Living The Dream

In The Anthropocene

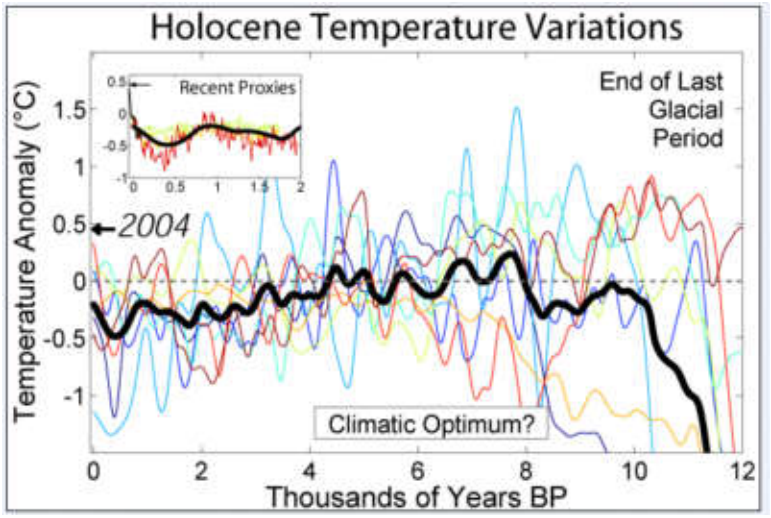
BY THOMAS M. CIESLA

Approximately 12,000 years before present, the Earth's climate began to warm. The last of the glaciations in the Pleistocene Epoch subsided and the current interglacial period began. Geologists refer to the warming period as the Holocene (Whole – New) Epoch. With a few exceptions (notably the Younger Dryas and the Little Ice Age) the Holocene represents the longest interval of stable climate and sea levels in the past 400,000 years.

It was this stable, hospitable environment that allowed Homo sapiens to flourish and allow 'civilization' to blossom. Every aspect that we associate with humanity – political, social, theological, architectural, agricultural – every thing humanity has accomplished has been done in that short blip of time that we call the Holocene.

Unfortunately, this extended period of benevolent climate also allowed us to show our dark side. In addition to accomplishing great things during the Holocene, we also became a sort of invading alien species wherever we extended our presence.

For starters, we grew in numbers. Starting around 1,000 A.D. there were about 380 million of us on the planet. In 1800 we numbered around one billion. In 1900 we were at 1.6 billion, and in 2000 we were six billion strong. As our numbers increased so did our impact on the planet.



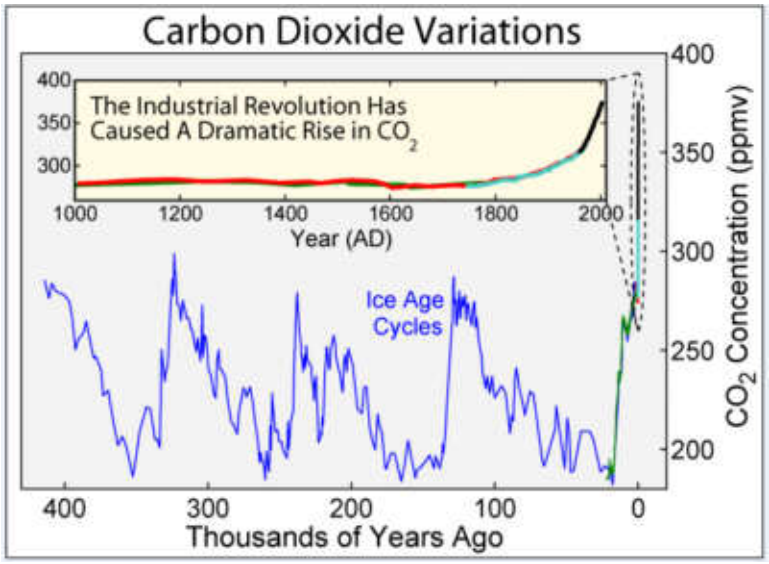
The 'present' is on the left side of the graph

In the early Holocene, even when are population was relatively low, humans began clearing land for crops, and the number of large animals (mastodons, mammoths) began to decrease, due in part to hunting. By the mid-Holocene, humanity's fingerprint was evident in the geological record including weed pollen, remains of cultivated plants and a layer of lead pollution that settled in the polar ice caps and peat deposits from Greco-Roman times onward.

Our imprint in the geological record became more pronounced during the Industrial Revolution and continues in earnest. Dramatic erosion due to expanded construction and agriculture, sedimentation changes to the damming of most major rivers, rising levels of acidity in the oceans, disappearance of natural vegetation, waves of extinctions, and a spike in CO2 levels are all now part of the geological record. Carbon dioxide levels are over a third higher than in the pre-industrial times and at any time in the past .9 million years.

Recognizing the changes that have occurred to the environment during modern times prompted chemist Paul Crutzen to suggest that the Holocene Epoch is over and we are now in the Anthropocene (Human) Epoch, a phrase he coined in 2002 at a conference. According to his quote in the Encyclopedia of the Earth:

"...someone said something about the Holocene. I suddenly thought this was wrong. The world has changed so much. So I said, 'No, we are in the Anthropocene.' I just made it up on the spur of the moment. Everyone was shocked. But it seems to have stuck."



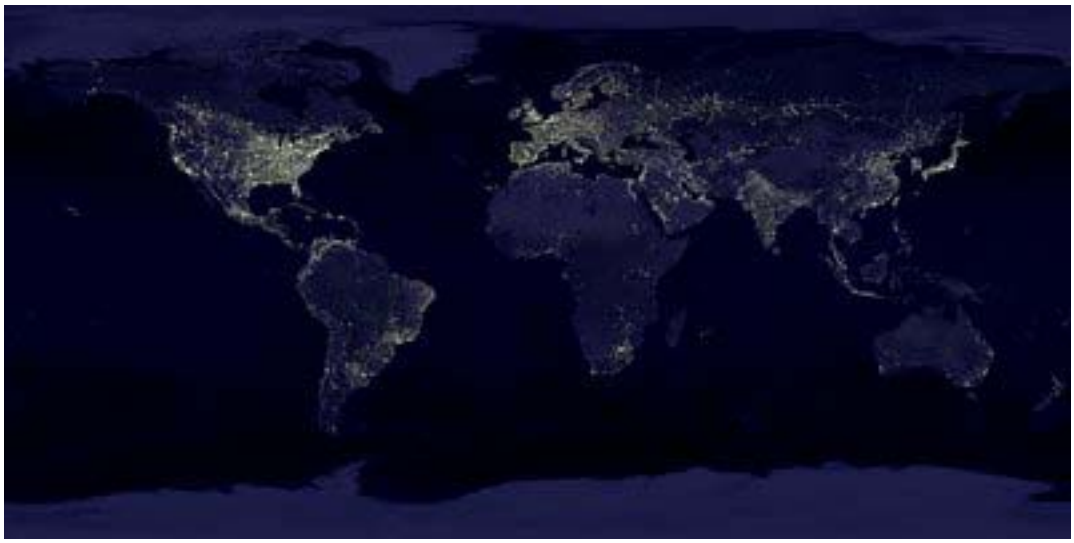
The decision to adopt 'Anthropocene' to designate a change in epochs is ultimately up to the International Union of Geological Sciences. However, in 2008, the Stratigraphy Commission of the Geological Society decided that there was merit in formalizing the term, and so an Anthropocene Working Group has been initiated. Regardless of how long this process will take, or at what point the new epoch should start (shift from hunter-gather to agriculture; the Industrial Revolution) it is obvious that a new phase in the history of our planet and humanity has begun, a phase when natural and human forces are intertwined and deterministic of each other.

Extinctions

Extinctions are part of the reality of evolution. Scientists have long recognized the existence of a background extinction rate in fossil records, in addition to the more dramatic mass extinctions preserved in stone. Yet the rate of extinctions in the Holocene Epoch appears to be similar if not greater to that found in the '5 Great Extinctions', the last one being the Cretaceous extinction that killed off the dinosaurs. In the 1700's extinctions were occurring at a rate of one species every three years. In the 1990's extinctions were occurring at a rate of three species per hour. It is estimated

that in the last quarter of the twentieth century, a million species were lost. It is likely that this rate will continue to accelerate over the next 100 years. It is important to remember that despite what is shown in the popular movies, mass extinctions such as the demise of the dinosaurs, don't happen over night or in a decade. Mass extinctions play out over thousands, even hundreds of thousands of years, which is why the Holocene extinction is being compared to past mass extinctions – the Holocene event is ongoing. Beyond the normal background extinction rate, humanity, both directly and indirectly plays a major role in this current increase in extinctions.

Welcome to the Anthropocene! Our stewardship of this planet over the past 100 years or so leaves us with a dismal legacy, and a questionable future. Pollution rates continue to rise as Western nations are joined in the 21st century with developing nations such as India and China, two countries with populations of over a billion. As those economies grow, demand for electricity, water, oil, motorized vehicles and manufactured goods also grows. Increased demand translates into increased depletion of resources and increased carbon dioxide levels.



Our impact on Earth is perhaps best captured in this night sky satellite composite that details the electrification of the continents.

We will continue to burn fossil fuels until each resource is exhausted. The ice will continue to melt, more habitats will be destroyed, and the salinity and acidity of the oceans will continue to be modified, which in turn will impact extinction of marine species. In the Northern Hemisphere lack of fresh water and shifting temperature zones will force a northward migration of flora and fauna, with a corresponding impact on the human population. There are likely to be more losers than winners in this evolving biosphere. Yet, for most of us these issues seem so very far away. After all, it's not all that bad is it? It's likely just a lot of media hype. And then one day we began to wonder, "Where are all the honey bees?" The dramatic decrease in the number of honey bees took everyone by surprise. Why worry about less honey bees? Because honey bees pollinate the plants that make the food that feeds humans and animals. Sometimes the most benign change in a causal chain of events can have dramatic repercussions.

Whether we are in the Holocene or the Anthropocene, we are entering uncharted waters during a remarkable episode in the history of this planet. Whatever the *'cene'* may be, let's hope a steady hand, clarity and wisdom will steer us through these waters.