

Climate Change: Local Data and Local Analysis

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1. Introduction

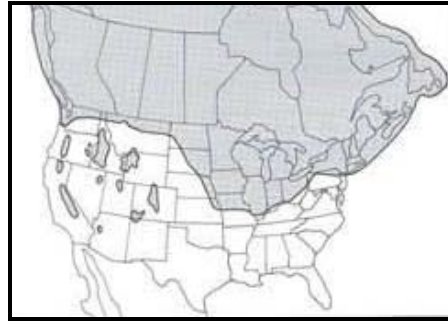
This white paper review was done for the period of 1881 to 2012 (part year) for local Spokane area data supplied by the National Oceanic and Atmospheric Administration (NOAA) and the National Weather Service Forecast Office (NWSFO). While there is much debate about global warming, I decided as an amateur researcher to bring the topic home to our local area by examining over 130 years of locally acquired data.

It should be noted, I know of no researcher or scientist that disputes “*climate change*”, as in disputing that the climate across the earth goes through periods of warming and cooling. Indeed the earth’s climate fluctuates regionally and as a whole depending on the period examined. Two aspects of climate change that are disputed are; (a) whether “*man-made*” (*attributed to human activities*) climate change is occurring and (b) is the planet getting hotter in recent times?

Everybody will remember Al Gore’s movie production “Inconvenient Truth,” which brought the issue of climate change into the minds of many, but it was indeed far more of an exploitive theatrical production than a documentary. There are many hard to quantify factors that make assigning man-made global warming to climate change, but there is also some perceived common sense aspects that make the casual and scientific observer support a man-made global warming concept. Common sense says if we drive millions of vehicles and build tens of thousands of large power plants and factories, they release large amounts of heat into the atmosphere. Thus we reason all this hot emissions air, must increase the surrounding air temperature.



Image from www.nature.nps.gov

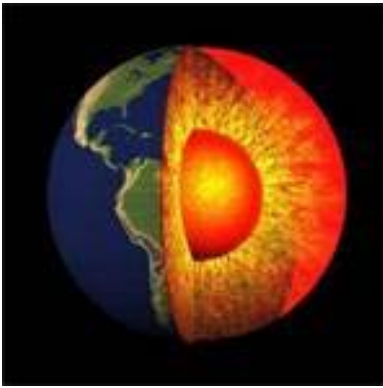


Yet it cannot be ignored that the earth has been through several ice ages and the glaciers have receded and melted long before man was driving cars or building factories. Indeed the regional area surrounding Spokane consisting of northern Idaho, Montana, and Eastern Washington, was covered by glaciers at one time. Glaciers melted back then so it is not unreasonable to expect them to melt now.

And we must keep some very obvious scientific truths in mind while we look at this topic. While man can influence aspects of our planet and environment, our planet is very large and very resilient. The earth will in fact be here long after we are gone. If we step back and look at this in evolutionary terms, or tens of millions of years in time, it is man who will go extinct, not the earth. In one context, what ever man does will be absorbed by the earth, not the other way around.

The earth’s water content has a big influence on climate change activity. The earth is covered 70% by water and it is relatively hard to heat water by changing the temperature above the water. We boil water by applying the heat under the pan rather than applying the heat over the top of it. Try boiling water using heat above the pan rather than under it to get an idea how difficult it is. Yet, we can slowly raise or lower the temperature of water when heat or cold surrounds it.

Also our atmosphere is also incredibly vast compared to human activity and we must consider that our atmosphere borders the boundary of space which is in a vacuum and over 400 deg F below zero. But we also have to consider that the earth's core is estimated to be between 7-10,000 deg F. We live in an area between two temperature extremes that monumentally exceed the punitive effects that our human activity can produce regarding heat or cold.



Earth's very hot core



Earth's very cold atmosphere

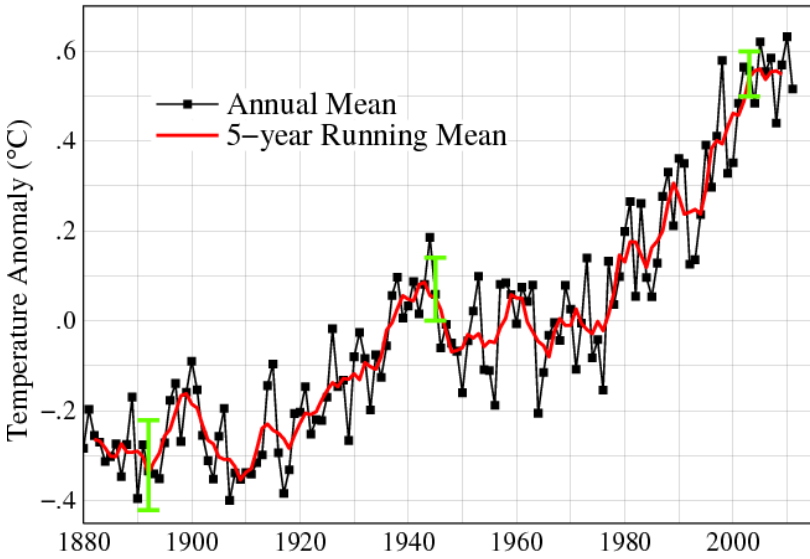
While Al Gore presented data (*presented in a very unscientific way and meant to dramatize*) regarding a correlation between Co₂ (*carbon dioxide*) and the historical average temperature, Al neglected to inform viewers that Co₂ is released from water as it warms (*in addition to changes in pH, pressure, and agitation*) all of which are huge components in understanding Co₂ and the quantity measured in the atmosphere or ice formations. While Al stated; "*the debate is over*", not only is the debate not over, Al seemed to have decided for the scientific community that the chicken came before the egg. Al Gore's position was rising Co₂ caused the temperature increase, rather than warming temperatures caused Co₂ to be released from the planets waters and ice formations and science is solidly established with the later position.

Many other factors also play into the climate change equation, the most talked about (*and becoming more regulated*) are what is known as "greenhouse gases" such as Co₂, methane and others. However one of the largest factors that block and or trap heat is ever present in our atmosphere but rarely mentioned by those supporting man-made global warming. We call them *clouds*. You've never heard Al Gore talk about clouds when he promotes global warming in his traveling road show. Other factors are; solar sun activity, volcanic eruptions both above and under the sea, fluctuations in deep ocean currents, measurement uncertainty, disputes on previous chemically measured Co₂ levels verses what ice samples reveal, the number of temperature measurement stations added and/or replaced in calculating an average temperature and several other factors. As you will see in this analysis, there are many, many ways to analyze data, each of which can yield different or conflicting results.

The point is, in the midst of some very controversial global based discussions on this topic I will show you the reader many ways data reveals answers which will both support and deny global warming but all the while focusing just on our local Spokane area data. We will set aside the question as to whether any warming is man-made warming and just look to see if warming is confirmed on its own merits alone.

The overriding question might be, is it hotter in the Spokane area? But I'll answer that question by asking and answering a dozen other questions, which at face value produce answers that often contradict each other. In the end, you'll be asking yourself, which is the best question to ask and you understand why the answer to the man-made global warming question remains elusive or is directly dependent on what question you base the theory on.

Global Land–Ocean Temperature Index

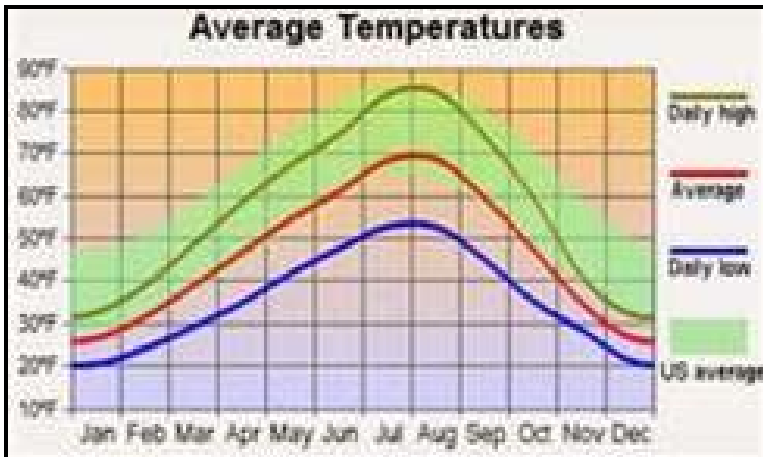


Example graph depicting global warming for the same 130 year period I'll be examining.

(not regional Spokane data)

(Note the magnified scale range of just 1.2 deg C and that the last 12 yrs or so shows no heating.)

NOTE: The accuracy of the data is entirely based on the NOAA website provided data which was not validated by other sources. Questioning data is a healthy aspect of research; however I did not perform or examine the data but took it at face value.



Spokane temperature averages

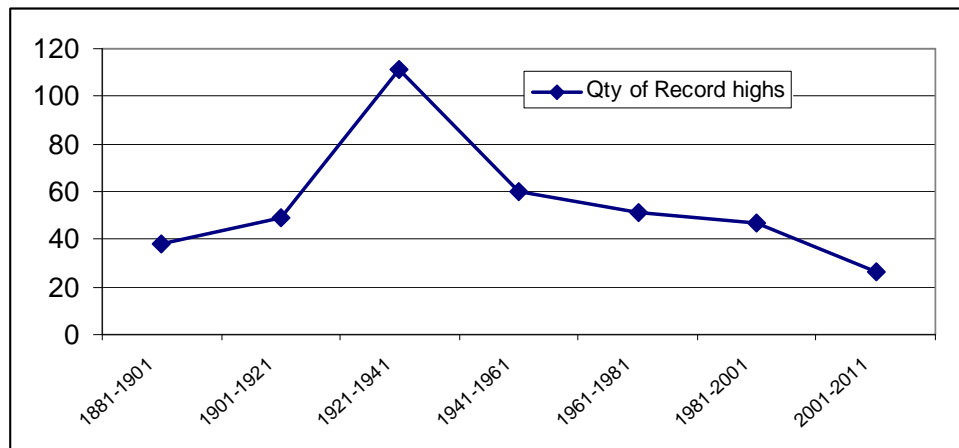
2. Analysis Results

I'll focus the examination of the respective data by asking a question to frame the analysis, then provide the related data to reveal a numeric answer to the question followed by a brief textual answer to each question. I'll also keep a running tally of answers supporting either regional cooling or regional warming. Remember, we are looking at 130 yrs of local data only.

I'll be using the following 7 types of Spokane temperature data: (1) historical record highs, (2) historical record lows, the (3) historical record low highs (*the daily high only got to a high temp of "x" during that day meaning the high for the day was a low value, or not that warm*), (4) the historical record high lows (*the daily low only got to a low temp of "x" during the day, meaning the low for the day was a high value, or not that cold*), (5) the historical August average monthly temperature, (6) the historical January average monthly temperature, and (7) the composite value of the August & January average monthly temperatures combined.

1. Are there more record high temperatures recorded in recent times than in prior 20 year periods?

- 111 – Highest qty of record highs in a 20 yr period occurred in the period 1921-1941
- 60 – Next highest qty of record highs in a 20 yr period 1941-1961
- 26 – Recent qty of record highs 2001 to 2011 (*half of a 20 yr period 52 if doubled*)



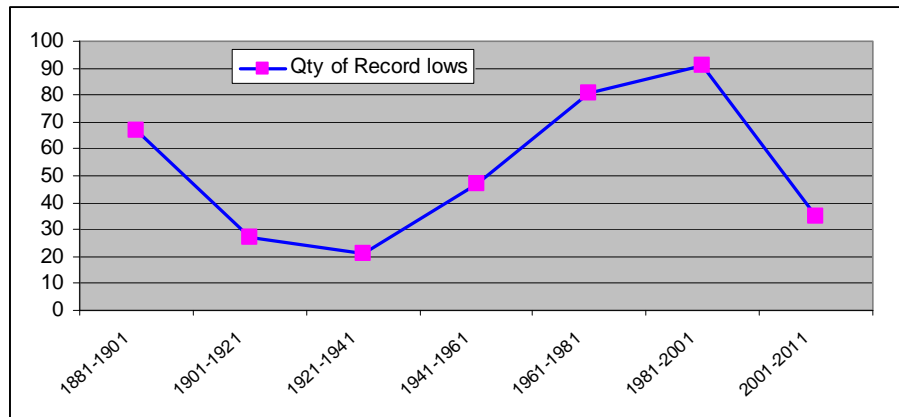
Answer: NO Recent warming not established, previous 20 yr periods of record high temps had many more record highs than in recent times. Note the period of the most record highs was known as the “dust bowl period” that occurred during the period of 1932-1936.
{SCORE - warming 0, no change or mixed result 0, cooling 1}

2. Are there more record low temperatures recorded in recent times than in prior 20 year periods?

91 – Qty of low temps in a 20 yr period 1981-2001

81 – Qty of low temps in a 20 yr period 1961-1981

35 - Recent qty of record lows 2001 to 2011 (*half of a 20 yr period, 70 if doubled*)



Answer: YES Recent warming not established, rather records show higher volumes of record lows in the last 50 yrs than previous 20 yr periods.

{SCORE - warming 0, no change or mixed result 0, cooling 2}

3. What and when were the extreme top recorded >105 F high temperatures of all time recorded and do they occur in recent times?

108 F was recorded 1928 and 1961

106 F was recorded 1934 and 1931

Answer: NO Recent warming not established, more extreme record highs set prior to 1960's

{SCORE - warming 0, no change or mixed result 0, cooling 3}

4. What and when were the extreme top recorded < -20 F low temperatures of all time recorded and were they in more recent times?

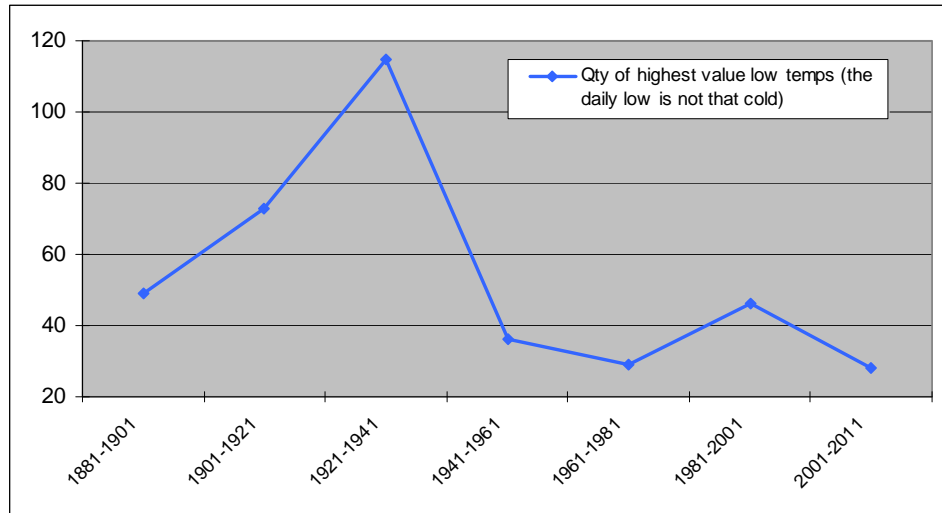
-20 to -25 F was recorded 2x1996, 1985, 1978, 1979, 2x1968, 1964, 3x1950, 2x1899, 2x1890, 1888, 3x1883,

-26 to -35 F was recorded 2x1888,1883,

Answer: NO Recent warming not established. Mixed results indicate roughly 11 extremes since 1950, and 11 prior. However, 3 of the historical really extreme colds were prior to 1900's.

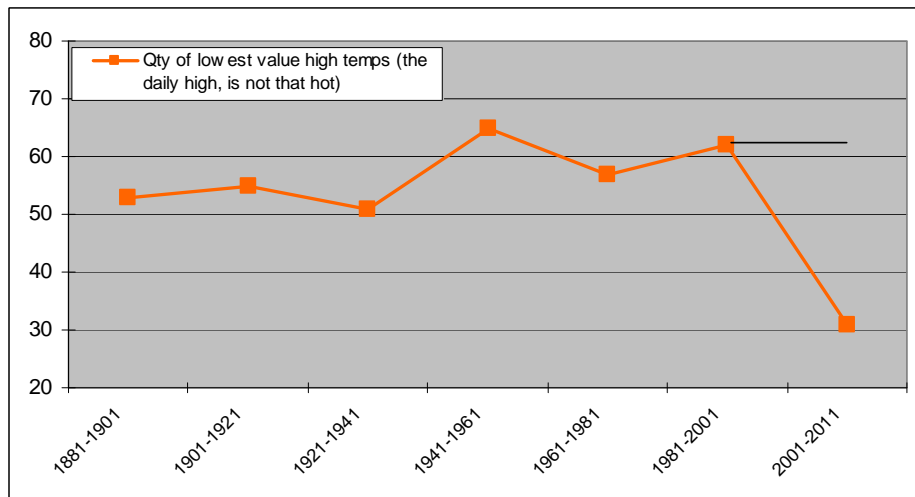
{SCORE - warming 0, no change or mixed result 1, cooling 3}

5. In recent times has there been a greater quantity of record high low temps (the daily low temp was not that cold) using 20yr period comparisons?



Answer: NO Recent warming not established, there have been historically more record low high temperatures in the past than in recent periods. We've had less daily lows that were record high values. {SCORE - warming 0, no change or mixed result 1, cooling 4}

6. In recent times has there been a greater quantity of record low high (the daily high temp was not that hot) using 20yr periods comparisons?



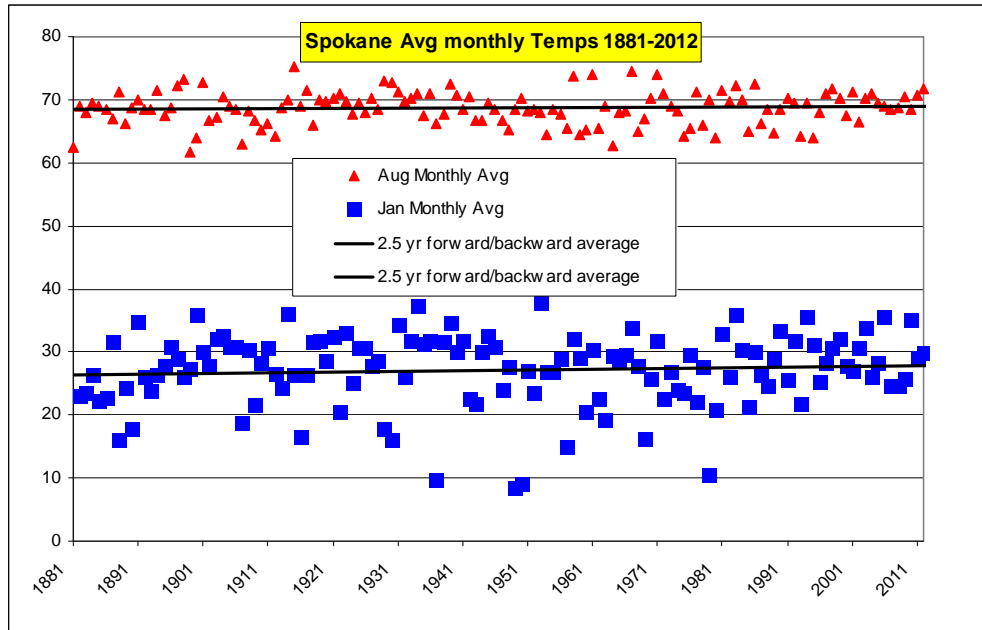
Answer: YES Recent warming not established. There have been historically more record high low temperatures than in previous periods. We've had more daily highs that were record low values. {SCORE - warming 0, no change or mixed result 1, cooling 5}

7. Is the recent 20 yr average August monthly temperature hotter than the 130 yr average August temperature?

68.7 F August average temperature over 130 yrs
 69.1 F August average temperature since 1990

Answer: YES Recent warming established, the average August temperature is .4 F warmer than the historical average.

{SCORE - warming 1, no change or mixed result 1, cooling 5}



Questions 7 & 8 are reflected in this chart

8. Is the recent 20 yr average January monthly temperature colder than the 130 yr average January temperature?

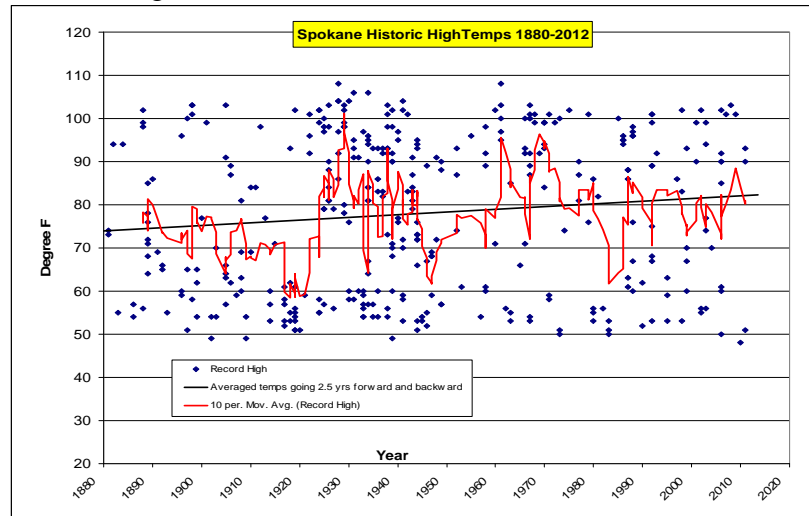
27.2 F January average temperature over 130 yrs
 29.3 F January average temperature since 1990

Answer: NO Recent warming established, the average January temperature is 2.1 F warmer than the historical average. Note that the spread of either the Aug highs and Jan lows is compacting and getting tighter to the black average line. This “implies” less average monthly temperature swings than have occurred historically.

{SCORE - warming 2, no change or mixed result 1, cooling 5}

9. Are the recent record highs, trending higher than the historical average of recorded highs?

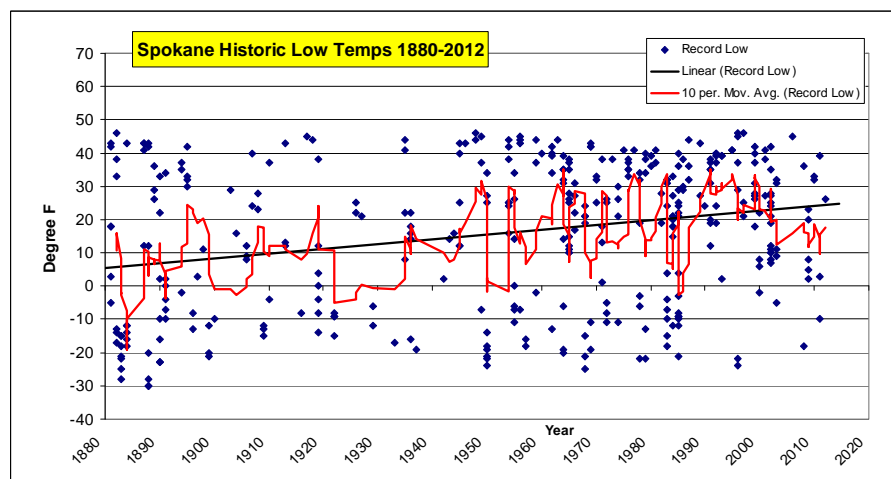
77.9 F Average record high value for the last 130 yrs
 78.1 F Average recent record high 1990 to 2011



Answer: YES Recent warming established, the recent average record highs are .2 F warmer than historical record average. The results, which are calculated somewhat contrast the chart. We see a bunch of record points in the 30's and 40's, while it is sparse looking. The black trend line shows a clear upward trend, while the red moving average trend appears to be flattening. Also, while this question is in a manner that it's answer supports warming, the answer is revealed with record highs that are not as hot as in the 30's and 40's. While subtle, the quantity of data points above the 80F degree line, is more than the points below, thus the slightly upward trend is observed.
 {SCORE - warming 3, no change or mixed result 1, cooling 5}

10. Are the recent record lows, lower than the historical average of recorded lows?

16.0 F Average record low value for the last 130 yrs
 23.5 F Average recent record low 1990 to 2011



Answer: NO Recent warming established. The recent average record lows are 7.5 F warmer than the historical record average. The chart reveals that while we have a greater frequency of record lows, they are concentrating above the 10F line since the 1950's, with many concentrating above the 20F line. This causes the trend lines to rise up to meet them.

{SCORE - warming 4, no change or mixed result 1, cooling 5}

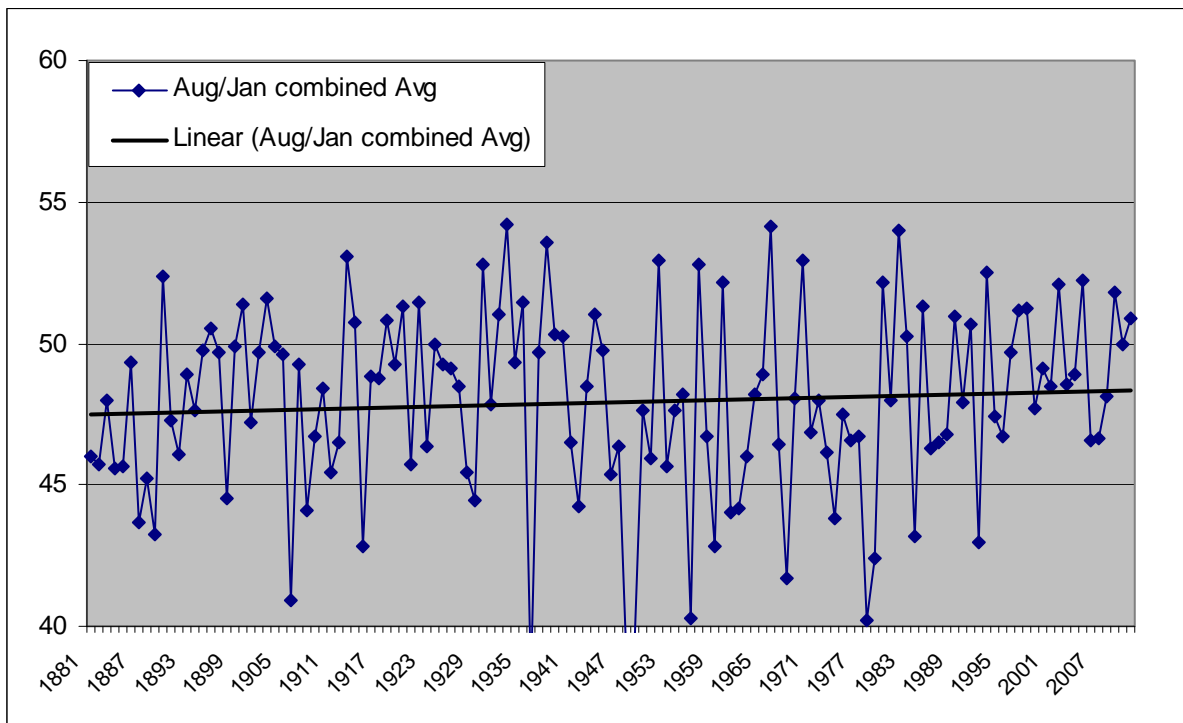
11. Observing the combined aspects of 10 yr period for; record highs, record lows, low end highs, and high end lows, is regional warming supported?

10 yr periods	Qty of Record highs	Qty of Record lows	Qty of lowest value high temps	Qty of highest value low temps
1881-1891	20	52	36	16
1891-1901	19	21	22	35
1901-1911	24	14	30	36
1911-1921	26	13	27	41
1921-1931	48	9	27	56
1931-1941	68	12	25	63
1941-1951	42	23	20	15
1951-1961	18	24	48	22
1961-1971	33	49	35	14
1971-1981	19	36	29	16
1981-1991	24	55	43	27
1991-2001	23	44	20	19
2001-2011	26	36	28	28
median	24	24	28	27
avg	30	30	30	30

Answer: NO Recent warming not established. By using the colors (red/orange for hotter & blue shades for cooler) the table clearly shows more defined periods of cooler activity and less hotter activity.

{SCORE - warming 4, no change or mixed result 1, cooling 6}

12. If we combine the average August and January hot & cold averages to create a combined summer/winter value, does it support warming?



Answer: YES Recent warming established. In looking at the graph and inserting a linear bar, we see that the calculated temperature has risen, we also see that the width of the calculated value is narrowing becoming more concentrated, towards the upper end of the scale, however, without exceeding previous periods of higher values.

{SCORE - warming 5, no change or mixed result 1, cooling 6}

Summary

So we have, 5 points supporting increased warming and 6 showing cooling with 1 mixed reading. At this point statistical minded researchers would perhaps begin adding a weight to each question giving greater importance to one result over another to further work toward a conclusion.

I prefer to leave my readers with what I consider to be the raw results. If you focus on one question over another, you will yield the answer you perhaps desire, but if you ask many questions, the results may be less clear, but being less clear may be the correct answer.

Taking this back to the real world of those of us who live in this area who might be approached and asked the question; *“Do you believe in global warming?”* I’d answer; *“Yes, just as I believe in global cooling and that our climate changes up and down over time.”*

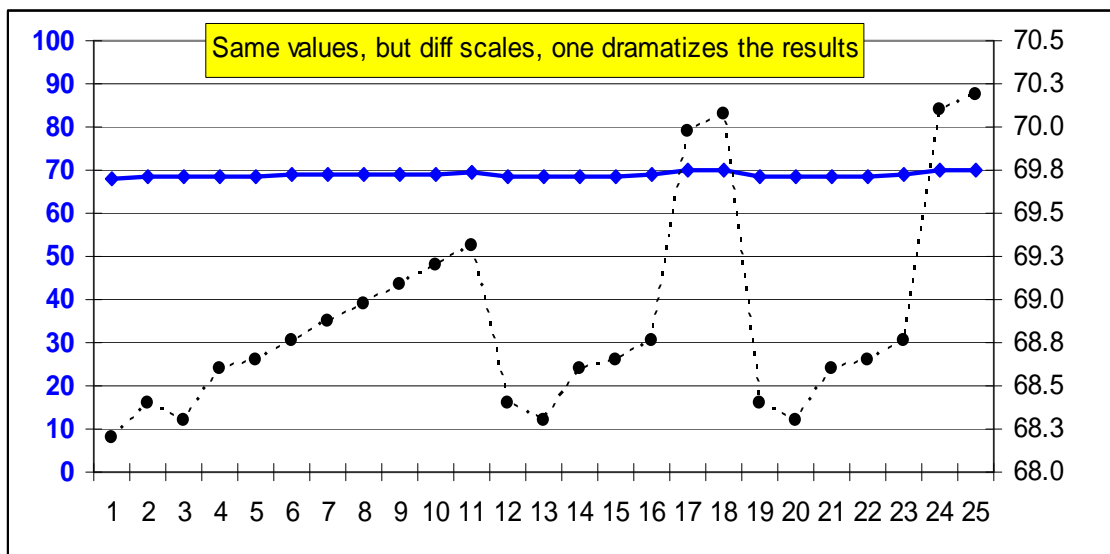
I’d then explain, that our local data does not clearly support our local region is either warming or cooling over the last 130 years. Since the data does not support we are warming or cooling but is conflicting, the next question; *“Do I believe in man-made global warming?”* is irrelevant, for the data does not support the base hypothesis of global warming let alone man-made warming.

The Data

While the Al Gore (actor, politician) and some in the scientific community want to say the discussion on climate change is over, there are a host of reasons why it is not anywhere near over, nor should it ever be. Looking at our local data you would have to agree the topic is conflicting at best, but certainly not definitive.

1st off, science never ends the discussion of any topic, including such things as gravity. Science should never take the position “*it’s done*”, science must always be open and willing to examine data that challenges or supports any theory. Thus anyone making such a claim is something other than a credible researcher and neither are they using the whole of scientific theory. One clear example of the nutty professor gone awry is famous professor and cosmological theorist Stephen Hawking who ventured way-out beyond credible science to proclaim: “there is no God.” Stephen is a man to be admired for his contributions to science however even he would have to quantify that he is scientifically incapable of making such a claim. To be able to make such a claim, one would have to say, they either have all knowledge, or science so fully mature and never more able to better, and thus now fully knowing, which of course it is not. Stephen like Al Gore, is entitled to an opinion, but as with most scientists, researchers and politicians, truth may not be found in what they say.

What many people do not consider is that the scientific community is filled with bias, collusion, political and financial prejudice. Such examples are abounding in recent history. The best of researchers present all aspects of any research, however research very often involves the need for grants and money, and frequently the research gets biased by either skewing data, manipulating it, or neglecting to include other pertinent information. Even in our local politics, I see audiences swayed by slick presentations that fail to ask all the questions or present just a portion of the facts.



How to make chart variations seem more extreme than what we experience normally

We want our readers to understand the various ways we could manipulate the data using just the Spokane “record high” temperatures. Data can be buried or magnified by the scale used to display it. Every chart produced by those promoting global warming uses a very blown up scale, in other words magnifying the movement beyond perhaps the amount of “uncertainty”. Uncertainty is the amount of potential error that could be present in the values. If the uncertainty value for temperature collection is say 5%, that means that any single recorded record high temperature might actually be 2.5% lower or higher than the value provided. A 100 F record high could actually be 97.5 F or 102.5. There are a variety of ways that uncertainty can be a higher or lower amount.

The following tables are an example of the entire data set I used to produce the results in the previous pages. As stated on the first page, all of the data was extracted from the NOAA website.

Date	Record High	Year	Date	Record Low	Year	Date	Lowest High Temp	Year	Date	Highest Low Temp	Year
3/30	74	1881	2/17	-5	1881	7/31	62	1881	6/6	63	1882
3/31	73	1881	7/13	43	1881	9/28	48	1881	7/21	72	1882
6/5	94	1882	8/15	42	1881	10/12	38	1881	8/9	71	1882
11/28	55	1883	10/13	18	1881	10/13	36	1881	11/28	45	1883
6/18	94	1884	10/14	18	1881	10/14	40	1881	11/30	46	1883
2/6	54	1886	11/18	3	1881	10/16	41	1881	10/29	48	1885
12/13	57	1886	1/28	-17	1882	11/18	22	1881	12/7	42	1887
2/16	56	1888	2/18	-14	1882	2/17	8	1882	1/29	40	1888
8/21	99	1888	2/19	-13	1882	2/18	15	1882	5/31	62	1888

Portions (above and below) of the data set provided by NOAA for the Spokane area.

Year	Avg Aug Monthly High	Avg Aug Monthly Low	Year	Jan avg Monthly High	Jan avg Monthly Low	Aug Monthly Avg	Jan Monthly Avg	Aug/Jan combined Avg
1881	76.6	48.3	1881			62.5		
1882	84.5	53.5	1882	30.0	15.9	69.0	23.0	46.0
1883	83.2	52.5	1883	31.0	16.1	67.9	23.6	45.7
1884	85.1	54.0	1884	33.6	19.2	69.6	26.4	48.0
1885	83.2	54.6	1885	30.4	14.0	68.9	22.2	45.6
1886	83.2	53.6	1886	30.9	14.8	68.4	22.9	45.6
1887	81.9	52.1	1887	38.1	25.2	67.0	31.7	49.3
1888	88.0	54.6	1888	23.7	8.3	71.3	16.0	43.7
1889	80.9	51.5	1889	30.3	18.2	66.2	24.3	45.2
1890	83.1	54.1	1890	24.2	11.6	68.6	17.9	43.3
1891	83.9	55.9	1891	39.8	30.0	69.9	34.9	52.4
1892	82.0	54.8	1892	32.6	19.8	68.4	26.2	47.3
1893	83.8	53.0	1893	29.6	17.8	68.4	23.7	46.1
1894	86.8	56.0	1894	31.9	21.0	71.4	26.5	48.9
1895	82.8	52.2	1895	33.5	22.0	67.5	27.8	47.6

END