

FORECAST MEAN GLOBAL TEMPERATURE TRENDS FROM 2009 TO 2050

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Introduction & Methodology: Using the latest version of the Holton Solar-Ocean-CO2 Statistical Computer Model (HSOCM4), an attempt is here made to determine approximate Global Temperature Trends for the period 2009 to 2050. This type of forecast is a little difficult to make, because the initial climate input factors have to be forecast for that period ahead, to enable the Global Temperature Trend to be then forecast (i.e. a forecast is used to make another forecast). However, having said that, all of the climatic input data used in this HSOCM4 model are shown from past Historical climatic data, to run in reasonably easy to discern regular cycle patterns lasting several decades, i.e. The Pacific Ocean Decadal Oscillation Index (PDO), Atlantic Ocean Oscillation Index (AMO), & Solar Magnetic AA Index (AA).....And therefore, a reasonable forecast value of each can be determined with a reasonable degree of certainty well into the future. While the other used climatic variable in the model, CO2, shows levels that are historically in a fairly linear upward direction, so this CO2 value also can be reasonably easily forecast.

These 4 variables mentioned above, AA, AMO, PDO & CO2, were placed in a model equation. This HSOCM4 model equation was formulated according to the amount of each input climatic variable that gave the best HSCOM4 result (when compared with past Global temperature data from 1901 to 2008). The final equation for the HSCOM4 had an approximate value for each climatic input component as: Solar Magnetic Lagged AA Index 45%: AMO Ocean 29%: PDO Ocean 21%: and CO2 5%. The Solar magnetic AA value being run with a mean lagged value of 0 years to minus 15 years. A lagged mean AA value not only captures a full Solar Cycle of approximately 11 years, but also has a lag time required to pass the Solar-Magnetic changes, onto Ocean heating changes, and then further onto Global Temperature changes. The time taken to transfer the heat energy through the earth's transfer system would be expected to occur over a period of up to 15 years.

GRAPH 1 BELOW: The Solar-Magnetic AA value is a measure that I have selected, because, with a lag time it accurately reflects many (or even most) of the Global Temperature Trace changes shown over the 1901 to 2008 period. It is also one of the few solar values readily available with accurate records back to the turn of last century. Also, recent studies have shown that solar-magnetic activity has a big influence on Stratospheric & Atmospheric temperature changes, and has an effect on ozone levels as well.

See e.g.

- <http://www.springerlink.com/content/ru1t47p5rj0lu856/>
- <http://www.sciencedirect.com/science LongURL>
- <http://www.sciencedirect.com/science LongURL2>

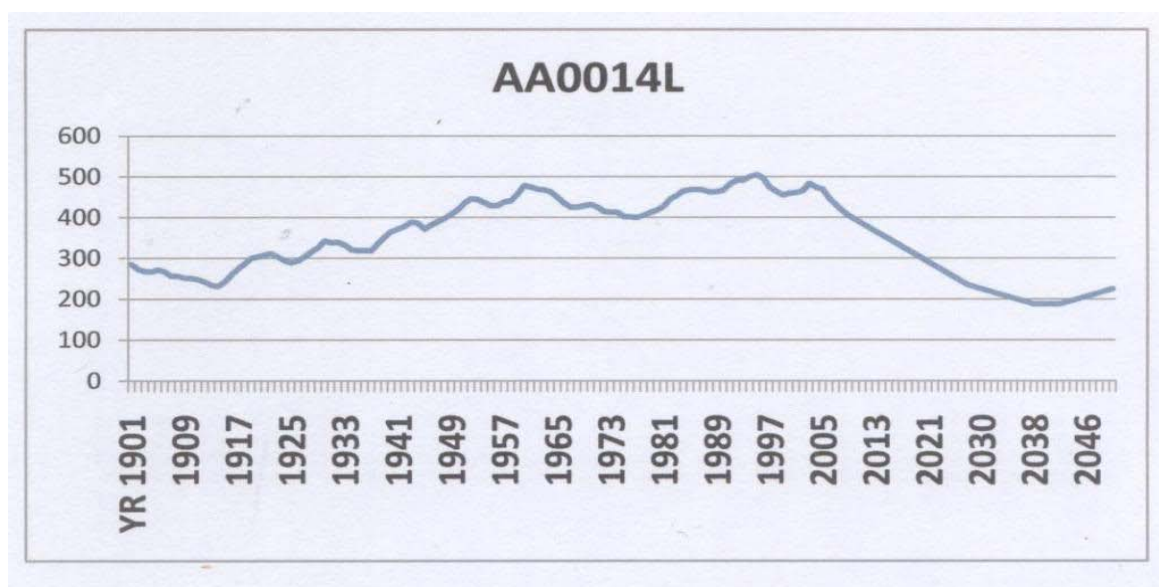
See the 1901 to 2008 Actual lagged AA values below, together with Forecast lagged AA values from 2009 to 2050, are formulated to reflect the current very long and very low solar-magnetic transition period from Solar Cycle 23 to Solar Cycle 24 that is now occurring.

See eg.

- <http://wattsupwiththat.com/2009/03/12/nasa-solicits-new-studie-on-the-current-solar-minimum/> &
- <http://wattsupwiththat.com/2009/03/15/cosmic-ray-flux-and-neutron-monitors-suggest-we-may-not-have-hit-solar-minimum-yet/>

...And the forecast AA lagged values are also reflecting the many predictions of a continuing low solar-magnetic output for Solar Cycles 24 and 25. See e.g.

- <http://wattsupwiththat.com/2009/02/12/using-the-ap-magnetic-index-prediction-for-solar-cycle-24-amplitude-prediction/>
- <http://wattsupwiththat.com/2008/06/02/livingston-and-penn-paper-sunspots-may-vanish-by-2015/>

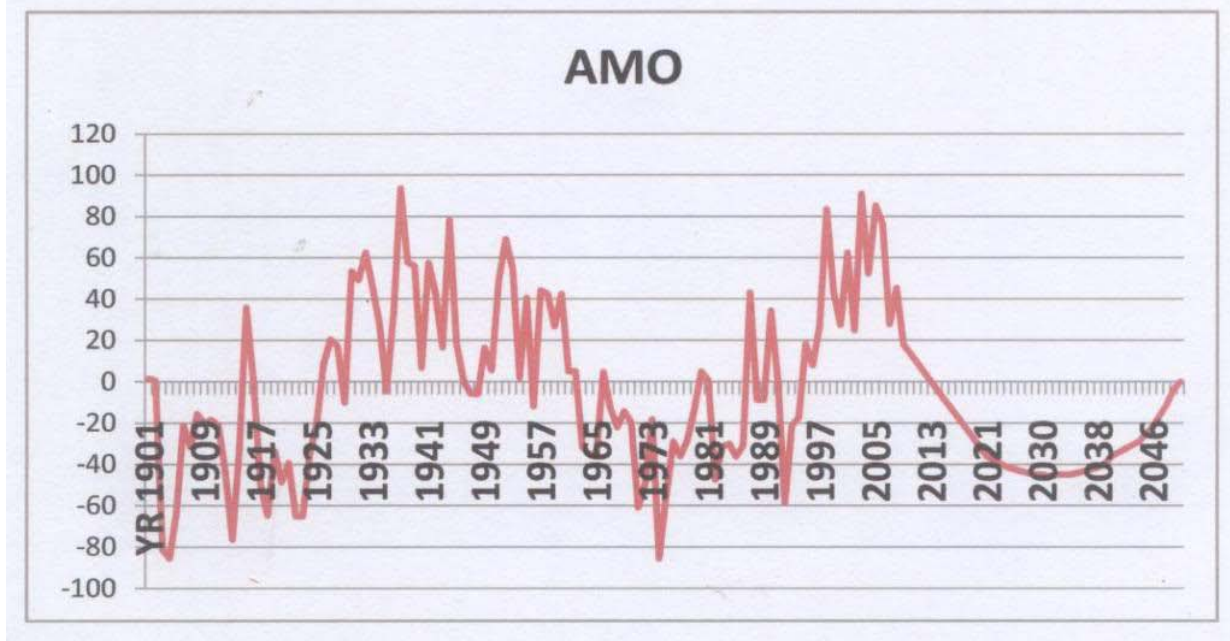


GRAPH 2 BELOW: The AMO Ocean Index value is a measure of ocean temperature changes that regularly occur in long "many decadal" cycles in the North Atlantic Ocean. These AMO values have been shown, from the historical 1901 to 2008 data, to correlate very well with Global Temperature trends. As this AMO ocean area is one of the main ocean temperature formulation areas of the world ocean current systems, it is no wonder that the AMO has a large effect on Global Mean Temperatures.

See AMO/PDO explanations & effects Links e.g.

- [LongURL](#)
- <http://icecap.us/docs/change/OceanMultidecadalCyclesTemps.pdf>

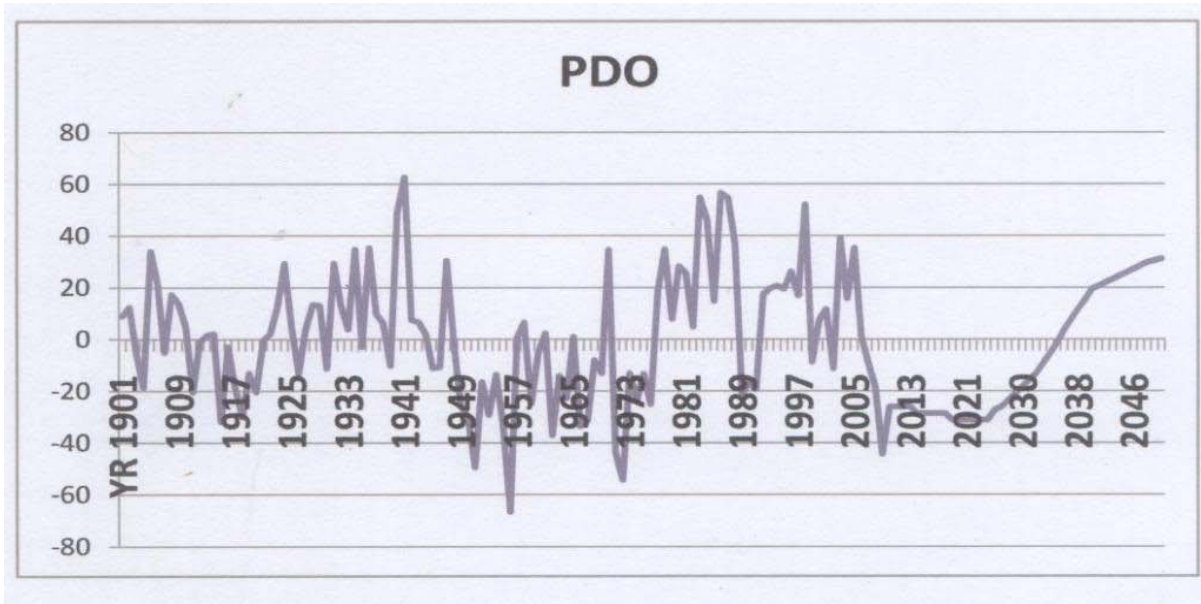
See the 1901 to 2008 Actual AMO values below, together with Forecast AMO values from 2009 to 2050, formulated reflecting the current expected below Average AMO Temperature Cycle, which appears to have started to commence in the North Atlantic Ocean during late last year 2008 & early this year 2009.



GRAPH 3 BELOW: The PDO Ocean Index value is a measure of changes that regularly also occurs in long "many decadel" cycles in the North Pacific Ocean.

These PDO values have been shown, from the historical 1901 to 2008 data, to correlate very well with Global Temperature trends. As this PDO Ocean area is one of the main ocean temperature release areas to & from the Arctic Ocean, and also is linked strongly to the well known El Nino-La Nina cycles and their frequency, it is not surprising that the PDO also shows good correlations with global temperature trends

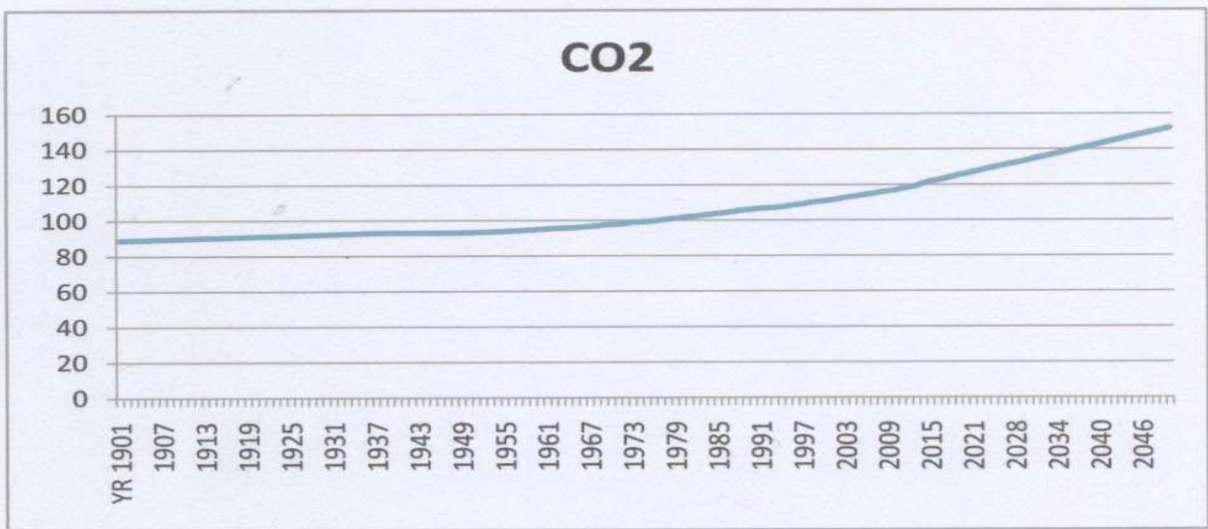
See the 1901 to 2008 Actual PDO values below, together with Forecast PDO values from 2009 to 2050, formulated reflecting the current and expected Below Average PDO "Cool Temperature" Cycle that has in the past few years commenced in the North Pacific Ocean.



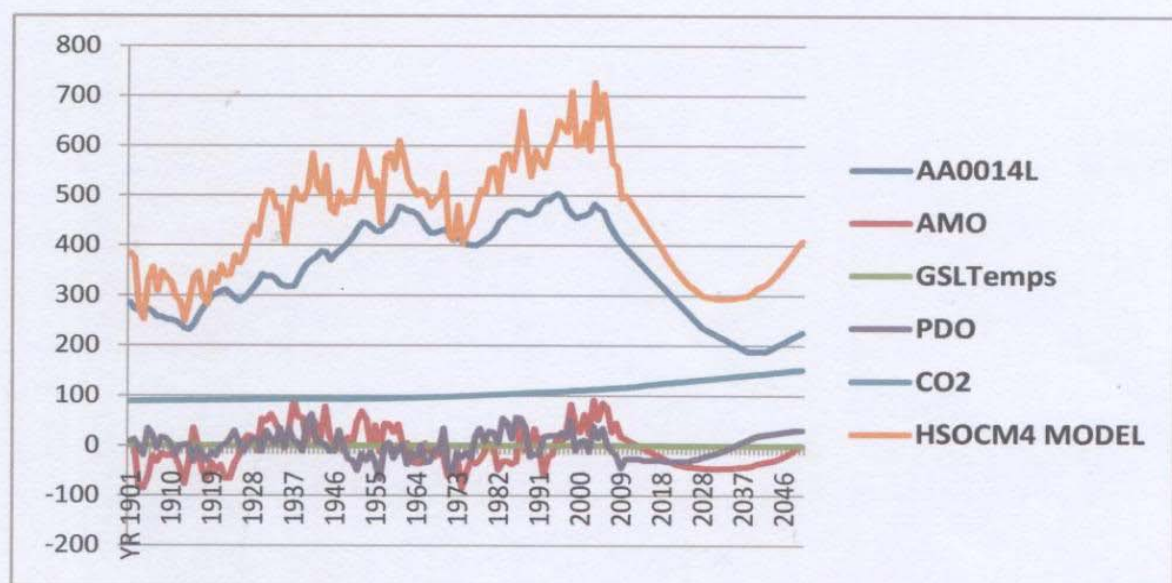
GRAPH 4 BELOW: The CO₂ value (calculated in parts per million) is a measure of the main Green-House Gas, and its changes of quantity found in the earth's atmosphere. The mean yearly CO₂ value has been going upwards at a linear trend right through the 2001 to 2008 period, but since around 1980 it has increased at a slightly higher rate than pre-1980 values.....Assumedly due to either (1) man-made industry emissions increase, or (2) gradually rising world ocean temperatures allowing more CO₂ to escape from the world's oceans, or (3) a combination of the two.....which is more likely the result. The link between CO₂ levels & Global Temperatures is a very controversial one! On its own CO₂ will not, from current CO₂ levels upwards, cause any particularly significant increase in Global Mean Temperature. However, IPCC reports state that, with the aid of computer model programs, which add several positive feed-backs to the CO₂ increase (e.g. increased water vapour added to the atmosphere as global temperatures warm), more heat is kept within the earth's atmosphere. Therefore Global Temperatures will increase significantly in the future.....from these added positive feed-backs. Then again, other scientific persons & science organisations believe that several opposing negative feedbacks will counteract the positive feed-backs that may occur from any increasing CO₂ levels (e.g. more water vapour will mean more clouds and albedo levels will increase, lowering global temperatures. See <http://www.bbso.njit.edu/Research/EarthShine/>) I would agree with the latter opinions on CO₂ Global Mean Temperature effects.

Apart from the above opinion on the effects of CO₂ on Global Mean Temperature, I strongly believe (and much available science literature will back me up on this), that most, if not all, IPCC used Global Mean Temperature Forecasting Models, do not allow sufficiently in their formulation for any Solar-Magnetic and AMO/PDO Ocean changes...And it is these latter mentioned 3 climatic variables, which are in my opinion (and the opinion of many others), the 3 strongest climatic influences on Mean Global Temperature trends.

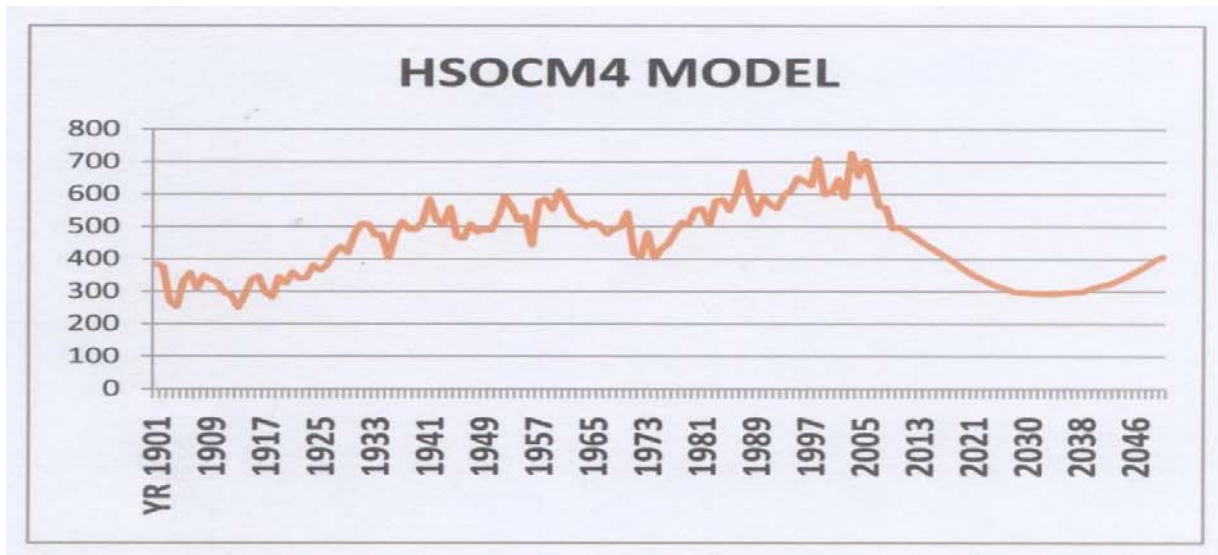
See the 1901 to 2008 Actual CO₂ values below, together with Forecast CO₂ values from 2009 to 2050, formulated reflecting the current continuing upward linear CO₂ increase levels.



GRAPH 5 BELOW: The actual & forecast values used for each of the climatic input values are shown in the graph below, together with the HSOCM4 model produced from the numerical addition of these climatic input values. It can be seen clearly that the AA magnetic input is the highest input used at 45% of the total 100% value of the HSOCM4 model values. The AMO comprises 29%, and the PDO 21%. While the CO2 value is at a much lower 5% level, which is the level which, when added to the Solar-Ocean part of the HSOCM4 model, correlated best...And, this low value for CO2 "temperature effectiveness", would also be around the expected very approximate basic science related "temperature effectiveness" value of CO2 on Global Mean Temperature trends (i.e. Without the IPCC quoted computer model positive feed-backs added on).



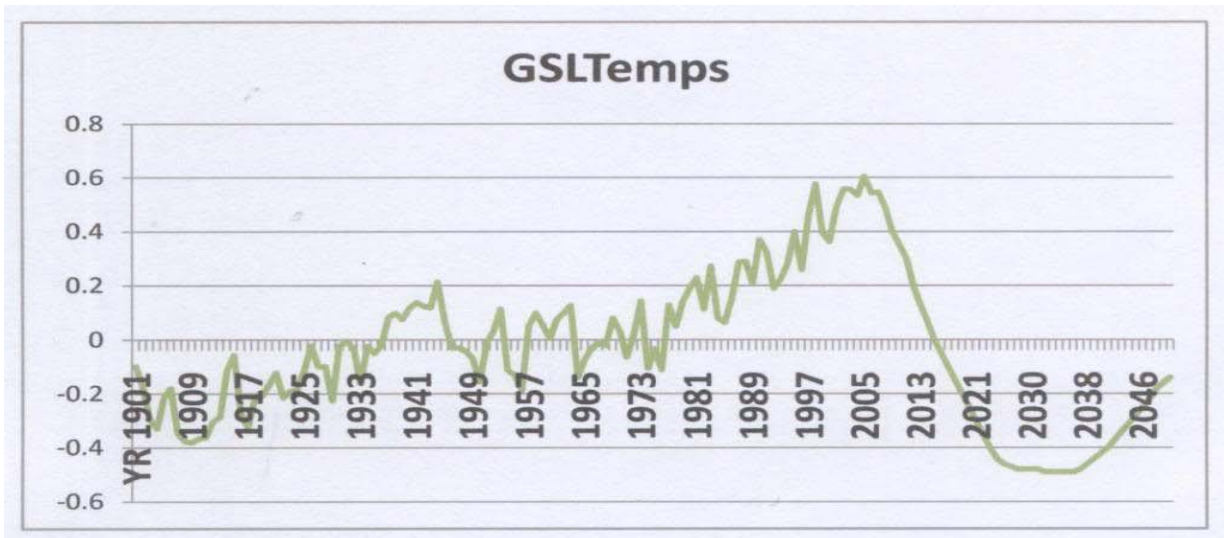
GRAPH 6 BELOW: The actual & forecast HSOCM4 values can be more clearly seen when shown on their own, as in the graph below.



FORECAST RESULTS OF GLOBAL TEMPERATURE TRENDS FROM 2009 TO 2050 AS CALCULATED BY HOLTON WEATHER HSOCM4 MODEL

GRAPH 7 BELOW: Past Global Mean Temperature values from 1901 to 2008, and the Forecast Global Mean Temperature Trend HSOCM4 values from 2009 to 2050, can be seen in the graph below.

Importantly, Mean Global Temperatures are expected, according to the HSOCM4 model, to continue the current slow cooling that has occurred since around the year 2002.....And, even more importantly, because of the Solar-Magnetic lag time period (Which is only just now starting , as are only at the start of the 15 year lag period which reflects the current "Solar Slowdown"), and the fact that the cooler ocean mode cycles of the PDO and AMO appear to have only just commenced.....Then cooling is expected to occur at a greater rate, by the HSOCM4 model shortly. And this is forecast to bring Global Mean Temperatures back to early last century values (i.e. 1901 to 1920 values).....or to even slightly lower Mean Global Temperatures than the 1901 to 1920 period, by around the 2016 to 2021 period of time. The Mean Global temperatures are then expected to stay down at these cooler levels until the end of the forecast period of 2050. Note however, that because of a forecast PDO and AMO cycle changes towards their next warmer cycles, a returning warming period of Global Temperatures is forecast to occur after around 2036-2041 onwards (Though Global Mean temperatures are still forecast to stay below the long term average until after the year 2050.)



Postscript to these New HSCOM4 Mean Global Temperature Forecasts:

I started formulating this HSOCM4 model by correlating the Historical Solar AA lagged Index with Historical mean Global Temperatures, and selected the best fit.....I then added an amount of the historical AMO Index which gained a further increase in the "Best fit" with the Historical Mean Global temperature data set.....And then, I did the same with the PDO values to obtain an even better correlation with Global Mean Temperatures. All of the above climatic input values, i.e. The historical Lagged AA Index; The AMO Index; and the PDO Index, could be seen to be clearly influencing the Historical Mean Global Temperature oscillations and trends from 1901 to 2008.....Even by just visually comparing them to the Historical Mean Global Temperature Trace the correlations are quite obvious!

On the other hand, CO₂, however, while it shows an upward trend, does not correlate with any of the Historical Mean Global Temperature oscillations depicted from 1901 to 2008.....And the facts are, that if one goes further back using proxy historical temperature records and compares them with proxy CO₂ records, CO₂ always follows Global temperature, with a lag of approximately 800 years for any warming trends. CO₂ also lags well behind in any cooling trends.....So one can only assume, in my opinion & the opinion of many scientists, that the CO₂ is being released from the oceans as the temperature warms and vice-versa when it cools. Therefore, the CO₂ component to the HSOCM4 model was added lastly to see if it would further increase the accuracy of the HSOCM4 model. And it was found to increase the correlation slightly with a small addition of CO₂. However, any further addition was found to decrease the correlation, and to hence make the HSOCM4 model less accurate as one would expect if CO₂ is not a big influence on Global temperature Trends.....However, to be fair, and to add a small caveat, it should be noted that the Mean Global Temperature predictions shown in the graph above, would show less Mean Global temperature cooling if a larger quantity of input CO₂ were added to the HSOCM4 Model i.e. If CO₂ did contain some extra positive feed-back mechanisms which overwhelmed any negative feedback mechanisms.....Though I strongly believe, and the HSOCM4 Model shows that this is not the case.

On the flip-side of the coin, however, it should be noted that there also the Mean Global Temperatures Forecast from the HSO CM4 model would become even lower if a "Maunder Minimum and Dalton Minimum Solar Type" situation develops, as forecast by some solar scientists.

Also, it is of note that the AMO cycle may take longer than I have predicted to fall into its cooler phase, and this would slow down a little, the steep Global Mean temperature cooling rate on the forecast graph.... but, this AMO slower effect would not significantly effect the end resulting forecast of a deep Global Cooling Trend until the year 2050.

Final Note; A lot of helpful further helpful related reading (with much information on how solar, oceans and CO2 affect Global Temperatures) can be found at <http://climaterealist.com/news.php?id=1302&linkbox=true>

(Please Note...That this is an independent, non peer reviewed research study, non-funded research study, and is provided purely for my & your interest.....However the results, I believe, are soundly based on my reading, understanding & interpretation of the current science.....And, I also believe that they are of high importance. and of great interest to all who live in these in these times of global change)

Acknowledgements of information sources:

- AA
Indices: ftp://ftp.ngdc.noaa.gov/STP/SOLAR_DATA/RELATED_INDICES/AA_INDEX/
- Global
Temperatures: <http://lwf.ncdc.noaa.gov/oa/climate/research/anomalies/anomalies.html>
- AMO Ocean Index data: <http://www.cdc.noaa.gov/Correlation/amon.us.long.data>
- PDO Ocean Index data: <http://jisao.washington.edu/pdo/PDO.latest>
- Other Ocean data: Calculated by Ian Holton of Holton Weather Forecasting
- SE Australian Rainfall data: Bureau of Meteorology, Australia
- CO2
data: http://www.junkscience.com/MSU_Temps/Warming_Look.htm and <http://cdiac.ornl.gov/trends/co2/sio-keel.htm> and several other sources.
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