefs, yet to be collected but preferred locations in the Caribbean Sea and Great Barrier Reef (lead investigators to be identified); 3) one within an estuary setting in San Francisco Bay (University of Leicester); 4) three within lakes, including the meromictic Crawford Lake, Ontario with 2 cores collected in 2018-19 (Brock University), Huguangyan maar lake, China to be acquired (State Key Laboratory of Loess and Quaternary Geology, Xian), and an artificial reservoir at Jasper Ridge, California collected in 2018 (Stanford University); 5) one from a peat bog, Etang de la Gruère, Switzerland collected in 1990 (University of Alberta); 6) one in firn/ice layers from the Antarctic Peninsula drilled in 2012 (British Antarctic Survey); and 7) one from a speleothem from Ernesto Cave, NE Italy, for which the bulk of analysis is already published (University of Birmingham).

Airborne signals provide the most geographically widespread and near-isochronous proxies, applicable across most environments, which are expected to provide distinctive markers at around the mid-20th century, the preferred start/base of the Anthropocene. Proxies to be analysed in the majority of sites include: upturns in ^{239}Pu , ^{241}Am , ^{129}I and ^{14}C radioisotopes, fly ash and nitrates abundance and downturn in $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ values. Additional means of correlation include appearance of microplastics and certain persistent organic pollutants, changed heavy metal concentrations and lead isotope ratios. Microfossils will be analysed in marine, estuarine and lake settings to determine how assemblage changes are driven by changing environmental factors across the Holocene–Anthropocene boundary. Other signals of importance in ice cores include sulphur and sulphates, CO_2 and CH_4 concentrations and $\delta^{18}\text{O}$ values and sea surface temperature and pH proxies in corals.

The collection of systematic and comprehensive datasets, with correlation established between sections, will be used to formulate a proposal for formalisation of the Anthropocene, with definition of a candidate GSSP and several auxiliary stratotypes. Other potential candidates that adhere to strict suitability requirements are strongly encouraged, in addition to the sites listed above.