

# **The Future of Everything**

## **Part 2**

### **Climate, Growth, the rest**

Bernie McCune

February 17, 2018

Cruces Atmospheric Science Forum

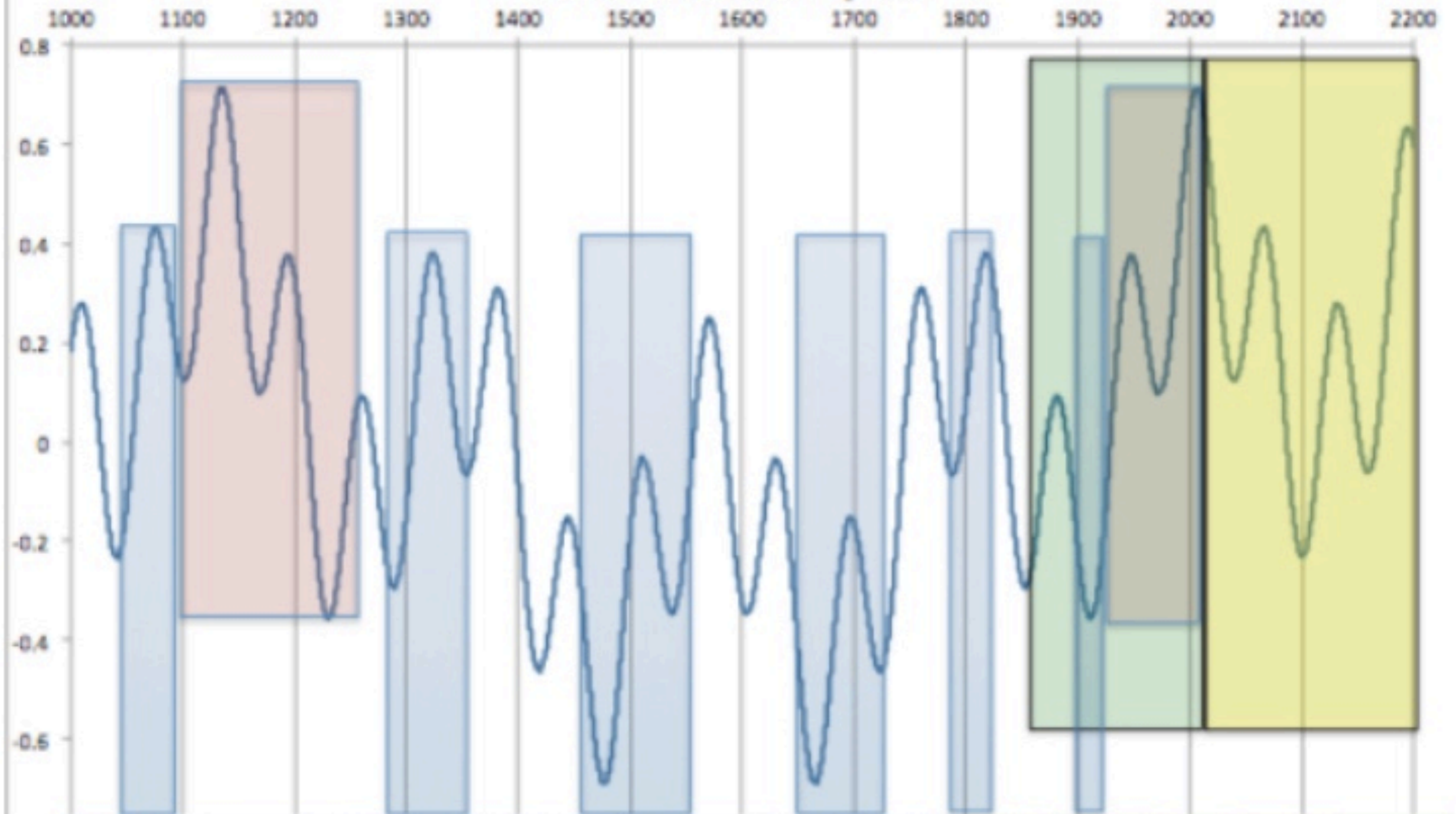
# Climate the next 100 years

- What does Ed Caryl's Model tell us?
- Can we believe the IPCC models?
- Ed's 3 cycle model and the basis for 62 year cycle, 204 year cycle and 1040 year cycle
- Summing the cycles and using the results to hindcast and forecast temperature

# Three Natural Cycles

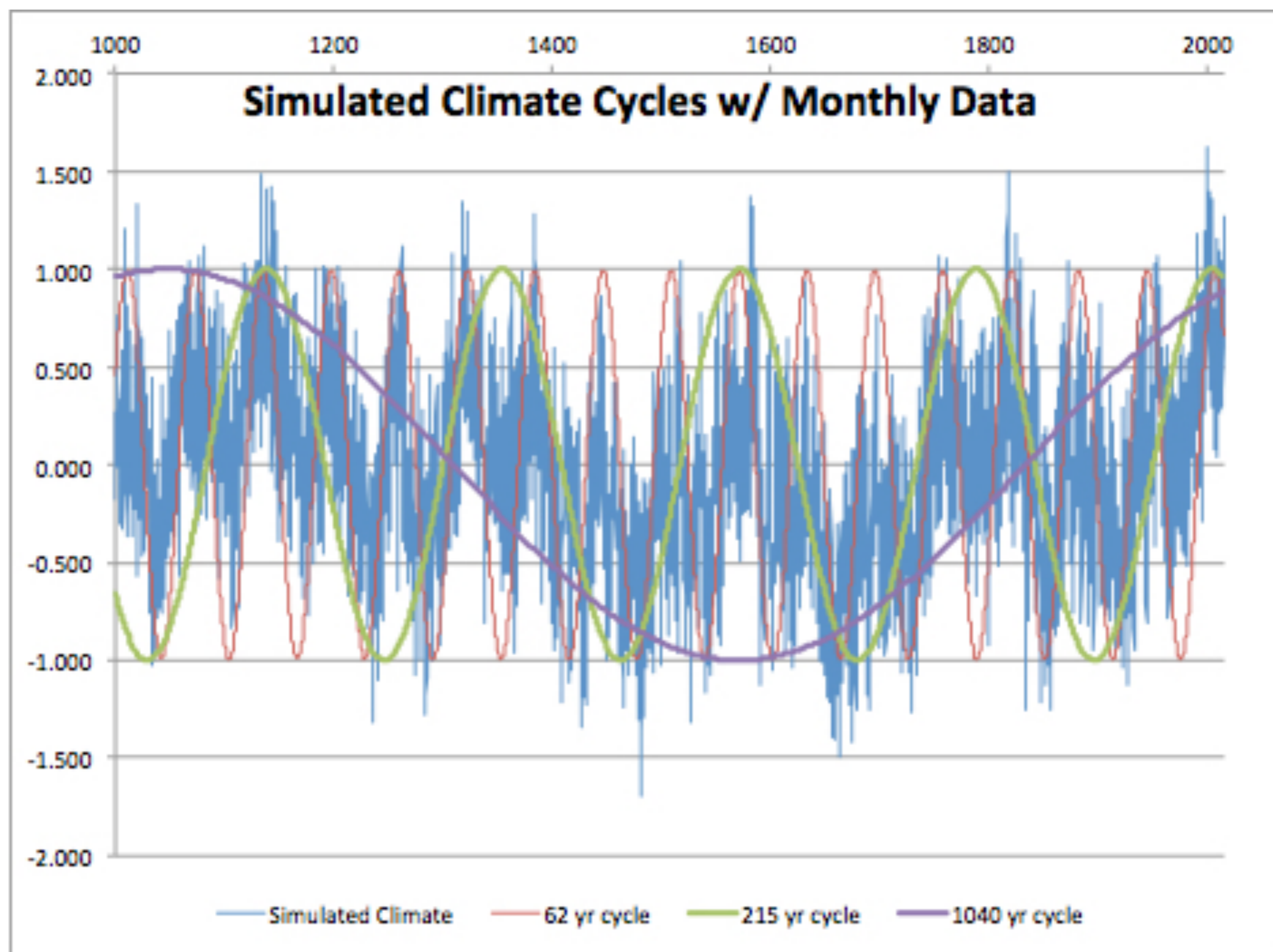
- 62 year cycle based on ENSO ocean temperature (PDO and AMO)
- 204 year cycle based on variation in solar output as measured by variation in Carbon 14 due to cosmic rays at the top of the atmosphere
- 1040 year cycle (Bond cycle) which is thought to be based on atmospheric/ocean circulation patterns and/or solar/cosmogenic patterns
- Overlay the three cycles using their proper individual phasing and sum them (Caryl's model)

# Sum of Natural Cycles

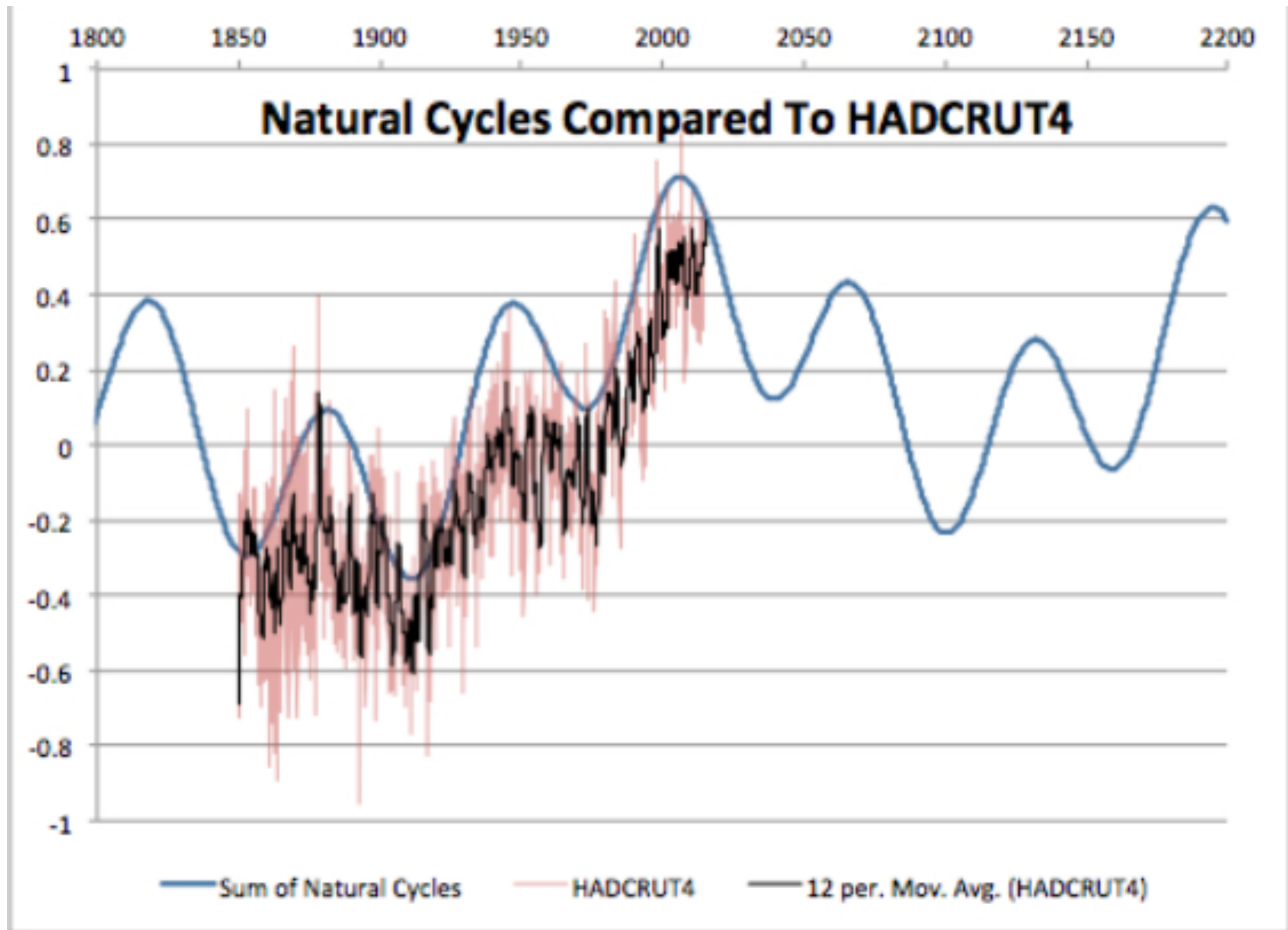


-0.8	Oort minimum	1040	1080	Maunder Minimum	1645	1715	Period of Temp Records	1850	present
	Medieval maximum	1100	1250	Dalton Minimum	1790	1820	The Future	present	2200
	Wolf minimum	1280	1350	Gleissberg minimum	1900	1920			
	Spörer Minimum	1450	1550	Modern Maximum	1920	present			

The next figure shows a more noisy (and more realistic) pattern with monthly data presented to look more like actual instrument temperature data taken in the modern era. Note the three cycles shown in purple (Bond), green (solar), and red (ocean surface temperatures).



And to see how the full actual instrument temperature record fits the Caryl model, look at the HADCRUT4 data nested in the period from 1830 until present in the figure below. Now look at the future plot of the model from present until 2200. The next 80 years show a cooling pattern until 2100 when the trend begins to warm again. The actual temperatures will possibly drop to the level of the period of around 1900 and probably not as cool as was seen in the late 1800s.





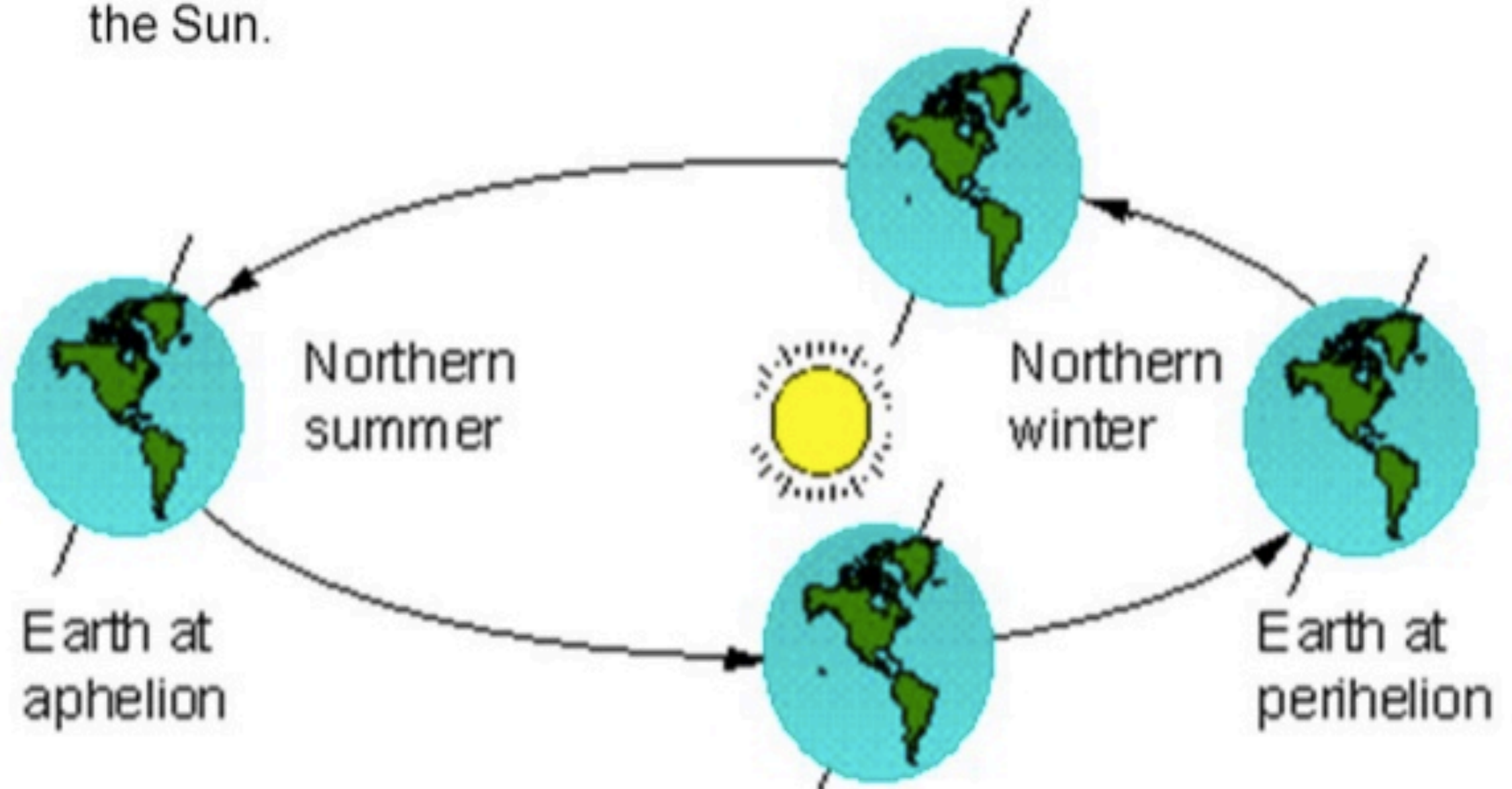
# What does the model tell us?

- For the near term we have probably reached a 1000 year peak
- The 1 or 2 degree C climb over the past several hundred years has probably also peaked
- The model for the next 80 years shows that by 2100 much of that gain will be lost before temperature begins to climb again
- But in the next several hundred years there may be a much bigger event in our future

# How about the Milankovitch Cycle?

Precession is the 'wobble' of the Earth on its axis. Variation in precession changes the amount of energy received by the Sun.

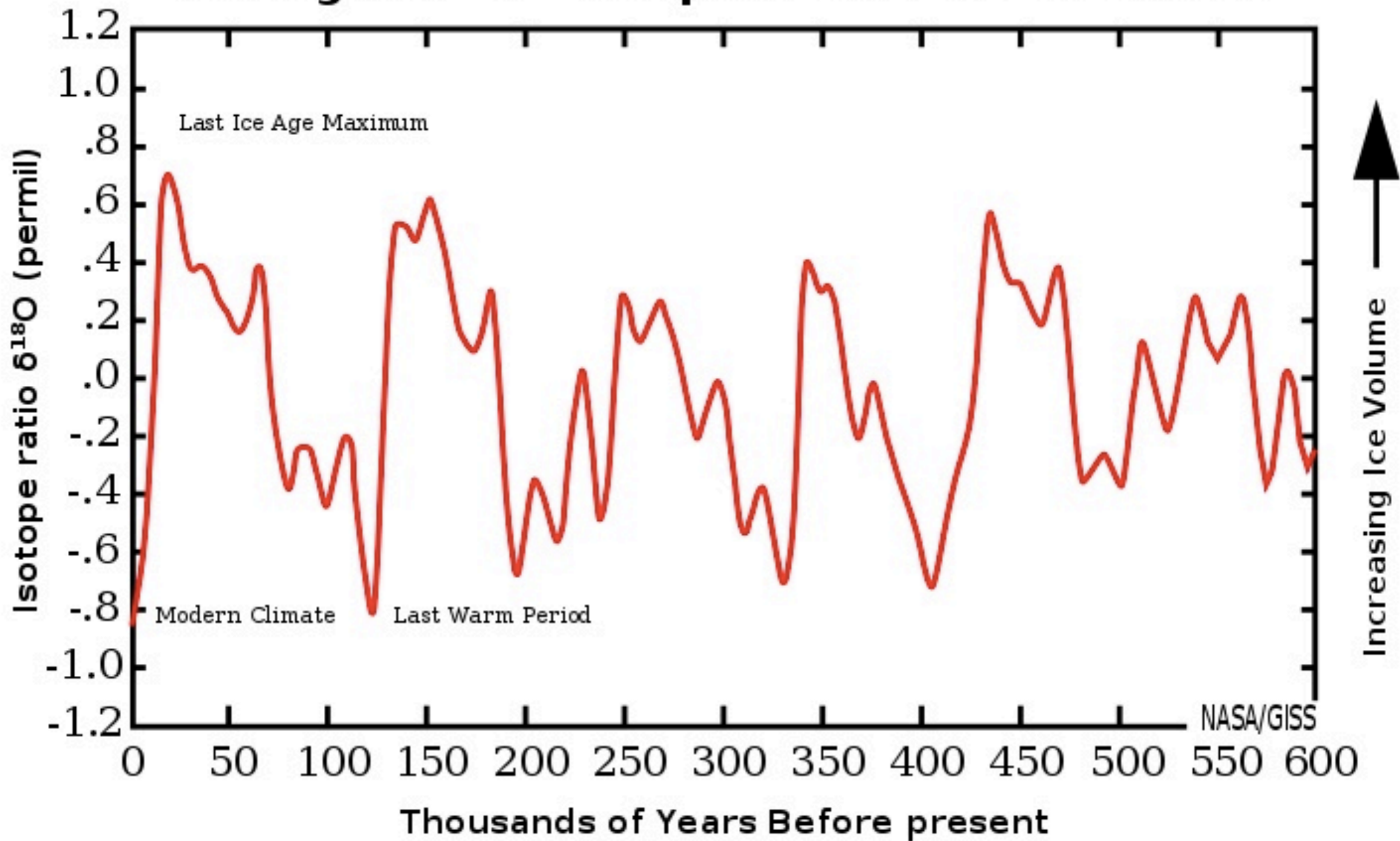
When the cycles of tilt, obliquity and precession align, we should expect periods of elevated or diminished global temperature.



The last prediction that could be made about future climate is that we may have period of deep glaciation in the not too distant future that will possibly include 10 or 20 degree C drops in global average temperature. There have been a series of these deep glacial periods over the past several million years that last on average about 100,000 years.

Look at the following chart showing the last 6 cycles of this global phenomenon. These are not a one or two degree fluctuation in global temperature as we have seen over the past 200 years. This is Chicago with a mile of ice on top.

# Averaged $\delta^{18}\text{O}$ in deep sea sediment carbonate



NASA/GISS

# Growth as discussed by Ned Smith

- “Business” magazine article in February 2013 titled “Is the end of growth the end of Capitalism?”
- In almost all areas of our life the human race has experienced continuous growth until our future now begins to look like there will be an end to that growth
- Some folks say we must shrink our population in order to save the planet
- The **Occupy Wall Street** movement suggested that economic stagnation will be the death of Capitalism (and seemed delighted by this idea)
- They proposed that perpetual growth on a finite planet was impossible

# Growth Assumptions

- Part 1 discussed some of the issues of population growth
- What does economic growth really mean?
- There are two types of growth - “extensive” and “intensive”
- With extensive growth there are inputs to the system that quickly reach limits
- Intensive growth uses inputs in different ways to produce more interesting and useful stuff versus just more and more stuff
- The modern information economy is an example of intensive growth where it tries to satisfy more and more people using less and less energy

# Two Important Questions

- If growth ends does our economy end?
- Does Capitalism need continuous growth (especially in population and the economy)?
- Basic economic theory does not even consider growth
- Capitalism flourishes from more and more trade and not necessarily from growth
- Raising 30% of the world's people into the middle class and promoting broad economic efficiency is the “gold ring” of future economic well being not growth

# Capitalism, Environment and Growth

- In the 1970s there was a very large push to take care of a deteriorating environment and to look at limits to growth
- At the same time government was involved in lowering taxes, deregulation and wide spread privatization
- Financial markets began to have an increasing role in the global economy
- Japan, Europe and the United States have strengthened their capitalistic roots while communistic and socialistic countries have been shrinking, going away or have introduced basic capitalistic elements into their economies



# Rapid Growth

- The biggest challenge to capitalism is probably rapid growth and change
- The early 20th century was the heyday of communism, anarchy and socialism
- This chaotic period of growth disrupted stable social systems that were in place before the Industrial Revolution
- Starting late in the 20th century through the early decades of the 21st century we are seeing another “growth” related disruption (much of it based on technology change)

# Ideological “Growth”

- A few African and Middle Eastern countries have been in a power struggle of competing ideologies
- The chaos and immigration pulses from those regions have disrupted the whole world
- Cyber war from there, China and Russia if it grows in the future may be one of our main concerns

# Growth and the Financial System

- Does our financial system require growth? Or with the blockchain process do we even need the financial system?
- We probably still need loan and debt handling capability but that may be eventually handled somehow by the blockchain system
- The issue of long term secured debt, loan equity and the process of consumption spread over time seem to be unaffected by growth or the lack of it.

# Does Capitalism have some hidden flaw?

- Numerous modern activists believe that capitalism and a growth economy produce inequalities (and rage) that will destroy it
- Historically any economic system that produces inequalities is bound to eventually fail
- So is there a way to deal with this? Probably yes!
- By restraining excesses, providing strong social safety nets, by demanding efficient and well functioning bureaucracies, having only prudent and necessary regulations and a generous provision of public goods (roads, other public infrastructure, police, military etc.)
- Simply put - promoting a mixed economy

# Artificial Intelligence

- Until robots can open doors, they can't help us or harm us very much
- They are becoming much more capable and very soon they will be able to do a whole lot more
- Will their learning capabilities eventually become a threat?
- Until recently our smart machines were micro controllers and analytical computation devices
- Watson as powerful as it seems to be, is still only a very fast information mining device - not exactly the thinking process that humans are capable of

# Cyberwarfare

- The extent that this phenomenon may reach is not clear
- It could be taken to the level of a full scale hot war
- The headaches that have occurred to date are really annoying but I am sure we have not seen “nothin” yet
- China and Russia are the near term threats and so far there is not much that we know of that has been done to even slow them down

# Has Bitcoin's time arrived?

- This blockchain concept that removes the middle man and replaces him with a trusted machine arbiter is revolutionary
- The more complicated tasks of lawyers, financial brokers, Google, Amazon and a growing number of other applications may soon be handled by a very very smart app running on blockchain processes
- Bitcoin to me is especially appealing when I contemplate moving money around to my global family in this post 9-11 era
- The Feds and the banks don't like it cuz the Feds may now be unable to "follow the money" and the banks may soon be completely out of business

# A hint at what this all means

- It's complicated in the detail so I will not attempt to completely enlighten you
- But here is the gist of it:

*A blockchain is a ledger of facts replicated across several computers assembled in a peer-to-peer network.*

*Facts can be anything from monetary transactions to content signature validation. Members of the network are anonymous individuals called nodes. All communication inside the network takes advantage of cryptography to securely identify the sender and the receiver. When a node wants to add a fact to the ledger, a consensus forms in the network to determine where this fact should appear in the ledger; this consensus is called a block.*



# A Few Details

- With a distributed system it is difficult to reconcile conflicts or offer referential integrity
- When two incompatible facts arrive at the same time, the system must have rules to determine which fact is valid
- There must be a consensus system to agree to the ordering of facts
- An algorithm “the proof-of-work consensus” is implemented in blockchain using blocks
- For more on a description of blockchain:

<https://marmelab.com/blog/2016/04/28/blockchain-for-web-developers-the-theory.html>

# Blockchain Implementation

- Facts stored in the blockchain can't be lost and are replicated at all the nodes
- It stores the whole history of all past states not just the final state
- Storing data in a blockchain is a slow process since it requires a distributed consensus
- Bitcoin is only one of a number of businesses using this blockchain idea - is Bitcoin ready for prime time?

# The Future of Bitcoin

- Parts 2 and 3 of the above mentioned blog post by a very experienced web development team who spent several weeks on this research believe that Bitcoin is not quite ready but it does probably have a future
- The biggest shortcoming is that Bitcoin needs someone who is very smart to develop a “killer app” so that individual applications can be developed easily with very few bugs
- This team found the existing process to be very tedious and in some cases bordering on impossible (time consuming and expensive)
- And finally, the operation of the system is inefficient consuming huge amounts of memory, time and computing power

# Bitcoin is not very mature

- But -
  - they think it may very well be “the future”
  - And they would not venture a guess at what time in the future that it will reach maturity
  - it is complicated and predictions are foolhardy

# More Bits of the Future

- Space
  - the present trend is commercialization and privatization
  - NASA, the private sector in general and Elon Musk and Jeff Bezos in particular are already planning and working toward this end. Re-useable is the word.
- The push for global citizenship has been faltering for awhile and in fact there seems to be a wave of nationalism (populism) that has taken hold
- Medicine and Energy

# Conclusion

- The nature of predictions indicates that most of what I have covered in this discussion is most likely to be well off the mark
- I have brought up some of these issues because I feel that many are predicting doom on a number of fronts and are distracting us from some of the real problems we will probably face in the future
- Climate is one of those issues and I feel we are wasting time and resources trying to stop catastrophic warming
- I don't really like being called names but in truth what bothers me the most is that these name callers refuse to have a civil discourse on these issues that is scientific and not political