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## Welcome to the Thermocene: the potential impact of global warming on the sedimentary record

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### Summary

Much has been made of the Anthropocene and how, millions of years from now, alien geologists will use plastic debris to reconstruct recent Earth history. However the early Plasticene is only a thin sliver of the overall Holocene stratigraphy, and of equal importance is what will overlie these beds. Whether or not you believe that man is responsible for global warming, ongoing climate change will also leave its signature in the sedimentary record.

### Theory

While the precise nature of changes in weather patterns is not fully understood, there is already clear evidence of increases in flooding around the world. These inundations are matched by longer and more extensive droughts in other regions. Storms are of greater magnitudes and severity, with markedly larger storm surges, and the consequent uplift in rainfall is triggering more landslides. Hurricanes are already thought to have increased in size by around 50% since written records began. Overall there is a mappable rise in weather related disasters since 1980. Taking this as a starting point, what deposits are likely to be preserved over the next 200 years and what will they look like?

Organisms are also being affected, and probably the greatest biological impact on the geological record is the mass extinction of corals. It is thought that around 1% of coral is dying off each year due to warming and acidification of the oceans, bleaching and pollution. What will post coral, tropical coastlines look like, and what deposits will be preserved? In temperate settings there will be significant changes in erosion and depositional patterns, while at higher latitudes we can expect a return to a Cretaceous world devoid of glacial deposits.

Utilizing notional transects running from source to sink, a series of sedimentary profiles have been erected to highlight the potential succession of deposits ranging from flood deposits, arid aeolianites, tsunamiites and coastal shoreface settings through to hurricane and storm deposits. Obviously these extreme event beds will be superimposed on more normal, background deposits. Estimates will be made of the relative thickness of the event beds, and whether it will be possible to use these sediments to discern the Thermocene Epoch from older Pleistocene deposits. Finally we will look ahead to envisage the geological aspects of a greenhouse world where temperatures remain unchecked.

## **Results, Observations, Conclusions**

Based on existing catastrophic deposits in the fossil record, idealized sedimentary successions were erected for a variety of depositional settings. The results are surprising, in that some extreme events are likely to leave little to no signature in the stratigraphy, while others will undoubtedly leave their mark. Contrasting deposits of floods, wildfires, storms and hurricanes, tsunamis and landslides will all be discussed and evaluated, and the potential deposits quantified..

Extrapolating to thousands of years in the future, and assuming that global warming continues, relatively unchecked, suggests that many extreme events will not be discerned in the “future fossil record”, while certain components, such as the absence of coral reefs and the preponderance of landslides, will form a significant component of the stratigraphy to come.

## **Novel Information**

It is believed that this is the first time that the potential impact of climate change on sedimentary deposits and Holocene stratigraphy has been considered in depth.