Easterbrook, D.J., 2008, Correlation of climatic and solar variations over the past 500 years and predicting global climate changes from recurring climate cycles: International Geological Congress, Oslo, Norway.

CORRELATION OF CLIMATIC AND SOLAR VARIATIONS OVER THE PAST 500 YEARS AND PREDICTING GLOBAL CLIMATE CHANGES FROM RECURRING CLIMATE CYCLES

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Recurring cycles of global climate change over the past several centuries are apparent in glacier fluctuations, oxygen isotope ratios in ice cores, and historic observations and clearly show that natural climatic warming and cooling have occurred many times, long before increases in anthropogenic atmospheric CO_2 levels. Cyclic, decadal, climate patterns can be traced over the past several centuries, showing that climate changes occur without increased human CO_2 emissions and casting doubt on increasing CO_2 as the cause of warming over the past 30 years. Global climate changes show exceptionally good correlation with solar variation since the Little Ice Age.

Based on past recurring climate patterns, the Earth is now near the end of a 30–year warm cycle that began in 1977 and is poised to enter a 30–year cool cycle of about 0.3–0.5 ° C that should continue until about 2040. This is in sharp contrast to the drastic global warming of about 2° C predicted by the IPCC. Past warm/cool cycles suggest a succeeding warm period (2040–2070) may be somewhat warmer than the past 30years, but well below temperatures predicted by the IPCC. The projected cool cycle from 2070 to 2100 would cool climates slightly, so by 2100, the temperature increase above the present would amount to only ~0.5 C (1° F), compared to as much as 6° C (10° F) predicted by the IPCC.

The IPCC has predicted a global temperature increase of 0.6° C (1° F) by 2011 and 1.2° C (2° F) by 2038, whereas Easterbrook (2001) predicted the beginning of global cooling by 2007 (± 3–5 yrs) and cooling of about 0.3–0.5° C by 2040. The predicted cooling may have already begun. Recent measurements of global temperatures suggest a gradual cooling trend since 2002 and the winter of 2007–2008 was one of global, record–breaking cooling and snow. The cooling trend may continue as the sun enters a cycle of lower irradiance.

International Geological Congress, Oslo, Norway. Aug. 2008

Easterbrook, D.J., 2007a, Geologic evidence of recurring climate cycles and their implications for the cause of global warming and climate changes in the coming century: Geological Society of America Abstracts with Programs, Vol. 39, No. 6, p. 507.

GEOLOGIC EVIDENCE OF RECURRING CLIMATE CYCLES AND THEIR IMPLICATIONS FOR THE CAUSE OF GLOBAL WARMING AND CLIMATE CHANGES IN THE COMING CENTURY

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Synchronous, interhemispheric, Holocene and late Pleistocene climate changes are recorded by glacier fluctuations, oxygen isotope ratios, CO2, and dust in ice cores, historic observations, and tree rings. Recurring cycles of global climate change are apparent in these records over the past several centuries and millennia and clearly show that natural climatic warming and cooling have occurred many times, long before anthropogenic CO2 emissions raised atmospheric CO2 levels. In addition to showing that climate changes can occur without human CO2 emissions, past climate changes follow cyclic decadal patterns that can be traced for 400–1000 years.

The Earth is now near the end of a 30–year warm cycle, which coincidently corresponds to high atmospheric CO2 levels. However, the preceding 30–year global cooling cycle (1945-1977) occurred despite the dramatic rise in CO2 emissions that began about 1945, and about half of the global warming of the past century occurred before 1945. Because ~80% of manmade CO2 emissions occurred after 1945, increased atmospheric CO2 clearly did not control climate in either case.

Similar warming and cooling cycles that have occurred over the past 400 to 1000 years have implications for understanding present–day global warming. The only time that global warming coincided with high atmospheric CO2 was from 1977 to 2007, but the present warm cycle is just what would be expected from the pattern of past cycles. If the cyclic pattern continues, the present warm cycle should soon end and global cooling should begin and continue until about 2040. The succeeding warm period (2040-2070) may be somewhat warmer than the present one, but well below temperatures predicted by the IPCC. The projected cool cycle from 2070 to 2100 would cool climates slightly, so by 2100, the temperature increase above the present would amount to only ~0.5 C (1° F), compared to as much as 6° C (10° F) predicted by the IPCC.

The predicted IPCC temperature increase by 2011 is 1° F greater than that predicted by extrapolation of the climatic cycles and nearly 2° F greater by 2030. These differences are greater than warming of the entire past century, so should be easily detectible. Thus, the next few years may tell us whether we're heading for the global catastrophe predicted by IPCC or minor warming predicted by climate cycles.

Geological Society of America Abstracts with Programs, Vol. 39, No. 6, p. 507

GSA Denver Annual Meeting (October 28–31, 2007)
The Cause of Global Warming—Are We Facing Global Catastrophe in the Coming Century?

For Powerpoint slides of this paper go to: http://gsa.confex.com/gsa/responses/2007AM/280.ppt

For MS Word text document go to: http://gsa.confex.com/gsa/responses/2007AM/281.doc

Easterbrook, D.J., 2007b, Historic Mt. Baker glacier fluctuations—geologic evidence of the cause of global warming: Geological Society of America Abstracts with Programs.

HISTORIC MT. BAKER GLACIER FLUCTUATIONS—GEOLOGIC EVIDENCE OF THE CAUSE OF GLOBAL WARMING

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Advance and retreat of glaciers on Mt. Baker show distinct oscillations with periods of ~30 ± 5 years. From ~1890 until the late 1920s, glaciers on Mt. Baker were well downvalley from their present termini, and then retreated rapidly from the late 1920s to the late 1940s. Glaciers readvanced again from the late 1940s and early 1950s to 1977, then retreated rapidly from ~1977 to the present. These glacial oscillations are mirrored by global temperature curves, North Pacific sea surface temperatures (PDO), North Atlantic sea surface temperatures (NAO), European alpine glaciers, and Greenland ice cores (GISP2). Similar earlier glacial fluctuations are recorded in Little Ice Age moraines that show cooler climates at about 1790, 1850, and 1890. Oxygen isotope ratios in Greenland ice cores show that these cycles have continued over the past millennium.

These late Pleistocene, global, climate changes have implications for understanding present–day global warming. The global climate has been warming (and cooling) not just since modern atmospheric CO2 has risen, but over the past millennium, long before rising atmospheric CO2 from manmade emissions. Although atmospheric CO2 is now at an all time high, 80% of manmade CO2 emissions occurred after 1945. However, more than half of the global warming of the past century occurred before 1945, mostly between 1890 and 1940, when it could not have been caused by increased atmospheric CO2. During the 30 years (1945 to 1977) following the most dramatic rise in CO2 (1945), global climates actually cooled, raising the question, if increasing CO2 is the cause of global warming, why did global climates cool during this dramatic rise in CO2? If rising CO2 causes global warming, temperatures should have increased, rather than decreased, during this 30 year period.

Extrapolation of previous cyclical global climate changes suggests that the present global warming should begin to decline between now and about 2010, remain cool until about 2040, then warm again from about 2040 to about 2070 before entering another cool cycle from 2070 to 2100. The total amount of global warming to 2100 should be about 1° F, rather than 5° F to 11° F predicted by the IPCC.

Geological Society of America Cordilleran Section Annual Meeting Bellingham, WA (May 4–6, 2007)

Easterbrook, D.J., 2006a, The cause of global warming and predictions for the coming century:
Geological Society of America, Abstracts with Programs, Vol. 38, No. 7, p. 235

THE CAUSE OF GLOBAL WARMING AND PREDICTIONS FOR THE COMING CENTURY

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At least five abrupt, global climate changes of 4-15° C in the past 16,000 years have implications for understanding present–day global warming: (1) the end of the last glacial maximum (~16,000 yrs. ago), (2) the onset of the Younger Dryas (~12,700 yrs. ago), (3) the end of the Younger Dryas (~11,500 yrs. ago), (4) in the early Holocene (~8,200 yrs. ago), and (5) during the Little Ice Age (~1600–1850 AD). Climatic models that predict soaring of global temperatures in the coming century as a result of increased atmospheric CO2, do not incorporate such geologic data. GISP2 ice cores show that late Pleistocene, abrupt, temperature fluctuations of 8–12° C occurred in only 20–100 years. The GISP2 ice core suggests warming of ~7° C in about a decade at the end of the Younger Dryas. These changes, 10 orders of magnitude greater than the 0.8° C global temperate of the past century, were clearly not caused by changes in atmospheric CO2. During these climatic changes 10Be and 14C production rates varied, suggesting a connection between global climate changes and solar variation. Global warming over the past century has not been constant–glaciers in the Cascade Range show distinct oscillations having a period of ~30 years, dating back to about 1790 AD. Glaciers advanced from about 1890–1920, retreated rapidly from ~1925 to ~1945, readvanced from ~1945 to ~1977, and have been retreating since the present warm cycle began in 1977. Comparable, cyclical, climatic fluctuations occurred in the North Pacific (PDO), the North Atlantic (NAO), Europe, and Greenland. Because the warming periods in these oscillations occurred well before atmospheric CO2 began to rise rapidly in the 1940s, they could not have been caused by increased atmospheric CO2 .and global warming since 1900 could well have happened without any effect of CO2. If the cycles continue as in the past, the current warm cycle should end soon and global temperatures should cool slightly until about 2035, then warm about 0.5° C from ~2035 to ~2065, and cool slightly until 2100. The total increase in global warming for the century should be ~0.3 ° C, rather than the catastrophic warming of 3-6° C (4-11° F) predicted by the IPCC.

Geological Society of America Abstracts with Programs, Vol. 38, No. 7, p. 235.

Philadelphia Annual Meeting (October 22–25, 2006)

For Powerpoint slides of this paper go to: http://gsa.confex.com/gsa/viewHandout.cgi?uploadid=215

Easterbrook, D.J., 2006b, Causes of abrupt global climate changes and global warming predictions for the coming century: Geological Society of America, Abstracts with Program, v. 38, p. 77.

CAUSES OF ABRUPT GLOBAL CLIMATE CHANGES AND GLOBAL WARMING: PREDICTIONS FOR THE COMING CENTURY

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Abrupt Younger Dryas (YD) climate oscillations occurred synchronously in both the Northern and Southern Hemispheres with no significant lag between hemispheres, as shown by double YD moraines in the Pacific NW, Rocky Mts., Swiss Alps, Canada, Scandinavia, and New Zealand. The lack of a time lag between hemispheres means that changes in the North Atlantic deep current cannot adequately explain the abrupt global climate changes.

As shown in the GISP2 ice cores, late Pleistocene abrupt temperature fluctuations occurred in only 20–100 years, clearly not caused by atmospheric CO2. During these climatic changes, 10Be and 14C production rates also varied, suggesting the possibility of solar changes. Similar changes also occurred during climate changes in the early Holocene and the Little Ice Age, again suggesting a connection between climatic changes and solar variation.

Historic fluctuations of alpine glaciers, solar activity, and measured isotope changes suggest that the present global warming could well be solar in origin, rather than a result of increased atmospheric CO2. Alpine glaciers in the Pacific Northwest and elsewhere show distinct oscillations, having a period of ~25-30 years. Glaciers advanced from about 1890–1920 (cool cycle), then retreated rapidly from the late 1920s to the early 1950s (warm cycle). Then readvanced again from ~1955 to ~1977 (cool cycle) and the present warm cycle that began in 1977 continues today. Comparable, cyclical, fluctuations occurred in the North Pacific Ocean, the North Atlantic Ocean, and in Europe, and Greenland.

Global temperature curves show a cool reversal from ~1955 to ~1980), inferring that global temperatures then were not driven by atmospheric CO2. Solar irradiance curves almost exactly match the global temperature curve and satellite data suggest that the earth has received increased solar radiation over the past 25 years, coinciding with the present 25–year warm cycle. If the cycles continue as in the past, the current warm cycle should end soon, and global warming should abate, rather than increase, in the next 25-30 years. Using these data as a basis, the coming century should experience a cooler climate from ~2006 to ~2035, a warmer period (probably warmer than the 1977–2005 warm period) from ~2035 to ~2065, followed by another cooler period from ~2065 to about the end of the century. The coming decades will test this prediction.

Geological Society of America Abstracts with Programs, Vol. 38, No. 5, p. 77

Annual Meeting of the GSA Cordilleran Section (May 8–10, 2006) Anchorage Alaska

Easterbrook, D.J., 2005, Causes and effects of abrupt, global, climate changes and global warming: Geological Society of America, Abstracts with Program, v. 37, p. 41.

CAUSES AND EFFECTS OF LATE PLEISTOCENE, ABRUPT, GLOBAL, CLIMATE CHANGES AND GLOBAL WARMING

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The sensitive, global synchroniety of abrupt Younger Dryas climate oscillations, shown by double YD moraines in the Pacific NW, Rocky Mts., Swiss Alps, Canada, Scandinavia, and New Zealand, challenges the viability of changes in the North Atlantic deep current to explain such abrupt changes in both hemispheres with no time lag. New cosmogenic dates from twin YD moraines in the North Cascades and Sawtooth Mts. confirm that the western U.S. was sensitive to these abrupt climate changes, far removed from any oceanic connection to the North Atlantic.

These late Pleistocene, global, climate changes have implications for understanding present–day global warming. Climatic modelers have predicted that global temperatures will soar in the next several decades as a result of increased atmospheric CO2. However, evidence from glaciers and the oceans suggest that these predictions may be premature. Advance and retreat of glaciers in the Pacific NW and elsewhere show three distinct oscillations, each having a period of ~25–30 years. Glaciers advanced from about 1890 until the early 1920s (cool cycle), retreated rapidly from ~1930 to ~1950-55 (warm cycle), readvanced from ~1955 to ~1980 (cool cycle), then retreated rapidly from ~1980 to the present (warm cycle). Comparable, cyclical, oscillation patterns occurred in the North Pacific (PDO), the North Atlantic (NAO), Europe, and Greenland. Global temperature curves show a cool reversal from ~1950 to 1980) at a time when large amounts of CO2 were introduced into the atmosphere, inferring that global temperatures then were not driven by atmospheric CO2. During this cool cycle, solar irradiance curves almost exactly match the global temperature curve. Satellite data indicate intensifying solar radiation over the past 24 years, coinciding with the present 25–year warm cycle and suggesting a solar cause for the warming. If the cycles continue as in the past, the current warm cycle should end in the next few years, and global warming should abate, rather than increase, in the next 25–30 years, followed by renewed global warming in the following 25–30 years.

Geological Society of America Abstracts with Programs, Vol. 37, No. 7, p. 41

Geological Society of America Annual Meeting (October 16–19, 2005) Salt Lake City, Utah

Easterbrook, D.J., 2001, The next 25 years: global warming or global cooling? Geologic and oceanographic evidence for cyclical climatic oscillations: Geological Society of America, Abstracts with Program, v. 33, p. 253.

THE NEXT 25 YEARS: GLOBAL WARMING OR GLOBAL COOLING?—GEOLOGIC AND OCEANOGRAPHIC EVIDENCE FOR CYCLICAL CLIMATIC OSCILLATIONS

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Global temperatures have been predicted to soar in the next several decades from increase in atmospheric CO2. Such a temperature increase could be catastrophic.

However, evidence of past climatic changes over the past century from glaciers and the oceans suggest another possibility. Advance and retreat of glaciers in the Pacific Northwest show three distinct oscillations, each having a period of ~25 years. Glaciers retreated rapidly from ~1930 to ~1950-55 (warm cycle), readvanced from ~1955 to ~1977 (cool cycle), then retreated rapidly from ~1977 to the present (warm cycle). Evidence in the Northern Hemisphere temperate latitudes shows comparable, cyclical, oscillation patterns in the North Pacific (PDO), the North Atlantic (NAO), European alpine glaciers, and Greenland ice cores (GISP2). If the trend continues, the current warm cycle should end soon.

Global warming curves show a temperature reversal during the last cool cycle (~1950 to 1980) at a time when large amounts of CO2 were introduced into the atmosphere. This infers that global temperatures then were not driven solely by atmospheric CO2 but responded in the same fashion as the Northern Hemisphere, temperate, glacial and oceanic cycles. The present global warming occurs during a warm climatic cycle, suggesting that only part of it can be attributed to increased atmospheric CO2 If the cycles continue as in the past, the current warm cycle should end in the next few years, and global warming should abate, rather than increase, in the coming decades.

Geological Society of America Abstracts with Programs, Vol. 37, No. 7, p. 41.

GSA Annual Meeting, November 5-8, 2001, Boston, Mass.

Easterbrook, D.J., and Kovanen, D.J., 2000, Cyclical oscillation of Mt. Baker glaciers in response to climatic changes and their correlation with periodic oceanographic changes in the northeast Pacific Ocean: Geological Society of America, Abstracts with Program, v. 32, p. 17.

CYCLICAL OSCILLATIONS OF MT. BAKER GLACIERS IN RESPONSE TO CLIMATIC CHANGES AND THEIR CORRELATION WITH PERIODIC OCEANOGRAPHIC CHANGES IN THE NORTHEAST PACIFIC OCEAN

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Ten major Mount Baker (3285 m) glaciers flow radially from a summit ice cap, terminating at elevations of 1200 m to 1600 m. The termini of six glaciers were photogrammetrically mapped at 2-7-year intervals for the period 1940-1990 (Harper, 1992). All showed a cyclical oscillation in three distinct phases having a period of two to three decades. Although the timing was slightly different among glaciers, all six glaciers retreated rapidly from 1940 to about 1950-55, then advanced until about 1980, followed by a second rapid retreat that is presently continuing.

Temperature and precipitation data from nearby weather stations show that the glacier fluctuations may be explained by changes in accumulation-season precipitation and ablation-season mean temperature. Lag times between trend reversals in the climate records and changes between advance and retreat phases ranged from 3 to 17 years. Other glaciers in the Cascade and Olympic Mts. seem to have undergone similar oscillations.

Recent oceanographic studies in the northern Pacific region have shown a cyclical oscillation pattern (PDO) that has a similar periodicity, suggesting that the glacier oscillations are caused by cyclical changes in the ocean. The Pacific NW is currently in a warm cycle, thus raising the question of whether the warmer climate in the area over the past two decades is due to constantly escalating global warming or merely to a typical warm cycle. The answer to this question should become apparent within the next 5 years when the warm cycle should reverse if the pattern continues.

Geological Society of America Abstracts with Programs.

GSA Annual Meeting, 2000, Reno, Nev.