

Ice Age

By Mike Nash

Two recent papers in the journal *Science*, highlight an aspect of climate change that we may not be aware of as we look apprehensively at Earth's rapid warming.

Reconciliation of the Devils Hole climate record with orbital forcing resolves a longstanding question arising from Devils Hole cave in Nevada. The chemistry found in calcite deposits deep in caves is an excellent source of information about climate in earlier times, but data from Devils Hole has not always agreed with measurements taken elsewhere. This has given us "...one of the great paleoclimate enigmas of the past three decades."

Orbital forcing is the combined effect on climate of three influences on the Earth's motion in space. The first two are the 26,000-year cycle of change of the Earth's axis of rotation (precession) and the 112,000-year cycle of change of the Earth's eccentric elliptical orbit around the Sun (apsidal precession), which combine to create an effective 21,000-year cyclical effect on Earth's climate. The third cycle is the 41,000-year oscillation of the tilt of the Earth's axis (obliquity) in relation to its orbital plane around the Sun between 22.1 and 24.5 degrees. Together with some other factors, these overlapping cycles have, over the last million years or so, combined to create ice ages on a roughly 100,000-year cycle.

Measurements of past climates made in Devils Hole cave have provided an important component of the historic

climate record, but their disagreement with other measurements has muddied the waters. However, recent measurements taken from calcite deposits in the cave have removed the 8,000 to 10,000-year discrepancy between this important paleoclimate site and other locations, so climatologists can now be much more confident that our understanding of these climate-driving mechanisms in times past is correct.

The second fascinating paper in the same journal issue, The Anthropocene is functionally and stratigraphically distinct from the Holocene, also considers the climate effects of orbital forcing while discussing the new geological age of humans, the Anthropocene.

The paper suggests that following a warm peak in the current interglacial period at around 2,000 years ago, the planet has been cooling in accord with predictions of orbital forcing, culminating in the Little Ice Age from about 1250 to 1800 CE. It goes on to say, "Given that the orbital trend is continuing, Earth should still be cooling. However, increased anthropogenic emissions of greenhouse gases have instead caused the planet to warm abnormally fast, overriding the orbitally-induced climate cycle."

Taking these two papers together, we can perhaps now infer with more confidence that, notwithstanding the climate impact that technological human civilization has had on the planet, the 12,000-year interglacial that allowed the emergence of civilization in the first place was beginning to be over in the Middle Ages with the onset of the Little Ice Age. This poses an interesting question: where would we be today if, in the absence of the industrial revolution and its associated increase in fossil carbon burning, the Little Ice Age had continued to deepen? Clearly the planet is now warming too fast, but the inference drawn from these recent papers brings an added dimension to human-wrought changes on the Earth's climate. We certainly should not make the mistake of rejoicing in greenhouse gas emissions, or relaxing on the issue, but we can consider the judicious burning of fossil carbon as a thermostat to mitigate the opposing scenarios of a too-hot or too-cold world. Fossil carbon's real value, therefore, is as a long-term temperature regulator, not as a primary energy source. ❧



By Wikipedia Commons

An artist's impression of ice age Earth at glacial maximum.

Festival Active Pass Galiano Island April 22 - 24, 2016

Come experience spring in the Gulf Islands on Earth Day weekend at Festival Active Pass (festivalactivepass.com). Take in a wildlife spectacle as thousands of Bonaparte's Gulls make their annual feeding stopover in the Active Pass Important Bird Area, joined by other gulls, loons, cormorants, and eagles, as well as Steller and California Sea Lions, and Harbour Seals. Orcas are frequently seen in Active Pass from several Whale Trail viewpoints.

The themes for the three-day festival are Nature, Art and Community. Festival Central will have displays, live music, delicious food and an arts and crafts market. Choose from guided hikes, boat tours and kayaking, or tour island gardens and artists' displays. Talks and walks will be presented on topics ranging from birds to ocean monitoring, to local archeology and history, to field sketching and nature photography, to the community food program and solar energy production. Attend an exciting concert on Friday evening, and then the Festival banquet for a sampling of locally-sourced foods followed by a community dance on Saturday evening. On Sunday enjoy a special brunch followed by a play performance.

There are convenient morning and evening ferry connections to Galiano, and on-island shuttle buses will get people to Festival venues and events. Camping is available at Montague Park, and there is a full range of visitor accommodations. Galiano provides a wide choice of eating places, from funky food wagons to award-winning fine dining restaurants. ❧



**Active Pass
Nature and Arts
Festival**
April 22-24, 2016
Galiano Island, BC
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