AIChE

The NJAIChE Newsletter

New Jersey's Oldest Section

Volume 26 Issue 2

Greetings from the Arizona Side of the NJ Section!

We have the normal meetings planned on the second Tuesday of each month (Stage House in Scotch Plains or Rolf's in Warren, NJ) with our executive committee meeting on the first Tuesday at Paisanos at Watchung Square Mall.

As usual we are always looking for volunteers to help run the section. Please contact any officer or just show up at Paisanos.

Important Links

Webpage: https://njaiche.org/

Facebook: https://www.facebook.com/njaiche.engineers/

2019 Section Officers

Chairperson:
Howard Stamato

Chair-Elect:
Mike Kolber

Treasurer:
Yasha Zelmanovich

Secretary:
Jacqueline Sibbles

Directors:
Andrew Soos
Laura Turci
Ken Carlson
David Greene

Director Emeritus:
Phil Messina

ANNUAL RUTGERS STUDENT AWARDS

NJAIChE honored on April 24th the Leader Scholars and Research Scholars from the Rutgers Chemical and Biomolecular Engineering Department.

Junior Leader Scholar- Tiffany Yang
Junior Research Scholar - Sarah Sonbati
Senior Leader Scholar - Carimer Andujar
Senior Research Scholar - Ana Nachtigal

The Interglacial Period We Are In

ICE AGES

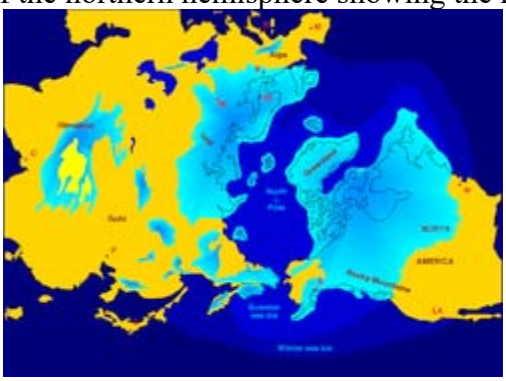
An ice age is a long period of lower temperatures on the Earth's surface and atmosphere, resulting in the presence of continental and polar ice sheets and alpine glaciers. Earth is currently in the Quaternary glaciation.

Although geologists describe the entire time period as an "ice age", in popular culture the term "ice age" is usually associated with just the most recent glacial period or glacials (when the ice sheets were at their maximum extent). Since earth still has ice sheets, geologists consider the Quaternary glaciation to be ongoing, with earth now experiencing an interglacial period. Intermittent warm periods are called "interglacials", with both climatic pulses part of the Quaternary glaciation period.

Much of Europe and North America was covered by glaciers. See the map below of northern Europe as an example.

Red: maximum limit of Weichselian glacial; yellow: Saale glacial at maximum: blue: Elster glacial maximum glaciation.

Next we have an image of the northern hemisphere showing the maximum extent of the last ice age.



Ice ages have always been part of Earth’s history. The world oscillates between extreme cold and relative warmth. There have been periods of geologic time without ice age caused glacials. Consider them extra-long interglacial periods

There have been at least five major ice ages in the Earth's history (the Huronian, Cryogenian, Andean-Saharan, late Paleozoic, and the current Quaternary Ice Age). Outside of these ages, the Earth seems to have been ice free even in high latitudes which means the world was much warmer on average and the poles ice free.

Rocks from the earliest known ice age, called the Huronian, formed around 2.4 to 2.1 billion years ago during the early Proterozoic Eon. Sections of this glacial age and deposits are exposed north of Lake Huron extending from near Sault Ste. Marie to Sudbury. Similar Huronian deposits have been found near Marquette, Michigan, and Western Australia. The Huronian ice age was caused by the elimination of atmospheric methane, a greenhouse gas, during the Great Oxygenation Event. This was when Oxygen generating plants first became dominant.

The next well-documented ice age (Cryogenian), and probably the most severe, occurred from 720 to 630 million year ago. and may have produced a Snowball Earth in which glacial ice sheets reached the equator possibly being ended by the accumulation of greenhouse gases such as CO_2 produced by volcanoes. It has been suggested that the end of this ice age was responsible for the subsequent Ediacaran and Cambrian life explosion.

The Andean-Saharan ice age occurred from 460 to 420 million years ago, during the late Ordovician and the Silurian geologic periods. During this period glaciation is known from Arabia, Sahara, West Africa, the south Amazon, and the Andes. The center of glaciation migrated from Sahara in the Ordovician (450–440 million years ago) to South America in the Silurian (440–420 million years ago). The maximum extent of glaciation developed in Africa and eastern Brazil.

The evolution of land plants at the onset of the Devonian period caused a long term increase in planetary oxygen levels and reduction of CO2 levels, which resulted in the late Paleozoic icehouse (Once named Karoo). There were extensive polar ice caps at intervals from 360 to 260 million years ago in South Africa during the Carboniferous and early Permian Periods.

This was the world of one super large continent (Pangaea). This led to disruption of warm-water currents in the Panthalassa Ocean and Paleo Tethys Sea, which led to progressive cooling of summers, and increasing snow and ice accumulations at the poles.

The Quaternary Glaciation /Ice Age started about 2.58 million years ago at the beginning of the Quaternary Period when the spread of ice sheets in the Northern Hemisphere began. Since then, the world has seen cycles of glaciation with ice sheets advancing and retreating on 40,000 to 100,000-year time scales called glacial periods (colder) and interglacial periods (warmer). The beginning of this ice age period is defined as when the arctic ice cap formed.

The earth is currently in an interglacial of the Quaternary ice age, and the last glacial period ended about 10,000 years ago.

HOLOCENE

The Holocene is the current geological epoch. It began approximately 12,000 years ago after the last ice age. It has been steadily melting the ice sheets ever since. This is the Quaternary interglacial period. How long the interglacial period may last is not clear. Some scientific speculation says 20 to 30,000 years which makes the present time about the middle of this interglacial period.

According to traditional history and science the human race started their civilization in this era. For example:

1. Gobekli Tepe was in its heyday around 9000 BC.
2. New Stone Age (Neolithic era) started 12000 BC; farming started.
3. Egypt and Sumer civilizations started @ 4000 BC
4. Jericho earliest settlements around 9000 BC.

With the warming there was a global rising of sea levels. There was an estimated 100 plus foot rise in sea level. This rise is still occurring. There was also a rising of land heights once the heavy weight of the ice sheets were removed. Vast climate changes occurred. Below is one example of how the sea level changes were like. This is a map of Great Britain and the adjoining North Sea. Britain was not an island back then and the North Sea was vastly smaller.

Large floods (some dramatic and sudden) and some slow and steady occurred. The Persian Gulf was once land. The Black Sea was once a lake and not a salty sea. The Sahara desert was once grass land and swamps. Where the ancient Mohenjo Daro civilization flourished around 2500 BC has become desert in places. The time of the Holocene was a time of constant climatic upheaval and change.

Nontraditional history and science suggests that there are a number of submerged cities off present day coast lines. Dwarka in India is one. Yonaguni is an underwater location near Japan that was above water earlier in the Holocene. The Sphinx in Egypt show signs of water erosion that could not have occurred in the accepted traditional time frame. Whatever the case the Holocene was a time of vast climate change long before the industrial age @ 1900 AD and its theoretical impact.

The Holocene extinction, occurred at the end of the last ice age glacial period when many giant ice age mammals, such as woolly mammoths, went extinct in the Americas and northern Eurasia. An analysis of the extinction event in North America found it to be unique among Cenozoic extinction pulses in its selectivity for large animals. Various theories have attributed the wave of extinctions to human hunting, climate change, disease, a putative extraterrestrial impact, or other causes.

ICE AGE CAUSES

The causes of ice ages are not fully understood for either the large-scale ice age periods or the smaller ebb and flow of glacial–interglacial periods within an ice age. The consensus is that several factors are important such as:

1. Atmospheric composition, such as the concentrations of carbon dioxide and methane which are greenhouse gases that promote the retention of heat.
2. The world oceans acting as a giant sink for CO2 and help keeping the CO2 levels lower.
3. Changes in the earth's orbit around the Sun known as Milankovitch cycles (roughly a 25,000 year cycle).
4. The motion of tectonic plates resulting in changes in the relative location and amount of continental and oceanic crust on the earth's surface, which affect wind and ocean currents.
    a. The Antarctic continent location on the south pole blocking some ocean currents.
    b. The arctic polar ice cap at the north pole and the opening and closing of straits such as the Bering Strait blocking warm water currents from melting arctic ice.
5. Variations in solar output.
6. The orbital dynamics of the Earth–Moon system.
7. The impact of relatively large meteorites.
8. Volcanism including eruptions of super volcanoes.

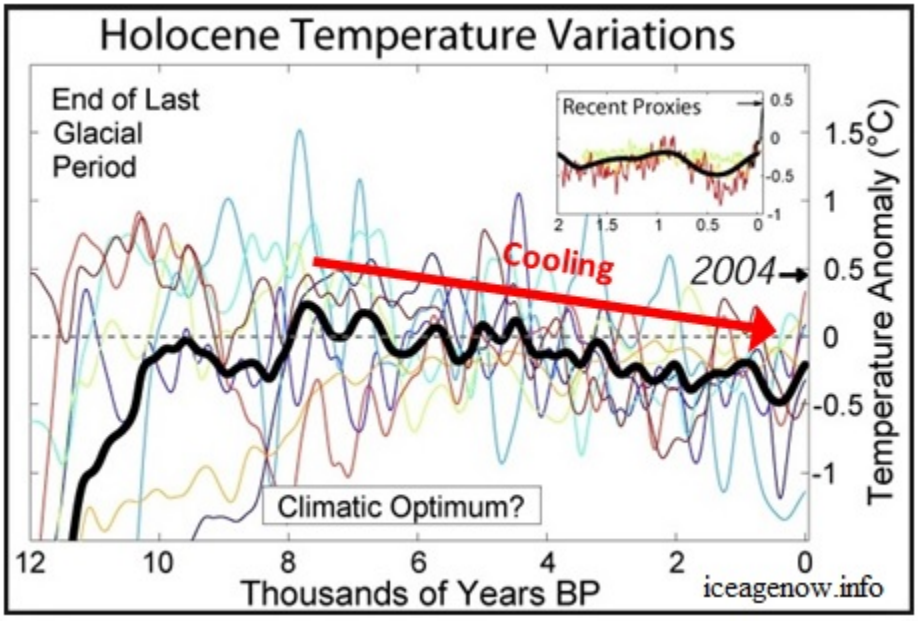
Some of these factors influence each other. For example, changes in Earth's atmospheric greenhouse gasses are affected by many other factors such as:

- Plant life absorption of CO2
- Sudden release cause by volcanism
- Industrial gas release of CO2 by combustion
    - There is no doubt that this occurs; the argument is more as to how significant it is.

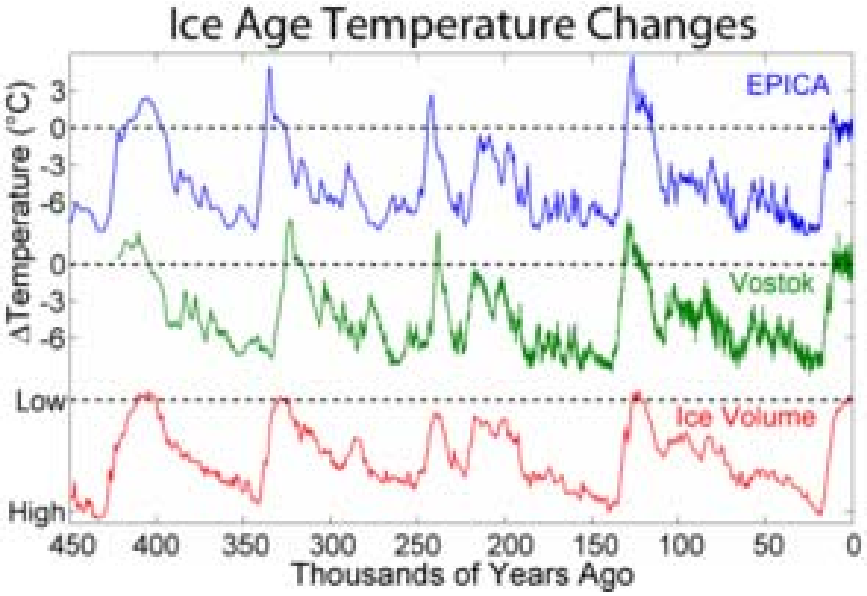
Some have proposed that the Tibetan and Colorado Plateaus are immense CO2 "scrubbers" with a capacity to remove enough CO2 from the global atmosphere to be a significant causal factor. They further claim that approximately half of their uplift (and CO2 "scrubbing" capacity) occurred in the past 10 million years.

TEMPERATURES IN THE HOLOCENE ERA

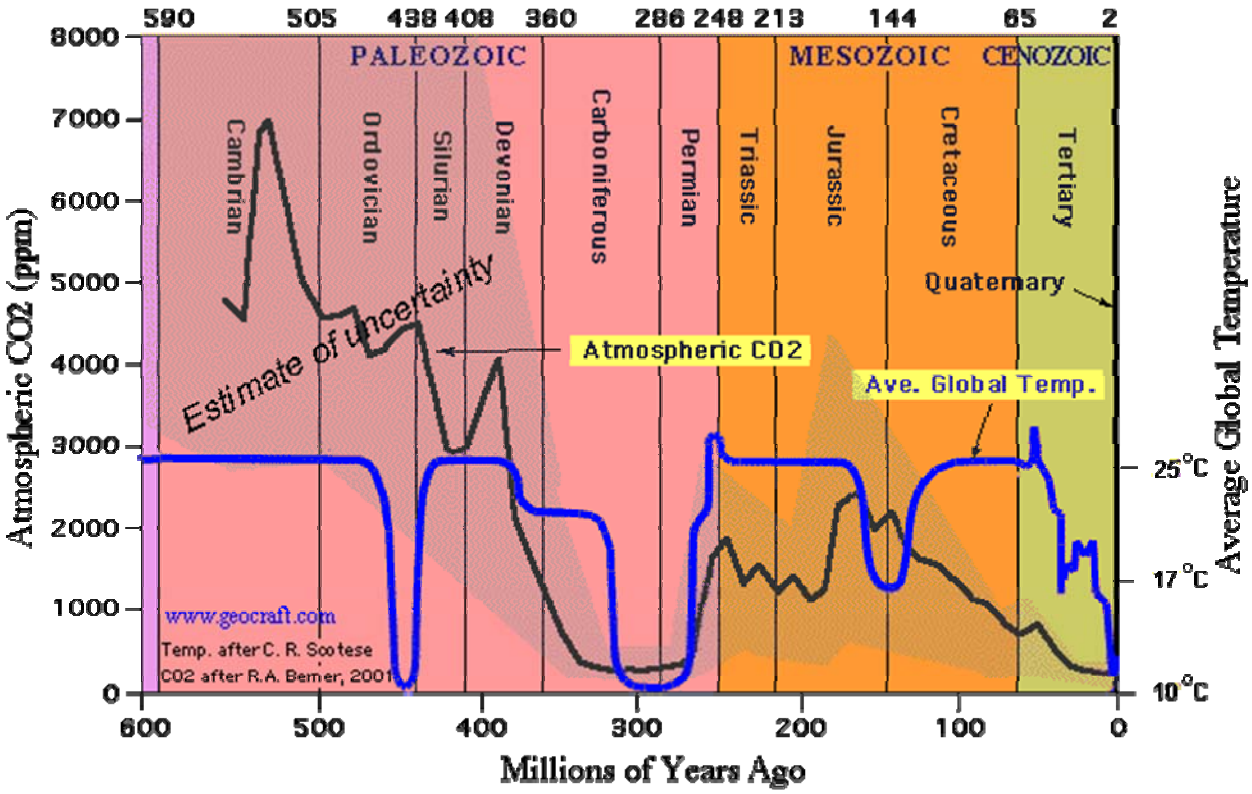
For any given year world temperatures can be high or low. There are too many variables to accurately predict. However tendencies and general ranges can be predicted. In the first chart below it can be seen that the average temperatures in the Holocene have been going down slightly (about 1 degree F or 0.5 degrees C). This is almost insignificant as a variation. It is also noteworthy to see that the present world temperature seems higher than would have been predicted by this interglacial projection. This may be due to human created CO2 emission raising overall atmospheric concentrations.



Let us go back 450 thousand years, deep in the most recent series of ice ages. This chart shows that world temperature lows occur every 100,000 years. There are also corresponding highs every 100,000 years. The temperature swings are a total of 9 C or 16 F. The world is currently at the middle of these swing amounts. This suggests the next 10,000 years may add a degree C to the average world temperatures before it starts going down again.



If we go back further in time and include not just the present Holocene era, the average global temperatures have been descending over the 65 million years. Indeed every 140 million years or so the world temperatures have reached a similar low of about 10 C or 50 F. The other extreme is about 25 C or 80 F. This is more the normal world temperature than the current lows. However, the world temperature is never constant.
It is also curious to note the CO2 levels have never been lower than the present. 150 million years ago it was about 2000 ppm. 400 million years ago it was 4000 ppm. High world temperatures and high CO2 levels do not correlate well.



CONCLUDING REMARKS

The world is roughly in the middle of an interglacial period. CO2 levels are rising but are about 10% of historical highs. The present world average temperatures, based on historical interglacial averages, is maybe a 1 degree C higher but this is well within statistical variations and is not unusual. The world ever since the end of the last ice age has been in a state of constant climatic change as the world has warmed. Change is inevitable and normal. The world is either in a state of oscillating ice ages or a much warmer overall situation. That means we either have ice at the poles or we do not. When we do not the world is significantly warmer than now. Both are normal but different.

Current Conferences and Meetings at National

2019 AIChE Annual Meeting

November 10-15, 2019
Hyatt Regency, Orlando
The AIChE Annual Meeting is the premier educational forum for chemical engineers interested in innovation and professional growth. Academic and industry experts will cover wide range of topics relevant to cutting-edge research, new technologies, and emerging growth areas in chemical engineering.

Commercializing Industrial Biotechnology 2019

May 13-14, 2019
DoubleTree by Hilton Los Angeles Downtown
This 2 day-conference on Technology Challenges and Opportunities in Commercializing Industrial Biotechnology will take place at The DoubleTree by Hilton Los Angeles from May 13th to 14th in Los Angeles, California.

Sixth International Mammalian Synthetic Biology Workshop (mSBW 6.0)

May 17-19, 2019
Norris Center, Northwestern University, Evanston Campus, IL
We are pleased to announce the Sixth International Mammalian Synthetic Biology Workshop (mSBW 6.0), to be held at Northwestern University in Evanston, IL (near Chicago) on the weekend of May 18-19, 2019. The mSBW series has grown exponentially in recent years to become a signature worldwide event...

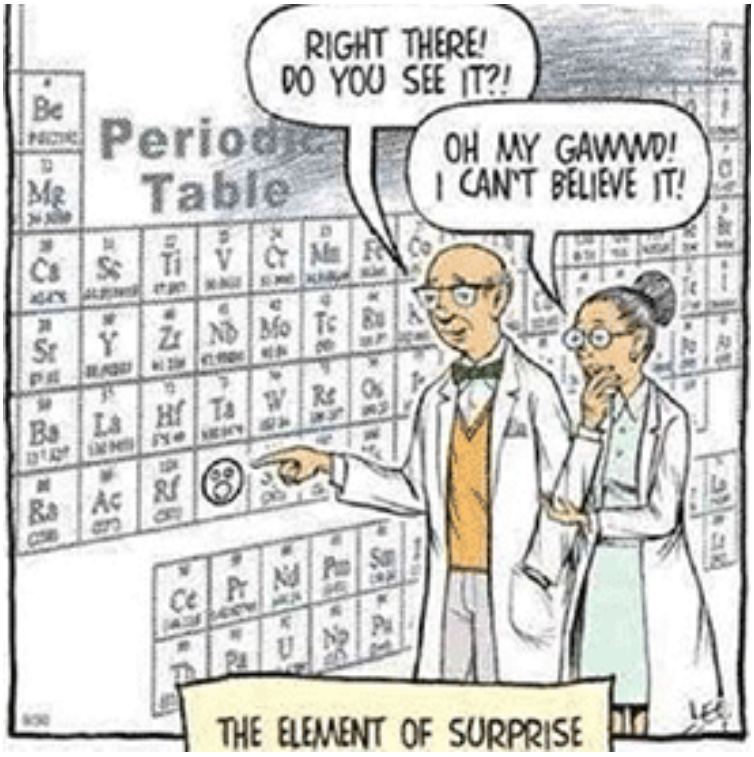
8th International Conference on Bioengineering and Nanotechnology

May 28-31, 2019
Hyatt Regency Baltimore Inner Harbor, Baltimore, MD
Presented by the Society for Biological Engineering (SBE), this conference will bring together leaders and trainees from cutting edge fields of bioengineering and nanotechnology. Topics to be presented include: biomolecular engineering, translational medicine, cell engineering, immunoengineering,

2019 Process Development Symposium

June 11-13, 2019
Houston Marriott Westchase, Houston, TX
The 2019 Process Development Symposium is a place to exchange wisdom, knowledge, tips, and personal experiences in the development and scale-up of chemical and related processes. Register Now

JOKES!!!!?



Don't trust atoms, they make up everything.

Did you know that you can cool yourself to -273.15˚C and still be 0k?

H_2O is water and H_2O_2 is hydrogen peroxide. What is H_2O_4? Drinking.

Did you know that oxygen went for a second date with potassium?
How did it go? **It went OK2!**

Why do chemists like nitrates so much? They're cheaper than day rates.

Q: What is the show cesium and iodine love watching together? **A:** CSI

Q: What is the chemical formula for "coffee"? **A:** CoFe2

Q: What do you do with a sick chemist?
A: If you can't helium, and you can't curium, then you might as well barium.

Q: Anyone know any jokes about sodium? **A:** Na