Climate and Solar Flux

A new first principles perspective

A mechanism for the observed solar flux influence on the Arctic Ocean is described.

Solar Flare 7th December 2011 & Solar Magnetic Field Swirls: NASA 304 A° UV May 2012
An energetic sun has sunspots which release flares. Magnetic pattern distorts & migrates.

“ABC” over the southern ocean in eastward drifting air. Adelaide, approach Oct 2008
Browning (ABC) is due to aerosols. They nucleated water vapour essential for rain. However when they are in super abundance the condensate is dispersed as a rainless ‘smog’ instead of a rain cloud.

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Purpose of Article

This document is an attempt to provide a coherent technical overview of the Arctic’s role in the Earth’s climate mechanism and why it is dependent on the Sun’s energy output.

This is an especially critical matter with respect to understanding the likely impact of the forecast imminent massive reduction of solar output for years to come.

It is not the last word on this subject and much knowledge has yet to be acquired.

Above all we agree with Syd Levitus: “Models are not perfect. Data are not perfect. Theory isn’t perfect. We shouldn’t expect them to be. It’s the combination of models, data, and theory that lead to improvements in our science, in our understanding of phenomena.” (Levitus et al. 2000).

Petty unconstructive criticism has no place in any scientific endeavour, least of all in the complexity of climate science. Progress would be served if uncertainties in data were properly disclosed and critics would do well to propose constructive solutions to perceived issues.

So, if you don’t like the concept vision of climate in this article, build and present your own but it should be significantly smarter and more elegant.
FOREWORD

The influence of solar energy flux on climate change has been underestimated in climate models. The focus has been on the atmospheric influence of carbon dioxide emissions. The role of solar energy flux capture and its redistribution by ocean currents appears to have been largely ignored.

As geoscientists we are acutely aware that it took about 100 years of recording static geological features onto maps before the general theory of Plate Tectonics became accepted. Along the way many models were proposed and even today alternative continental reconstructions are being mooted.

The static nature of geology affords the opportunity of all historically documented knowledge remaining current unlike climate data which is transient. There is no “truly current” climate data set. The modern detailed scientific knowledge collection only began in about 1950, stimulated by the level of military and civilian use of the air space and by military interests in the marine environment. These culminated with the International Geophysical Year in 1959. The climate knowledge acquisition rate as stimulated by the CO₂ debate is enormous, and of course growing, but lacks a contextual framework.

This article introduces a new climate model that focuses on solar energy variance and the most likely mechanisms by which it influences the earth’s climate. The response to solar energy impinging on the earth’s surface is affected by convective processes and conductive mechanisms. Most of the surface materials absorb solar radiation and transform it into heat, a portion of which is re-radiated into the atmosphere where it is partially captured (commonly called the “green-house effect”).

The atmosphere consists of multiple complex, usually rapidly moving, circulation systems whereas by comparison the major ocean currents are tediously slow but travel thousands of km on an unrelenting consistent basis. Whereas, in climate terms, air is a more mobile and a faster transfer mechanism than oceans its thermal capacity is much less. The oceans cover 70% of the earth’s surface. The direct thermal influence of solar radiation is small beyond 30m depth. The warmer water being generated near the surface inhibits deep convective circulation. Ocean wave activity, combined with surface cooling due to wind and evaporation, ensures continuous energy exchange with the atmospheric circulation systems that occupy the lower 10-15km of the atmosphere.

Thermal energy of solar origin is thus ultimately delivered to the semi-independent circulation systems of the upper ocean and the lower atmosphere that re-distribute it across the planet. Climate cooling and warming are perpetually alternative, mutually exclusive, conditions which apply across both spatial and time scales. Earth history shows this has always been the case and will remain so.

Each day, as the earth rotates west to east the solar energy flux rises from zero, at dawn, to a maximum at the astronomic midday for the longitude and then back to zero at nightfall. Along any latitudinal strip the intensity of the energy being supplied at any point is dependent on the angle of Earth’s surface to the sun-direction. This varies with the geographic latitude and tilt of the earth’s axis to the plane of the solar system.

This energy pumping occurs every day and constitutes a daytime energy wave that is delivered pole to pole along each longitude line on a time base. For an observer on earth this rotationally induced energy wave pulse transits once in every 24 hours over a duration of ~10 hours (wavelength). It is a spatially pulsed energy supply to the world’s climate energy machine.

Sunspot cycles are long term representations of the strength of the solar energy flux. Sunspot cycles 21, 22 and 23 were very active which led to a sustained increase in solar energy delivery over the period 1980-2005 (25 yrs.). The impact of this increased solar energy on the earth’s climate was not instantaneous. The oceans have demonstrated an inertial redistribution response of ~10-15yr. to deliver this heat boost across the whole planet. The full impact began about 1990 and is now fading in 2012.

Sunspot cycle 24 is much less intense and it is therefore postulated that temperatures are likely to fall further as energy dissipates from the oceans. This article discusses these mechanisms in the context of the North Atlantic Ocean and the Arctic Region because this is where the recent warming phenomenon is strongly evident in the Northern Hemisphere.
Preface

A guide to understanding this article

Climate science, as presented in the public domain, has been so simplified as to conceal its great complexity.

Pursuit of simplicity has lead to misleading interpretations based on restricted portions of the available information. This is demonstrated by analysing Northern Hemisphere climate data, which revealed that relative temperature increases in recent time have not been uniform with respect to latitude.

The following article illustrates the complexities of climate that can only be addressed on a multi-disciplinary basis.

A probable mechanism linking equatorial heating and Northern Hemisphere warming is proposed but the last 20 years or so of high intensity data acquisition is not yet adequate for reliable prediction.

The article has been structured using the following macro-topics:

- General Climate Knowledge
- Analysis of World Temperature Data
- Description of Circulation Systems and Heat Flows
- Arctic Ice System
- Influence of Solar Energy Output
- Planetary Driver of Solar Energy Levels
- What is going to happen?

The import of this article ultimately rests upon successfully grasping the climate framework herein and its ongoing technical implications. This cannot be achieved by reading only once.
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1 INTRODUCTION

The climate data presented in the public domain has been and continues to be confusing and conflicting. The authors of this contribution lament the low level of scientific integrity being demonstrated in this instance and its consequent descent to the level of Parliamentary debate. The demonstrated failure of the peer review process to capture flawed data and the interpretation of it has crept up on the scientific community and the public alike with potentially significant political and social consequences.

We make one primary observation and it is that the climate – the thermal condition of the veneer of water and air which manifests as weather, must in-toto obey the fundamental laws of physics and in particular the principles of energy conservation. So far as we are aware there is no climate frame work presented in the public domain which formally incorporates this guiding principle and specifically identifies the boundary constraints that must be met. In our view the climate discussion seems to have started with the voluminous temperature records and attempted reverse engineering of the observations to fit a preferred concept model without identified overarching restraints.

We also make a philosophical observation that historical observations must also be satisfied/explained by they actual direct or proxy measurements. Our experience has taught us that all reliable data is relevant and if there is a misfit with a concept model then the model is flawed. Climate science and geosciences have much in common – in fact they are linked in that geological history records aspects of climate. From the scientific viewpoint, the available data in both fields of endeavour are a tiny fractional subset of reality that has significant variance in time and space on an hour by hour basis which is being characterised on a time-frame orders of magnitude longer.

![Figure 1: Global Atmospheric Water Vapour Distribution](Wickipedia)

Please Note: Low moisture levels of the polar regions (purple) demonstrate that glacial environments are relatively dry because all the available water has been converted to ice. Tropical black areas are > 7.5 cm detection limit. To see details visit: [http://earthobservatory.nasa.gov/GlobalMaps/view.php?d1=MYDAL2_M_SKY_WV](http://earthobservatory.nasa.gov/GlobalMaps/view.php?d1=MYDAL2_M_SKY_WV)

Extracting long term features from such information is perilous without a constraining framework. Geoscientists have a framework centred on processes that are replicated many times in contemporary events and historic analogues – the thesis being that processes in play today have and will be invariant throughout the life of the planet while it remains in its current relationship to the sun.
Spontaneous exotic rare solar events, longer term trends and solar behaviours not evident in data scientifically acquired over the last few hundred years are potential issues for humanity, particularly since they cannot be predicted or recognised at onset.

Humans have a recorded history with major planetary events enshrined in folklore/mythology/dreamtime-religious accounts that have led to governance of social behaviour and agricultural practices. The “moving stars” we know as planets and rare periodic comets are likely to have been strong recurrent themes. The importance of celestial observations is enshrined in the sophisticated alignments incorporated in ancient monuments the world over. Of themselves the required degree of engineering and necessary recorded knowledge implicitly demands recognition that human well-being was apparently impacted by celestial behaviour. The Babylonian scholars, who used a 60 base mathematics to document time and celestial behaviour prior to 700 BC, modelled space as a sphere enabling a Greek in ~ 500 BC to make an accurate prediction of a solar eclipse. The same Babylonian scholars named the constellations and thereby defined the celestial divisions used in astrology.

In particular, the sun has been a recurrent feature as in the historical North American Indian, Aztec and the Japanese (flag) cultures. A particular solar event may have, circa 1300-1325 BC, triggered Pharaoh Amenhotep IV (renamed Akhenaten) and Nefertiti to realign the religious doctrine of Egypt to focus on Ra the Sun God and to relocate the physical seat of power from Thebes to Akhenaten near modern day Amarna. Intuitively, for physics based scientists, the sun remains a dominant influence just as much as any ancient observers deduced. For physics based geoscientists it is axiomatic that it has also influenced geological history and that history, where recorded in geological observations, implicitly incorporates solar influence at some level.

In more recent history North Atlantic related climate “aberrations” on record include the recent extended melting of the Arctic pack ice, melt-back that opened the NW passage 1940-44 followed by the ultra-cold -25°C that impacted forced marches of allied POWS during the 1944-5 winter, ice bergs that drift into transatlantic shipping lanes, one of which sank the Titanic in 1912 at 41°43.5’N 49°56.8W (~400 km south of present day iceberg zone), the sudden melting and snap freezing of the Arctic that destroyed the Franklin Expedition in 1847 whilst it was searching for a NW passage across the Canadian Arctic, the freezing storm that captured the Spanish Amada in 1588, the deep freeze demise of Nordic pre-1000 AD settlements in Greenland and North America in circa 1500. The persistent European famine from 1315 until staple cereal food was replaced by root crops such as potatoes, beets and turnips which resulted in social, political, and military upheaval, a population decline from 60 to 40M and the 1607-1814 Thames frost fairs.

In recent time a prolonged warm period (atmosphere) has provoked scientific interest and ultimately public political alarm over the possibility of run-away warming. That carbon dioxide and water vapour were related to world temperature was first proposed in 1856 by Svante Arrhenius who suggested that fossil fuel combustion could lead to global warming. The more recent vision that infrared radiation adsorption by carbon dioxide was/is almost the sole cause of warming (called greenhouse effect) when atmospheric water vapour is much more abundant and has similar, more effective properties was, at its out-set, dubious. Atmospheric water has variable optical impact: it is frequently transparent but when cloudiform it is simultaneously dispersive and reflective.

Mathematically characterising the hourly to seasonal transient change in these properties and the complexity of the overall water vapour coverage (figure 1) is a daunting challenge. It is also an unclosed system that exchanges both heat and moisture with the marine environment that further compounds the complexity which needs to be understood before the warming mechanism can be properly explained. This document sets out to give an overview insight into these principle factors which affect climate and a possible explanation for the observed warming without hype.
2 CONSERVATION of ENERGY

It is a self evident axiom that the sun is the primary natural source of warmth over the majority of the earth’s surface. If this day-time daily top-up weakened appreciably it is predictable that the prevalence of chilled and icy Arctic conditions would expand. If the supplied energy increased shrinkage of the cold polar zones would be expected instead. If heat were being trapped and accumulated, the near surface temperatures would ultimately increase to the level at which the oceans would evaporate and the atmosphere boil off as appears to have happened on the planet Venus which is closer to the sun.

The geological record unequivocally shows that sediments have been forming in ‘marine’ environments for at least 2,500 – 3,000 million years. For most of this time there is direct evidence of primitive life-form fossils derived from algae almost identical with present day organisms. Many sedimentary units from then and later have either a high carbonate or carbonaceous content which is likely to be the result of microbiological activity and is in keeping with the Gaia Hypothesis (Lovelock 1969). The more primitive rocks laid down during this time span do however suggest significantly different marine chemistry and atmospheric gas abundances that reflect progressive sequestration of carbon dioxide and sulphur within rocks, a process which continues today.

Since abundant life, so far as we know, only exists in a relatively narrow temperature band, the earth’s surface temperature is unlikely to have varied dramatically over these millennia. Global near sea level average atmospheric temperature has probably stayed within a band as narrow as $70^\circ C$ maximum with the lowest values not less than $-5^\circ C$. Present day short term extremes do fall outside this range however, as they indeed must have in the past.

The described temperature constraint requires that the Earth has a self-perpetuating response mechanism that buffers changes in the solar energy supply. Clearly the mechanism retains heat when solar output is low and disposes of it when the solar energy supply is high. This means that the thermal energy stored in the atmosphere and marine environment is nearly constant or very lethargic in its response to supply variance. Since energy is conserved (which means it cannot be lost but only transformed/relocated) the Earth necessarily has a cooling system which releases heat/thermal energy to the cosmos. Climate science must comply with these constraints. Redistribution of thermal energy within the atmosphere ~ marine environment is not constrained by these particular aspects.

Heat flow supplied from within the earth does occur but it is of minimal significance since it is incapable of competing against Antarctic and high mountain ice such as on the Andean Cordillera. The high heat flow region along the Arctic continuation of the sub-marine Mid Atlantic Ridge, where there are submarine volcanoes, has not ever sustained an ice free Arctic in recent history.

The heating mechanism is obvious but cooling is far more complex. The earth loses energy by radiance, which is obvious by virtue of the fact it is visible from aircraft and satellites. Most of that visible energy is however directly reflected sunlight since the dark side of the earth is “dark”. Excepting for artificial lighting from urban areas it is not quite “truly dark” however because earth radiates energy at frequencies beyond the visible spectrum which we sense directly as heat. In the polar regions this energy loss rate has no counter-point daily solar top-up during the depth of perpetual winter darkness and therefore exceeds solar energy delivery except for very brief periods at the height of polar summers. It thus follows that the polar regions are the primary heat sinks for the earth atmosphere ~ marine environment.
3 HEAT/TEMPERATURE & FLUID RESPONSE

Energy is measured in joules. Heat is an energy form stored in the atomic/molecular structure of material. Temperature is an indicator of the thermal condition of a material namely the contained heat. The structure of a material often has finite limits to increasing and decreasing heat levels beyond which molecular structure breaks down. With human tissue we are acutely aware of “burning”, which is cellular destruction that results from contact with hot or cold (frostbite) objects. At higher heat levels the atomic bonding in molecules is weakened and structural integrity is progressively lost such as the softening of plastic and metals and ultimately changes of state solid/liquid/gas. Hotter still destroys atomic structure to create plasma which is nuclear soup of nuclei and electrons. The sun is a ‘boiling’ plasma. Super cooling collapses molecular structure and the properties of material are significantly modified which enables biological activity to be placed in a suspended cryogenic state.

Heat can be transferred through contact or radiatively. Radiated heat is actually infra-red light the eye cannot see and otherwise has the properties of visible light that are easily demonstrated such as with an exposed flame. Application of concentrated radiative heat and/or light can cause chemical instability and trigger irreversible changes. Because chemical bonds have specific energy levels particular to each atomic pair they can only absorb equivalent specific energy pulses, which in the case of light are determined by its frequency, which we sense as colour.

Once ‘light’ of that frequency is used up there is no further absorption. Selective absorption is cleverly used in photo capture and reproduction technology. This is why most forms of solar ‘light’ transit the atmosphere and when not reflected by cloud reach the earth’s surface, where they may be selectively reflected enabling sight, utilised for photosynthesis in plant leaves or absorbed by the many dissolved salt forms and micro-biota in the oceans with consequent warming. Some frequencies fortunately don’t transit the atmosphere successfully at all or only weakly such as UV. Reflected light forms seldom have the features of the primary light.

The heat required to increase temperature is different for each substance and depends on the condition of the material which is well illustrated by water as it transforms from ice to water to vapour and hot vapour we call steam. Accompanying such thermal changes the mass per unit volume is also modified due to the expanding and contracting molecular structure of the material. The general rule is that increasing temperature means increased volume but there are exceptions such as ice which is marginally less dense than water and therefore floats.

This floating tendency due to reduced density in a portion of fluid mass causes it to circulate. Where heat energy is being supplied warm fluid rises and cold fluid descends elsewhere, and a consequent lateral redistribution of fluid is necessary. In a heated room without forced circulation this convection mechanism is easily recognised, where the floor level remains cool relative to the ceiling. The same mechanism is the driver of ocean currents and the atmospheric wind system.

The convective movement of fluid also transfers heat. The more coherent the flow pattern the more efficient the heat transfer. Small scale eddies and turbulent flow paths, as forced by stirring in a saucepan or chemical processor plant, lead to rapid uniform dispersion but such processes are usually short term at super-macro scales. The most spectacular and also dangerous natural form of heat transfer is a tornado which is a high velocity vortex warm air rushing upward into a cloud formation. Cyclonic (H & L’s) wind patterns have the same function but are larger and less intense.

How much heat is transferred depends on the heat load in the fluid relative to its enclosing environment. The thermal capacity of a fluid is the heat load adjustment relative to mass for each degree C of temperature. For ordinary tap water this is 4,180 kilo joules /kg, and dry air 1.005 kilo joules/kg (at sea level). In volume terms however this is 4.28 million and just 1.21 kilo joules / cubic
metre respectively. It is self evident that volumetrically dry air has a tiny energy-holding capacity compared to sea water. (Sea level is specified because pressure has an influence here as well.)

Within any contiguous mass, heat will attempt to become uniformly distributed. The rate of conductive heat transfer (without convection processes) is directly dependent on temperature contrast and highly dependent on the nature of the material. This is exemplified by brick or stone houses that take days to become affected by a heat wave and remain warm for days afterward compared to a steel-clad shed which responds to the external temperature almost immediately. The use of metals and ceramics in cooking reflects the same properties. Both “hot” and “cold” are relative heat conditions that are really convenient temperature categories tied to human comfort. Cold objects including ice actually hold considerable thermal energy. (True zero thermal energy is much much colder.)

The response to solar energy impinging on the earth’s surface is affected by convective processes and conductive mechanisms. The highest surface temperatures occur where rocks and rock particles such as sand are fully exposed. The reflectivity of the earth’s surface of solar radiation is known as its albedo and is highly variable. Most of the surface materials absorb solar radiation and transform it into heat that is partially captured by the atmosphere as it is re-radiated. One of the best examples of this is experienced when sunlight passes through a window on a cloudless winter day and yet the window and the inside room are warmed. The analogy is desert rocks becoming too hot to comfortably sit on during the day, then giving up heat in the late afternoon and long after sundown, a feature that reptiles enjoy.

The atmosphere consists of multiple complex, usually rapidly moving, circulation systems whereas by comparison the major ocean currents are tediously slow but travel thousands of km on an unrelenting consistent basis. Whereas, in climate terms, air is a more mobile and a faster transfer mechanism than oceans its thermal capacity is much less. The oceans cover 70% of the earth’s surface. The red light penetrates just few metres, orange – yellow light to 40m, green and violet light to ~ 100m, and blue light fades out at about 270m. The direct thermal influence of solar radiation is thus probably small beyond 30m depth with the warmer water being generated near the surface which inhibits convective circulation. Wave activity combined with surface cooling due to wind and evaporation ensures mixing. The atmospheric circulation systems however occupy the lower 10-15km of the atmosphere.

Thermal energy of solar origin is ultimately delivered to the semi-independent circulation systems of the lower atmosphere and the upper ocean that interact and ultimately re-distribute it across the planet. The interactive process is, to say the least, complex but none the less must obey the boundary conditions as described and be consistent with observations of recorded history. Climate is the collective term used to describe the condition of this mechanism as it tries to generate a uniform temperature regime while the solar energy supply and heat loss rates continuously change, precluding any permanent steady state balance being achieved. Climate cooling and warming are thus perpetually swapping alternative, mutually exclusive, conditions which apply across both spatial and time scales. Earth history shows this has always been the case and it will always remain so.

4 SOLAR HEAT PULSE

For the most part, all of the climate-energy flux models are presented as steady state “constant conditions” concepts, whereas the weather is anything but constant and barely predictable. We are collectively aware that the wind systems deliver the weather but the models, as publicly presented, pay scant attention to this and even less to their principle driving mechanism.
As the earth rotates west to east the solar energy flux rises from zero, at dawn, to a maximum at the astronomical midday for the longitude and then back to zero, at nightfall, along any latitudinal strip. The intensity of the energy being supplied at any point is dependent on the angle of Earth's surface to the sun-direction (A in figure 2). This varies with the geographic latitude and tilt of the earth's axis.

Simple geometry shows that for a given pixel area on the earth's surface the energy supply intensity at a particular time is proportional to the product of the cosines of the astronomic latitude + latitude tilt offset and rotational longitude difference (A). For any given pixel, as rotation proceeds the latitude is a constant and the aggregate energy delivery is the integral function of the cosine of the astronomic rotational longitude difference (A).

In reality solar energy does not simply accumulate but dissipates by redistribution and adsorption. The "free" energy available in a clear sky at the earth's surface is the cumulated solar flux less the dissipation loss (see Special Note 1, P32).

The mathematics will be complex but the concept is simple. Each day the maximum temperature occurs after peak energy supply at the point when the energy supply rate falls to the maximum dissipation rate. After sundown the residual energy continues to fade away during the night and will follow a typical decay curve as shown (figure 2).

Figure 2: Rotational Energy Wave

Figure 3: Solar Radiance – Month, Latitude and Incidence Angle (Anthoni 2000)
(Asymmetry is inherent due to elliptical orbit and tilt of rotational axis.)
This energy pumping occurs every day and constitutes a daytime energy wave that is delivered pole to pole along each longitude line on a time base. For an observer on earth this rotationally induced energy wave (REW) pulse transits once in every 24 hours with a duration of ~10 hours (wavelength). It is a spatially pulsed energy supply to the world climate energy machine. The peak energy delivered on any one day is affected by the variance in the earth’s tilt which we recognise as the seasons. On an annual basis the eccentricity of the earth’s orbit will also affect the sun’s intensity as also will any changes in the solar energy flux level. Figure 3 shows the latitudinal and time variation of energy supplied by the REW.

This daily energy pulse does not however uniformly intersect with the land or marine interface due to cloud and generally prevailing weather conditions. Factors of influence include but are not restricted to aerosols, water vapour, clouds, GHG, and the earth’s surface albedo. For each of the interactive components the solar flux energy reflection-absorption response is different and any re-radiation of absorbed energy, be it thermal, heat or other forms, is also different.

It is quite evident that the daily solar thermal pulse does not give rise to an even sustained temperature. The coolest period of the daily thermal regimen is usually late at night when the temperature drop can be appreciable. For many places warm day times are followed by nocturnal freezing conditions. Cloud cover frequently mitigates the severity of freezing however.

It is almost certain that nocturnal loss of heat is of radiant energy which may be reflected by clouds back to the near surface environment. In some instances higher average daily temperatures are consequences of warmer nights which suggests increasing cloud cover/atmospheric water vapour may be a major contributor to “global warming” observations.

*NOTE: Aerosol in this context refers to suspended particulate dust commonly from combustion, volcanism and desert uplift.

5 OBSERVED THERMAL ENERGY DISTRIBUTION

Under pressure the IPCC supporters and others have released their underlying temperature data used to present the global warming case. There has been much criticism regarding “fit for purpose” acceptance of raw temperature data used to substantiate global warming. The function of temperature and climate data gathering has, for the most part, been directed toward weather prediction for the majority of populations whose interest is focused on predicting daily domestic and short term work related activities. As a result adherence to standard micro-environments for documenting climate factors have been allowed to lapse because the environment of recording has morphed from an “agricultural” emphasis to the urban environment i.e. the population centres for which predictions are being generated.

Using this same data without due regard for its circumstance of collection and normalising/calibrating it back to a standard reference is scientifically flawed in the context of precision for characterising global climatic features. However, if the “world” is either cooling or warming, the trend direction should be evident in all data providing it has a compatible reference. On a de facto basis if all the record points were in similar city centres then that data set could be crudely deemed to be based on an urban reference different from the nominal standard weather station designed to have a near zero urban influence. The authors of this article therefore assume the data in the following discussion acquired from NASA commonly incorporate urban influence which throws its accuracy into question but we consider the trends it illustrates are however real on a relative basis.

NASA has released version three data purported to be urban impact adjusted. This revised (V3) data has not been used herein since it does not appear to be significantly different with respect to the themes discussed in this document whereas it would be of importance in computer modelling.
Firstly it needs to be pointed out that the graphs in figure 4 have different temperature ranges and are averaged data from above the tropic of Cancer, the equatorial zone and below the Tropic of Capricorn. The most significant observation is that since ~1980 the northern part of the planet was apparently getting warmer at a relatively more rapid rate as compared to the rest of the earth. Secondly there was a mild warming event in the northern hemisphere that began in ~ 1920 and lasted until 1950, which appears related to a step change increase in the southern hemisphere at ~ 1930.

**Figure 4:** NASA Earth Temperature differential data 1900-2009 by latitude bands.
(Please Note: Temperature axes have different ranges but common scale.)
Perusal of the graphical data (figures 4-7) shows that although the northern band was slightly warmer prior to 1980, it only had a long term trend similar to the other bands of about +0.5°C/100 years.

**Figure 5: NASA Temperature differentials 1990-2000**

(Please note: Polar region areas are enlarged due to map projection distortion.)

**Figure 6: NASA Temperature differentials 2001-2009**

(Please note: Polar region areas are enlarged due to map projection distortion.)
Comparison of the mapped data for the 1990-2000 and 2001-2009 periods demonstrates that the highest temperature differences are only encountered above 45°N latitude (predominantly above 60°N) and manifest as warm winters in the Arctic and nearby tundra when the REW is weakest (figure 3). Importantly this spatially restricted September-February winter warming (figures 5 & 6) does not directly correlate with population and/or major centres of industrial activity.

The most astonishing aspect is that the Arctic Warming occurred during the winters which means the extensive coeval “melt-back” of the Arctic Ice Sheet may not be a result of summer melting per se but a result of poor ice growth (not necessarily extent) during the long sunless Arctic winter. This implicitly indicates that the Arctic warming is largely a marine event which impacts on low altitude air temperatures. Marine ice forms at ~ -1.8°C and melts at 0.0°C. The pack ice therefore buffers the surface marine temperature to its formation temperature ~ -1.8°C so that more/less cooling equals more/less ice growth not lower temperatures and Arctic surface temperature maps reflect this. Arctic air temperatures of <-25 and up to +2 over large areas in winter and summer respectively are counter-intuitive with respect to survival of the icepack, particularly during the summer, but this is probably because ice is a very poor absorber of radiant energy on account of it being white and very reflective (high albedo).

The northern warming of 1990-2000 is mirrored by slight Autumn warming in the Antarctic, which faded and was followed by a slightly colder winter. The northern warming of the 2001-2009 period was only mirrored locally in the Antarctic Peninsula region the near the tip of South America during the southern winter which was elsewhere relatively cooler.

This temperature data unequivocally does not support appreciable universal world-wide warming during the last 20 or so years but localised warming in the Arctic and near Arctic only, which we name in this document Enhanced Northern High Latitude Warming and an earlier Mid Century HLW (P 27).

Contaminating any data set with a small population of strongly deviant information and then collectively manipulating it often leads to trends that reflect the deviant data despite its minority status. NASA therefore, in generating the graph in figure 7, inadvertently created the gross misrepresentation that significant post 1980 warming was indeed a world-wide phenomenon which contributed to general alarm even though the adjacent world picture shows the spatial bias.

**Figure 7: NASA Global Temperature differential.**

*Please note that the ±0.8 magnitude Y axis range of figure 7 and inconsistent magnitude ranges from ±0.8 to 2.0 of figure 4 distort visual comparisons. In particular at first glance figure 7 superficially appears to be a replication of figure 4a until the diagrams are placed next to each other.

(Please also note: Polar region areas are enlarged due to map projection distortion.)
Furthermore presenting graphical data on a year average basis only focuses attention away from the seasonal bias in the data. There is no scientific excuse for this lack of thoroughness what-so-ever, especially when the deviant and rest of world data should and could have been shown separately.

Pressure by the scientific community forced release of the temperature data used above and has enabled a finer level of latitude interrogation such as in figure 8. The pattern of figure 4 is evident and the ENHLW feature is restricted to above 45°N.latitude. N & S Polar region data are shown to have rhythmic diametrically opposing warming and cooling with a periodicity of about 90 years which could suggest an Arctic maximum and Antarctic Minimum circa 2020 superimposed on a long term increasing trend but this is now unlikely (see section 9).

**Figure 8: Comparison of 44N-90N, 64S-44N & Global Temperatures (NASA data)**

(ENHLW = Enhanced High Latitude Warming, MCHLW = Mid Century High Latitude Warming)

At shorter time scales the 18.6 yr. Metonic nutation cycle of the of the moon’s rotational axis (See Special Note 2a, P32 & Plimer 2009, P306) can be recognised in the northern high latitude temperature data implicating the associated long period ‘N-S’ lunar-nodal tide surge (northerly maximum in 2006). This influence points to a more general global marine impact on climate. That sunspot cycles are not however self-evidently resolved does not imply they are irrelevant however.

The redistribution of solar energy is obviously not simple. The temperature distribution over the last 20 years is such that a simple universal mechanism is not at play otherwise the thermal signatures of the ENHLW would be universally evident at all latitudes because the air mass is mixing quite readily and systematically changing its composition as documented by monitoring stations such as on Mauna Loa, Hawaii.

The only possible reason for the spatial temperature distribution and its annual time variance must relate to the energy redistribution mechanisms of the atmosphere-marine environment couple.

**6 THERMAL ENERGY REDISTRIBUTION MECHANISMS**

The big ticket questions are: How did the heat get into the Arctic? Why did it only significantly impact on the winter Arctic climate? The winter bias is a particular puzzle because without significant solar influence (REW) maximal radiant energy loss would be anticipated.
The atmosphere and oceans are physically dynamic because they are fluids. This means that temperature contrast results in density variance which under gravitational influence leads to convective mass circulation and physical redistribution of their thermal energy load – captured solar energy as illustrated by figures 2 & 9.

The relative importance of each of the distribution systems is to some extent a matter of perspective. In the context of weather and human activities, the atmospheric circulation is of highest significance because it moves heat around very rapidly – frequently changing significantly within hours.

![Figure 9: Principle Paths of Global Heat Transfer.](Times Atlas 9th ed.)
(See actual flow complexity at [http://svs.gsfc.nasa.gov/vis/a000000/a003900/a003913/index.html](http://svs.gsfc.nasa.gov/vis/a000000/a003900/a003913/index.html))

An attempt has been made to model this as illustrated by figure 10 which demonstrates that both mechanisms contribute in an inverse manner with respect to latitude. It is noted that the ocean curve shows net negative thermal flow above 60°N at odds with the Gulf Stream flow rate in figure 9 which means that the curve incorporates full cycle return of very cold Arctic water as shown in figure 14.

![Figure 10: Marine and Atmospheric Thermal Transport – Northern Hemisphere](Anthoni 2000)

**Note:** Ocean accumulates solar energy below 25°N and above gives it up to the atmosphere over many years. It’s extremely low thermal capacity is compensated by recycling of the air mass. Above 60°N the Arctic heat sink role is evident and ocean <0 pw reflects net southward transport of very cold water. A significant portion of atmospheric heat is associated with moisture. Thermal loss/gain/transformation is related to evaporation and precipitation processes.
(blue paths). This net thermal outflow confirms the heat sink functionality of the Arctic region. The lower atmospheric circulation system has a huge volume which off-sets the sluggish ocean currents that carry 4 million times as much thermal energy in each cubic metre (per degree centigrade (°C)).

The interrelationship between these components is more significant than their absolute thermal capacities. On figure 9 macro current map, the black numbers list typical energy transfer rates in petawatts. Since 1 petawatt (pw) = 10^{12} Kilo joules/second and is about sixty times the global energy consumption rate (GEC), the energy held in the marine system is almost incomprehensibly large.

The diagram shows the warm Gulf Stream/North Atlantic Drift (northbound mid-Atlantic current) energy transfer rate is reduced by 1.2 pw between the equator and the Arctic. A large portion of this energy must be transferring to the atmosphere as warming and/or water vapour which is transported away by west / southwest winds ultimately contributing to Northern European rainfall. The residual 0.2 pw, (12 x GEC), is continuously received by the Arctic Ocean, half the southern Atlantic thermal feed.

The Antarctic however is circumnavigated by the cool Antarctic Drift mid-way between the continents mostly to north of the Antarctic Circle. It is fed warm water from the Indian Ocean at 0.8 pw and has energy flow rate 1.2 – 1.7 pw. This is the highest energy flow of all the ocean currents but necessarily reflects a larger flow volume because of its cool condition. Relatively fast current flows are also likely, since it is being driven by the “roaring forties”, unimpeded westerly winds at latitudes south of 40°S. This source of energy is located ~ 800 km from the Antarctica “coastline” at about 60°S.

The driver of the ocean currents is gravity due to relative “mounding and hollowing” resulting from temperature induced volume density differences which have maxima just east of the Philippines-Japan in the western Pacific, in the central Indian Ocean and the smaller Bahama Thermal Mound (BTM) just east of Florida – Bahama Is. Archipelago in the Sargasso Sea. The BTM hot spot drives the Gulf Stream and is assisted by the south westerly winds of the Ferrel Cell that also capture its heat and warm Europe.

The Atmospheric circulation consists of three semi-independent latitude-restricted convection cells which are very ‘flat’ in profile, reaching generally less than 10, but locally up to 15 km high over the thermal equator and extend ~ 3300 km N-S (~ 30°Latitude) (figure 9). The equatorial Hadley Cells convey air toward the thermal equator along the earth’s surface from 30°latitude, uplift it and then return it at altitude. The mid-latitude Ferrel Cells have an opposite flow sense conveying air at the earth’s surface northward to 60°latitude where it rises upwards on a ramp of cold air before returning at altitude toward 30°latitude where it descends. Polar cells have a high density cold centre in the polar position which induces radial outward air flows along the earth’s surface toward 60° latitude where it is slightly warmed and rises parallel to Ferrel Cell flow before returning pole-ward at altitude. This polar flow pattern leads to these cells being referred to as polar vortexes in some literature.

The mutual Polar ~ Ferrel Cell interface is a low pressure zone where a powerful circumpolar westerly wind (Jet Stream) occurs in the upper nose of the Ferrel Cell. This was spectacularly verified by the April 2010 eruption of Iceland’s Eyjafjallajoekull volcano that injected a dust plume to 8 km altitude through the toe of the Polar Cell ramp from where the JS redirected it to Scandinavia (figures 9 & 11). It was subsequently dispersed southward at high altitude ≤ 10km (~ 30,000 ft) on the upper side of the Ferrel Cell into Europe where it compromised commercial air traffic operations for some days.

The north circum-polar wind wraps around the cool and dense polar air mass which displaces the northern edge of the warmer Ferrel Cell upwards. It is quite irregular. The contrast is such that mixing is minimal unless the circumpolar wind weakens and cold air breaks out of the polar region. This is the mechanism for sudden onset deep freeze storm events in the Northern Hemisphere. (See
Significantly, whereas the Arctic air mass remains semi-permanently trapped and thermally isolated from the much warmer Ferrel Cell air, the Gulf Stream continues to send warm water unimpeded into the Arctic Ocean, relentlessly pumping heat into the Arctic region. It is therefore evident that the thermal condition of the Arctic environment is being strongly influenced by this mechanism which is currently unique in the world by virtue of the continental land mass distribution.

The marine macro-current map (figure 9) shows heat can potentially migrate from the Pacific into the Atlantic and northward to the Arctic. An initial 0.4 pw is supplemented by 1.0 pw at the equator then loses 1.2 pw in the northern Atlantic and ultimately delivers 0.2 pw beyond the Arctic Circle. The Arctic is therefore a significant heat sink feature for the marine circulation system and ultimately the earth’s climate system. It follows that any overheating of the earth’s marine system will impact the Arctic Ocean and ultimately nearby land masses. The efficacy of heat loss in the Arctic thus determines whether an increase in heat supply is material to climate stability. It is evident that marine thermal transfer imputes large time lagged temperature responses.

For heat loss rates to increase from any material, the temperature contrast with its surroundings must increase. The ENHLOW must be a result of lowered cooling efficiency and/or a higher Gulf Stream thermal pump rate. The latter is highly probable because warmer water will promote evaporation and the resultant increase in water vapour load will, with or without cloudiness, impede radiant cooling. Accumulating aerosols from global pollution will also impede precipitation and further increase suspended moisture, thereby enhancing this natural greenhouse response mechanism.

In order to establish a new, warmer steady state heating-cooling regimen, the regional Arctic temperatures must rise to ensure the heat flow loss rate is increased sufficiently to compensate for the higher thermal inflow and thus surpass the increased “greenhouse” feedback impediment. When

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**Figure 11: Jet Stream path shown by ash streamer across the Atlantic to the northern coast of the Scandinavian Peninsula** NASA.

Subsequently dispersion expanded into Northern Europe.
the heat input rate is reduced the regimen settles to a lower thermal loss rate with a reduced
temperature. Sudden increases or reductions in heat inflow cannot be expected to cause immediate
atmospheric temperature response. This is because the atmosphere which is the dispersive vector,
has a low thermal capacity. As a result many cycles of the Ferrel & Polar Cells are required to warm
or cool exposed land and ice surfaces. This inertial delay could be significant with the result that short
term thermal supply fluctuations may not be recognisable.

Temperature rise of the Arctic cannot be attributed to a universal carbon dioxide induced “greenhouse
effect”. There are three reasons for this:--

a) Carbon dioxide rise is universally demonstrated and the ENHLW temperature response in the
Arctic is not reflected elsewhere.
b) The recent relative stabilisation/cooling of the Arctic air temperatures and restoration of the
ice sheet to its near former extent during the last two winters or so while the carbon dioxide
levels continue ever upwards means that the ENHLW was induced by a different mechanism
that overwhelmed and enhanced any global carbon dioxide effect.
c) Additional energy must have been accumulated in the Arctic region from a natural source.
Carbon dioxide cannot generate heat because, like water vapour, it absorbs infra-red
radiation (light) leading to increased atmospheric heat load measured by temperature. It is
then re-distributed by mass transfer, conduction and/or re-radiation.

7 ARCTIC THERMAL SUPPLY FLUCTUATIONS

There are only two significant thermal sources for the Arctic region. They are igneous activity and the
Gulf Stream thermal variance.

The former is far less obvious. It is the continuation of the Mid Atlantic Ridge, which extends from the
southernmost Atlantic northward to beyond Iceland. Geological symmetry requires this major suture,
that was opened up to form the Atlantic Ocean, has continuity across the Arctic. It has been
omnipresent for 160 M years, and remains the focus of many earthquakes, rivalling the Pacific Rim of
Fire with its many submarine volcanoes. The Gakkel Ridge occupies the centreline of a deep ~ 40my
old submarine basin immediately north of Greenland and just west of Svalbard-Zemlya Archipelago,
following on land-ward as the Verkhoyanski-Khrebt and into the Pacific as the Sakhalin-Japanese Trench dogleg. The active volcanoes of the Gakkel Ridge contribute heat to the deeper portions of the Arctic Ocean which could rise as thermal plumes and contribute to the near surface temperature of the Gulf Stream.

A spurt of volcanic activity is therefore a potential trigger mechanism for the upsetting of the thermal equilibrium of the Arctic Ocean that could have lead to the ENHLW but the required consistent & sustained thermal output is improbable. There is some independent justification in this from the Antarctic. The strong enhanced warming of the Antarctic Peninsula region observed in the June-July-Aug 2001-2009 NASA map (Figure 6) has been suggested to be reflecting terrestrial volcanism.

The Gulf Stream thermal energy flux contribution begins just to the east of Florida with maximum 1.4 pw after the Mid Atlantic Current has acquired a 1.0 pw boost as it transited the equatorial zone beginning at the latitude of Brazil but only 0.2 pw is delivered to the Arctic. It is obvious that this thermal energy is captured solar radiance and reflects delayed long term Solar Flux (REW).

![Graph: Arctic Air Temperature ~ Solar Flux Correlation](image)

**Figure 13: Arctic Air Temperature ~ Solar Flux Correlation** (see Special Note 3, P35)

Figure 13 (Soon 2005) demonstrates a generalised correlation between Arctic air temperatures and solar flux over the last 130 years. A more recent study (Solheim et al. 2012 in press) of coastal based weather stations in Scandinavia, Greenland and, Svalbard (also known as Longyearbyen and formerly named Spitsbergen) has shown appreciable correlation between solar flux output and temperature fluctuation with a near decadal delay. The paper specifically reported the investigation of a signature feature in the sunspot count and found it replicated in the temperature pattern with the strongest correlation at Svalbard which was invariant with respect to the sunless Arctic winter period. The study determined across the data set that 25-60% of the temperature was directly correlating with the solar sunspot cycles. The poorer correlations corresponded to greater distances inland from coastal regions. (The linkage of sunspot cycles to sympathetic variance in total solar flux is well established as illustrated by figures 16 & 17).

That this data has an inertial delay of 10 -11 years is of major significance and explains the fuzzy nature of the correlation in figure 13. Those authors conjecture that these observations are due to
marine influence, a view the authors of this article strongly support. Unfortunately the study did not extend or refer to the relationship between coeval marine and local air temperatures, possibly because they don’t exist. With the Argo monitoring system in place hopefully such data will soon be available for a sufficient time span for proper scientific assessment. Marine temperature variance will however be slight and difficult to recognise (see section 11).

We anticipate it will eventually be shown that more generally for Northern Europe the solar-marine inertial delay is ~6-8 years and the marine-air delay 1-2 years. This evidence also suggests the same signal should be found in NW directed trade wind weather features impinging onto south-eastern USA, and the NE directed weather of Ireland and UK/Middle Europe with lesser inertial delays.

It is contended therefore that if the sun is particularly energetic it could trigger an ENHLW event. The ENHLW ramp began in ~ 1990 suggesting a possible solar radiance boost circa 1980 which was just prior to the zenith of Solar Cycle 21 (SC21). Both SC21 and the following SC22 in 1990 were very energetic, only surpassed by SC19 in 1960 and ~ equalled by SC3 in 1780. The solar energy pumped into the Gulf Stream over the period 1980-1995 has only been similar in the periods 1945-1960 (SC 18-19) and 1775-1790 (SC 3-4) during the last 300 years.

The energy boost of SC 21-22 ended in 1995 and consequent cooling in Arctic observations, would have been expected to begin circa 2005, just a year or so after Europe had an intense heat wave in 2003. However the effect of SC23, a less intense cycle (about 75% of SC21/22) kicked in just a few years later, probably flattening the smoothed energy decline trend until its appreciable decline in 2003-04. (The northerly maximum of the lunar-nodal tide surge in 2006 is a complicating factor as it transiently adds to the Gulf Stream energy flow over this general period (section 5). Impacts of the significant delay of SC24 initiation until ~ 2007-8 should be becoming obvious about now in 2012!

Anecdotally recent weather in northern Europe suggests it has been appreciably colder during the last few years, especially 2009-2011, and a cool 2012 northern summer is currently predicted.

({Climate data published for Europe as a whole is not directly relevant to this document since it is defined as the area between 35º to 70º Northern latitude, 25º to 30º Eastern longitude, plus Turkey (=35º to 40º North, 30º to 45º East) and therefore incorporates the Mediterranean region of Spain, Italy and the Balkan Countries plus Turkey that are not impacted since their climate is not entirely dependent on the Atlantic per se. None the less the data does show a distinct 2005 dip.})

8 GULF STREAM DISPERSAL & ARCTIC OSCILLATION (AO)

There are two distribution patterns presented in the literature which indicate the dominant delivery path of the Gulf Stream to be between Russo-Scandinavia and the Zemlya Archipelago, and alternatively on the pole-ward side of the Archipelago. Rather than suggest one of these models is wrong there is a strong possibility that they are both correct and represent different flow regimes that swap prominence episodically (figures 14 & 15).

The Arctic Oscillation (AO) is an atmospheric pressure signature which was first recognised in 1920 from prior weather observations. It is a rhythmic pattern about 10-15 years long. In 1990 the index used to map the signature effectively went off scale coincidental with the commencement of the ENHLW. The AO index is the difference between sea level pressure (SLP) and a reference value expressed as REF-SLP. AO index is positive and negative for low and high average pressures respectively. It is strongly positive for the ENHLW.

We suspect that the AO is reflecting the albedo and more particularly the proportion of the exposed Arctic Ocean and the share of it occupied by the Gulf Stream. As melt back of the ice occurs the increased surface area should lead to a warmer air mass and a stronger ‘greenhouse effect’ feedback
cooling impediment and increase in the rate of warming. The increasing warm air mass is essentially creating a macro atmospheric inversion of the Arctic Polar Cell that is directly reflected by the AO index.

**Figure 14: Arctic Marine Circulation.** Dark red is Gulf Stream at surface and pink its subsurface extent. (WHOI; Compare with Fig. 15.)

**Figure 15: Gulf Stream Arctic Influx** (Martison et al. National Geographic 2000)

Flow path complexity is illustrated at [http://svs.gsfc.nasa.gov/vis/a000000/a003900/a003913/index.html](http://svs.gsfc.nasa.gov/vis/a000000/a003900/a003913/index.html)
Unfortunately the NASA data through 1980-2009 is too ‘noisy’ to reliably observe such an increasing trend but figure 15 supporting data correlated the ‘Warm Phase’ to lower atmospheric pressures in the Polar Cell, consistent with the strong positive AO index.

During the ENHLW it appears the Arctic circulation expanse of the Gulf Stream was significantly increased as illustrated in figure 15. We note the strong ?thermal signature adjacent to the Zemlya Archipelago is virtually disconnected from the warmer water to the south and might represent a thermal contribution from the Gakkel Ridge heat source. This speculative possibility would need supportive data such as a hydro-geochemical signature.

9 SOLAR ENERGY PREDICTIONS

In section 2 the axiom that the sun is the primary natural source of planetary warmth was demonstrated. Many investigators of climate science in recent times appear to have considered the sun as a uniform invariant factor in their deliberations which is fine for an abstract theoretical model designed to test ‘what if’ questions for sensitivity to parameters. This assumption is however quite inappropriate for real world data because it is not so and it is distinctly unscientific for such data to be fed into such an abstract model without refinement.

Propagation of even small errors through multiple iterative calculations often lead to numerically unstable calculations and potentially large, possibly order-of-magnitude errors in the results. Numerical analysis is a special branch of applied mathematics that covers this topic and yet predictive climate results are announced to the public domain without quality assurance criteria or base assumption qualifiers, even if they are in the original script. Screening and refinement of input data has apparently been avoided and seems to be a topic only addressed by critics. We thus consider that any climate modelling using natural observational data that has not been built around a variable solar intensity or formally normalised to a constant sun will be fundamentally flawed, with results varying from unreliable to potentially grossly misleading.

It is easily demonstrated that the sun’s radiance intensity is far from uniform. Long term observations have recognised patterns in weather that are systematic cycles varying from a few tens of years to 100s of years which are suspected to be related to the various planetary co-alignments of the solar system. The mechanism is not fully understood as to how this occurs but it is easily appreciated that gravitational pull on the dynamically active sun’s core & plasma must set up some internal mass distribution distortions of its symmetry with respect to its “rubbery” plasma envelope. On shorter decadal time frames the invention and principle refinement of the telescope during 1608-1668 and formal establishment of the Royal (Astronomical) Observatory in 1675 enabled systematic solar observations to commence and thus there is a 338 year record of sunspots. Modern observations show that the sunspot abundance is directly related to the solar radiance intensity (figures 16, 17 & 18). Figure 17 shows the detailed level of correlation since 2000 for both the sunspot count and the solar 10.7 cm wavelength radio wave intensity. Figure 18 demonstrates that the sunspots are tiny features near the centres of solar regions with high radiant intensity.

Their abundance has been long recognized to follow a cyclic pattern with an apparent average periodicity of 11 years named a solar cycle (SC). It has been shown that the SC has variations in length in the order of ± 1-2 years and is actually averaged at 22 years (called the Hale cycle) because the dominant magnetic polarity of the sunspots switches every 11 year “half cycle” and indeed the first spots of the new cycle appear before the prior cycle is completed. Empirical schemas and indices based on observations of historical sunspot data have been used to try to predict future sunspot abundance and solar energy output. Mathematical analyses of the frequency components of the historical sunspot pattern and time forward predictions have also been attempted in recent time.
The most obvious feature of the 300+ years of data is that shorter the lag time to the next SC the higher the intensity of that cycle and correspondingly weaker cycles follow longer lag times. This has been used to compare the most recent data with previous profiles as a predictive tool as in figure 19 which strongly suggested SC24 would possibly be of weak intensity which is proving correct as observed in figure 17. The prediction in figure 19 has been compiled onto the longer term sunspot observation profile in figure 20.

Importantly however, physicists studying the sun have detected horizontal plasma flow paths below the sun's visible exterior. These plasma currents are initiated simultaneously in both solar polar regions and slowly migrate toward the solar equator distorting the plasma pattern (see front page). They control sunspot activity which is initiated as they migrate below 22°Lat but before one flow pattern has faded away in the equatorial zone the subsequent one has already appeared in the polar region and migrated to 22°Lat so that sunspot cycles actually overlap.
Figure 18: Solar Regions of High Radiant Intensity and Sunspots

Note: Sunspots are tiny compared to their enclosing high radiant intensity regions. During the time difference of 11 hours some of the sunspots have virtually disappeared.
Figure 19: Solar cycles 3 & 4 – 22 & 23 Comparison (Archibald Feb 2010a)

Figure 20: Solar cycles 1700-2030 & SC 24 - 25 Prediction (Archibald Feb 2010b)
(Annual averaged data)
This relatively new technology is now being used predicatively to forecast sunspot frequency and solar energy output. It was the underlying basis for sunspot predictions in figure 21.

Scaling the base data using the total number of spots for SC23 Penn & Livingston suggest peak SC24, and SC25 spots at ~ 66, and just ~ 7 respectively. Figure 17 demonstrates SC24 data is closely on track for this prediction but possibly weaker ?< 70, confirming the profound SC25 prediction.
in ~ 2033 is a very real possibility. One author has suggested that sunspots might disappear altogether. Two new articles have appeared on this topic in recent time on this topic. (Frank Hill – US Nat Solar laboratory, and Seiji Tanaka solarcycle25.com/384 & solarcycle25.com/385 respectively).

The stunning result for SC25, implanted on figure 20 as figure 22 demonstrates that from 2017 just prior to the SC24-25 transition in ~ 2020 onwards low solar energy output for up to 25 years or more could occur. Given the 6-8 years inertial delay, the cool weather will chill further in about 10 years from now, with major impacts on the world’s ecology and agricultural production. The current 2012-2013 period reflects the thermal impact of the SC23 –SC24 saddle and is potential predictor of the post 2018 climate.

Mathematical calculation of the gravitational influences of the planetary orbits on the sun’s rotation rate, its own orbit and outer plasma flow (Wilson et al. 2008) demonstrate replication of a systematically varying arrangement having a periodicity of ~ 90-100 years. Each cycle is completed by planetary cross-over step point that enables the next, at which time there is necessarily a corresponding solar adjustment that potentially affects the plasma flow regime. This deduction is supported by orbital path analysis that identified adjustment events occurring in the early 1790’s and late 1870’s coincident with the initiation of cool climatic conditions of the Dalton (1790—1830, SC 5 & 6) and Victorian (1880-1900, SC 12-17) solar activity minimums. In 2008 Wilson recognised the planetary configuration to be at cycle change adjustment once again and anticipated solar effects to be detectable during the later part of SC24/early SC25.

Subsequently Wilson also inferred orbital induced tide-like effects in the solar plasma which are likely to be a primary driver of sunspot cycles. Importantly, backtracking of planetary configurations showed such adjustment events led all the documented periods of minimal sunspot maxima. He particularly recognised that the planetary configuration from 2005 onwards replicates the oldest documented minimum, the “Oort” (1000-1050) suggesting cooling impacts up to 2045. Wilson recognised the medieval maximum period as an enigmatic exception (1100-1180 AD). Examination of Wilson’s data alongside the carbon 14 isotopic variance suggests the Earth may have been experiencing a replication of the Medieval Maximum (warming) since ~ 1935 which is now entering its decay phase. This work independently underpins the recently observed ‘abnormal’ solar behaviour that suggests a weak SC25 and the beginning of an extended period of weak solar flux. (See Special Note 5, P38).

Even if the solar output for SC25 is twice the Penn & Livingstone prediction it would still be the weakest cycle ever documented. Climate conditions should quickly deteriorate after the SC24 maximum which is probably going to be around late 2013 ~ early 2014 (figure 17 page 20).

The climate response to the SC24 solar decline will provide a once-off unique opportunity to measure the time lapse decay and magnitude of the solar flux component in the marine and atmospheric temperature record. As a consequence, meaningful limits will be demonstrated for the collective contribution of anthropogenic factors on the world temperature regime. Planning to capture such data is urgently required. (This is just as internationally significant to solar astronomy and earth physics as the solar eclipse observations in 1770 following the establishment of the Royal Astronomical Observatory in Greenwich UK that also resulted in the discovery of Australia by Captain Cook. Solar Cycle 25 has become such a hot topic that a specific website! solarcycle25.com has been established as a technical forum.)

10 POLAR CLIMATE FORECAST

10.1 ARCTIC ICE COVER

The Arctic winter and summertime 2011-12 ice extent in figure 23 shows strong melt- back to a kernel with an adjacent platform of thinning vulnerable ice. The kernel is similar to the minimum observed in 2007 demonstrating the ENHLW is continuing. From 2014 the thermal Gulf Stream impact of SC23
should however be dissipating (see Figure 17 page 20 & above discussion). The full Arctic extent of the 2012 winter ice demonstrates the capacity for ice growth has not been lost and the forecast cooler Gulf Stream inflow has the potential double impact of improving ice growth and reducing melt-back leading progressive kernel growth. This is obviously a finely balanced thermal buffering system with internal feedback.

Anecdotal evidence from shipping and related observations have previously reported significant reductions of the Arctic ice in 1907, 1922, 1935, 1940, 1944 & 1947. Less well defined warming related evidence is the substantial release of ice bergs in 1912 that led to the Titanic disaster, and the 1840’s melt back that ultimately led to the entrapment of the Franklin expedition in 1847, also point to reduced Arctic ice extents compared to recent history. The years 1907 and 1922 probably reflect warming spurts following the Victorian 1880-1900 solar activity minimum (page 23) and 1935 and 1947 occur within the MCHLW (figure 8, page 11). Additional evidence of Arctic warming in 750, 1000, (establishment of the Nordic settlements in Greenland) 1400 and 1750 has been cited in the general literature.

Of particular significance is a 2007 in-depth study of tree-ring growth patterns over the last 1500 years from Tornetrask (Figure 24, Northern Sweden near Kiruna) which maps temperature variance pointing to the 750, 950-1100 (medieval), 1400-1550, and 1750 warming events being either stronger or similar to that of the ENHLW. The major result of the study (Grudd 2008) which examined TRW (tree ring width) and MXD (maximum tissue density) signatures, presented in figure 24 demonstrates a long term temperature reduction of 1°C per 500 years (see Special Note 4, page 37).

The evidence suggests that the 900-1100 medieval warming exceeded the ENHLW by ~ 0.5°C. This data does not however match well with C¹⁴ isotopic and planetary configuration data demonstrated to correlate with solar flux intensity (Special note 5, pg, 39) which implies that there are additional influences on Scandinavian hinterland temperatures which is consistent with the analysis of climate station data in Solheim et al. 2012. Of particular note is the ~ 1125 temperature fall at mid-way
through the Medieval Warming which lasted until ~1300 and since then temperatures have fallen within a ±0.8°C band about the base reference. Greenland GISP2 ice cores demonstrate even higher temperatures during the Late Bronze Age ~1300BC & Roman Warm Period ~100BC.

Collectively this builds a picture of episodic warming and possible 100% ice sheet melt backs over the last 3500 years or so. The implication is that the ENHLW and MCHLW are very likely to be natural warming events. It follows that a working hypothesis for the ENHLW mechanism is a necessity for predicting the likely regional Arctic climate response to the forecast post 2014 cooling episode.

10.2 ARCTIC THERMAL BALANCE
A realistic mechanism for the ENHLW must, fit the known information, incorporate a source of heat, and a heat loss process. To predict the future direction of climate the mutual dependence of these factors must be understood.

NASA is now presenting temperature data on virtually a live basis. Figure 25 is a new version of the Figure 7 that acknowledges “global warming” is not the same in the northern and southern hemispheres. Close examination of the 5 year mean after 1990 reveals that the ENHLW is a
consequence of a near step wise change of 0.2°C that took place in 1992-3 followed by a continued climb to 0.75 around 2005 but there is no corresponding sympathetic growth in the southern hemisphere. The 1993-5 thermal kick corresponds to a solar flux boost of SC 22 (1989-93) supplanted over of SC 21 (1979-83). Thereafter pauses and increments probably correspond to SC21 fadeout, SC23 boost over SC22, and SC22 fadeout. The Arctic cooling mechanism was self evidently not capable of losing the thermal energy at the supply rate and consumed ice instead, creating a thermal buffer thereby minimising atmospheric temperature increase.

Overall the northern hemisphere thermal impact of SC23 has already dissipated except for high latitudes and the Arctic, where its influence will be much diminished from ~2014 onwards. This will coincide with the much weaker maximum of SC24 which will show up around 2024 possibly stalling the expected cooling trend as the weak SC25 radiance chills the equatorial and subtropical regions.

To forecast the impact of the predicted solar flux reduction and consequent earth captured solar energy budget the specifics of the underlying mechanism of the EHHLW need to be identified. NASA’s Goddard Space Centre has been monitoring carbon dioxide (CO$_2$) across the Northern Hemisphere and derived figure 26 by smoothing highly irregular data using a widely used mining industry statistical method (Kriging). The geographic correspondence between the high CO$_2$ signature and the belt of EHHLW winter warming is unmistakable.

The CO$_2$ distribution signature in figure 26 has relatively sharp northern and diffuse southern edges respectively. It is a frame from a year long image sequence beginning in February 2010 that shows the CO$_2$ accumulation was

**Figure 26: Arctic CO$_2$ Distribution (NASA)**

Is CO$_2$ a proxy for industrial pollution gathered up by the Ferrel Cell to ~ 10km altitude?

http://svs.gsfc.nasa.gov/vis/a000000/a003800/a003812/index.html & Movie

http://svs.gsfc.nasa.gov/vis/a000000/a003800/a003812/airsarcticco21080p.mp4

Figure 27: Arctic Pollution Plume
strongly prevalent for March – May 2010, & in Feb 2011 but very weak for June – late August & November 2011. The strong winter and weak summer CO₂ signature generally correlates with the high and low Arctic/Subarctic temperature differentials respectively (Page 9). Since the CO₂ data is for only one year mutual causality cannot be claimed but a plausible mechanism is proposed.

The mid-troposphere is also the upper altitude of the North Polar ~ Ferrel Cell Ramp interface (NPF). This evidence is interpreted to indicate that, episodically during winter months, there is a perpetually replenished accumulation of industrial pollution from the south in the upper northern portion of the Ferrel Cell and above the North Polar Cell Ramp which is being redistributed by its jet stream in an easterly direction and generally dispersed southwards at the top of the Ferrel Cell (figure 27).

Logically “ABC” aerosols, carbon monoxide, sulphur compounds, hydrocarbons, nitrogen compounds, CFC’s and industrial ozone would also follow a similar pattern (dependent on their chemical stabilities). Many of these components are combustion products of modern mankind and will have been transported with coevally derived water vapour and perhaps industrially derived heat. It is our view that moisture associated with high density Atmospheric Brown Cloud aerosol (ABC as on the front page & Sect 4 P12) is most likely to be a significant anthropogenic ‘greenhouse’ factor because Arctic precipitation is low and therefore moisture residence life time may be longer and concentration potentially higher than elsewhere. Rainfall flushing of pollutants will also be inefficient.

Jet stream mobilisation of ‘natural pollution’ is illustrated in figure 11 (page14) and the first two images in the following link. http://earthobservatory.nasa.gov/Features/Gallery/aqua.php?src=features-recent
In the second image northward migration and focussed latitudinal redistribution of the natural sulphur dioxide pollution streamer plume from the Grímsvötn volcano (Iceland, May 2011 eruption) illustrates the jet stream redistribution mechanism postulated above. The massive 1783 Laki volcano eruption (Southern Iceland) also had a similar major longer term impact on European weather.

This focussed anthropogenic accumulation is quite a separate phenomenon from any impact of the overall average global rise in CO₂ such as that measured on Mauna Loa Hawaii (section 6, P15). It is none-the-less tempting to presume that the ‘classic greenhouse effect model’ (CGE) is directly applicable in this setting but the CGE models assume appreciable surface capture of solar flux energy, which in the Arctic is minimal. There in the depth of winter it varies from very weak to nil and in summer, the incident obliquity is low angle and the ice albedo (reflectance) is very high. For an appreciable CGE type back radiation response to occur in the Arctic the “surface energy source” cannot be therefore locally captured solar flux. The present day potential contributing possibilities are stored terrestrial/marine heat, exothermic processes in the atmosphere (chemical (oxidation) and physical (freezing of water vapour)), volcanism and industrial heat (power stations, smelters, foundries and refineries etc.).

Historically however the level of industrial pollutants was trivial compared to the present, whereas the overall wind system has probably been in place for thousands of years. Yet the evidence points to significant warming events in the Arctic during the last 2000 years (see figure 24). We note with some interest that a video simulation of the global temperature differential anomaly from 1880 to the present time, available on the NASA website (This is also available as a step through elsewhere on the site. Run video at http://www.youtube.com/watch?v=OnkpSe-4ejM&feature=player_detailpage or http://youtu.be/GVPtSljLtVc), shows that there is a significantly long period of enhanced Arctic regional warming during the period 1930-1950 which is very similar to the current ENHLW (evident on figurers 8 & 13), herein named the Mid-Century High Latitude Warming MCHLW. It corresponds to substantial reduction in Arctic ice since the Canadian Schooner St. Roch successfully navigated the North West Passage in 1940 and 1944.

These warming events reflect a mechanism unrelated to the recent atmospheric CO₂ abundance increases especially since the MCHLW correlates to generalised solar output as illustrated by figure
13. It must be acknowledged however that it was possibly enhanced by progressive growth in coal emissions up until the advent of particulate precipitators on power stations, substitution of coal in Europe by North Sea natural gas and electrification and diesel electric replacement of steam locomotives. This process began during the 1945-55 period and ultimately resulted in the near elimination of the infamous “pea soup smogs” of Europe and eventual cleaning of soot shrouded buildings. Nuclear power also began substituting coal from the late 1950s.

This article therefore proposes that the recent warming of the Arctic region is a localised natural seasonal response to an increased thermal energy supply driven into the Arctic Ocean by the Gulf Stream from the tropical regions of the Mid Atlantic and the capacity limits of the Arctic to shed that heat by radiation. It is conjectured that the underlying overall cause for the recent warming event is a relatively recent cluster of energetic solar cycles (SC 21, 22 & 23, figures 20 & 25) which have pumped a significant energy boost into the Earth’s climate systems. The alternative potential energy sources are likely to be of much lower magnitude (as listed three paragraphs above).

The inferred mechanism is warming of air at the Gulf Stream ~ Ferrel Cell interface followed by easterly redistribution by the Jet Stream at higher altitude. At this higher altitude, the anthropogenic load could result in back radiation precluding cooling that might otherwise occur (figure 26) thereby accentuating the ENHLW. The CGE computer models utilising the Mauna Loa CO₂ trend data as a pollution proxy will be absolutely inappropriate for predicting the Arctic –Sub Arctic region CGE back radiation response and any Arctic related flow-on predictions to overall global climate. The seasonal nature of the ENHLW probably reflects low wintertime and faster summertime dispersion rates of CGE back radiation phases away from the NPC Ramp thereby reducing summer time CGE back radiation. Higher thermal energy consumption during winter and consequent pollution release would also be a factor.

The current ENHLW and relatively recent MCHLW potentially involve anthropogenic combustion and industrial pollutants but this is not a realistic scenario for previous warming events. The NPC Ramp pollution plume is however very real as illustrated by figure 26 (& 27). The northward sweep of the Ferrel Cell as illustrated by figure 9 takes in the whole of Europe and North African Mediterranean countries, Siberia, Mongolia, and Canada. However during the winter the Haley-Ferrel Cell pressure ridge has moved northward to become centred over the Mediterranean and in summer manifests as mega high pressure centres over the northern Atlantic and Pacific.

The associated low altitude wind vectors ensure that Africa and subtropical Asia have remained essentially isolated from the Ferrel Cell northward drift over recent history. This restricts the origin of both natural and anthropogenic contributions to the NPC Ramp plume to the USA/Canada, Northern Europe, Siberia and Northernmost China. Prior to modern fossil fuel based industrialisation only wood smoke and wind-borne dust would have been available for capture by the present day NPC Ramp plume. Historic deviations likely to result in previous ENHLW type events thus require a very major igneous/impact event (spontaneous, short lived and random) or a significantly different wind regime (sustained change in energy supply that is persistent or rhythmic).

The plausibility of the Gulf Stream giving up heat in lieu of solar flux energy to warm the North Polar Cell (NPC) air mass is easily demonstrated. Using the specific heat data from section 3 (P4), and taking the overall dimensions of the NPC as being 60-90°N and up to 10,000m altitude, it can be shown that cooling a body of water by 0.25°C down to 0.25m depth covering an area measuring 1260 x 1260 km, (such as the Barents Sea) releases energy sufficient for 1°C warming of the total NPC dry air volume. Although such a calculation does not accurately reflect ocean water or compensate for entrained water vapour in the atmosphere, it does demonstrate, on an order of magnitude basis, that Arctic atmospheric warming could be derived from the Gulf Stream with minimal impact on its near surface temperature, which would be difficult to recognise in marine surface temperature data.
Mathematically a thermal index concept for the Arctic can be expressed as:

\[ I_a = G_a - R_a - A_a \]

Where \( I_a \), \( G_a \), \( R_a \), & \( A_a \) are the Ice melting/freezing (buffer transfer) and energy flow rates of the Gulf Stream, Radiant loss, and Atmospheric adsorption respectively. When \( I_a > 0 \) the ice melts and if \( I_a < 0 \) it freezes. \( G_a \) is function of the solar intensity at \((t - 8)\) years and net heat loss rate during the Mid-Atlantic travel time. \( R_a \) is a function of the aerosol loading, atmospheric humidity, cloudiness and ‘greenhouse absorption’. \( A_a \) is a function of the sea surface temperature, humidity and ‘greenhouse absorption’. Clearly \( R_a \) & \( A_a \) are not independent since the greenhouse factor converts some of the radiated energy to heat with atmospheric temperature rise increasing water vapour capture potential in a positive feedback loop until dynamic and/or adiabatic instability triggers precipitation over land areas and/or a southward Arctic North Polar Cell break-out under/into the Ferrel Cell.

When \( I_a > 0 \) and ice melts, heat becomes stored in the resulting melt water. If \( R_a \) cannot keep up with \( G_a \) inflow, the Arctic will accumulate thermal energy by reducing the net sea ice volume. (see Special note 3, page 36.)

10.3 NORTH ATLANTIC COOLING RESPONSE

The Gulf Stream, the North Polar Cell - Ferrel Cell Ramp (NPFR) and its related Jet Stream clearly influence the Arctic energy index equation. This system is only superficially simple. This is easily demonstrated by observing the video simulation of the Jet Stream (http://svs.gsfc.nasa.gov/vis/a000000/a003800/a003864/jetstream.mp4)

The model diagram in figure 27 is quite abstract compared to reality where the NPC and FC clearly compete for lower atmosphere space. The video indicates the mean latitude position of the interface is usually close to the USA/Canada border.

The upper atmosphere on a relatively short term basis will be minimally impacted by earth surface–atmosphere thermal exchanges taking place below 10,000m altitude and thus effectively confine major temperature–pressure–volume adjustments between the NPC and FC to lateral variance. It follows if more energy is pumped in to the Ferrel Cell it will tend to expand and drive the NPFR interface northward (recent situation) and correspondingly if less energy is supplied from a cooler Gulf Stream it will become less dominant and the NPFR interface would be likely to move southward (immediate future).

During a warm phase the Ferrel Cell is likely to have increased moisture carrying capacity and slightly higher average density and the converse in a cooling phase. At the initiation of a warm phase the NPC will receive less heat because of its northward retreat (reduced solar flux area, increased

![Figure 28: Gulf Stream – Complex Flow Pattern](http://svs.gsfc.nasa.gov/vis/a000000/a003900/a003913/index.html)
average obliquity and reduced Gulf Stream contact area) and therefore have a lower moisture load. If warming continues and adds net energy to the Arctic region, partial reversal of the initial response is likely.

At the initiation of a cool phase the expanded NPC will enable it to receive more heat from the Gulf Stream and carry more moisture. This is because the thermal changes in the Gulf Stream arrive in the Sub-arctic/Arctic 10/11 years after solar initiation. At the onset of a cooling phase the Ferrel Cell contraction begins immediately due to reduced reflectance of terrestrial heat, and continues as the warmer portion of the Gulf Stream leaves the mid latitudes (?4-5 years), whereas the Arctic will continue to receive strong energy inflows for some time thereafter (?5-11 years) (see figure 28).

Therefore at global cooling phase onset in the Arctic will initially be relatively warm and moist with increased precipitation as a presage to much colder and drier conditions. The polar cell will also expand the southward extent of relatively dry air (compared to the Ferrel Cell) reducing precipitation levels below norm. Impacted terrestrial regions experiencing reduced precipitation may dehydrate to the extent that when the cooling effect of moisture transpiration is lost mean daytime surface temperatures are increased, creating an apparent thermal paradox. Agricultural crop failures and bare soil wind erosion are potential outcomes.

Recent weather events in the USA and Europe are associated with a southward repositioning of the Jet Stream which might indicate the recent 2006-2011 in solar output reduction is already impacting the world climate and is a predictor for similar circumstances looking forward as SC 24 declines after 2017. The SC 25 cooling event will provide a special opportunity for measuring and assessing the factors involved in this complex mechanism. Only the next 5 years are available for setting up long term monitoring programmes!

10.4 ANTARCTIC THERMAL BALANCE
The basis of the Arctic thermal concept should be applicable to the Antarctic where the South Polar Cell (SPC) is centred over an ice cap of significant elevation (similar to that of Greenland). The higher altitude land mass ensures that the base of the SPC must be colder than the sea level situation of the Arctic.

Unlike the Arctic, the potential heat and moisture transfer from the ocean to the SPC is limited to the narrow band overlap it has with the Antarctic Drift beyond the Antarctic land mass and ice shelf perimeter. Since it is a cool current (see Section 6, P13) evaporation will be much less and the SPC will not become charged with moisture. The Antarctic is consequently recognised as the largest desert in the world. It is therefore quite difficult for a CGE back-radiation mechanism to function within the SPC anywhere over the Antarctic and thus no surprise that there is no evidence of an ESHLW except for the Antarctic Peninsula (figures 5, 6, & 7).

Following a period of high solar activity the Antarctic Drift will also warm but to a lower temperature than that of the Gulf Stream. Where Antarctica and its ice shelves extend beyond the SPC, warming melt-back response similar to that of the Arctic would be likely to occur such as observed in the vicinity of the Antarctic Peninsula.

However, unlike the Arctic, near surface Antarctic air temperatures over the ice cap are reduced precluding melting altogether. It is deduced that the Ferrel Cell expansion during warming events (previous page) confines the SPC southward, all but eliminating the SPC ~ Antarctic Drift interface. Reduced heat and moisture transfer to the SPC is a consequence that leads to weakened CGE back-radiation capacity and increased radiant heat loss efficiency. (See Special Note 2a Figures SN2-1& 2, P34).
The 5000 yr BP ice core data shows that the oppositional Arctic–Antarctic temperature signature is inherent in smoothed and detailed data, there being no Antarctic MWP, RWP or LBA warming events.

11 SUMMATION

Solar Radiance

Solar radiance is the underlying energy source for Earth’s climate system. The mass of water in all its forms (ice, water, and vapour) is an enormous thermal buffer system and re-distributor of heat predominantly collected in the tropical regions and governed by the marine circulation system.

Continuous loss of excess heat from the polar regions has ensured life sustaining temperatures over the millennia. The efficiency of cooling is enhanced by polar oceans and inhibited by polar land masses possibly explaining geological puzzles such as the “snowball earth” glaciations and the apparent high latitude ice free epochs evident in the geological record.

Ultimately variation of the solar radiance is the overarching influence and the climate is a reactive consequence. Solar radiance is influenced on 1000 – 1500 year cycles by planetary gravitational disturbance of the solar plasma with Jupiter’s orbit as a major factor. Since ~1935 the planetary orbital configuration has been mapping paths that are very similar to those of the Medieval Warming (~1100–1175) and is now predicted to follow that of the Oort (1000–1050) low solar flux episode. Globally cooler conditions until mid-21st century are probable much like the ‘little ice age’ which followed the Medieval Warming.

Evidential data points to the climate responding to solar flux variance with variable time lag which increases with distance away from the equatorial region due to ocean currents being the primary capture medium and carrier of thermal energy. Ever-changing observed climate data reflects the combined impact of all influences on thermal energy transport history for each specific data-point up to a time/date. Averaging coevally acquired data from widely distributed data-points therefore necessarily cancels out all variances within the time span history that the data-set represents. This means that since the marine system has inherent response lags of up to a decade averaged global data will not reflect medium term decadal / sub-decadal semi rhythmic influences such as solar flux variance associated with sunspot activity. Typically only much longer trends and specific local effects, with the exception of very large spontaneous high energy events (e.g. Pinatubo 1991) will be recognisable. The Solheim study (Solheim et al. 2012 in press) indicates the lateral extent over which sub-decadal common time-history regional data can be successfully investigated.

Contemporary mid 2012 weather events in the Northern Hemisphere suggest that fade out of the SC23 solar flux has resulted in a reduced Gulf Stream thermal load and cooler air in the Northern Ferrel Cell during this spring, with adverse impact on rainfall patterns in the USA and Mediterranean countries. Coeval strong rainfall in Northern Europe is probably reflecting pre-fadeout energy stored in the Gulf Stream. These recent weather events are in many ways similar to historic descriptions of the early part of the “Little Ice Age”.

Future Directions of Climate Science

Previous assessments of global temperature data have been uncritically mishandled in the formal publication process leading to unwarranted and scientifically unsupportable consequences in the scientific community and general public domain. This first attempt to manage the world’s natural climate systems, has been too narrow. Placing the whole focus on one parametric – temperature and its relationship to one proxy indicator CO2, which has many incompletely understood environmental interactions, is fundamentally technically unsound, especially without a world climate system model. Much information has been collected but collation is urgently required, this article being one small step in that direction.
Climate science has a unique opportunity of properly planning multidisciplinary scientific programmes (quickly set in place) to monitor climate change response to the impending solar flux decline which could provide critical data to establish a full understanding the mechanisms and their interrelationships that drive climate both globally and regionally. The ultimate objective being reliable predictive climate forecasting as an underpinning platform for long term proactive environmental initiatives to ensure population pressure does not overwhelm the natural world ecosystem.

**Unquantified Anthropogenic CGE**
The only public interest question on climate variance not conclusively assessed in this article is:-
“To what degree are anthropogenic factors impeding the cooling function of the Arctic?”

The claim that the warm winter temperature differentials of recent years in the Arctic region are global has been debunked. Publicly made assertions that this “global warming” had an anthropogenic origin are being questioned because the inferred driver, CO₂, has continued to increase in abundance without the anticipated temperature rise. The intermittent super-concentrations of CO₂ in the Arctic Region described in section 10.2, (Page 27) suggests that the high winter temperature differentials are a consequence of pollution capturing radiant heat from the Arctic Ocean that has been appreciably increased by a warmer than normal the Gulf stream. As such it is unrelated to ice melt-back during the Arctic summer, but rather an impediment to ice growth during the winter months.

The NASA website lists investigation topics focused on clouds, aerosols, atmospheric chemistry, solar radiation, world energy budget. It also lists the failed “Glory Mission” that attempted in 2007 to place a ‘Low Earth Orbit’ satellite destined to study aerosols and irradiance which almost certainly would have enhanced knowledge of the inferred North Polar Cell Ramp pollution plume by this time.

Strikingly, CO₂ is absent from the NASA study topic headers. These subtleties and diversity may indicate the Goddard Institute for Space Studies is taking a broader canvas on climate science and leaving that topic to Dr Hansen’s own special web area. See [http://www.giss.nasa.gov/projects/](http://www.giss.nasa.gov/projects/) to interrogate NASA GISS thrust of investigations.

**12 ACKNOWLEDGEMENTS**

We acknowledge the contribution of our fellow professionals being fearless in offering their opinions in discussions. In particular, on the public front of collating and presenting data, Dr. David Archibald and the Lavoisier Group of Australia are standouts.

We also appreciate the response to criticism of the IPCC and related parties in respect to the release and availability of data into the public domain, particularly the acceptance by NASA of the urban island site effects on weather station data that could potentially corrupt assessments and the subsequent remedy through the generation and release of its V3 data sets.

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**SPECIAL NOTES**

*Special Note 1: Solar Flux* (from page 6)
The sun is a nuclear reactor that is highly energetic which emits many forms of radiation randomly into space. Some types of radiation do not reach the surface of the earth because our magnetic field deflects them or they are absorbed by the gasses that make up the outer atmosphere.

The sun emits high velocity particles which are broken down atoms of which by far the most common are hydrogen nuclei called protons. By far the most common form of energy relates to the light which we can see. This is called electromagnetic radiation (abbreviated EM) which includes varieties of
“invisible light” that are known to us as gamma rays, X-rays, ultraviolet light, infra-red light, and radio waves (short waves and long waves). The solar flux is the sum total of all these radiation types being received at any time.

**Special Note 2a: Lunar 18.6 yr. Metonic Nutation Cycle** (from pages 11 & 30)
The moon like all other satellite bodies has a rotational axis that wobbles. The wobble is a systematic change in the tilt of the axis to the plane of its orbit which is called precession and its repeat cycle time nutation. For the Earth’s moon this is the 18.6 yr. Metonic nutation.

For most planetary bodies the centre of mass is at the geometric centre of the body which is common to axis of rotation. This does not however apply to the Earth’s moon where the centre of mass is offset to the axis which leads to the moon always facing the Earth on its ‘heavy’ side and its rotational period and orbit cycle being an identical lunar month.

A secondary effect of the eccentric centre of mass is that as the axial tilt changes the lunar centre of mass rises and falls with respect to the lunar-Earth orbital plane. Just as the daily rotation of the earth causes a 12 hour marine tide, so too does the lunar precession wobble with an 18.6 yr. frequency. This mobilises ocean water toward the north and south progressively for ~ 9.3 yr. at a time across the equatorial zone. The northward migration maximised in 2006, and the southward migration will maximise in ~2015.

Each day as the Earth rotates about its axis tilted at ~ 23° a location on the equator (0°Lat) dips below and rises above the orbital plane where the moon is positioned. Therefore each day there is a N_S tidal surge (NSDTS) which is maximal in the equatorial region and very weak at high latitudes.

![Figure SN2-1: NASA Antarctic & ENHLW modified Arctic Temperature Differential and Metonic Cycle](image)

(Northern Hemisphere: GA(M) = glacier advance (maximum), GR = glacier retreat (maximum), & GS = glacier stability).

As the tilt of the moon varies, slow bobbing up and down of its centre of mass occurs and accordingly the range and peak position of the NSDTS is also shifted. The maximum tilt of the moon’s rotational axis is 11.8° to the inter-planetary orbital plane but about 5-7° to its own orbital plane which is thus tilted at ~ 6° relative to the planetary plane. In 2010 the lunar tilt to the planetary plane was just 1.54°
which indicates that it varies up to 10-11° relative to the earth tilt of 23°. This sets an order of magnitude range limit on the maximum N & S off-set of the NSDTS.

The peak NSDTS is an elevation hump (LEH) on a longitudinal oceanic surface profile. It occurs along a band oriented close to the planetary orbit plane but is oblique to the equator as the earth rotates. As the moon’s axis rhythmically tilts the mean position of the LEH will transit across the equator but within ~ ±15° of it but remaining south of the Bermuda Thermal Mound in the Atlantic.

The LEH necessarily briefly impedes the northward flow of the Mid Atlantic current (MAC) on its southern flank and enhances it on its northern flank. It follows that when the LEH is at its northward maximum the slightly slowed MAC to its south will result in extra solar energy pick up and possible thermal enhancement of the Bermuda Thermal Mound (BTM) increasing the gravity gradient driving the Gulf Stream and consequent flow rates.

Correspondingly when the LEH is at its southward maximum, solar energy gain on it southern flank will be less and the BTM more reliant on solar energy captured on its northern flank where the residence time is likely to be shorter leading to possibly weaker Gulf Stream impetus.

However during the northern Metonic cycle maxima (red triangles figure SN2-1) the positive responses in the Arctic temperature data don’t occur but instead short 3-5 yr periods of low temperature variance begin (yellow rings), suggesting suppression of another more erratic thermal influence. Sometimes in the past extremely cold events in the Antarctic (blue loops) also occurred. The southern maxima (green triangles) seem to have little effect if any on polar temperatures. The 3-5 yr. Arctic Metonic temperature signature suggests the Gulf Stream is somehow thermally stabilising the Ferrel Cell.

**Special Note 2b: Salinity Signature of Law Dome Ice Core (Antarctica)**


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**Figure SN2-2: Correlation of Law Dome Ice Core Salinity with Northern Hemisphere Cooling and Warming**

Figure SN2-2, reproduced from ‘The Australian’, when amended to show the recognised warming and cooling events demonstrates that the high / low salinity correspond to Northern Hemisphere cool / warm
conditions respectively. It is contended that this information supports the contraction / expansion of the Hadley & Ferrel Cells at the growth / expense of the SPC respectively.

If correct this suggests the coeval inverse Arctic warming – Antarctic cooling pattern has been recurrent during the entire time the Arctic Ocean and Antarctic Continent polar configuration has existed.

Vance, T.R1, et al. 2012. A millennial proxy record of ENSO and eastern Australian rainfall from the Law Dome ice core, East Antarctica. American Meteorological Society Journal of Climate. 1 Antarctic Climate & Ecosystems Cooperative Research Centre, University of Tasmania, Hobart, Australia.

Special Note 3: Arctic Air Temperature, Ice Extent and Solar Flux (Background to fig 13 page 16)
The temperature data in figure 13 is not restricted to coastal settings and thus necessarily differs from that used by Solheim et al. It is thus no surprise that while the irradiance profile features correlate to the sunspot record, the temperature signatures (delayed) do not, due to local terrain impacts on inland observations. Figure 13 is from the chapter: Solar Variability & Climate Cycles (page 226) in: Idso, C, Singer, S.F., 2009. Climate change reconsidered: 2009 Report of the Nongovernmental International Panel on Climate Change (NIPCC), Chicago Illinois. The Heartland Institute, 2009.

In the NIGPC 2009 report is the following passage summarising Soon 2005 in support of figure 13. “A final paper of note from 2005 was that of Soon (2005), who explored the question of which variable was the dominant driver of twentieth century temperature change in the Arctic—rising atmospheric CO2 concentrations or variations in solar irradiance—by examining what roles the two variables may have played in decadal, multi-decadal and longer-term variations in surface air temperature (SAT). He performed a number of statistical analyses on
(1) a composite Arctic-wide SAT record constructed by Polyakov et al. (2003),
(2) global CO2 concentrations taken from estimates given by the NASA GISS climate modeling group and
(3) a total solar irradiance (TSI) record developed by Hoyt and Schatten (1993, updated by Hoyt in 2005) over the period 1875-2000.

The results of these analyses indicated a much stronger statistical relationship between SATs and TSI, as opposed to SATs and CO2. Solar forcing generally explained well over 75 percent of the variance in decadal-smoothed seasonal and annual Arctic SATs while CO2 forcing explained only between 8 and 22 percent of the variance. Wavelet analysis further supported the case for solar forcing of the SAT record, revealing similar time-frequency characteristics for annual and seasonally averaged temperatures at decadal and multi-decadal time scales. By contrast, wavelet analysis gave little to no indication of a CO2 forcing of Arctic SATs. Based on these data and analyses, therefore, it would appear that the sun, not atmospheric CO2 has been the driving force for temperature change in the Arctic.”

# We, the authors of this article, contend that the concentration levels of CO2 and other anthropogenic components of “greenhouse gas” in the Arctic precinct will prove to be distinctly different from NASA world average CO2 and therefore the relative “solar ~ world average CO2” forcing influence ratio is unlikely to reflect actual Arctic atmospheric conditions. This does not detract from the importance of the SAT ~ TSI relationship.

Solheim et al. demonstrated sunspot signature within coastal/near-coastal Sub-Arctic/Arctic temperature data and deduced it was a consequence of marine influence. In this article the pathway for such result has been investigated and demonstrated even small temperature changes in the ocean can reflect large heat transfers.

The most profound heat transfer event of recent time is the recurrent and progressive shrinking of the Arctic Ice sheet. Sea ice grows at -1.8°C during winter and melts at 0.0°C. It follows that the annual ice loss volume corresponds to a significant thermal transfer between the Arctic Ocean and the winter ice. This is net energy neutral because the ocean heat is given up to “new water” thereby cooling the ocean. This process stops when the ocean is either cooled through heat loss or the winter onset
chills the ocean surface to nearly 0.0°C. Ultimately the stop point reflects the initially available thermal energy in the Arctic Ocean.

If the Gulf Stream model for Arctic Ocean heating is correct and its thermal condition is a delayed response to solar heating of the Bahama Thermal Mound, the annual Arctic Ice melting stop points should show such an influence. If we assume average ice thickness is similar each year the significant contrast between winter and summer arctic ice cover will be proportionally similar to the actual changes in ice volume.

![Figure SN3-1: Annual Arctic Sea Ice Variance 1979-2013 (Dec)](image)

Figure SN3-1: Annual Arctic Sea Ice Variance 1979-2013 (Dec)

![Figure SN3-2: Annual Arctic Sea Ice Area Variance](image)

Figure SN3-2: Annual Arctic Sea Ice Area Variance

This was investigated by extracting ice extent maxima (Avg. 142 Mkm$^2$) and minima (Avg. 45 Mkm$^2$) from figure SN3-1(red Triangles). The annual ice loss was then determined and is presented in figure SN3-2. On average the annual ice loss has been 96.6 Mkm$^2$ i.e. 68% ((Max 78%, Min 62%) since modern public records were initiated in 1979. The annual ice loss has progressively ramped up with increasing variance since 1987 to a maximum in mid 2008, declined for three years and then jumped to a new maximum in mid 2012. Importantly in 1996 and ~10 years later in 2006 the annual ice loss was appreciably less for three to four successive years by up to 10 Mkm$^2$ (~ 10%).
During the observation period the maximum & minimum ice extents have reduced by 13.9 km² and 32.9 km² respectively which can be seen in figure SN3-1 where year to year variance has no obvious pattern. The Arctic Ocean now has an increased thermal load corresponding to 20 Mkm² of former ice stored within it suggesting the cooling mechanism of the Arctic has been overtaxed since ~1988.

Consistent with the 10-11 yrs delay identified by Solheim et al. the sunspot cycle profile for SC20-SC23 (1986-2010) was overlaid with the delay time of 10.7 yrs onto figure SN3-2. The annual average sunspot data were three point smoothed to take into account potential mixing within the Gulf Stream given the complex flow paths illustrated in figure 28 (P 29). The adopted matching time point is the mid 1996 ice minimum and then a mild time stretch was applied to fit the 2007 ice minimum.

The fitting of the sunspot data suggests the travel times of 9.7-11.5 years along the ~8000 km travel distance between the Bahama Thermal Hump and the Arctic yields vector flow rates of 1.9-2.3 km/day (0.043 – 0.051 knots). Clearly the 0.4 km/day range of this tortoise like flow rate is not unrealistic over a 20 year time span and could be driven by progressive elevation of the Bahama Thermal Hump until heat build up in the Arctic reduces the gradient.

Prior to 1987 the annual fluctuation was in the order of 10 Mkm² suggesting this is an inherent variability that potentially impacts all data points which means only changes in excess of 15-20 Mkm² are of significance. Furthermore it is obvious that the time frame of the ice observations is far too short and the uncertainty of approximating old + new sea ice volume by area only is too high to declare this analysis as scientifically rigorous.

This correlation is thus a plausible explanation for sea ice extent but is inadequate to be declared proof of concept. If it is correct however the data indicates that the Arctic Ocean cooling system can cope with thermal pulses of SC20 and less but not SC21 and higher. This would suggest that only SC’s with Wolf Numbers exceeding 120-130 will impact significantly on Arctic Sea Ice distribution (>15 Mkm²). There have been 11 such cycles since 1700. They are SC’s -2, 3, 4, 8, 9, 11, 18, 19, 21, 22, and ?23 with half of these occurring since 1940!.

University of Illinois, Polar research group: http://arctic.atmos.uiuc.edu/cryosphere/


Special Note 4: Time Related Correlations Between Temperature Proxies!

Temporal correlations between thermally related data has become an obvious issue especially with higher frequency data over short time spans. There are two potential reasons, namely local effects and mathematical treatments to remove/suppress such noise.

Some regional effects cannot be eliminated. The most obvious example is that the ice cores of Antarctica and Greenland are not from identical environmental settings. The Antarctic drill holes are centrally positioned in a contiguous Polar Ice Cap whereas the Greenland ice cores were taken from a terrestrially bound Ice Sheet, centered about 15° Lat south of the NP and its related marine ice raft. Greenland ice has probably been derived from moisture acquired from both the Arctic Ocean and the tundra portion of Canada unlike Antarctic ice for which such diversity is not likely. It is thus possible that inherited isotopic partitioning may have existed prior to encapsulation. Uncertainties in dating and/or “thermal calibration” of the proxy parameter are therefore possibilities.
The second issue lies within the mathematical processing (frequently referred to as smoothing) to reveal trends in data with high frequency relatively low amplitude variance often called “noise”. This is typically done by an averaging process on the assumption that the “noise” is randomized about a common trend. Some smoothing regimes average the data over several adjacent values on the basis that the noise will be self cancelling. It often works quite well providing the data blocks are of short range compared to the overall data range, say 1%. Eg 100 years of data would need to be provided at one monthly intervals to derive 12 point (1yr) averaging. In this example the result for the “year” could be plotted against the mid year or at the end of the averaged year.

The latter disposition is appropriate if the objective is to investigate 12 month cumulative outcomes and is the protocol used by MS Excel spreadsheet software such that if the averaging box is made longer the time offset for all the data increases. In the example 10 yr averaging (120 data points) creates a 6 yr offset. In contrast if the median of the averaging box is used as the plot reference there is no offset.

Figure 24 is an example of smoothed data which is a just little surprising since the Medieval Warming signature is evident over circa 900 – 1120 AD seemingly in advance of this 950 – 1250 AD aged event, especially when tree ring response should be a following reaction. The apparent premature initiation of the tree ring response may have a mathematical cause whereas the relatively short duration is probably a local effect. Some GRISP2 Ice Core temperature dataset seems to have similar issues.

An important consequence is that data smoothed to demonstrate 100 year periodic influences over a 5000 yr time span may not be reliably/successfully compared with other detailed information (unsmoothed) over time spans of 500 yrs or less.

Special Note 5: Orbital Influence on Solar Cycles (SC) and Solar Radiance (SR) (from page 23)
Analysis of planetary orbits has demonstrated that in combination they give rise to systematic cyclic variance in the strength of their gravitational force acting on the sun and its plasma. Specific collinear and orthogonal planetary configurations with respect to the Sun (S) of the Jupiter (J), Venus (V) and Earth (E) correlate with SC sunspot maxima, with distinct configurations for odd and even maxima.

The Jupiter and Venus years are 11.86 and 0.62 Earth years (Eyr) respectively. S–V–E inferior conjunctions occur at intervals of ~1.6 Eyr (i.e. ~7 times each Jupiter year) and similarly also E–S–V superior conjunctions. Jupiter’s strong influence over the solar cycles is reflected by their ~ 11 Eyr periodicity. Successive SC maxima occur at slightly earlier positions (~0.86 Eyr) on Jupiter’s orbital path, ultimately taking ~ 14 SCs (~164 Eyr) to completely back-step around it. This “back stepping cycle” obviously influences the Jupiter – Solar distance at SC maxima but is not a significant influence on SC/SR maxima intensity (see figures 20/22). (Wilson I.R.G. 2006, et al. 2008, & 2010).

It is obvious the collinear conjunctive configurations (figure SN4-1 below) have the potential to setup an Earth-Lunar type tidal mechanism on the Sun. The linear conjunctions with orthogonal Jupiter offset are more dynamically complex. The gravitational forces on the sun will be both radial and rotational because of the planets’ different orbital frequencies. SC23 had both OIC (11/2002) and OSC (08/2003) maxima (Recognisable as separate peaks in figure 17). The upcoming SC24 maximum will have an ESC pattern in 02-03/2013. In early 01/2014 a J–E–V–S conjunction occurs and might delay or otherwise impact on SC24 decline.
These SC maxima correlations firmly link variance in sunspot count and hence SR with planetary gravitational disturbance of the solar plasma. Indeed it is possible that the polar to equatorial migration of latitudinal solar plasma currents (page 21) is a compensating mass transfer response to Jupiter in the form of a gravitational pressure wave within the solar plasma with Venus and Earth.
modulating its strength. Because the solar system is in free space, plasma mobilisation has the corresponding potential to also distort the planetary orbits. Planetary orbits probably also influence latitudinal plasma flow. Indeed sophisticated modelling provides strong evidence that plasma tidal bulges of V-E conjunctions impacted by the tangential gravitational force of Jupiter could comprise a pulsing torque couple that causes systematic variance in latitudinal plasma flows and SCs. (Recent anonymous author ~ three postings to: http://www.astroclimateconnection.blogspot.com.au.)

Wilson further investigated the planetary configurations and their parameters associated with periods of low sunspot count (Weak Solar Radiance (WSR)). The profiles in figure SN4-2 demonstrate unambiguous parametric correlations of the variance in distance of Jupiter from the Sun for the SC/ SR maxima from its nominal 5.2 A.U. and the Venus elevation angle as seen from the sun (heliocentric latitude, – ve = depression) relative to the solar system reference plane (ecliptic). The solar distance of Jupiter varies according to its elliptical orbit (aphelion~max., perihelion~min.).

(1 A.U = mean Sun – Earth distance, 149,597,870,700 M kilometres m / ~ 90 M miles, revision 2012)

Jupiter leads the pattern suggesting that Venus is responding to Jupiter’s much larger mass. The pattern for each WSR period is distinct and the predicted ‘Oort replication’ in the immediate future suggests a macro-orbital cycle of close to 1000 years. The enigma of the Medieval Maximum (MM) suddenly has importance because it has also been tagged in the literature as the precursor event to the little ice age. This ‘climate shift’ is described in anecdotal history as clustered abnormal/unusual/extreme weather events in Europe but such information sources tend to under-report the mundane, possibly explaining to some extent why the weak sunspot periods Wolf, Sporer & Maunder are not obviously reflected in such records. Gulf Stream time lag would also spread their impact on Europe.

We observe that the Oort and 1175-1250 MM decay patterns are similar. Also the MM + MM decay is replicated by the 1950-2010 modern warming signature and the predicted 2010-2100 ‘Oort replica’ combination. The carbon 14 data suggests the Oort was preceded by a warm period suggesting the MM + MM decay was a repeat of ~950–1100. Tree ring data (page 25) confirms pre Oort warm conditions in Scandinavia. This could imply the Earth may have been experiencing a replication of the Medieval Maximum since ~ 1935. This “Wilson cycle” might therefore consist of back to back MM–WSR–WSR–WSR–WSR–MM solar radiance patterns in which case a second MM could initiate just after 2100. Carbon 14 data is consistent. (see next)

The carbon 14 (14C) isotopic data reflect SR. Carbon 14 is derived from the interaction of cosmic ray derived neutrons with nitrogen 14 (14N) in the outer atmosphere and generation therefore occurs more readily when cosmic shielding provided by the solar flux is weakened. δ 14C<0 corresponds to excess 14C and means reduced solar flux. It is notable that peak 14C abundance clearly reflects the Wolf, Sporer and Maunder SR minima with a considerable accumulation time similar to the inertial off-set of the Little Ice Age which was the combined impact of the same periods of weakened solar flux. The Dalton 14C signal is weak probably the consequence of 12C contamination from fossil fuel 'industrial pollution'. (Smaller 14C/12C sample term = δ 14C <0)

Oxygen and carbon isotopic data identify Dansgaard-Oeschger warming spikes during the last ice age, 15,000—70,000 years ago, which occurred ~1500yr apart (average). Their proxy data have some resemblance to the MM profile form and are the closest match to this “~1000 year Wilson cycle”. Pushing the time range of SN4-2 back to 0yr A.D. would enable further investigation of the 14C ~ planetary (Jupiter) relationship.
The correlations identified by Wilson are very strong and almost irrefutable but lack a mechanism that explains how the gravitational influence impacts on the solar flux intensity. Plasma has a strong similarity to a gas but consists of atomic nuclei only, with almost no possibility of molecular structure and related forces at the sub-nano scale, that are typically present in a terrestrial gas and liquids. Gravitation is therefore freely acting independently on each nucleus in the solar plasma. Hence compression and expansion within the plasma could accommodate the tide-like planetary gravitation forces without systematic dramatic distortion of the solar surface. There is also the possibility of disjointed mobilisation and/or distortion of the solar core itself. The equatorial migration of the helioseismically detected latitudinal currents is a potentially related feature (see pages 20 & 31).

The potential consequence of these relatively minute force fields, in the context of the Sun’s enormous mass and gravitational field, becomes significant where trivial changes in the inter-nucleonic spacing facilitates or inhibits the possibility of thermo-nuclear fusion reactions (TNFR) within a portion of the plasma shell thereby increasing or diminishing SR respectively. TNFR probability is a very complex topic, such that in any given circumstance it could increase/decrease with any minute change in either the solar plasma temperature or pressure irrespective of it being positive or negative.

To view the present day, recent and historic planetary locations and motion, visit the following website: [http://www.theplanetstoday.com/](http://www.theplanetstoday.com/) and to view the scientific contributions of Wilson run a web search for ‘Wilson I. R. G.’ to read/download the following:


**Ultimately it’s all about this relationship:**

*The Sun our energy source and 149.6 Mkm away, Earth and its magnetic field.*

*The Earth in the right image is about 4 times larger than on the Sun image scale.*

*(If you are an American the separation is ~ 93M miles)*
FURTHER INVESTIGATION OPTIONS

This document can only be a synopsis given its size and the volume of data which has exploded during the last few years. Traditional restriction of data sources and referencing of published hardcopy printed articles is no longer feasible because much of the information is virtually real-time/regularly updated internet-accessible. This we have used extensively without apology.

We suggest the following “Hot Linked” websites for reader investigation:—If they don’t work directly from within this document we suggest using a copy - paste operation to put them on your internet web browser software utility.


CLIMATE CHANGE & SEA ICE PORTLET:
http://portlets.arcticportal.org/arctic-sea-ice-introduction and http://portal.inter-map.com/#mapID=26&groupID=162&z=1.0&up=1099.1&left=0.0

GLOBAL WARMING POLICY FOUNDATION:

NASA:
http://earthobservatory.nasa.gov/GlobalMaps/
http://data.giss.nasa.gov/
http://data.giss.nasa.gov/gistemp/ graphs_v3/
http://airs.jpl.nasa.gov/image_gallery/gases/carbon_dioxide/
Temperature 1880-present
http://svs.gsfc.nasa.gov/vis/a01000/a010900/a010901/3901_GISS_Temp_narratedv2-540-MASTER_high.mp4
step through http://climate.nasa.gov/ClimateTimeMachine/climateTimeMachine.cfm,
http://www.youtube.com/watch?v=kxevaO1IMSE
Related:

NOAA:
http://www.ngdc.noaa.gov/

University of Illinois, Polar research group
http://arctic.atmos.uiuc.edu/cryosphere/

AMAP=Arctic Monitoring and Assessment Programme: (International Collaboration Project)
http://www.amap.no/?main=http%3A//www.amap.no/mapsgraphics/

NZ Marine & Oceanography Interest Group – “Seafriends”

National Geographic: Polar Marine & Atmospheric Environment
http://jisao.washington.edu/wallace/natgeo/ArcticSubart.pdf

Woods Hole Oceanographic Institute:
http://www.whoi.edu/page.do?pid=39138&tid=441&cid=48352&ct=61&article=28811
http://www.whoi.edu/main/topic/arctic-ocean-circulation
http://www.whoi.edu/main/aope

Solar Cycle 25 Discussion site
http://sc25.com/

Solar Observations – collective near real time data
http://www.solarham.net/

University of Colorado Solar Radiance – Laboratory for Atmospheric and Space Physics
http://spot.colorado.edu/~koppg/TSI/

Lavoisier Group (Australia)
SELECTED REFERENCES:
The following references are no longer of the classic type. Much of the information is only readily available by internet search as a result of which access and validity of the links cannot be considered to be of long term reliability. Reverting to the root of the link address is recommended if they don’t work.


Archibald, D. 2012. First Estimate of Solar Cycle 25 Amplitude – may be the smallest in over 300 years (figure 12). “Watts Up With that” Internet guest post.


ZOMBO: http://zomobo.net/satellite-temperature-measurements
This article has been written for the purpose of stimulating clear scientific thinking at a time when the status and integrity of scientific endeavour is under question. It was stimulated by the observation that solar flux influenced Arctic temperatures (Solheim et al. In press 2012). The conceptual aspects had already been evolved.

Sadly it is reality that in recent times the scientific philosophy practised by many has been brought into disrepute by some practitioners of climate science.

This document is an attempt to redress this situation by presenting a coherent technical overview of the Arctic’s role in the Earth’s climate mechanism and how it is dependent on the Sun’s energy output.

This is an especially critical matter with respect to understanding the likely impact of the forecast imminent massive reduction of solar output for years to come.

Politics has degenerated to power-personalities using the issues of the day as ammunition to reinforce or change their mutual pecking order.

Unfortunately organisations, particularly those within and affiliated with Government funding, have become compromised. Group think feedback between Government and Agencies in the scientific domain is a consequence.

The internal administration of those agencies has consequently been infected with play-the-game mentality to an alarming extent. In a scientific context this is the equivalent of instructing medical doctors to let people die because it might affect the budget.

Recently ‘retired and resigned in protest’ scientists and engineers from NASA have published a collective letter accusing the organisation of not being frank with respect to its public charter. (39 co-signees)

Similarly, the much smaller CSIRO of Australia also has some explaining to do regarding suppression of seemingly climate related reports, as has been raised in a recent letter, made public in May 2012, identifying 25 official complaints.

Scientists need to be diligent in assessing all the possible relationships that might impact an investigation and need to have the certainty that if they find evidence that a prevailing viewpoint has flaws they have a duty to disclose it in an open forum. The organisation within which they function does not have an inalienable right to suppress such information once peer reviewed, because it might be painful, embarrassing, or politically damaging to a power-personality. Any power-personality who attempts such abuse of authority should be liable for public castigation and dismissal from office.
“Global Warming” has morphed to “Climate Change” as the number one environmental bogey.

‘Global warming’ as portrayed in the public domain is a myth and ‘climate change’ has ever been and will continue to be the omnipresent norm of planet Earth’s atmospheric & marine self-sustaining solar energy redistribution, storage, and cooling system.

Humanity has no influence over the sun, our life sustaining energy source.

If we don’t understand the sun’s role we don’t have any hope of having a viable climate model on which to base anthropogenic mitigation measures.

Climate science is far from this situation but a once-off opportunity to potentially resolve the failure of recent efforts is imminent.

The ultimate purpose of this article is to redirect climate research into a logical framework that fits the observed data.

It is time to junk concept driven climate research. It is potentially perilous to humanity not to do so.

We write our article with true independence from political or commercial interests, without fear or favour. We acknowledge our professional interests are impacted by the scientific climate debate and its political manifestations but our deliberations are not swayed by these aspects – we are scientists first and foremost.

We have widely distributed this article without a formal peer review process, and regard you the reader as the ultimate peer reviewer.
Who Are We?

We, the authors of this document, bring 90 years of geo-scientific experience to this task. We are qualified to speak on this topic because our qualifications encompass university level geology, geochemistry, geophysics, classic physics, mathematics, nuclear physics, and engineering. These skills have been used throughout our professional lives. Geophysics incorporates astrophysics, solar physics, earth physics, earth hydrology and climate science. One of us has meteorological knowledge and a pilot’s licence. Our resources are meagre, mainly cerebral with the adjunct of a desktop PC.

We are private citizens who have initiated this dissertation without prompting, promotion, payment from other parties such as political syndicates, corporate conspiracies and enterprises that might be advantaged by our opinions. Neither of us has career promotion or related personal advancement objectives with respect to climate science.

Our one goal is to provide stimulus and initiate development of an overarching accepted climate model and reality based limiting framework that has been lacking from the public domain. The IPCC through clearly improper procedural behaviour has besmirched the credibility all scientific endeavour and played upon public fear with political overtones to the extent that climate science funding and consequent research orientation has not been full, thorough, nor reported with integrity.

The overview of major climate mechanisms has been prepared from public data which have been widely sourced and frequently circulated by climate aware individuals over recent years. We don’t claim to know of every document or organisation generating and interpreting climate data so our knowledge is necessarily incomplete. It now appears misinterpretation and consequent misrepresentation of these same data have ultimately led to the global warming fear syndrome.

We consider it is time to have a comprehensive review of climate science and hope there is scientific team out there with the requisite skills and intellectual freedom to do it justice. The IPCC had this charter opportunity but its politically oriented genesis and hence focus destroyed its integrity. The failed predictions of the IPCC are a potential cause celebre for the anti-CO₂ lobby that could potentially shut down climate research. This possibility is of major concern because such a study is integral to developing the global environmental management policies that will preclude the world population ceiling from potentially destroying “our human habitat”.