

# **The Anthropocene: The Dawn of a New Age?**

## **Aim**

The aim of this exercise is to get students to think about how they would recognize the start of the human era in the geological record

## **Time**

Suggested time allowed for this exercise: 35 minutes

## **Background notes**

Geological time is divided up into different time intervals known as eons, eras, periods, and epochs. The boundary between one time interval and next is usually defined by some sort of event that can be recognized worldwide. That event might be the origination or extinction of a species, abrupt climate change, or some other phenomenon. For example, the end of the Cretaceous Period, 65 million years ago, is defined a massive extinction that wiped out the dinosaurs and many other animals on land and in the sea. This event was probably caused by the impact of a huge meteor in the Gulf of Mexico, which in turn triggered global tsunamis, wildfires, and the start of a 'nuclear winter'.

If you take a look at the geological column, you will see that we are currently in an epoch called the Holocene. This time of warm stable climates has persisted since the end of the last Ice Age some 10,000 years ago. However, some geologists are now arguing that we have crossed over into a new epoch. They would say that the recent explosion in human population and the dramatic way that humans have modified environments and ecosystems marks the dawn of a new age in the geological record. They call this new age, the Anthropocene Epoch, meaning the Age of Humans.

## **Debate**

Get students to debate these issues: Do you really think humans have changed the world sufficiently to initiate a new geological epoch? Or is the 'Anthropocene' this just an inconsequential blip within the Holocene? If the former, how would you identify the start of the Anthropocene in the geological record? When did it begin? Some pointers to help seed discussion are provided below.

## **Reference**

Zalasiewicz, J. and others 2008. Are we now living in the Anthropocene? *GSA Today* v. 18, p. 4-8.

## Pointers for discussion

How would you identify the start of the Anthropocene and when did it begin?

- (1) **Mass extinction.** There have been five mass extinction events over the past 500 million years and these have been used to draw major boundaries between different periods and eras. For example, the boundary between the Palaeozoic and Mesozoic Era is defined by a huge extinction when around 95% of all species vanished. Today, humans are wiping out species at an extraordinary rate. This may represent the start of a sixth mass extinction event. If so, when did this mass extinction begin? Did it begin 8000 years ago when hunters started to wipe out large land animals like the woolly mammoth, or did it begin more recently as the pace of extinction accelerated?
- (2) **Population explosion.** Some geological time intervals are marked by a superabundance of a particular species. The technical term is an acme biozone. Human population has exploded from less than one billion to more than six billion in the last century. Will the superabundance of human remains in recent sediments be sufficient to identify the base of the Anthropocene at the start of the twentieth century?
- (3) **Urban and agricultural environments.** In the past, environments were mostly controlled by climate and the earth's land surface could be divided into various zones like tropical rainforest, savannah, and tundra. Today, urban and agricultural environments cover more than a third of the land surface. Based on this evidence, when would we define the start of the Anthropocene? Would it be with the rise of agriculture in the Middle East, 8000 years ago, or would it be in the last hundred years since the growth of the first megacities like London, New York and Shanghai?
- (4) **Waste Products.** All organisms produce waste products that build up in the environment. In the earliest times, our planet had an atmosphere that lacked oxygen. Then about 3.8 billion years ago photosynthetic bacteria evolved that produced oxygen as a waste product. We can identify the probable time when these bacteria appeared by their oxygen waste preserved in the geological record. What waste products do humans produce that might help define the start of the Anthropocene? For starters, how about plastics and tin cans? The first plastics were used in the mid-nineteenth century, but it is only since the mid-twentieth century that they've become really widespread.
- (5) **Climate Change.** Many geological boundaries are defined by abrupt periods of climate change. One example is the boundary between the Pleistocene and Holocene epochs, 10,000 years ago, when the last Ice Age abruptly ended. However, taking a longer view, the past two million years (known the Quaternary) has seen climate repeatedly swing in and out of Ice Ages. So one might argue that the Holocene is just a warm blip in this Ice Age cycle. Human activity has dramatically warmed climate over the past two hundred years. Perhaps global warming has now brought an end to the Ice Age cycles of the Quaternary. Is this enough to mark the start of the Anthropocene?
- (6) **Radioactivity.** Nuclear bomb testing started in the mid-1940s. Could radioactivity be used to fix the start of the Anthropocene?