

Scientists home in on a potential Anthropocene 'golden spike'

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Credit: University of Leicester



The international working group, which includes geologists Jan Zalasiewicz, Mark Williams and Colin Waters, from the University of Leicester's School of Geography, Geology and the Environment and archaeologist Matt Edgeworth has, since 2009, been analysing the case for formalisation of the Anthropocene, a potential new epoch of geological time dominated by overwhelming human impact on the Earth.

The group has found that a broad range of potential physical, chemical and biological markers characterise the Anthropocene, the clearest global markers being radionuclide fallout signals from nuclear testing and changes in carbon chemistry through fossil fuel burning – these in particular show marked changes starting in the early to mid-1950s.

The group, with a number of invited scientists, has now reviewed present knowledge on where these and other markers form the clearest, sharpest, and most stable signal in strata that might be used to define the Anthropocene as a formal unit of the Geological Time Scale.

The current study, which is published in the journal Earth-Science Reviews, informs the scientific community where they should start the process of collecting and analysing continuous core samples of strata across the proposed Holocene–Anthropocene transition.

The study considered a range of arguments in support of and against hosting a 'golden spike' in a range of potentially suitable environments across the globe. They found that Anthropocene strata are often thin – but also that they are globally distributed and may be clearly recognised by geologists.

Professor Colin Waters, who led the study, said: "Of the 65 'golden spikes' of the Geological Time Scale currently ratified, all but one are located in strata that accumulated on the sea floor, the one exception being the ice core used to define the base of the Holocene Epoch.



"This study considers those environments in which the very short history of the Anthropocene is best recorded. In addition to such traditional geological strata, we have also considered human-generated deposits, sediments accumulating in lakes, estuaries and deltas, peat bogs, cave mineral deposits and even biological hosts such as corals and trees. The presence of annual layers or growth rings within many of these provides geologically unprecedented accuracy in the placement of the primary reference marker, wherever this might be ultimately chosen."

Professor Jan Zalasiewicz said: "This preliminary assessment of potential 'golden spike' locations around the world is important in that it clearly shows we are spoilt for choice – there are very many possibilities where the Anthropocene might be effectively defined. Now we have a lot of work in front of us in examining the most promising locations in enough detail to really pin down how the Anthropocene might be clearly and precisely recognised around the world."

Professor Mark Williams said: "The range of environments we are working with is remarkable – from polar ice and snow layers to deep lake and sea floors to the skeletons of reef corals and stalactites in caves. The fact that signals of the Anthropocene are so sharply visible in all of these shows just how pervasive human impact has been on the planet in post-war times."

Scientists within the Anthropocene Working Group are working towards developing a proposal, based upon finding a 'golden spike', more technically known as a Global Boundary Stratotype Section and Point (GSSP).

This is a reference level within recent strata somewhere in the world that will be proposed to most clearly and consistently characterise the changes as the Holocene, which represents the last 11,700 years of <u>geological time</u> on this planet, gave way into the Anthropocene about 65



years ago.

Once this detailed work is completed in a few years' time—a required part of the process in seeking formalisation of the term by a number of geological bodies— it will first be submitted for scrutiny to the Subcommission on Quaternary Stratigraphy of the International Commission on Stratigraphy. There is no guarantee, though, that the proposal will be accepted.

More information: Colin N. Waters et al. Global Boundary Stratotype Section and Point (GSSP) for the Anthropocene Series: Where and how to look for potential candidates, *Earth-Science Reviews* (2017). DOI: 10.1016/j.earscirev.2017.12.016

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