

LETTER TO THE EDITOR

Re: J.J. Clague and R.J.W. Turner, 2000, *Climate change in southwestern British Columbia: Extending the boundaries of earth science: Geoscience Canada*, v. 27, p. 111-120

Dear Editor:

THREE STEPS BACKWARD... The Climate Change Mirage

The authors of the above paper requested "critical thought." Here are some of my thoughts. Geoscientists have to be concerned when brightly coloured papers such as that by Clague and Turner (2000; cited above) appear. There are at least three very good reasons for concern:

1. Misleading the Public. The authors strongly assert that the main cause of climatic change is due to man's activity...burning of fossil fuels, agricultural practices, and deforestation, resulting in an apparent and inferred rapid build-up of carbon dioxide.

One of the most deeply disturbing aspects of the paper is the total absence of the major causes of climate change: 1) near-surface magma chambers and submarine volcanic activity in the great oceans of the world, a principal heat source for ocean water; 2) affects of the Earth's convection currents; 3) fluctuations of solar energy; 4) oscillations of Earth's orbit, inclination of its axis, and related planetary forces; 5) thermodynamic forces driving plate tectonic activity; 6) pole reversal implications; 7) electromagnetic energy.

This subject, admittedly, appears far too complex for mere mortals. One thing we do know is that the forces mentioned above are able to move continents, thrust up mountains, split ocean basins on a global scale, initiate in some way frequent ice ages, wipe out

huge biotic communities on a worldwide scale, and cause volcanic eruptions and earthquakes in every sector of the Earth. The paltry influence of man's activity pales terribly in comparison.

If the authors wanted truly to examine climatic change in southwestern British Columbia they should have been obligated to at least synthesize what geoscientists know about this in British Columbia. The authors have ignored all of the data on raised alluvial fans of Holocene age, all of the revealing paleobotanical work in British Columbia, and much of the work that Clague himself has done, and the record of numerous alpine ice advances and retreats in the last 10,000 years. Ignored also are the yearly production of gases from volcanic eruptions, natural production of gases related to indigenous animal and vegetation decay, weathering of rocks and minerals, the numerous studies of oceanic sediments, and the recent studies on Greenland ice proving rapid fluctuations in past climates. The list of omissions, further elaborated below, is nearly limitless!

The illustrations presented in Clague and Turner's paper are gross generalizations that have no place in any serious scientific publication. Not only that, many are misleading in the extreme. An opportunity to show possible influence of near-surface magma chambers (serving to heat ocean water) beneath the ocean was missed in Figure 4, for example. The pictorial sketch of the Okanagan Valley is particularly troublesome (my home) since it is the exact opposite of the real situation in terms of ground water at least. Harvesting forested Okanagan terrain causes not only an increase infiltration of ground water, which in turn causes a rise in the water table, but also causes increased runoff. Historical

stream data do suggest a slight decrease, but much of that decrease is caused by increased storage in upland reservoirs and increased storage in ground water systems. The authors would be well advised to attend some of the forestry and hydrologic workshops devoted to these issues. Many of the other colourful illustrations are equally suspicious, some derived from earlier productions of the authors, and a so-called sophisticated "powerful high-speed computers" program, and the reader has no clue about input data.

2. Insufficient Research. The authors offer a grand total of 14 references to support their paper, 38% of these references are their own publications, 38% represent environmental groups or agencies, with a mere 36% from other sources, some of which appear to have limited geoscience representation. How could editors and reviewers of *Geoscience Canada* be satisfied with this depth of research? One publication examining a related topic lists 400 references, and each of these references has a list of references. Clague and Turner's financial sponsors have to be disappointed with this comparison.

Part of this concern has to be directed to the three reviewers of Clague and Turner's paper. Roger Macqueen and Godfrey Nowlan are two and the other is not known. Are Macqueen and Nowlan *bona fide* arms-length reviewers? It is doubtful. This is a sad day in my view for *Geoscience Canada*.

3. Rush to Proliferate. The authors are on a scary mission to quickly distribute and market their cartoon-like images to schools, apparently their prime target. This is of great concern to me since I too have a mission to transmit geologic information to the public. One of my prime concerns is to make sure that it is not misinformation, and thus misleading.

Due to the vast apparent incompleteness of Clague and Turner's paper and their early admission in their paper that "there is considerable uncertainty and debate about the rate and magnitude of warming, and about regional variations in warming," and "Furthermore, the impacts of warming on the Earth's hydrological regime remain uncertain," I strongly urge these geoscientists to reconsider their intent to widely distribute this material.

These authors had a wonderful opportunity to provide a balanced look at this nasty atmospheric trend, and I am so disappointed with their effort. Some items, incomplete to say the least, that I feel should be included in such a study are as follows:

1. Comparison of time-dependent CO₂ levels with base station temperature change: I know of one station at 51°N up to 1970s.
2. Projection of decline in fossil fuel availability: is this factor in the computer models?
3. Production of CO₂ in nonhuman generators (vulcanism, coal fires, forest

fires, for examples), and comparison to human generators of CO₂.

4. Data on snowpacks. There have been some record snowpacks in this area recently.
5. Changes of CO₂ composition in atmosphere throughout geologic time.
6. Recycling mechanisms of CO₂ on Earth. The oceans, for example, are huge absorbing pools for carbon dioxide. That's how most of the limestone of the world was made.
7. Cloud cover and its causes and effects on climatic factors. Warmer oceans mean more evaporation, more precipitation, more cloud cover on elevated land, more cooling, more snow. Garibaldi Alpine Ice Advance in southwestern British Columbia, for example, coincides with Hypsithermal at 6600 years BP, the hottest and driest time in the last 10,000 years!
8. Climatic indicators as recorded in Holocene paleobotanical and terrain studies. There is a wealth of data in this work, including that done on recent lacustrine deposits, and the numerous

raised alluvial fans that have been studied. 9. Geothermal activity, oceanic rift zones, near-surface magma chambers, terrestrial hot spots, *etc.* all contribute to (or perhaps control) warming and/or cooling. Some of the hot spots in oceanic vents are boiling, and most have not been discovered yet. 10. The authors conveniently ignore actions that have been undertaken to reduce CO₂ emissions, however insufficient. This is no accident, it is a reflection of their bias.

There is much more, but you get the idea. Clague and Turner's treatment of this subject is grossly oversimplified, incomplete, biased, and misleading, and provides absolutely nothing new. It is no wonder they boast that this mirage-like study only took a few months to throw together.

Murray A. Roed
1365 Crawford Road
Kelowna, British Columbia V1W 4N4
mroed@home.com

REPLIES

Dear Editor:

Murray Roed criticizes our paper, and the poster on which it is based, claiming that they are "three steps backward." Dr. Roed is entitled to his opinion, but we believe he is wrong. Let's examine his three principal criticisms.

1. Misleading the Public. Roed claims that we present an unbalanced view of the factors that control climate and cause it to change. He argues that we completely ignore major natural causes of climate change. This is not true. One section of the paper, titled, "Climate Has Always Changed," deals with major natural fluctuations in climate in late Pleistocene and Holocene time. As well, Figure 5 summarizes global carbon sources and sinks. Both of these themes are developed at greater length in the poster.

It is true that the paper and the

poster emphasize the likely role that humans play in causing climate to change: this was our objective and requires no apology or further explanation. Unlike Roed, we believe that there is a very high likelihood that human activity will alter climate and that the human impact, over the short term, will outweigh the effects of the natural factors that Roed mentions. Certainly "oscillations of Earth's orbit, inclination of its axis, and related planetary forces" alter climate, but they do so over time scales of thousands of years to hundreds of thousands of years, and will have no appreciable effect over the next 100 years, the period of concern here. Likewise, pole reversals and changes in the positions of plates are irrelevant to the discussion on the time scale of the next century.

Roed considers our illustrations "gross generalizations that have no place in any serious scientific publication." We

point out that our *Geoscience Canada* paper is not a scientific article, but rather a description and overview of an educational product. Our drawings are purposely generalized to get ideas and messages across to the poster users, primarily grade 10-12 students and teachers.

Roed believes that many of our illustrations are misleading and cites Figure 11 (Okanagan Valley water budget) as an example. According to Roed, this figure "is particularly troublesome (my home) since it is the exact opposite of the real situation in terms of groundwater at least". Let's examine his concerns. The purpose of Figure 11 and its companion text is to illustrate a likely deficit in the summer water budget in the semiarid Okanagan Valley, given the predicted increase in evapotranspiration under a warmer climate (Coulson, 1997). The figure depicts lowered water tables