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Provide an executive summary of your response(s).

The additional comments submitted are a collaborative effort and are submitted on behalf of the Competitive Enterprise Institute, FreedomWorks, the American Legislative Exchange Council, and the Free Enterprise Action Fund.

Our analysis of the premises underlying the White Paper concludes that the White Paper is based on several assumptions ("findings") which are not supported by the best available scientific and economic evidence. The White Paper thereby short circuits discussion of these underlying issues in order to arrive at the questions about how best to design a mandatory cap-and-trade regulatory regime to limit greenhouse gas emissions. In our view, a scrupulous assessment of the underlying assumptions would conclude that no mandatory reduction of greenhouse gas emissions is warranted by the evidence at this time. The additional comments review the first finding in detail and also discuss the assumption that the impacts of global warming are predicted to be adverse or negative.

If there is an additional topic related to the design of a mandatory market based program that you would like to address, please submit comments on this form.

Please begin your comments here. (no page limit)

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1.1 Some of the "findings" in the White Paper (WP) are, at best, questionable. Yes, greenhouse gases are accumulating in the atmosphere, but it is not clear whether the temperatures have risen outside of the range of natural variability or, if they have, whether it's due to anthropogenic contributions to greenhouse gases.

1.2 There is no empirical basis for the "finding" that there is an increase in either the severity or frequency of floods and droughts, or that these are now beyond the ranges of natural variability.

1.3 To make any statement about natural variability, we have to look at natural variations over millennia. Unfortunately, robust data over such long periods are not available.

2.1 The WP makes three implicit assumptions for which it provides no backing. The general approach suggested in the white paper towards addressing climate change is flawed.

2.2 First, it assumes that the net impacts of climate change, particularly for the United States, are negative now or will soon become negative.

2.3. Second, the WP assumes that the period between the present and the time over which net impacts turn negative is so short that we have to take actions now.

2.4 Third, it assumes that the most efficient method of reducing the net damages from climate change is through reductions in climate change (i.e., emission reductions) rather than through methods to adapt to climate change or reduce society's vulnerability to the impacts of climate change.

2.5 This submission will provide information that, in fact, contradicts these implicit assumptions.

3. How urgent is it that we commence GHG emission reductions over the next few decades?

3.1 To answer this question, we need to find out whether the net cost of climate change is currently negative, and if it's not negative today, when is it likely to turn negative. Once having established when that might occur, one approach would be to start serious emission reductions 50 years in advance of that time, under the assumption that it would take 50 years for emission reductions to be translated into temperature reductions.

3.2 Is the net impact of climate change negative today?

3.2.1 The short answer is that we don't know that it is negative today. If we look at the broad picture, in part because of the various activities that contribute to climate change—energy use, agriculture and forestry—the U.S. has never been more prosperous and better-off. Moreover, despite some year-to year variations, the productivity of climate-sensitive sectors of the U.S. economy, in particular, agriculture and forestry, has been increasing steadily.

3.2.2 Empirical evidence does not support the claim that floods and droughts are more frequent or severe today than they have historically been.

3.2 The IPCC (Climate Change 2001: Impacts, Adaptation, and Vulnerability, pp. 940-944) suggests that the net global impact of climate change might well be positive for globally averaged temperature increases in the range of 1-2^{o}C. Given that the negative impacts of climate change are expected to hit developing countries first, this suggests that for the United States, at least, net impacts might be positive for a greater amount of temperature change.

3.3 Other analyses for the United States suggest that the net impacts of the U.S. should be positive at least for a 2.5^{o} C increase, but might be slightly negative if it increases by 5.0^{o} C (Mendelsohn 2000).

When might the net impacts for the U.S. become negative?

According to the Global Historical Climatology Network (GHCN), for an area approximating the 48 contiguous states,[1] the average temperature for land surface area has increased at a rate of 0.05^{o} C per decade between 1880 and 2005, and 0.27^{o} C per decade between 1979 and 2005. Assuming, arbitrarily, that the 1979-2005 trend is a better indicator for future temperature trends for the U.S. land surface, then over the next 80 years, the temperature will increase by 2.2^{o} C. This suggests that the temperature will not have increased sufficiently to result in net negative impacts for the U.S. by 2085. [See Figures at the back.]

Further, let's assume that it takes 50 years to turn over our energy infrastructure from start to finish once a decision to do so has been made. In that case, we have at least until 2035 [= 2085 minus 50 years] until we launch any kind of an emission reduction campaign.

A corollary to the above result is that <u>emission reductions occurring before then will reduce the net well-being of the U.S. population for the next eight decades and more</u>.

So we should ask you to clarify and justify why the United States should undertake GHG reductions between now and at least 2035.

It might be argued that global climate change affects not just the United States, but the rest of the world. And we agree. But then we must ask whether reducing GHG emissions is the best way to improve the well-being of the globe and/or reduce global damages associated with the impacts of climate change. This will be addressed below.

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[1] This is for a quadrangle between 133.1W, 49.0N, 48.5W and 22.7N.

An alternative method of determining when the impact of climate change on the United States might turn negative would be to rely on model results to estimate the future increase in U.S. land surface temperature. However, there is no *a priori* reason to favor the use of model data unless it can be shown that the model(s) have reproduced relatively accurately past U.S. surface temperatures and precipitation patterns at scales that are relevant to impacts analysis, that is, at the scale of watersheds.

We await such a model analysis. Until that time, extrapolating from empirical data of the recent past is probably the most robust approach to projecting future climate change.

Regarding the assumption that reducing climate change is the most effective and efficient method of reducing damages due to climate change, and that such reductions are urgently needed:

In the short to medium term it is, in fact, more efficient and effective to reduce the vulnerability of society to climate-sensitive hazards and threats that could be exacerbated by climate change. The fundamental reason for this is that climate change will exacerbate existing problems rather than create new ones (Goklany 2003, 2005a). These include problems that have frequently been invoked to argue for immediate reductions in GHG emissions – problems such as agricultural production, hunger, malaria and other climate-sensitive diseases, coastal flooding, water shortages and threats to ecosystems (see, e.g., King 2004)

This allows us to compare the future contribution of climate change to these problems and compare them with contributions from other sources. Such comparisons based on studies sponsored by the UK government and which have used the UK Met Office's general circulation models (GCMs) in conjunction with various IPCC scenarios indicate that for the most part, the global contribution of climate change through 2085 to each of the above hazards and threats is relatively small compared to the contribution of non-climate-change related factors. The exception to this rule is the case of coastal flooding. However, it is much more efficient to deal with problems related to coastal flooding through measures that would protect the coast than through reductions in GHG emissions. The details of these studies can be found in Goklany (2003, 2005a, 2005b).

Therefore, reducing climate change will, for the most part, only reduce the smaller portion of the problems due to hunger, malaria, water stress, coastal flooding, and habitat loss, whereas efforts to reduce the vulnerability to these problems more generally would address the whole problem. As an example, consider malaria. Measures to reduce vulnerability to malaria via, say, a malaria vaccine would reduce the threat to the entire population at risk of malaria in 2085 (estimated at 9,100 million people), whereas halting climate change at its current level would at most reduce the population at risk by 323 million. That is, the latter approach would address about 3.2 percent of the population at risk, whereas the former approach would address 100 percent of the problem.

In addition, the former approach is a lot cheaper. The UN Millennium Project estimates that the current toll of malaria can be reduced by 75 percent through currently available methods at a cost of $3 billion per year. On the other hand, $3 billion will have virtually no effect on GHG emissions, and even less on the population at risk of malaria because it takes decades for such reductions to be manifested as temperature reductions, and, by contrast, the Kyoto Protocol, despite its ineffectiveness, would cost the world around $160 billion per year.

Moreover, the technologies, systems and institutions that would be needed to address current vulnerabilities to malaria would be very useful in combating malaria tomorrow, whether it is caused by climate change or a non-climate-change-related factor.

One can go through a similar exercise for each of the impacts noted above and show that, at least through 2085 (i.e., the foreseeable future), one can get far more risk reduction by investing $10-20 billion per year in reducing vulnerability to existing climate-sensitive problems that are urgent than through reductions in GHG emissions (Goklany 2005c).

Such an approach, moreover, would help developing nations surmount some of the major hurdles they face in their quest for sustainable economic development. This is because the climate-sensitive risks noted above, i.e., infectious and parasitic disease, hunger, water stress, etc., are among the most critical hurdles they face in that quest.

I. The findings contained in the WP are based on speculation, short-term data and are not necessarily supported by the latest science. We believe that all speculation should be checked against empirical data, preferably long term data, because one should not make long term policy based on short term data.

In the following we will focus on the details of the first finding, which we will show lack empirical support from long term data.

Sea Level Rise

Church's (2005) latest estimates are that sea level will rise by about 34 cm (or 13 inches) by 2100. By contrast, portions of coastal Louisiana could lose up to one foot of elevation over the next decade (NOAA National Geodetic Survey, July 2003). Moreover, estimates of the global cost of protecting against a 50cm rise by 2100 have been estimated by the IPCC's SAR to be in the range of $1 billion per year. We suspect that your program, whatever it is, could more than pay for this amount.

There is indeed a lot of media attention on the melting of the Greenland and Antarctic Ice Sheets. However, we would recommend going beyond the headlines and digging into the studies that have been quoted.

Regarding the claim that Greenland and West Antarctic Ice Sheets are melting:

1. We believe it's an error to focus on one or a portion of an ice sheet, e.g., the Greenland or the West Antarctic ice sheets. It is important to look at all ice sheets at once, as Zwally et al. (2005), for instance, have done. Moreover, changes in the combined ice sheet mass should be viewed in the broader context of the other factors contributing to changes in sea level.

2. An excerpt from the abstract of the Zwally et al. follows:

> Changes in ice mass are estimated from elevation changes derived from 10.5 years (Greenland) and 9 years (Antarctica) of satellite radar altimetry data from the European Remote-sensing Satellites ERS-1 and -2. For the first time, the d*H*/d*t* values are adjusted for changes in surface elevation resulting from temperature-driven variations in the rate of firn compaction. The Greenland ice sheet is thinning at the margins (-42 ± 2 Gt a^{-1} below the equilibrium-line altitude (ELA)) and growing inland ($+53 \pm 2$ Gt a^{-1} above the ELA) with a small overall mass gain ($+11 \pm 3$ Gt a^{-1}; -0.03 mm a^{-1} SLE (sea-level equivalent)). The ice sheet in West Antarctica (WA) is losing mass (-47 ± 4 Gt a^{-1}) and the ice sheet in East Antarctica (EA) shows a small mass gain ($+16 \pm 11$ Gt a^{-1}) for a combined net change of -31 ± 12 Gt a^{-1} ($+0.08$ mm a^{-1} SLE). The contribution of the three ice sheets to sea level is $+0.05 \pm 0.03$ mm a^{-1}.

This translates into a sea level rise of 5 millimeters per 100 years, or less than 0.2 inches per 100 years. Even if Zwally et al are off by a factor of 100, net SLR from these three ice sheets does not pose "substantial risks" as your "findings" contend.

How fast is the Greenland Ice Sheet melting, if at all?

1. Based on a 9-year long record, Rignot and Kanagaratnam (2006) estimate that the Greenland Ice Sheet is losing 224 cubic kilometers (km^3) per year. That means it will take another 5,400 years to melt the remaining 1,200,000 km^3 in that ice sheet, which might raise sea level by 23 feet (7 meters). That is a

sea level rise of 0.05 inches per year. While this might be a catastrophe for the ice sheet in the long run, it's not clear why it should be viewed as a socio-economic catastrophe.

2. However, Rignot and Kanagaratnam's estimate is based on a composite of empirical data for glacier melt and model data for the ice sheet.

3. Based on 11-years worth of satellite altimetry data, that is, empirical data, Johannessen et al. (2005) estimate that there is net growth of the Greenland ice sheet (despite melting on the margins).

4. Zwally et al. (2005), based on 10.5-years worth of satellite data, also find that the there is a net accumulation of ice in Greenland.

5. Given the year-to-year variations in climatic parameters, I submit that the length of the record is insufficiently long to draw any conclusions one way or another from any of these studies, and would caution against any rush to develop long-term policy on short-term data. But there is nothing in any of these papers that suggests any of this melting is: (a) catastrophic for humanity, or (b) outside of the bounds of natural variability.

6. We also submit that conclusions based on empirical data are likely to be more robust than estimates relying partly on model data.

How fast are the Antarctic Ice Sheets melting, if at all?

1. As noted, focusing on just the West Antarctic ice sheet is misleading.
2. A recent paper by Velicogna and Wahr finds that Antarctic Ice Sheets are losing 152 km^3/year of ice, which is equivalent to 0.4 mm/year of global sea level rise.

3. This paper is, however, based on 34 months of data.

4. Moreover, given the various caveats in the paper itself regarding the basic technique used to estimate the volume of ice melt, it's not clear how robust is their methodology. See CO_2 Science (2006).

5. Nevertheless, if one accepts the Velicogna and Wahr results as valid, these two ice sheets are raising sea level by 1.6 inches per century.

6. Zwally et al. (2005) suggest that the Antarctic Ice Sheets are contributing 0.08 mm per year to sea level rise, which would be equivalent to 3.2 inches per century (to which one should add/subtract changes due to the Greenland Ice Sheet). Such a rate of increase does not constitute "substantial risk".

We should also note the following regarding temperature and sea ice trends in the Antarctic:

1. Turner et al. (2005) in the International Journal of Climatology indicate that:

> "Although there is no evidence of Antarctic-wide warming or cooling over the last 40 to 50 years…there has been a broad-scale change in the nature of the temperature trends between 1961–90 and 1971–2000. Ten of the coastal stations …have long enough records to allow 30-year temperature trends to be computed for both these periods; of these, eight had a larger warming trend (or a smaller cooling trend) in the earlier period." [p. 293]

This is not consistent with global warming.

2. J. Liu et al. 2004. Interpretation of recent Antarctic sea ice variability. GRL 31, L02205, doi:10.1029/2003GL018732.

> “Overall, the total Antarctic sea ice extent (the cumulative area of grid boxes covering at least 15% ice concentrations) has shown an increasing trend (4,801 km2/yr). This is smaller than previous studies have suggested, and is not statistically significant. However, the total Antarctic sea ice area (the cumulative area of the ocean actually covered by at least 15% ice concentrations) has increased significantly by 13,295 km2/yr, exceeding the 95% confidence level. The upward trends in the total ice extent and area are robust for different cutoffs of 15, 20, and 30% ice concentrations (used to define the ice extent and area).” [p. 2]

Floods and Droughts

The discussion paper claims that the frequency and severity of floods and droughts are increasing. Let’s examine the data.

With respect to global floods:

Kundzewicz et al. (2004), based on an examination of 195 worldwide hydrological time series of maximum annual flow, report that:

> “The report presents results of a study on change detection in world-wide hydrological time series of maximum annual river flow. The study is limited to a subset of discharge time series held at the Global Runoff Data Centre (GRDC) in Koblenz, Germany (GRDC, 2003). Out of more than a thousand long time series made available by GRDC, a dataset consisting of 195 long series of daily mean flow records was selected, based on such criteria as length of series, topicality, lack of gaps and missing values, adequate geographic distribution, and priority to smaller catchments. The analysis of 195 long time series of annual maximum flows, stemming from the GRDC holdings does not support the hypothesis of general growth of flood flows. Even if 27 cases of strong, statistically significant increase have been identified by Mann-Kendall’s test, there are 31 decreases as well, and most (137) time series do not show any significant changes. Some regional patterns have been observed. However, a caution is needed, that in case of strong natural variability, a weak trend, even if it exists, cannot be detected by statistical testing.” [Emphasis added.]

With respect to floods in the US:

Several studies suggest that, in general, North American flooding tends to become both less frequent and less severe when the planet warms, although there have been some exceptions to this general rule.

Fye et al. (2003), based on annual proxies of moisture status provided by 426 climate-sensitive tree-ring chronologies, indicated that the greatest 20th-century wetness anomaly across the United States was a 13-year period that occurred in the early part of the century, when it was considerably colder than it is now. They also indicated a wetter period of 16 years from 1825 to 1840 and a prolonged 21-year wet period from 1602 to 1622, both of which occurred during the Little Ice Age, when, of course, it was colder still.

Ni et al. (2002) developed a 1000-year history of cool-season (November-April) precipitation for each climate division in Arizona and New Mexico, USA, using tree ring chronology. They found that several wet periods comparable to the wet conditions seen in the early 1900s and post-1976 occurred in 1108-20, 1195-1204, 1330-45 (which they denominate "the most persistent and extreme wet interval"), the 1610s, and the early 1800s, all of which wet periods are embedded in the long cold expanse of the Little Ice Age, which is clearly revealed in the work of Esper et al. (2002).

Brown et al. (1999) analyzed various properties of cored sequences of hemi-pelagic mud deposited in the northern Gulf of Mexico for evidence of variations in Mississippi River outflow over the past 5,300 years. This group of researchers found evidence of seven large mega-floods, which they describe as "almost certainly larger than historical floods in the Mississippi watershed." In fact, they say these fluvial events were likely "episodes of multi-decadal duration," five of which occurred during cold periods similar to the Little Ice Age.

Noren et al. (2002) employed several techniques using sediment cores extracted from thirteen small lakes distributed across a 20,000-km2 region in Vermont and eastern New York to identify the frequency of storm-related floods. Their results indicated, in their words, that, “the frequency of storm-related floods in the northeastern United States has varied in regular cycles during the past 13,000 years (13 kyr), with a characteristic period of about 3 kyr.” Specifically, they found there were four major peaks in the data during this period, with the most recent upswing in storm-related floods beginning "at about 600 yr BP [Before Present], coincident with the beginning of the Little Ice Age." In addition, they note that several “independent records of storminess and flooding from around the North Atlantic show maxima that correspond to those that characterize our lake records [Brown et al., 1999; Knox, 1999; Lamb, 1979; Liu and Fearn, 2000; Zong and Tooley, 1999].”

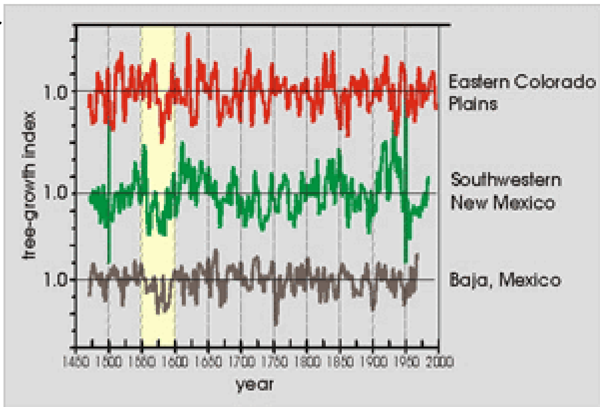
In addition, Shapley et al. (2005), using a variety of proxy records for a 1000-year period for the Northern Great Plains, found that that neither floods nor droughts have gotten more frequent and/or more severe during the current warm period.

With respect to US droughts:

Long-term records indicate that the droughts of the past 100 years are well within the bounds of natural variability. The following is information taken from: *North American Drought: A Paleo Perspective,* by the staff of the NOAA Paleoclimatology Program, 12 November 2003, available at http://www.ncdc.noaa.gov/paleo/drought/drght_data.html

The Last 500 Years

A gridded network of tree-ring reconstructions of Palmer Drought Severity Index (PDSI) for the last 300 years has been used to create a set of maps of the spatial pattern of PDSI for each year, back to AD 1700. This set of maps enables an assessment of the droughts of the 20th century compared to droughts for the past 300 years. An inspection of the maps shows that droughts similar to the 1950s, in terms of duration and spatial extent, occurred once or twice a century for the past three centuries (for example, during the 1860s, 1820s, 1730s). However, there has not been another drought as extensive and prolonged as the 1930s drought in the past 300 years.



Longer records show strong evidence for a drought that appears to have been more severe in some areas of central North America than anything we have experienced in the 20th century, including the 1930s drought. Tree-ring records from around North America document episodes of severe drought during the last half of the 16th century. Drought is reconstructed as far east as Jamestown, Virginia, where tree rings reflect several extended periods of drought that coincided with the disappearance of the Roanoke Colonists, and difficult times for the Jamestown colony. These droughts were extremely severe and lasted for three to six years, a long time for such severe drought conditions to persist in this region of North America.

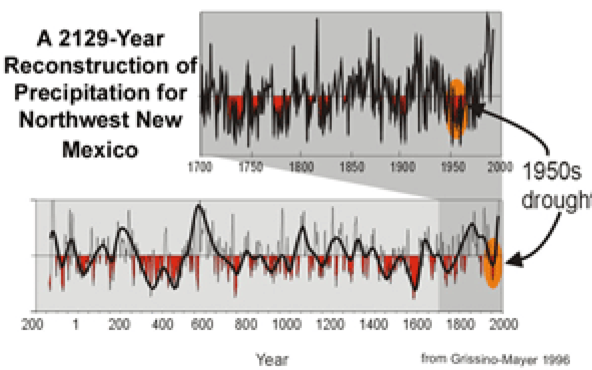
Coincident droughts, or the same droughts, are apparent in tree-ring records from Mexico to British Columbia, and from California to the East Coast (See examples in the graph to the right). Winter and spring drought conditions appear to have been particularly severe in the Southwestern U.S. and northwestern Mexico, where this drought appears to have lasted several decades. In other areas, drought conditions were milder, suggesting drought impacts may have been tempered by seasonal variations.

The Last 2,000 Years

When records of drought for the last two millennia are examined, the major 20th century droughts appear to be relatively mild in comparison with other droughts that occurred within this time frame. Even the 16th century drought appears to be fairly modest, when compared to some early periods of drought. Although there are still a few high resolution (offering data on annual to seasonal scales), precisely dated (to the calendar year), tree-ring records available that extend back 2,000 years, most of the paleodrought data that extends back this far are less precisely dated and more coarsely resolved. These records reflect periods of more frequent drought, or drier overall conditions rather than single drought events, so it difficult to compare droughts in these records with 20th century drought events. However, the 20th century can still be evaluated in this context, and we can assess whether parts of the 20th century or the 20th century as a whole were wetter or drier than in the past with these records. The studies below illustrate some paledrought records for the past 2,000 years:

A 2129-Year Reconstruction of Precipitation for northwestern New Mexico
*Source***:** Henri Grissino-Mayer. 1996. A 2129-year reconstruction of precipitation for northwestern New Mexico, U.S.A. Pages 191-204 in J. S. Dean, D. M. Meko, and T. W. Swetnam, editors. *Tree Rings, Environment and Humanity*. Radiocarbon, Tucson, AZ

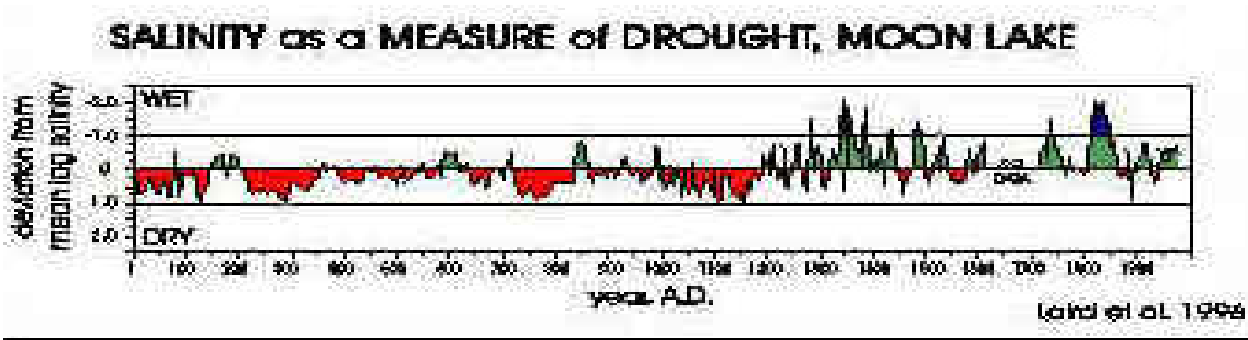
Extraordinarily long-lived trees have been found growing in the El Malpais volcanic field of west-central New Mexico. The oldest living tree found at this site is a 1274-year old Douglas-fir, the oldest known tree of this species in North America. Samples from this and other old trees were augmented with subfossil wood, from logs and remnants of living trees, to generate a 2129-year tree-ring chronology extending back to136 BC.



Not only are the El Malpais trees old, but they are sensitive to precipitation and thus, excellent recorders of past rainfall. The chronology was used to reconstruct annual precipitation for northwestern New Mexico for the past two millennia, as shown in the graph on this page (the units are standard deviation from the mean). The top graph shows the reconstruction for the years 1700-1992. The 1950s drought was the most severe drought 20th century drought in this region, but when viewed in the context of the past three centuries, it appears to be a fairly typical drought. However, when the 1950s drought is compared to droughts for the entire reconstruction, back to 136 BC (bottom graph), it is clear that the 1950s drought is minor relative to many past droughts. A number of the severe droughts of the past spanned several decades, the most recent occurring in the second half of the 16th century.

Greater Drought Intensity and Frequency before A.D. 1200 in the northern Great Plains.
Source: Laird, K. R., S. C. Fritz, K. A. Maasch, and B. F. Cumming. 1996. Greater drought intensity and frequency before A.D. 1200 in the Northern Great Plains, U.S.A. Nature 384:552-554.

Fluctuations in lake salinity records, inferred from fossil diatom assemblages, were reconstructed for Moon Lake, North Dakota. Different kinds of diatoms favor more or less saline conditions, so an analysis of the types of diatoms found in the layers of lake sediment can be used to reconstruct variations in salinity. The changes in salinity are a reflection of drought variability in this region over the last 2000 years. The sediments were sampled at an average interval of 5.3 years, and radiocarbon and lead- 210 dates provided age control. The gap in the record from the early 17th to the early 18th century is due to loss of data from the core drying out.



One of the notable features about this paleodrought proxy is the abrupt shift in the data about A.D. 1200. This record raises the possibility that different, relatively stable drought "states" or "modes" may have existed over the past 2,000 years. The graph on the right shows a marked shift between high and low salinity conditions around A.D. 1200, suggesting a change in general drought characteristics about this time. Before A.D. 1200, this record indicates regular and persistent droughts, specifically pronounced during the years of A.D. 200-370, A.D. 700-850, and A.D. 1000-1200. In sharp contrast with the period prior to ca. A.D. 1200, the current mode of drought appears relatively wet and free of truly severe drought.

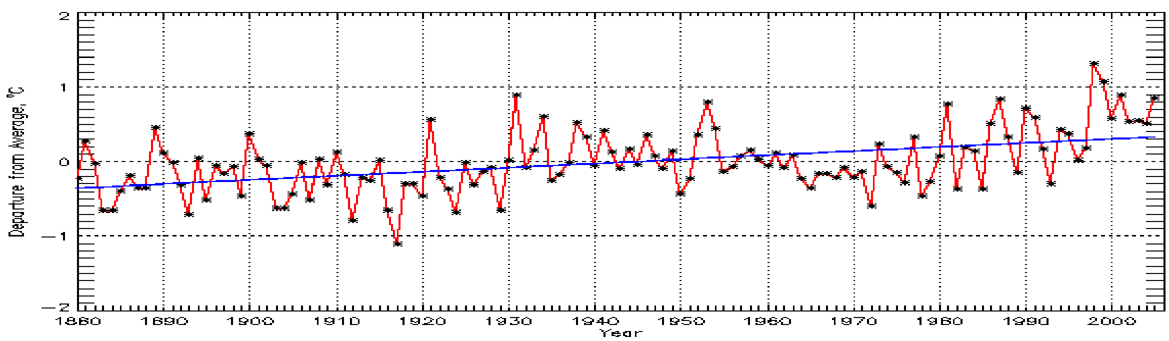
These research results suggest that the current mode of drought variability encompassing the modern instrumental record is not representative of the full range of drought variability displayed in this record. It is important to note that similar lake sediment records for this part of the northern Great Plains do not all reflect the shift in variability at AD 1200, so additional investigations are needed to confirm such a shift. The mechanisms for major shifts in drought variability in the past are not understood, and currently, there is no explanation of a climatic process that could lead to a mode change.

With respect to Extreme Events in General

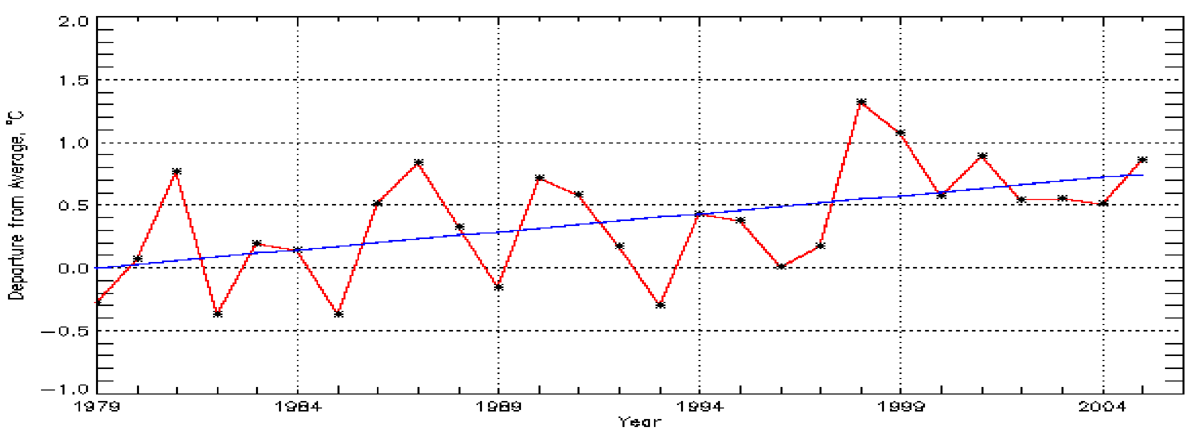
Average deaths per year from climate and weather related events (i.e., drought, extreme temperature, famine, flood, slides, wave/surge; wild fires, wind storm) declined worldwide by over 95 percent between the 1930s and 2000-2003, while death rates declined overall by 98.5 percent [Goklany 2005c, based on EM-DAT, the OFDA/CRED database; this database probably missed a number of events in the early years, which suggests an even stronger downward trend. If famines are excluded then both deaths and death rates peaked during the 1920s]. Similarly, long term data from the United States on cumulative deaths and death rates due to hurricanes, floods, lightning and tornados show that they peaked in the 1970s, and have since declined by over 50 percent for deaths, and 64 percent for death rates [Goklany 2000 and personal communication].

Similarly analysis of property losses due to hurricanes and floods for the United States indicate that, once the increase in the amount of property at risk due to increased population and wealth are factored out, the trend in losses are not upward. [Goklany 2000, Pielke et al. 2005, Pielke and Landsea 1998, Downton et al. 2005.]

Time series: Temperature   January-December ,   1880 - 2005
GHCN Land Surface Data Set
Selected Region: Longitude: -133.1 to -48.5   Latitude: 49.0 to 22.7
Trend: 0.05°C/decade   Significance: 100.0%



Time series: Temperature   January-December ,   1979 - 2005
GHCN Land Surface Data Set
Selected Region: Longitude: -133.1 to -48.5   Latitude: 49.0 to 22.7
Trend: 0.27°C/decade   Significance: 98.3%



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