

# Forecasting Farming's Next 40 Years

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to National Grain and Feed Ass'n  
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# Two Keys to Farming's Future

- Most controversial: Man-made global warming has not happened, not happening now. Global cooling will kill biofuels.
- The blessing: The rest of the world will get rich and spend money on high-quality foods vs. wind turbines.
- Affluence couldn't happen in a world of \$8 gasoline, fertilizer fees and no coal.
- Wealth creates biggest farm sales opportunity ever.  
Especially meat, milk and eggs.



# Current Situation

- **Must double food output by 2040** to feed at least 8 billion affluent people and their pets.
- Green Revolution **saving over 1 billion lives per year from hunger.**
- **Also saved 7 million square miles of wildlands**—area of South America.
- **Need new technology to triple yields--again—on the best land..**



# The Fading Population Challenge

- Births per poor woman down 85% since 1960.
- All countries reach stability (2.1 births) by 2050.
- Kids in cities an expensive ego investment.
- Scarcity of young people soon. Not enough to fund Social Security?
- Farmers no longer accused of “producing too much food.”



# The Rising Challenge of Affluence

- Population will rise another 30% before peaking out.
- 7 billion affluent consumers-- due to urbanization, technology, trade.
- Massive increase in demand for preferred foods:  
Meat Milk Fresh produce Ice cream Cheese
- More exports of high-value commodities, food grains.
- Far more purchased inputs to intensify.



# The Pet Challenge

- People in 2050 will have fewer children—but more pets.
- If China gets half of U.S. pet saturation—another 250 million animals. Few of them vegetarian.
- Global shift from food scraps to purchased pet food.
- Even parents who refuse to vaccinate kids vaccinate dogs and cats.
- Use pesticides to keep flea-free homes.



# Key Growth Markets for Food

- **China:** 1.3 billion people, GDP growth 9%. Land-short. Soybeans rather than corn.
- **India:** 1.3 billion. 7% GDP growth. Continuing expansion of milk and poultry.
- **Egypt:** 80 million people, exporting strawberries.
- **Bangladesh:** 162 million people. Indian model?
- **Nigeria:** 154 million people. Oil money, but graft.



# Key Competitors

- \* Brazil:

  - 14 million hectares of pasture with no crop constraints.

  - Far from export ports. Farmers now buying own roads.

- \* Argentina: Like Brazil, but govt steals.

- \* **World needs to value existing cropland and grasslands, not clear more.**





# Must Intensify Farming

- Failure to triple yields would cost millions of acres of wildlands.
- Most of the world's good land already being farmed..
- **Best land never had many species:**
  - Great Plains—bison, antelope, prairie dogs.
  - Australia--kangaroos.
  - Brazilian Cerrados--acid soils, ants and termites.
- **Amazon: estimate 1 million species.**



# Michael Huston, author of *Biological Diversity* (Cambridge Press)

- Three-fourths of biodiversity in warm, wet places.
- Don't clear new cropland in warm, wet places; raise yields instead.
- Pesticides as important to protect biodiversity as for food production!
- Protect the high yields from insects, fungus, bacterial and viral diseases.
- Norman Borlaug, 2002: *“Growing More Per Acre Leaves More Land for Nature.”*



# New! -- High Yield Farming Stops CO2!

- New: Stanford University. Burney et al, PNAS, 2010. “Greenhouse Mitigation Through Agricultural Intensification.”
- High yields saved 6.6 million sq. mi. of wildlands.
- Soil carbon equal to one-third of world industrial emissions since 1850!!!
- Must now re-emphasize high yields, fertilizers, pesticides and refrigeration.
- Don't plow more cropland, anywhere. Raise yields of crops, pasture and livestock products instead.



# What About Biofuels?

- No real contribution to U.S. energy security vs shale gas and oil.
- Competes with food for scarcer acres.
- Drives up food prices here and abroad.
- Now high gas prices and short crops.
- Stanford study says any biofuels raise greenhouse emissions.
- Congress must halt expansion.



# We Lack Technology to Triple Yields

- Green Revolution technology already widely used.
- Greens oppose:
  - nitrogen fertilizer
  - confinement feeding
  - irrigation
  - biotech for both plants and animals
  - most ways to save room for wildlife
- Will new research investments be made in the U.S.? Where? Whose advantage?



# Water Scarcity

- Second-scarcest farming resource.
- Farmers use 70%--at 40% efficiency.
- Solution simple: Money
- Investments:
  - Computer-controlled center pivots.
  - More supplemental irrigation—where?
  - More irrigated pastures? Where?
- Stanford study should push farms/ranches ahead of Delta smelt.



# The New Farm Chemical Ethic

- Use of farm chemicals justified by higher yields per acre, both crops and livestock.
- Avoid toxics if possible, but new ethic says “Don’t take more land from Nature.”
- Search for still-safer chemicals--but the **Precautionary Principle** now says, “Spray--carefully.”
- World Wildlife Fund--USA already singing this song.
- How do we prod Sierra Club and Greenpeace?



# The Safety Concerns

- EPA found chlorine could cause cancer at high doses. Lima, Peru, stopped treating water. Cholera. Every substance kills at high doses.
- EU wants to ban 85% of active pesticide ingredients, not on demonstrated risk. On theoretical risks.
- **Chemophobia kills:** The shame of DDT and malaria in the tropics.
- **Fear of “electronic pasteurization” kills--** through food-borne bacteria. Safe hamburger?





## Organic Farming's Massive Nitrogen Constraint

- Organic yields only about 60% of conventional.
- Conventional farms take N from the air ( 78% N).
- Organic farms grow “green manure” instead of food.
- “Organic Can Feed the World” 2007 paper  
authors overstated green manure's nitrogen  
delivery by three-fold.
- Lack of N fertilizer would mean vast hunger,  
nutritional diseases and food wars!



# An African Dust Bowl?

- Africa now risking bigger Dust Bowl than U.S. in 1930s. Higher population, shortened “bush fallow.”
- Ten African countries now trying Malawi’s fertilizer and seed subsidies.
- OECD countries pledged \$20 billion to give input subsidies full trial.
- Potential big impact on public perception of high-yield farming.



# High Yields Endorse Confined Feeding Too

- Land area of Pennsylvania to raise U.S. hogs on free range.
- Land area of New Jersey to put U.S. chickens outdoors.
- Confined animals more comfortable, need 15% less cropland plowed!
- Feedlot cattle emit 40% less methane. Grass hard to digest. *Alex Avery, CGFI*
- Grain-fed dairy cows cut dairy carbon footprint by 43% since 1944.



# Meat and Health

- Many claim meat takes too many resources. Give it up to “Save the Planet.”
- But meat resources are “free.” Humans can’t eat grass, don’t eat citrus pulp or cottonseed meal.
- Meat yields 1.4 times more nutrition than plant protein—costs 1.4 times more resources. *CAST*
- Also key micronutrients: iron, zinc, folate, etc.
- Should we waste the grasslands in a land-short world?



# EPA and Our Amazingly Moderate **Climate Crisis**

- Just 0.2 degrees net warming, last 70 years.
- **NO** warming trend in last 15 years, BBC.
- California , 1992: Urban counties had 3.15 degree F warming/century. **Rural counties no upward trend.**
- **Urban heat islands may have inflated recent average readings by 40 percent.**



# The “Consensus” View of Global Warming

- Warming due to human emissions of greenhouse gases.
- Major—and dangerous—increase in global temperatures in the next century or so.
- Polar ice melt could sharply raise sea levels, flood coastal populations.
- Floods, droughts and storms will all worsen.
- Human deaths will increase.
- Wildlife species such as polar bear endangered.



# No Global Warming Impact on Food

- Runaway warming never seen.
- Higher levels of atmospheric CO<sub>2</sub> act like fertilizer, and boost plants' water efficiency.
- Tropical temperatures won't rise--but tropic rain belts move north 500 miles. Shifts drought regions.
- Drought-tolerant crops on their way. What about drought-tolerant pasture grasses?



# British wine grapes as climate sensors

- **1st century AD:** Romans grew wine grapes in Britain.
- **Dark Ages** (600-950AD) too cold for British wine.
- **11<sup>th</sup> Century:** Medieval Warming 900-1200 AD), 50 British wineries on tax rolls.
- **Little Ice Age** (1300-1950 AD) -- Britain too cold for wine grapes. Ice festivals on Thames River.
- Only since 1950 have British hobbyists grown wine grapes again.





# How Did We Find the 1500 Yr Cycle?

- Greenland and Antarctic ice cores in the 1980s-- oxygen isotopes.
- Seabed sediments worldwide: Plankton microfossil species and abundance.
- Cave stalagmites—oxygen isotopes.
- North American fossil pollen: 9 plant reorganizations in past 14,000 years.



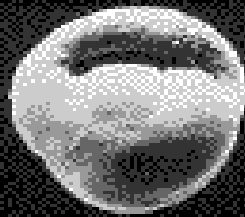
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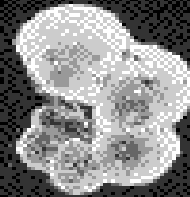
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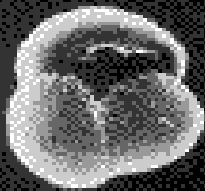


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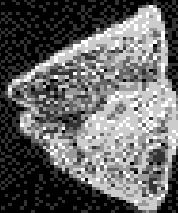


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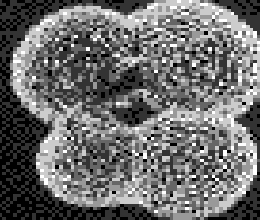
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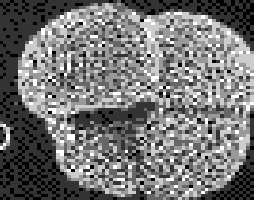
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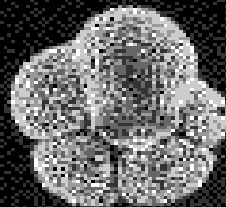


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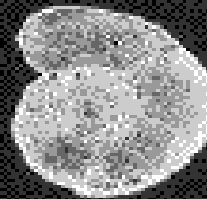
COOL SUBTROPICAL



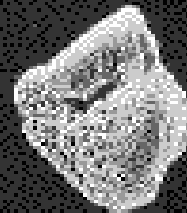
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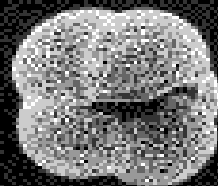


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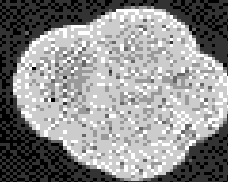


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SUBPOLAR



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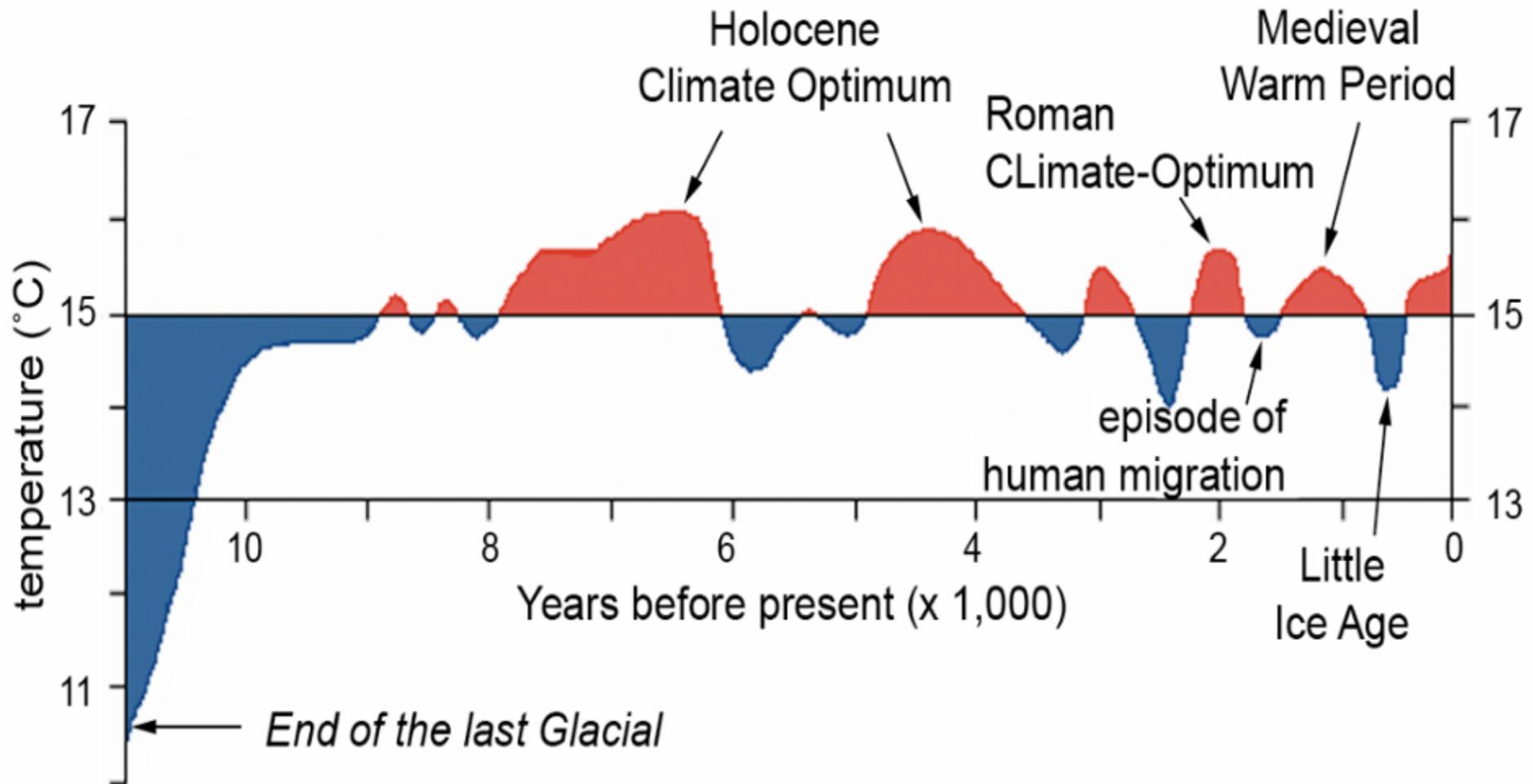


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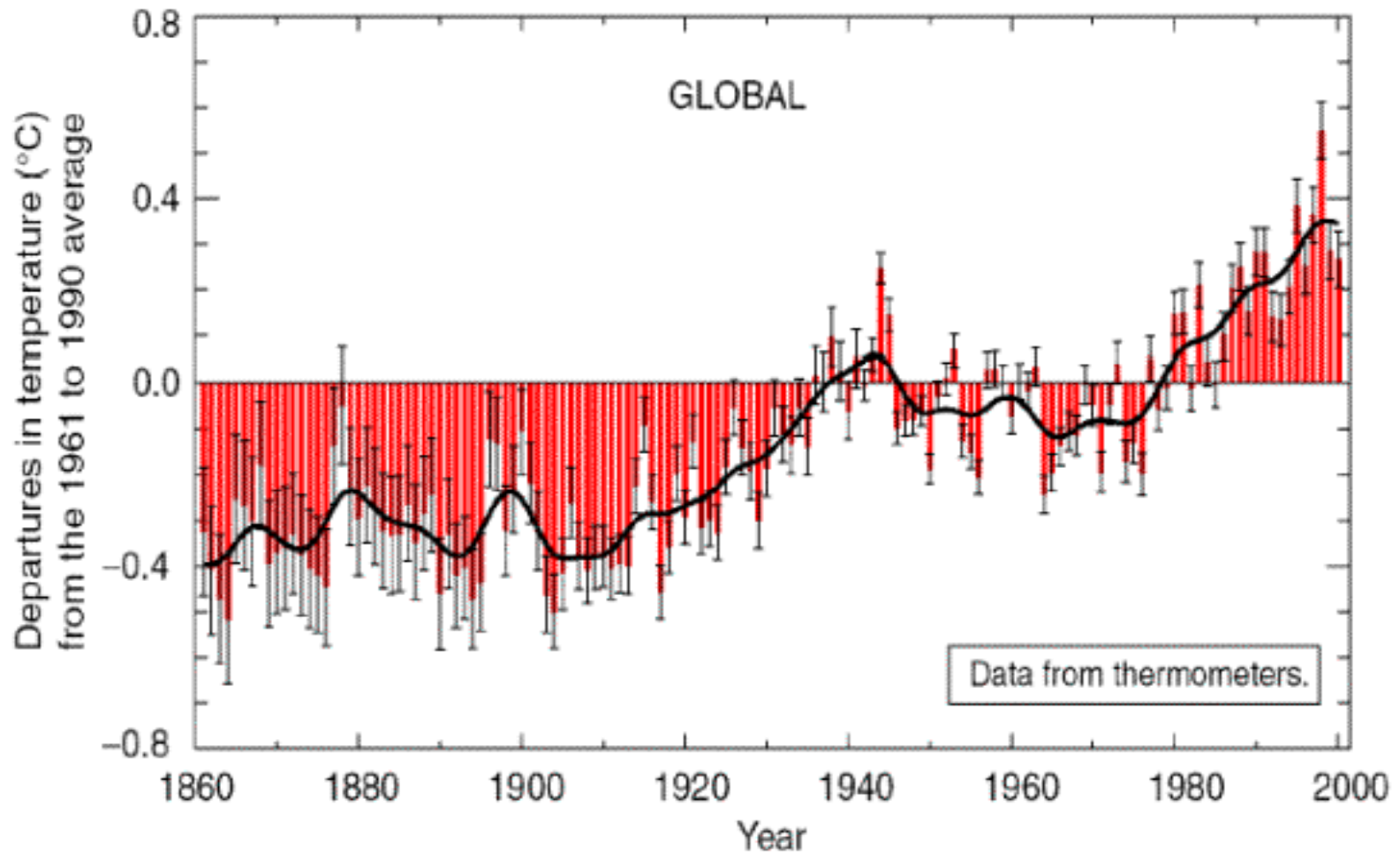
POLAR

# Climate swings of past 12,000 years

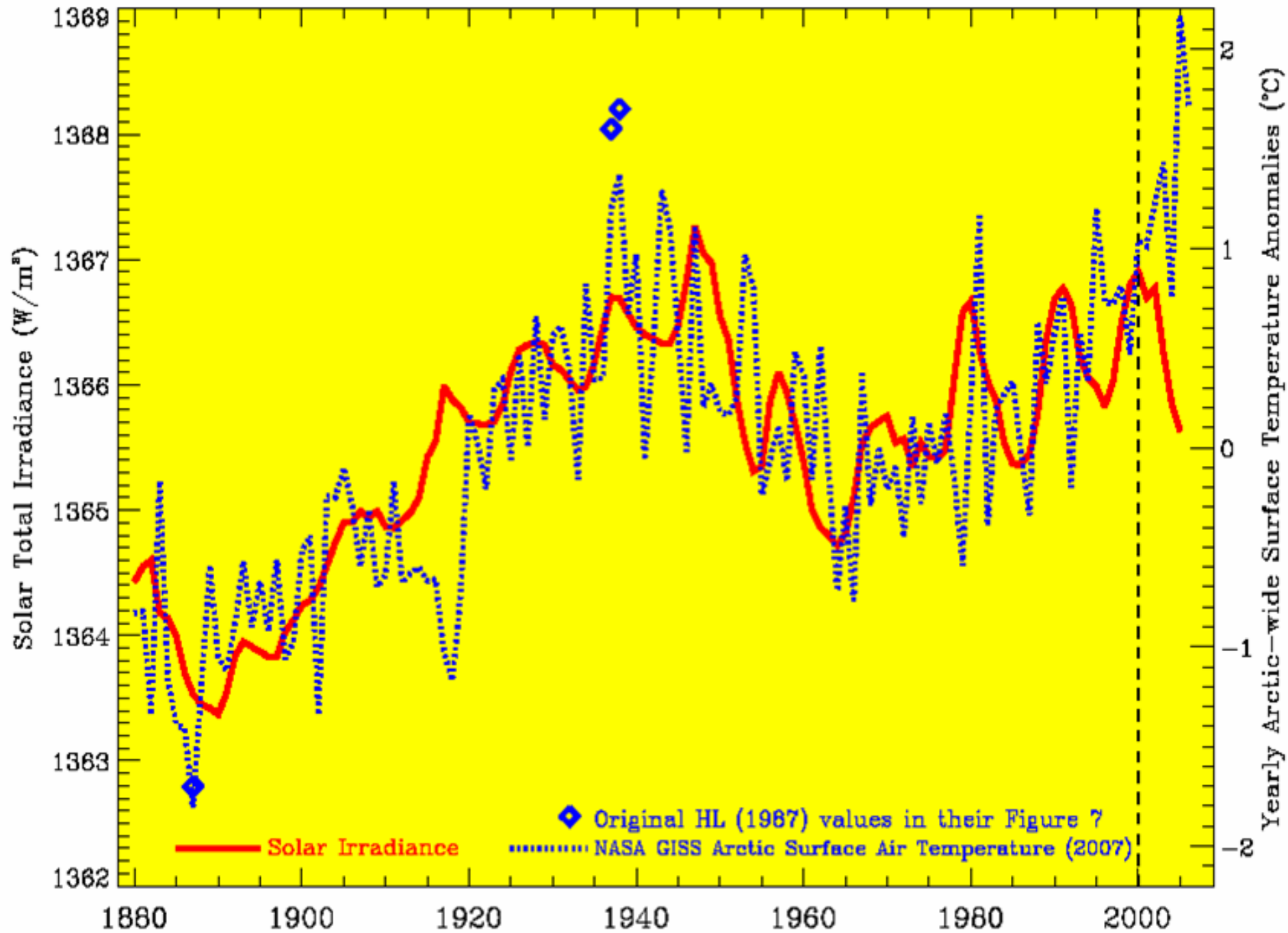
Northern Hemispheric temperature reconstruction for the past 10,000+ years



# Co2 can't explain pre-1940 warming, post-1940 cooling



# A Sun-Climate Coincidence?

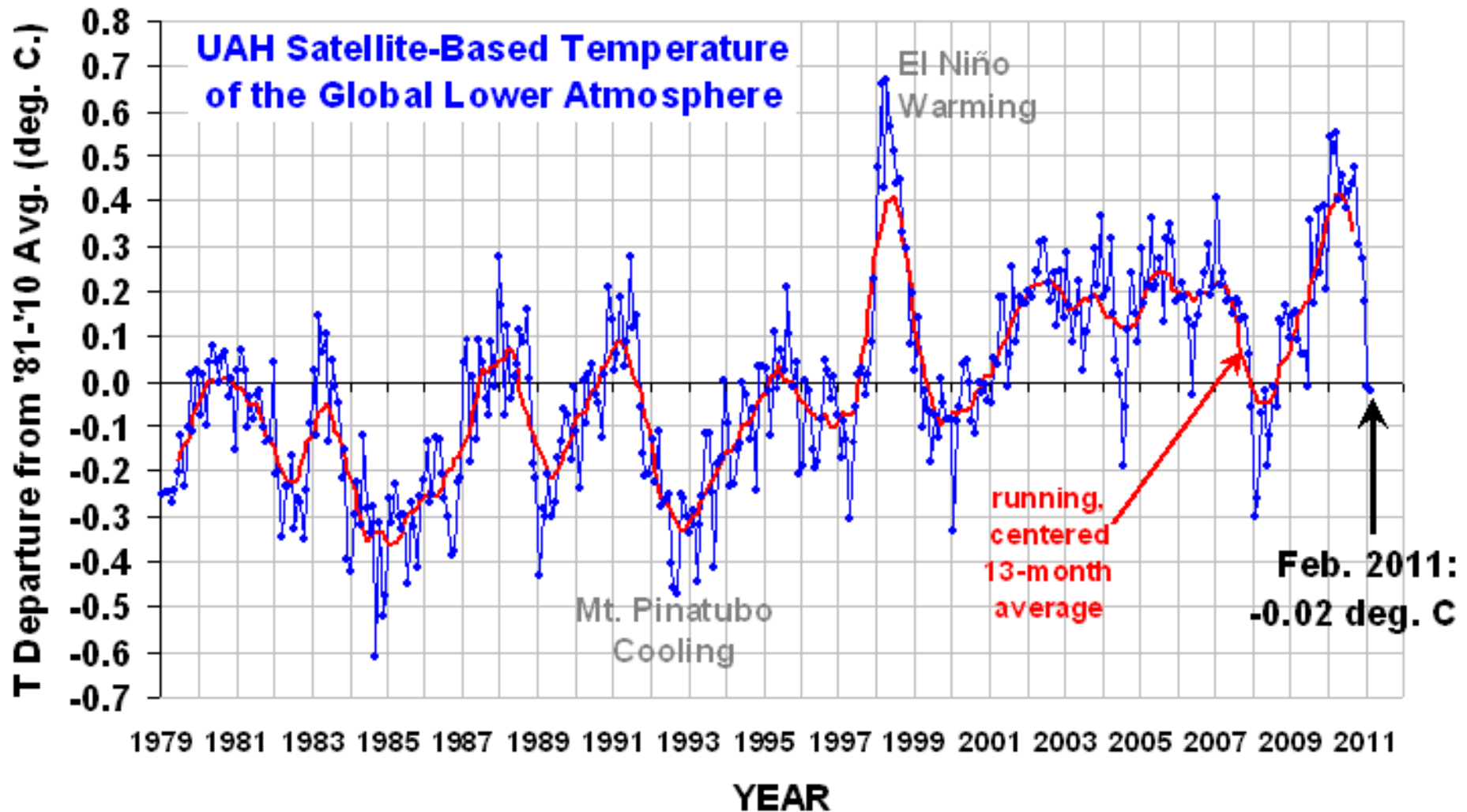


## Where's the Runaway Warming?

- Sunspots predicted a global cooling after 2000. Cooling arrived in 2007.
- Cooling trend likely to continue.
- Tree rings show Pacific has controlled short-term global temperatures in 30-year spurts, at least since 1600 AD.
- NASA satellites say Pacific entered cool phase in 2007. Likely to last 25-30 years.



# Latest global temperatures





# Why Global Warming **Won't** Destroy Species

- **1500-year cycles always shifted abruptly.** Species have been thru it many times.
- **Vegetation cold-limited, but not heat-limited.** Southern trees must await stand replacement to move north; dependent species get time to adapt.
- **Ontario pollen shows beech trees dominate warmings, oaks dominate coolings, pines dominate cold periods.** None goes extinct.



# Global Warming Overreach

- If James Hansen's models correct in 1988, planet now 0.6 C warmer. Instead, no warming. Overreach.
- EPA now imposing carbon limits. Farmers/ranchers will pay far more for nitrogen, feed, carbon emissions from livestock. Overreach.
- Ten years out, imagine half the N fertilizer gone— and half the corn.  
Food prices up 4X, kids hungry.
- Do we let gov't take the rest of fertilizer? Overreach.



# Climate Likely for 21<sup>st</sup> Century?

- Small further warming--less than 0.5 C.
- Cycle gains half its warming in early decades, as in 1850-1940.
- Sahara already getting wetter, greener.
- More U.S. drought as tropic rain belts move north.
- California and mid-Atlantic--century-long droughts during a Warming!



# What About Megadroughts?!

- Most megadroughts occurred during “little ice ages”
  - Roman empire in 586AD
  - Mayans in 9<sup>th</sup> century
  - China six times in 4000 years!
- BUT huge megadrought during Medieval Warming. Blitzed Anasazi in New Mexico, Cahokia in Illinois
- Cooling Pacific collided with warm Atlantic cycle.
- We're in a Pacific cooling now. Odds on a megadrought? Unknown. Don't relax.



# Dealing With the EPA

- “Only a fool would impose greenhouse emissions limits during a recession—if temperatures aren’t rising!” Dennis Avery, 2009
- The new House may de-fund EPA effort, deny money for enforcement.
- Lawsuits have been filed, more will be.
- Delay. Time is your friend.
- “A step-change in global temperature trends?” British Minister of Transport, Jan., 2011



# Winning the Future

- Greens will lose much of their power as global farming fails--but still powerful.
- Media uses you for scare stories—and will.
- U.S. Farmers & Ranchers Alliance
- Keystone Alliance
- Better—but must talk directly to consumers.
- Desperate new strategy--spending money?!
- Ads in cost-effective consumer magazines!
  - Saving billions of acres of wildlands.
  - Confinement feeding good for the planet.
  - Biotech saving kids from going blind.
- Is now the time?



# Best of Luck With Your Challenge

- *Unstoppable Global Warming—Every 1,500 Years*, S. Fred Singer and Dennis Avery. 2007. New York Times non-fiction best-seller. \$24.95.
- *Saving the Planet With Pesticides and Plastic: The Environmental Triumph of High-Yield Farming*. 2nd edition, 2000. Hudson Institute.
- \$20.

