

GLOBAL WARMING: A science viewpoint

Albert Jacobs

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Most of the opposition to Canada signing the Kyoto Protocol has been coming from economists and some politicians and it deals with the projected economic costs of reducing CO₂ emissions.

Between their multi-billion dollar figures, the essence of the cause of global warming, a scientific argument, has been given short shrift. Economists, lawyers and politicians are not known to take easily to the methods and arguments of science in general.

You may have read that there is indeed a difference of opinion whether global warming is and has been taking place. A number of researchers suspect a geographical bias in sampling of the post-glacial period. There has been criticism, as well, of aspects of the sampling of current temperature conditions,, which has been shown to have a bias due to locations near "heat islands" or more developed areas of the globe.

The Earth's surface has generally been warming since the last glacial period, more than 10,000 years ago. There have been a number of oscillations. In historic times there was, for instance, a particularly warm spell from about 1000 to 1200, AD, the Medieval Warm Period, a time when the Vikings farmed on Greenland and Newfoundland and grape vines grew in Scotland. It was followed by a prolonged and uncomfortable cooling period, the Little Ice Age, which plagued the world around 1600 for several generations. The sea ice extended South beyond the Viking colonies on Iceland, Greenland and Newfoundland and they could no longer be resupplied.

So, is there a direct correlation between our fossil fuel use since the Industrial Revolution began and the rate of warming?

For years, thousands of volcanoes have been spewing their gases into the atmosphere and present day biomass burning (Brazil, Indonesia) is a plague on the planet.

But by far by far the largest component of the greenhouse blanket is not CO₂, but simple water vapour. There are many scientists who are convinced that CO₂ is not the culprit in global warming. And there is solid scientific evidence that increases in CO₂ levels trail rather than precede a temperature increase.

Meteorologists, environmentalists and climatologists are generally limited to what can be measured, has been recorded in historic times and can be statistically

compared. From such data and using many assumptions as to variabilities, they construct computer models which project climate behaviour into the future. Such a data base is inadequate for a complex system such as the Earth's atmosphere.

It is increasingly clear that oceanic currents and solar oscillations have a major influence on the climatic balances of our planet. We need the help of paleoclimatologists (using geological methods) and astronomers (looking at influences from beyond our planet), oceanographers and others to trace the climatic history of the earth and the probable causes for variations.

Surely, the politicians who, in 1997, jumped on the bandwagon of the day, the Kyoto Protocol, were not in a position to make intelligent judgments on the issue or on the consequences of their commitment.

We have suspected for more than a hundred years that major climatic changes as documented in the geologic record are largely the result of variations in solar radiation.

A few examples of some of these forces directly affecting the variations in the warming of the Earth's surface are:

- * variations in the shape of the Earth's elliptical orbit around the sun: a variation with a 100,000-year cycle;

- * the variation in the tilt of the spin axis of the Earth with respect to the plane of the ellipse (a 41,000-year cycle);

- * the so-called "wobble" (precession) of the spin axis, a 23,000-year cycle.

- * the sun's 11-year sunspot cycle, which itself is subject to longer periodic oscillations in its intensity such as the so-called "Maunder Minimum", a 70-year period of essentially no sunspot activity, which fell within the coldest part of the Little Ice Age.

It is obvious that the culmination of any of the cycles at any given time can have significant climatic consequences for a prolonged period.

This is not to suggest that we ourselves are guiltless. In terms of the astronomical forces, our contribution to global warming is small, but our part in air and water pollution is large. We should clean up our act and the planet, but should not expect to have much influence on global warming.

The Kyoto Protocol of December 1997 would demand a reduction of carbon dioxide and other greenhouse gas emissions to a level of six percent below that of 1990. That means more than 15 % less than today.

Is the world economy ready for such an upheaval? In view of the relentless influence of the already existing large natural forces, would the expenditure of untold billions of dollars do any good?

Perhaps our efforts and expenditures should continue to be directed toward a cleanup of our pollution and a lessening of our consumption of fuel.

Albert F. Jacobs is a retired geologist, residing in Calgary and a member of "Friends of Science".