

Earth's Climate: Past, Present and Future and reasons for concern

Facilitator: *Paul Belanger*

Starting September 15 for 8 weeks: Tuesdays — 9:30 — 11:30 AM

OLLI west campus; Jefferson Unitarian, 14350 W 32nd Ave, Golden, CO 80401

This class will examine Earth's geologic climate history and the data and methods that were used to deduce that history. Climate is controlled by a combination of physical, orbital and chemical variations of the Earth and its atmosphere.

Earth's climate has varied significantly in its 4.5 billion year history from a "snowball" Earth in its deep past to a mostly hot-house Earth since the Cambrian explosion. Currently the Earth is in an interglacial of an "ice-house" Earth. We will examine the role of plate tectonics, ocean currents, and the competing balance of volcanic eruptions that add CO₂ to our atmosphere vs. weathering rates take out CO₂ out of our atmosphere and how it's changed through time. We will then look at how human activities have drastically altered that natural process primarily caused by the burning of fossil fuels, land use activities, cement production and methane increase.

We will take a field trip to the National Ice Core Lab in the 3rd week showing how empirical data has been collected about our atmosphere from ice cores giving us our atmospheric history for the past 800,000 years. Beyond 800,000 years we rely on proxy data suggesting what values and levels of CO₂ existed. Understanding the geologic record is key to being informed citizens in evaluating hype, media (mis)representation and politics and leads to having a discussion about what to do regarding adapting, mitigating or doing nothing. Related issues regarding rates of change, ocean acidification and extinction will also be discussed.

If you are ideologically challenged and feel that man-made global warming is a hoax and part of a conspiracy theory, this class is NOT for you; research shows that I will not convince you otherwise. 97% of climate scientists endorse man-made global warming. We will examine the psychology of climate change denial, myths, fallacies and how to best encounter such misrepresentation by a vocal minority.

People see short term benefits to global warming but don't appreciate the long term risks. In the big picture of things it's not so much about climate change as sustainability of our life as we know it. It's a comprehensive problem of economics, energy, population, environment and our impact on nature. The Earth will survive; our impact will leave an Anthropogenic geologic signature. We have recreated a biologic "Pangea"; the question remains whether we can avoid the modern dark ages and anarchy. Is it gloom and doom? It's easy to consider it so - I prefer to state: "Rather, it's a challenge and humanity has ALWAYS BEEN challenged, let's not be cowards to the challenge".

Books/Materials: 1) To be read before class — *What We Know About Climate Change* by Kerry Emanuel, 2nd Edition 2012, 120 pages — An outline of the basic science of global warming and how current consensus has emerged. 2) Optional reading *Don't Even Think About It: Why Our Brains are Wired to Ignore Climate Change* by George Marshall 2014, 272 pages. Both available from Amazon, Barnes & Noble, Tattered Cover in book, e-book, or audible forms.

3) Slides, links, and additional resources posted on the OLLI class link at <http://www.denverclimatestudygroup.com/> and on the OLLI Portfolio website. 4) Handouts
Class Type: Illustrated Lectures/Discussion; in lieu of 3rd class there will be a field trip to National Ice Core Lab located at USGS in Lakewood; <http://icecores.org/> set for 9 a.m. Tuesday September 29th.

Materials Fee: None.

Paul Belanger, Ph.D., a retired geologist who has first hand research background in paleoclimate and paleoceanography using microfossils and stable isotope geochemistry.

He is a graduate in geology, with a minor in oceanography from the University of Washington (BS) and Brown University (MS, Ph.D.); he was a National Research Council postdoctoral fellow with the USGS at Wood Hole, MA. His research background is in paleoclimate and paleoceanography of the late Cenozoic. This included serving as a scientist on Leg 161 in the Mediterranean of the International Ocean Discovery Program (<http://www.iodp.org/>). His research background gives him an understanding of past climates. His leading the Denver climate study group (see <http://www.denverclimatestudygroup.com/>) in talks and discussions on climate change, energy issues, and related socio-economic sustainability issues that have given him a big-picture view of the present and future climate issues expected to occur.