

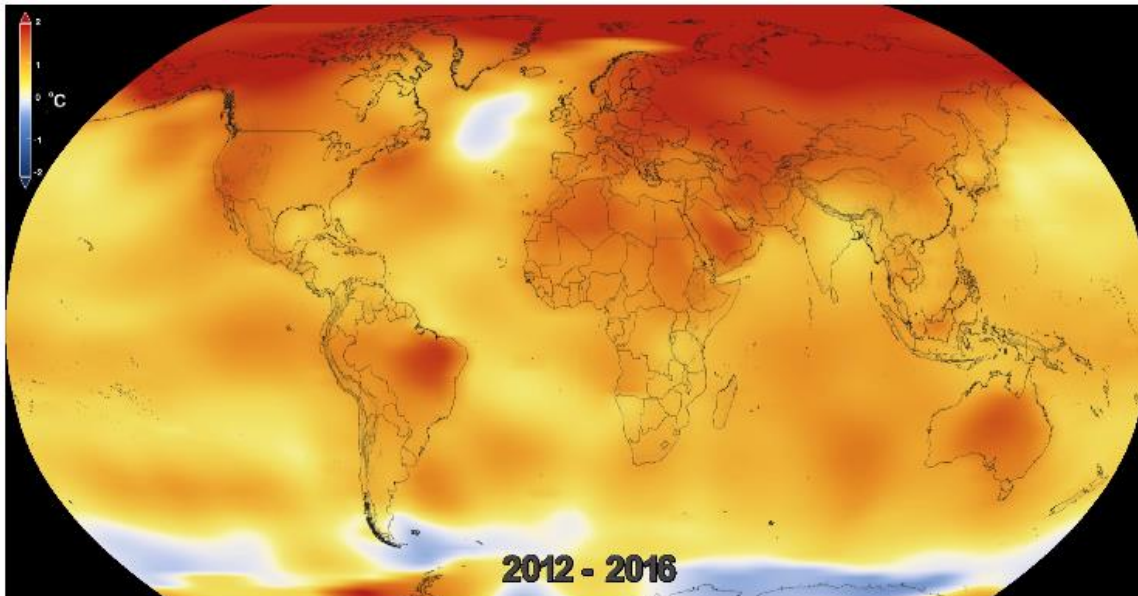
A Look at “Nobel Laureate in Physics (Ivar Giaever): ‘Global Warming is Pseudoscience’”

We’ll jump right in on the 1st slide.
References to each are at the end.

Here’s the 30 min video these charts reference:
<https://www.youtube.com/watch?v=SXxHfb66ZgM> Referenced again as [1]

Giaever: “You can’t measure 0.8°C”

- He claims such a small global average temperature rise can’t be measured
- We measure Rubidium clocks to within 0.00000000000001 seconds [2]
- 2002 Nobel for measuring just 11 Argon atoms emitted from 4×10^{30} molecules of Tetrachloroethylene in underground neutrino telescope [3]
- LIGO just detected combination of 2 black holes 1.5 billion light years away with a measurement accuracy $1/10,000^{\text{th}}$ the width of a proton [4]



Measuring 0.8°C is trivial by comparison

NASA measured global temperature change video, instrumented and pre-instrumented data combined, 1880-2016:
<https://svs.gsfc.nasa.gov/4546>

Notice above: most warming in northern hemisphere where humans live 9 to 1 over southern

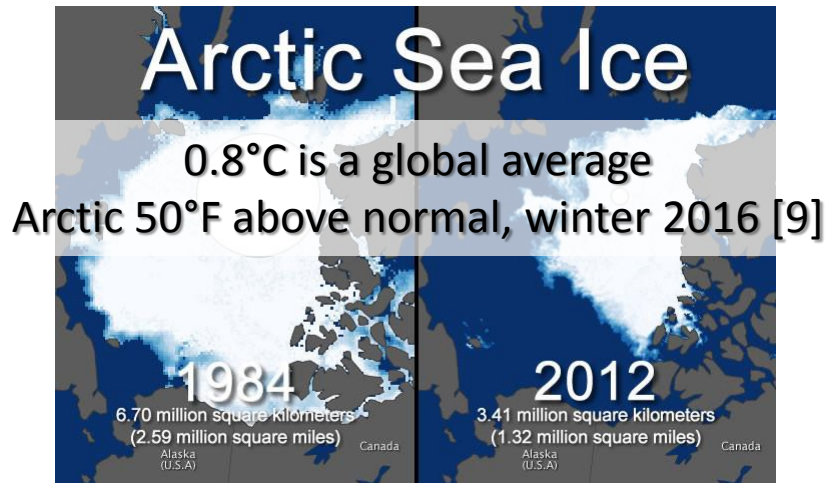
Some Facts About Measurements

- Anything can be measured
- Number of men outside on Saturday at noon. Heartrate of chipmunks in June. Size of a distant moon. Doesn't matter. All measurements behave the same.
- All measurements are **noisy** *about an average* (not just anywhere)
- Scientists measure long term average as the signal separated from noise
- Long term average like climate is signal, weather is noise
- Hence, future climate easier to estimate than next month's weather*
- Data can **vary** between phenomena
- Expect variations between measurements from ground level, troposphere, stratosphere, ocean surface, or depth of 10', 100', 1000'. If a phenomena is universal, all but a few data sets will point same direction.
- Those few have a name: *outlier*. Why they disagree spurs further study. If 100 experiments show something is happening, and 3 do not, what would consensus of experimental evidence be?

* To a point, depending on input parameters, model fidelity, and number of decades in future

Giaever: “0.8°C is not even a fever”

- He discounts 0.8°C (1.4°F) global average rise as insignificant - now it's 0.94°C (1.7°F)
- This is energy into 3×10^{18} lbs of atmosphere + 1×10^{18} lbs of ocean for top 1-meter [5]
- Specific heat of air is 1kJ/kgC° , specific heat of water is 4kJ/kgC°
- That makes total energy to raise globe by 0.8°C, w/o land heat-sink added, approx. 7×10^{21} Joules. That's 7,000,000,000,000,000,000,000 Joules, a magnificent number*
- Enough energy to supply US electrical consumption for 500 years [6]
- Enough to warm and acidify oceans, pushing coral into extinction right now [7]
- Enough to reduce Arctic ice by 13%/decade, readily apparent from space [8]



NASA: Arctic ice loss, just 28 years



Bleached coral forests worldwide

**0.8°C only sounds small to humans.
An enormous energy increase
affecting biology worldwide**

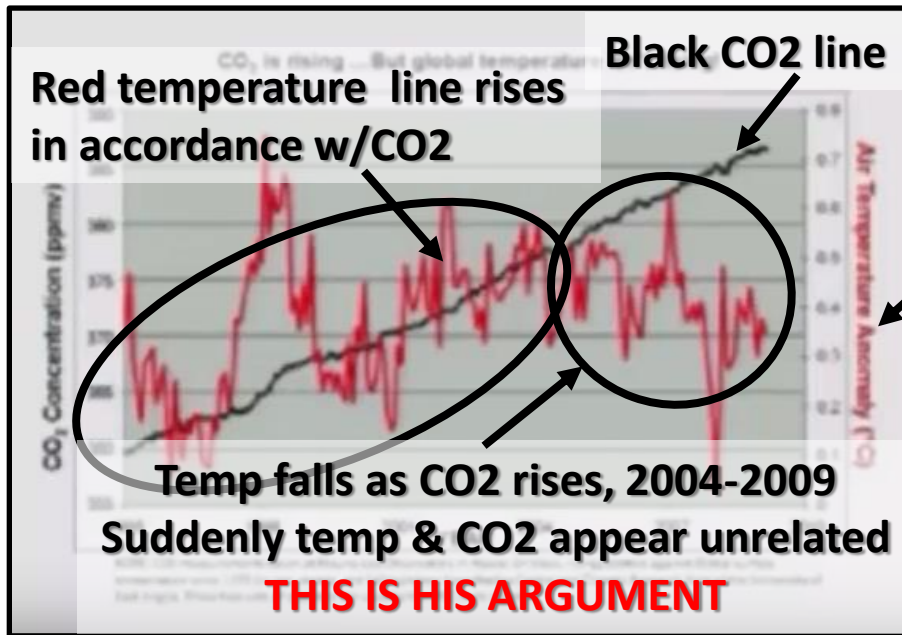
*This is not energy since industrial age. That number would be much larger. Earth cools nightly. Updated daily to maintain 0.8°C trapped by CO₂, methane, and water vapor.

What Science Is Not

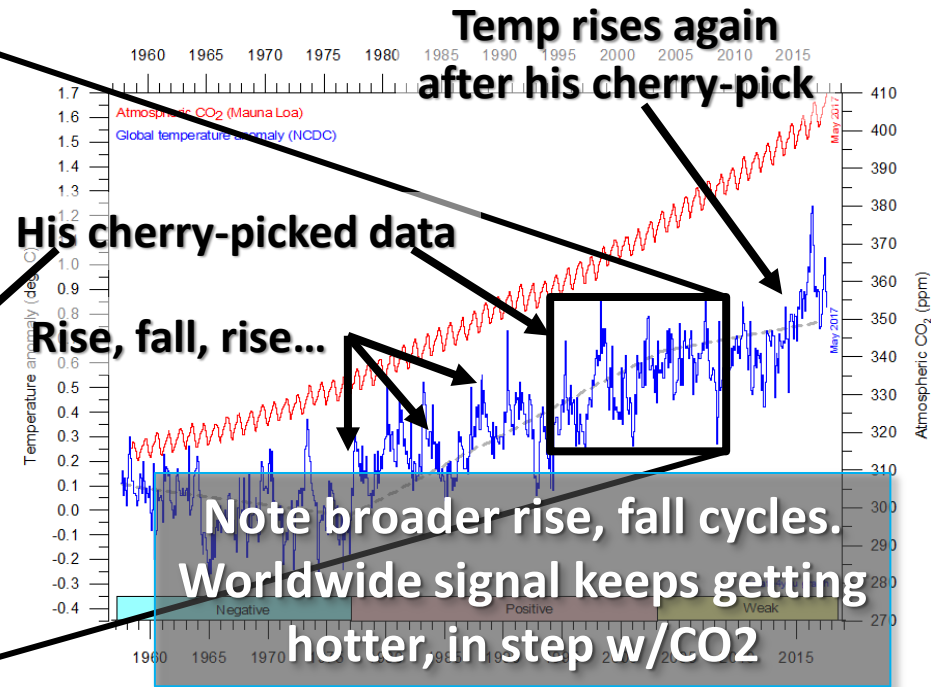
- Science is not a dogma
- The final judge in science is nature, not Party creed
- Make science conform to dogma and science will not work
- Make science conform to dogma and whatever you build will fail
- Been done, time and again:
- “Proletariat *Science*” gave Stalin and Mao *The Great Leap Forward*: 40 million people starved to death as a result [10]
- UCLA’s Sandra Harding claims “feminist *science*” shows Isaac Newton’s *Principia Mathematica* is a “rape manual” [11]
- Rush Limbaugh proclaims: “Science is one of the four corners of deceit.” Broadcast over radio waves discovered by science, by electronics built by science. The irony. [12]
- Make science conform to politics, it won’t work. Even Communist China doesn't suffer this problem. But 12th century Islam did. As threat to Koran, Islam banned scientific thinking. An interesting read on what happened as a result to that one time cultural light of the world is referenced: [13].

Giaever's CO2-Temperature Argument

- He says CO2 & temperature are unrelated, the earth is cooling not warming
- He shows data with the usual noise, imposed with broader cycles of rise & fall
- Broad temperature cycles occur 11 times before the data period he shows [14]
- Any audience of engineers I've been in front of would ask, why not say so? Why select just one decade? Why date limit the data set? **Why not show all of it?**
- Because full data refutes both his claims
- It's called "down the up staircase," [15] and here's how he does it...



Truncated data set from his video, 1995-2009



Expanded data set, 1957-2016

How Scientists & Engineers Communicate Data

- **Never cherry-pick** unannounced from a full data set – someone will publically humiliate you with it (see chart 6)
- If presenting limited data, say what, why, and reference full set
- Never present data without sources
- Never give a number without reference to what
- Never make a conclusion without supporting evidence
- Never make conclusions without caveats: “Based on measurements X, Y, Z, and relations A, B, C, the conclusion is...”
- Never fail to address other’s refutations to your own conclusions – someone will publically humiliate you with them (see chart 6)

Other Giaeever Claims

- *Each human exhales 40 tons CO2 per year. Why not limit humans?* Ask yourself, Where does carbon we exhale come from? From plants we eat, or animals we eat that eat plants. Plants then absorb our carbon exhale. **The very definition of zero sum. Human respiration adds no new CO2 to the planet.** While oil, gas & coal bring ancient carbon buried for millions of years into the present, overwhelming the carbon cycle. [16]
- *With 1000s of temperature stations round the world, only 8 in Antarctica. How can we know an average?* **It's called a satellite.** Since 1979, Landsat, Radar-sat, and in 2006 six identical COSMICs (Constellation Observing System for Meteorology Ionosphere and Climate). He doesn't know this? Of course he does. But it explodes his argument. [17]
- *"There have always been droughts and floods...The 100 years flood means it happened 100 years ago as well. So it's no more extreme now than ever."* **Except the 100 year flood now happens every 20, 10, or 5 years.** Old definition in a new normal. [18]
- *"Wind and solar are expensive."* Both are now cheaper than coal. And China now owns solar manufacturing market because part of America sees "green energy" as a liberal cause. **China is now spending \$361B on renewables, creating 13 million new jobs.** [19]
- *Greenland has been gaining ice inland.* This cherry-pick is why it's *not* called "Greenland Warming," or, "It's 120°F In Phoenix Warming." **It's called "Global Warming."**

Some Observations on What Science Is

- Capitalism, innovation, entrepreneurs, and nations all depend on science to create wealth through technologies and provide national defense
- Science is an open information practice
- Lie about data and someone else will measure it
- Results are checked by unrevealed scientists in peer review process
- Science merely tries to understand what nature is
- Science measures nature and makes mathematical models of nature
- Math models allow us to predict the future
- Math models allow us to build jets, TVs, cell phones, all acting *just as math models predicted*
- Science used to build machines that work is same science used by climate scientists: physics, chemistry, biology, *no difference*
- Science works

Some Minor Commentary

Skeptics Society head, Michael Shermer, defines *motivated-reason* as, “Reason that accepts only that evidence which supports what you already believe.” Likewise, motivated-reason denies evidence that refutes what you already believe. This is not reason, but dogma, creed, or doctrine. *Right-reason* as Thomas Paine defined it is reason that accepts validated evidence no matter how it makes you feel.

Nobel Laureate Ivar Giaever appeals to people’s motivated-reason to assert climate science is pseudoscience, while 36 Nobel Laureates and thousands of scientists from every nation and religion show evidence that man-made global warming is a fact. [20] Giaever manufactures that most valuable American political commodity: doubt. A cash cow worth vast fortunes, as the doubt machines of tobacco and lead industries proved. Giaever is paid by the Heartland Institute, global warming deniers and tobacco reps in Chicago. [21] Professional deniers like him take advantage of a scientifically ignorant public. Who outside science and engineering know the difference between signal and noise? Giaever knows, using our lack of knowledge against us to fabricate what sounds plausible to ignorance. But ignorant doesn’t mean stupid. I’m ignorant of most things. As it turns out, nothing is rocket science. Answers are available. Despite a rubbish rich internet, right-reason can separate its facts from “alternative facts.” Facts of nature are an invitation to innovate solutions and get rich. Better to solve hard problems, excited by the joy of discovery than to be sedated by obfuscation, used by the likes of Giaever for financial gain and self-aggrandizement before crowds, as the Chinese Century advances.

While these charts emphasize Giaever’s ruse, climate science evidence is much more interesting, with everything from astronomy to zoology. (Yes, astronomy. Google the Milankovitch cycle.) A few climate science sites are referenced below for those interested. Does all this information mean we know all there is to know about global warming? Not even close. A bore that would be. We don’t know all there is to know about heart disease. That doesn’t stop us from trying to fix it, frequently with great success.

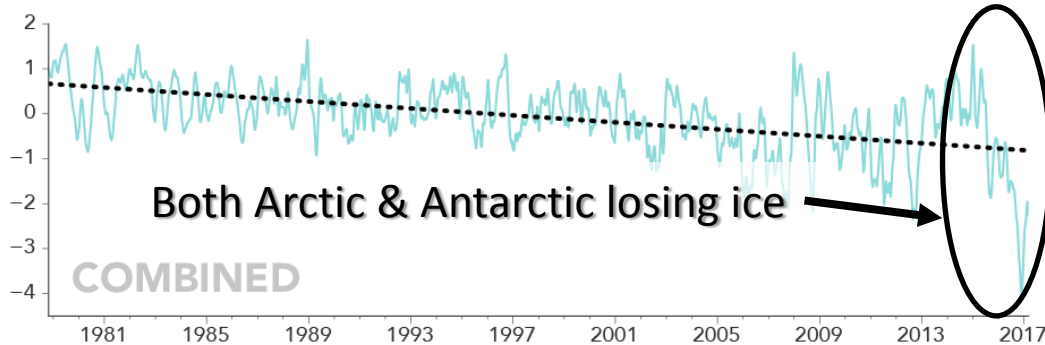
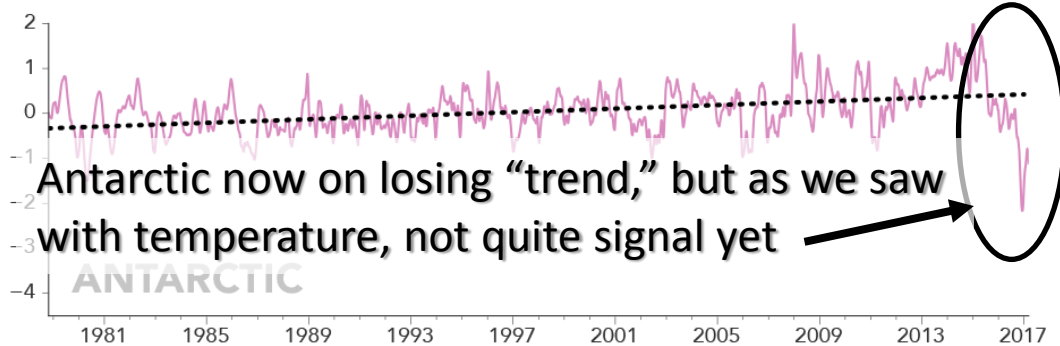
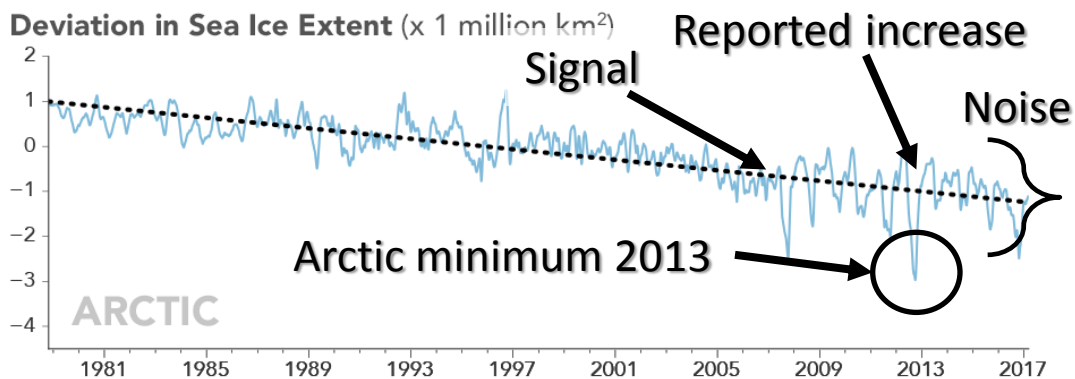
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2. Rubidium clock accuracy: [http://www.npl.co.uk/reference/faqs/what-is-the-most-accurate-measurement-known-\(faq-quantum\)](http://www.npl.co.uk/reference/faqs/what-is-the-most-accurate-measurement-known-(faq-quantum))
3. Counting atoms: https://en.wikipedia.org/wiki/Raymond_Davis_Jr. (there's period here that Power Point won't pick up, kills the link), Molar calculation direction for Argon count: http://www.forestville.com/cms/lib/NY19000591/Centricity/Domain/38/Mole_HW_Problem.pdf
4. LIGO accuracy: <https://www.ligo.caltech.edu/page/facts>
5. This fellow helps point in right direction on energy calculations, with Wolfram Alfa equation solver (cool!): <https://www.quora.com/How-much-energy-is-generated-by-a-1-degree-global-temperature-increase>
6. US electrical consumption: [https://en.m.wikipedia.org/wiki/Orders_of_magnitude_\(energy\)](https://en.m.wikipedia.org/wiki/Orders_of_magnitude_(energy))
7. Ocean acidification and heat kill coral: <http://www.climatecentral.org/news/hot-oceans-global-coral-bleaching-19528>
8. Arctic ice reduced 13%/decade: <https://climate.nasa.gov/vital-signs/arctic-sea-ice/>
9. 50 degrees above normal in Arctic: https://www.washingtonpost.com/news/capital-weather-gang/wp/2017/02/10/its-about-50-degrees-warmer-than-normal-near-the-north-pole/?utm_term=.02a4273056bb
10. Great Leap Forward: https://en.wikipedia.org/wiki/Great_Leap_Forward
11. Sandra Harding's feminist theory: https://www.amazon.com/Science-Question-Feminism-Sandra-Harding/dp/0801493633/ref=cm_cr_ar_p_d_product_top?ie=UTF8
12. Rush Limbaugh: <http://www.commonsevaluation.com/2015/11/04/god-and-climate-change/#sthash.7IPNGb1s.Fq8q9Jib.dpbs>, Heather Horn: <https://www.theatlantic.com/amp/article/344226/>
13. *Islam and Science* by Pervez Hoodbhoy: <https://www.amazon.com/Islam-Science-Religious-Orthodoxy-Rationality/dp/1856490254>
14. The AMAZING Fourier Transform. More than a mere average, every frequency component of what looks like complete noise can be separated by this most wonderful tool: https://en.wikipedia.org/wiki/Fourier_transform
15. Up the down staircase: <https://www.skepticalscience.com/going-down-the-up-escalator-part-1.html>
16. No new CO2 added by human exhale: <https://www.skepticalscience.com/breathing-co2-carbon-dioxide.htm>
17. Satellites over Antarctica: https://en.wikipedia.org/wiki/Climate_of_Antarctica, COMSIC climate science satellites: <http://www.cosmic.ucar.edu/>
18. 100 Year Floods happen more often: <https://phys.org/news/2012-02-climate-today-year-years.html>
19. Wind & solar now cheaper than coal: <http://www.independent.co.uk/environment/solar-and-wind-power-cheaper-than-fossil-fuels-for-the-first-time-a7509251.html>, China's \$361B green fund: <http://www.reuters.com/article/us-china-energy-renewables-idUSKBN14P06P>
20. 36 Nobels disagree: <https://qz.com/444787/a-group-of-nobel-laureates-have-signed-a-declaration-calling-for-urgent-action-on-climate-change/>
21. Giaeever : https://en.wikipedia.org/wiki/Ivar_Giaeever Heartland Institute: https://en.wikipedia.org/wiki/The_Heartland_Institute
22. Both poles melting: <https://www.nasa.gov/feature/goddard/2017/sea-ice-extent-sinks-to-record-lows-at-both-poles>, Why Antarctic ice loss delayed: <https://insideclimateneews.org/news/31052016/why-antarctica-sea-ice-level-growing-while-arctic-glaciers-melts-climate-change-global-warming>

Science websites

- Thousands of pages, hundreds of worldwide experiments , really good presentations, with summaries and details: <http://www.ipcc.ch/report/ar5/wg1/>
- Climate Central: <http://www.climatecentral.org/what-we-do/our-programs/climate-science>
- Skeptical Science: <https://www.skepticalscience.com/>, This one provides links to deniers for back and forth examination. Also Top 10 Myths.
- National Snow and Ice Data Center: <http://nsidc.org/>
- National Ice Core Laboratory: <http://icecores.org/>
- Climate Policy: <https://www.c2es.org/>
- Is more CO2 really good for plant growth? <https://www.skepticalscience.com/co2-plant-food-basic.htm>
- A bit of Milankovitch from Joides ocean research (but there are many others): <http://joidesresolution.org/node/3107>
- National Data Buoy Center: <http://www.ndbc.noaa.gov/obs.shtml>
- Hyperfine structure in atomic clocks allowing such accurate time measurements: https://en.wikipedia.org/wiki/Hyperfine_structure

Bonus Slide! Giaever & Media Get Tricky With Noise



NASA Earth Observatory Measurements 1979-2017

Giaever:

- *Relax, the world is always changing*
- *Arctic shrinks, Antarctic grows*
- That used to be "sort of" correct
- Arctic loss 21,000 sq. miles
- Antarctic gain 7,300 sq. miles
- Net loss 14,000 sq. miles
- But now both lose [22]

Both Arctic & Antarctic ice now shrinking

In 2013, the media correctly reported an increase in Arctic ice by a significant percentage. **From a record low.** Note: a large % of a small number is still a small number. Look left to see what happened after 2013. Ice shrank, grew, shrank. Signal is the dotted line. All real data is noisy. Half of our media reported the retreat in 2014. Noise allows either story to be cherry-picked.