



# Myths and fallacies in the *Climate Change Information Briefs*

Skeptical Science

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|   |    |
|---|----|
| Introduction  | 1  |
| Are record temperatures occurring more often in the conterminous United States?                       | 2  |
| Can computer models predict climate?  | 3  |
| Climate, climate change, and the general circulation  | 4  |
| The faith-based nature of human-caused global warming   | 4  |
| Hurricanes and climate change   | 6  |
| Is there a “climate emergency”?   | 7  |
| Radiation transfer  | 9  |
| The sun-climate connection  | 10 |
| Systematic problems in the four “National Assessments” of climate-change impacts on the United States | 10 |
| Summary   | 11 |
| Myth rebuttal chart   | 11 |
| Identified characteristics of science denial  | 11 |
| Additional Resources  | 13 |
| Climate Models  | 13 |
| Clouds  | 13 |
| Past  | 13 |
| Consensus   | 13 |
| Climate Change basics and how they get distorted  | 13 |

## Introduction

Recently, [Dr David Legates](#) published a series of flyers which incorrectly claimed to present current state-of-the-science on various aspects of climate change. In fact, these flyers contained a number of errors, some of which we are highlighting here. The links to the PDFs all go to archived versions as the original files have been taken down as far as we know.

We have also included references to the logical fallacies underpinning these errors as a way to illustrate the recurring flaws in arguments that claim to discredit the science of climate change. Finally, you can find links to additional resources in the last section of this document. These provide further information on the broader claims made in the flyers.



Are record temperatures occurring more often in the conterminous United States?

Dr. John R. Christy - PDF: [Record Temperatures in the United States.pdf](#)

## ***Trends in Maximum Daily Air Temperature***

The first chart shows the yearly total of record high temperatures for  $T_{Max}$ . The 1930s stand out. In fact, of the 15 years with the most record high  $T_{Max}$  values, 14 occurred before 1955 and six in the decade of the 1930s alone. There is a slight downward tendency in the chart toward fewer record high temperatures, but the key results are that the 1930s was a remarkable decade for producing record hot days and the today's occurrences are no different than the frequency experienced at the beginning of the period. Record hot days are not occurring more often than before.

### **#17 - [sks.to/1934](#)**

The term global warming refers to a rise in average surface temperatures across the world. Focusing on small areas can hide what is happening at the global level since regional temperature variations still occur. If we look at the surface temperature record for the whole world, it is clear that ongoing warming is unprecedented in the record, with the 10 warmest years all occurring after 2000. ([Basic rebuttal](#))

### **Cherry Picking**



roads, buildings, cities, etc.) has led to warmer and warmer nights. For reasons too complicated for this discussion, it is known that such increasing amounts of infrastructure around a station has a strong warming influence on  $T_{Min}$  but not as much on  $T_{Max}$ . Consequently, one can have more confidence that long-term changes in the general climate are better assessed using  $T_{Max}$ .

### **#6 - [sks.to/temp](#)**

The reliability of the temperature record has been confirmed by a number of studies. Different analyses show that the temperature trend is similar in urban and rural areas, whether measured by thermometers or satellites. ([Basic rebuttal](#))

### **Misrepresentation**





## Can computer models predict climate?

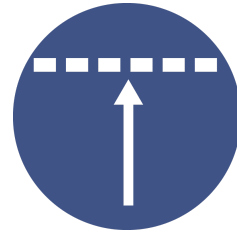
[Dr. Christopher Essex](#) - PDF: [Can Computer Models Predict Climate.pdf](#)

The climate problem is much too big, and computers remain far too small and slow to do proper computation for this problem.

### #5 - [sks.to/model](#)

Climate models have already predicted many of the phenomena for which we now have empirical evidence. Climate models form a reliable guide to potential climate change. ([Basic rebuttal](#))

#### Impossible expectations

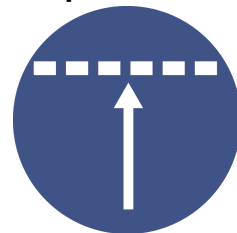


There is yet another issue. Nonlinear equations, distorted into discrete representations on grid points, fed faux physics, integrated for extreme long times, are notoriously computationally unstable.

### #97 - [sks.to/chaos](#)

Although it is generally not possible to predict a specific future state of a chaotic system (there is no telling what temperature it will be in Oregon on December 21 2012), it is still possible to make statistical claims about the behavior of the system as a whole (it is very likely that Oregon's December 2012 temperatures will be colder than its July 2012 temperatures). ([Basic rebuttal](#))

#### Impossible Expectations





## Climate, climate change, and the general circulation

[Dr. Anthony R. Lupo](#) - PDF: [Climate, Climate Change, and the General Circulation.pdf](#)

However, there is some disagreement regarding whether climate change is primarily driven by external factors versus the internal dynamics of the Earth-Atmosphere (EA) system.

### #3 - [sks.to/consensus](#)

In the scientific field of climate studies – which is informed by many different disciplines – the consensus is demonstrated by the number of scientists who have stopped arguing about what is causing climate change – and that’s nearly all of them.

[\(Basic rebuttal\)](#)

### Magnified minority



### #136 - [sks.to/cycle](#)

The observed fingerprints on global warming and the fact that only external forcings can cause a buildup in heat in the climate system work together to not only rule out natural cycles, but also confirm that the anthropogenic CO2 increase in the atmosphere is the main cause of modern global warming.

[\(Basic rebuttal\)](#)

## The faith-based nature of human-caused global warming

[Dr. Roy W. Spencer](#) - PDF: [The Faith-Based Nature of Human-Caused Global Warming.pdf](#)

That makes the belief in human causation of global warming, to a large extent, a matter of faith. The primary cause could be partly or mostly from increasing greenhouse gas emissions from our use of fossil fuels, but there is no way to know just how much.

### #136 - [sks.to/cycle](#)

The energy imbalance in the climate system shows that the ongoing warming comes from external forcings, since internal variability only leads to heat being redistributed throughout the climate system. Warming from external forcings leaves different fingerprints depending on the source of forcing. Taken together, the observed fingerprints indicate that human activities are the main cause of global warming. [\(Basic rebuttal\)](#)

### Slothful induction





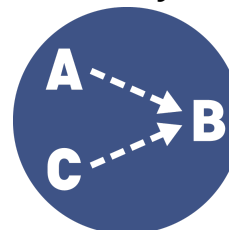
oceans are an example of a chaotic *nonlinear dynamical system*. All this means is that the climate system is capable of undergoing changes all by itself, without any kind of forcing from humans, the Sun, or whatever.

Considerable evidence exists that the Medieval Warm Period (~1,000 years ago) and the Roman Warm Period (~2,000 years ago) were just as warm as it is today.

## #2 - [sks.to/past](https://sks.to/past)

The rapid ongoing warming can only be explained by rises in CO<sub>2</sub> and other greenhouse gases from human activities. While different mechanisms, such as volcanic eruptions, the Milankovitch cycles and changes in solar output can explain past climate change, there is no evidence that they are involved in current warming. ([Intermediate rebuttal](#))

### Single cause fallacy



### Cherry picking

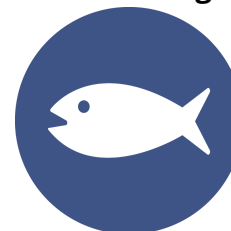


## #97 - [sks.to/chaos](https://sks.to/chaos)

There are chaotic components to the climate system, such as El Niño and fluid turbulence, but they all have much less long-term influence than the greenhouse effect. It's a little like an airplane flying through stormy weather: It may be buffeted around from moment to moment, but it can still move from one airport to another.

The chaotic nature of turbulence is no real obstacle to climate modeling, and it does not negate the existence or attribution of climate change. ([Basic rebuttal](#))

### Red herring





## Hurricanes and climate change

[Dr. Ryan N. Maue](#) - PDF: [Hurricanes and Climate Change.pdf](#)

“In summary, it is premature to conclude with high confidence that increasing atmospheric greenhouse gas concentrations from human activities have had a detectable impact on Atlantic basin hurricane activity, although increasing greenhouse gases are strongly linked to global warming...Human activities may have already caused other changes in tropical cyclone activity that are not yet detectable due to the small magnitude of these changes compared to estimated natural variability, or due to observational limitations.”<sup>1</sup>

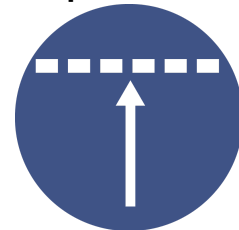
### #16 - [sks.to/hurricane](#)

Climate change is expected to impact hurricanes in a number of ways. Sea-level rise and more atmospheric moisture can lead to more widespread flooding and/or storm surges, while rising sea-surface temperatures can lead to stronger hurricanes.

[\(Basic rebuttal\)](#)

While it is difficult to determine whether climate change has already had an impact on tropical storms generally, there is evidence that higher sea levels, warmer oceans and greater atmospheric moisture all played a part in making the impacts of Hurricane Sandy worse than they would have been in the absence of climate change. [\(Basic rebuttal\)](#)

**Impossible  
Expectations**





## Is there a “climate emergency”?

[Dr. Ross McKittrick](#) - PDF: [Is There a Climate Emergency.pdf](#)

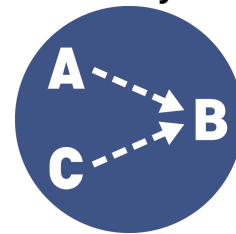
Data from around the world indicates that the global climate has been warming since the early 1800s. Those decades marked the end of the “Little Ice Age” during which many locations around the world had reached their coldest conditions since the end of the last ice age 11,000 years ago. Before that, there were long intervals in many places which were warmer than today. For example, while we are accustomed to the Canadian Arctic now being covered in ice most of the year, for thousands of years before the Little Ice Age much of the Beaufort Sea was ice free almost all year round<sup>1</sup>.

### #2 - [sks.to/past](#)

The rapid ongoing warming can only be explained by rises in CO<sub>2</sub> and other greenhouse gases as a result of human activities. While it is true that several factors, including the sun and volcanic activity, can cause climate change, they cannot explain the warming of the past few decades. ([Basic rebuttal](#))

Research shows that the warming at the end of the Little Ice Age was mainly caused by an increase in solar radiation and a decrease in volcanic activity, but that these factors are not involved in the rising temperatures of recent decades. Since 1970, human influence has had the largest impact on global temperatures. ([Intermediate rebuttal](#))

### Single cause fallacy



Over the past 200 years, the world has experienced both warming and dramatic increases in both incomes and living standards. The availability of inexpensive energy from fossil fuels was essential for economic and social progress. To the extent greenhouse gas emissions from fossil fuels contributed to the warming, it did not prevent us from becoming far better off. There is no historical support for the view that the warming we have experienced is a crisis or emergency.



Recent recession of ice fronts in Muir Inlet (lower left) and in the northwestern arm of Glacier Bay. Location of the permanent quadrats also is shown. [from W.S. Cooper (1923): “The recent ecological history of Glacier Bay, Alaska: The interglacial forests of Glacier Bay.” *Ecology*, 4(2), 93-128].

### #12 - [sks.to/impacts](#)

Research continues to show that the negative impacts of climate change outweigh the positive impacts. Agriculture, human health, loss of habitats, sea-level rise, extreme weather events, wildfires and more are all affected by the climate crisis. ([Intermediate rebuttal](#))

### Cherry Picking





It is important to note that in its 2012 review of long term trends in global extreme weather<sup>14</sup>, the IPCC did not find a clear connection between climate change and most types of weather extremes, and noted that some trends, including drought frequency, were decreasing around the world. To take an example currently on the minds of many Americans, wildfire trends<sup>15</sup> are decreasing globally, contrary to popular perception.

### #41 - [sks.to/extreme](https://sks.to/extreme)

Climate change affects several factors involved in the weather. Increased evaporation and a rise in atmospheric moisture impact the water cycle, which in turns has an effect on floods and droughts. Rising sea levels lead to greater storm surges when tropical storms make landfall. Rising temperatures make heatwaves more likely and potentially more widespread. An increase in sea-surface temperatures can make storms more powerful. So while climate change is not necessarily involved in all extreme weather events, it changes the odds of such events taking place. ([Basic rebuttal](#))

**Over  
simplification**



**Cherry picking**





## Radiation transfer

[Dr. William Happer](#) - PDF: [Radiation Transfer.pdf](#)

In summary, the figure above shows that the flux changes from doubling the concentrations of greenhouse gases, a very substantial change, reduces the radiation to space by only a few  $\text{Wm}^{-2}$ . This is only a few per cent of the several hundred  $\text{Wm}^{-2}$  in the natural flux to space, or the  $91 \text{ Wm}^{-2}$  change of solar flux between winter and summer.

### #30 - [sks.to/sensitivity](#)

All the models and evidence confirm a minimum warming close to  $2^{\circ}\text{C}$  for a doubling of atmospheric  $\text{CO}_2$  with a most likely value of  $3^{\circ}\text{C}$  and the potential to warm  $4.5^{\circ}\text{C}$  or even more. Even such a small rise would signal many damaging and highly disruptive changes to the environment. ([Basic rebuttal](#))

### Oversimplification



And cloud cover, like that shown in the figure on page 5 (i.e., the images of the Earth over the Gulf of Mexico), further diminishes the influence of greenhouse gases.

### #143 - [sks.to/cloud](#)

While clouds remain an uncertainty, the evidence is building that clouds will probably cause the planet to warm even further, and are very unlikely to cancel out much of human-caused global warming. It's also important to remember that there are many other feedbacks besides clouds. There is a large amount of [evidence that the net feedback is positive](#) and will amplify global warming. ([Basic rebuttal](#))

### Oversimplification





## The sun-climate connection

Dr. Michael Connolly, Dr. Ronan Connolly, [Dr. Willie Soon](#) - PDF: [The Sun Climate Connection.pdf](#)

if you use the rural-only estimates and consider one of the high solar variability TSI estimates, most of the trends since at least 1881 can be explained in terms of natural climate change.

### #1 - [sks.to/sun](#)

Some people try to blame the sun for the current rise in temperatures by [cherry picking](#) the data. They only show data from periods when sun and climate data track together. They draw a false conclusion by ignoring the last few decades when the data shows the opposite result. ([Basic rebuttal](#))

### Cherry Picking



## Systematic problems in the four “National Assessments” of climate-change impacts on the United States

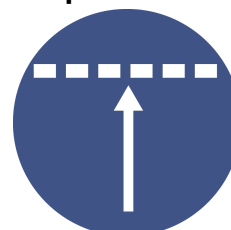
[Dr. Patrick J. Michaels](#) - PDF: [Systematic Problems in the Four National Assessments of Climate Change Impacts on the US.pdf](#)

The growing disparity between predicted bulk tropospheric temperatures and observed values, especially at altitude in the tropics (see the first figure which follows), casts overall doubt on the utility of the large ensemble of models used in the Fourth Assessment.

### #5 - [sks.to/model](#)

[A 2019 study](#) led by Zeke Hausfather evaluated 17 global surface temperature projections from climate models in studies published between 1970 and 2007. [The authors found](#) "14 out of the 17 model projections indistinguishable from what actually occurred." ([Basic rebuttal](#))

### Impossible Expectations





# Myths and fallacies in the *Climate Change Information Briefs*

## Skeptical Science

### Summary

#### Myth rebuttal chart

At least 13 of the long-debunked myths are included in the flyers, some of them more than once. You can access the complete list of myths and keywords on Skeptical Science on [the fixed number page](http://sks.to/fixednum.php) ([click](http://sks.to/fixednum.php) for larger version).

Skeptical Science Myth Rebuttals Online

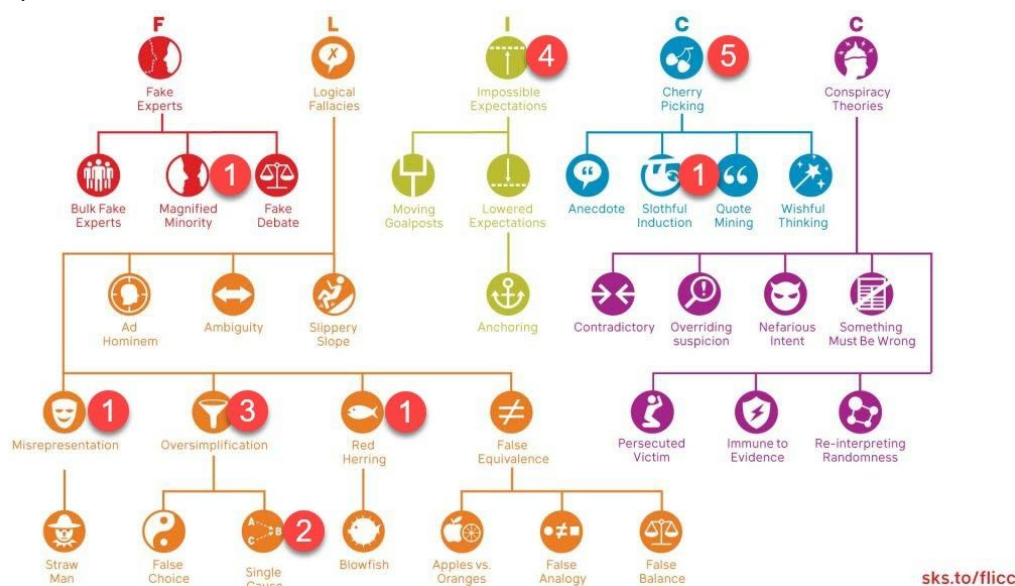
Use "http://sks.to/" plus the keyword listed in the table to access the complete rebuttal on SkepticalScience.com

|                   |                   |                   |                   |                  |                 |                  |                  |                  |                   |
|-------------------|-------------------|-------------------|-------------------|------------------|-----------------|------------------|------------------|------------------|-------------------|
| #1 sun            | #2 past           | #3 consensus      | #4 cooling        | #5 model         | #6 temp         | #7 1998          | #8 1970s         | #9 iceage        | #10 antarctica    |
| #11 lag           | #12 impacts       | #13 gore          | #14 cosmic        | #15 cold         | #16 hurricane   | #17 1994         | #18 hockey       | #19 mars         | #20 uhi           |
| #21 1500cycle     | #22 arcticcycle   | #23 sealevel      | #24 vapor         | #25 planets      | #26 green       | #27 oceanheat    | #28 climategate  | #29 co2          | #30 sensitivity   |
| #31 greenhouse    | #32 lia           | #33 midcentury    | #34 glacier       | #35 pre1940      | #36 evidence    | #37 bear         | #38 troposphere  | #39 kilimanjaro  | #40 underestimat  |
| #41 extreme       | #42 pollutant     | #43 correlate     | #44 greenland     | #45 pastco2      | #46 weather     | #47 hotspot      | #48 neptune      | #49 jupiter      | #50 pdo           |
| #51 saturate      | #52 pluto         | #53 icecollapse   | #54 volcano       | #55 species      | #56 wmp         | #57 co2data      | #58 ocean        | #59 elnino       | #60 arctic        |
| #61 schulte       | #62 dropped       | #63 slc           | #64 aerosols      | #65 microsite    | #66 residence   | #67 shift        | #68 thermo       | #69 significant  | #70 warming       |
| #71 falsify       | #72 landuse       | #73 settled       | #74 winter        | #75 methane      | #76 500         | #77 decline      | #78 himalaya     | #79 acid         | #80 seapredict    |
| #81 oreskes       | #82 1995          | #83 icemelt       | #84 oceanco2      | #85 agw          | #86 co2up       | #87 albedo       | #88 snowfall     | #89 hansen1988   | #90 lindzenchoi   |
| #91 acrim         | #92 solarcycle    | #93 spring        | #94 oism          | #95 watersun     | #96 amazon      | #97 chaos        | #98 stratosphere | #99 searetract   | #100 mauna        |
| #101 driver       | #102 trenberth    | #103 ordovician   | #104 southica     | #105 amplify     | #106 stopped    | #107 diverge     | #108 humle       | #109 etc         | #110 volcanodrop  |
| #111 co2conc      | #112 bright       | #113 warmco2      | #114 ozone        | #115 microwave   | #116 industrial | #117 icefraction | #118 tooold      | #119 waste       | #120 plant        |
| #124 greatlake    | #125 runaway      | #127 trace        | #128 overestimate | #129 breath      | #130 reloss     | #131 royalsoc    | #132 dmi         | #133 fewdegrees  | #134 humidity     |
| #136 cycle        | #137 fevdegrees   | #139 toohard      | #140 economy      | #141 baseload    | #143 cloud      | #144 peerreview  | #145 ipccskeptic | #146 foi         | #147              |
| #148 bleach       | #151 futurecool   | #152 stomata      | #153 name         | #155 soares      | #157 seale      | #158 linear      | #159 snowcover   | #160 atoll       | #161 inertia      |
| #162 trends       | #163 10000        | #164 ipccmwp      | #168 jungqvist    | #169 limits      | #170 highway    | #171 removeco2   | #172 urgent      | #174 soot        | #175 poor         |
| #176 arctic1940   | #177 expensive    | #178 sealevelrise | #179 venus        | #180 variable    | #181 limitscool | #182 searise     | #183 jobs        | #185 negspencer  | #186              |
| #187 loehle       | #188 salby        | #189 co2increase  | #190 postma       | #191 CERN        | #195 slr2010    | #197 underground | #198 galileo     | #199 northwest   | #200 stepfunction |
| #201 tuvalu       | #202 best         | #204 planetary    | #205 schmittner   | #206 iris        | #207 uah        | #209 santer      | #210 accelerate  | #211 ipccnatural | #212 thermostat   |
| #213 survived     | #214 himalayagrow | #215 pal          | #216 nuclear      | #217 seaice1940  | #218 antarctic  | #219 arcticstorm | #220 sandy       | #222 16years     | #223 longtail     |
| #225 solarminimum | #226 robust97     | #227 akasofu      | #228 confidence   | #229 projections | #230 ipccpause  | #232 heatwave    | #233 fringe      | #234 damagecosts | #235 adaptcheap   |
| #236 meat         | #237 satellite    | #238 money        |                   |                  |                 |                  |                  |                  |                   |

(Available at : <http://skepticalscience.com/fixednum.php>)

#### Identified characteristics of science denial

We also applied FLICC to the arguments made and identified several of them. Not too surprisingly, cherry picking was most often used (5 times) followed closely by impossible expectations (4 times).





## Myths and fallacies in the *Climate Change Information Briefs*

### Skeptical Science

The following table contains the definitions and examples for the fallacies encountered. To learn more about the overall taxonomy check out [A history of FLICC: the 5 techniques of science denial](#).

| Technique               | Definition   | Example   |
|-------------------------|--|---|
| Cherry Picking          | Carefully selecting data that appear to confirm one position while ignoring other data that contradicts that position.   | "Global warming stopped in 1998."   |
| Impossible Expectations | Demanding unrealistic standards of certainty before acting on the science.   | "Scientists can't even predict the weather next week. How can they predict the climate in 100 years?"       |
| Magnified Minority      | Magnifying the significance of a handful of dissenting scientists to cast doubt on an overwhelming scientific consensus. | "Sure, there's 97% consensus but Professor Smith disagrees with the consensus position."                    |
| Misrepresentation       | Misrepresenting a situation or an opponent's position in such a way as to distort understanding.                         | "They changed the name from 'global warming' to 'climate change' because global warming stopped happening." |
| Over-simplification     | Simplifying a situation in such a way as to distort understanding, leading to erroneous conclusions.                     | "CO <sub>2</sub> is plant food so burning fossil fuels will be good for plants."                            |
| Red Herring             | Deliberately diverting attention to an irrelevant point to distract from a more important point.                         | "CO <sub>2</sub> is a trace gas so it's warming effect is minimal."   |
| Single Cause            | Assuming a single cause or reason when there might be multiple causes or reasons.  | "Climate has changed naturally in the past so what's happening now must be natural."                        |
| Slothful Induction      | Ignoring relevant evidence when coming to a conclusion.  | "There is no empirical evidence that humans are causing global warming."                                    |

If you think that we overlooked any rebuttals and/or characteristics, please let us know via our [contact form](#)!



## Additional Resources

### Climate Models

Gavin Schmidt's Ted Talk "[The emergent patterns of climate change](#)" (March 2014)

Scott K. Johnson's ArsTechnica article "[Why trust climate models? It's a matter of simple science](#)" (September 2013)

### Clouds

Kate Marvel's TED Talk [Can clouds buy us more time to solve climate change?](#) (April 2017)

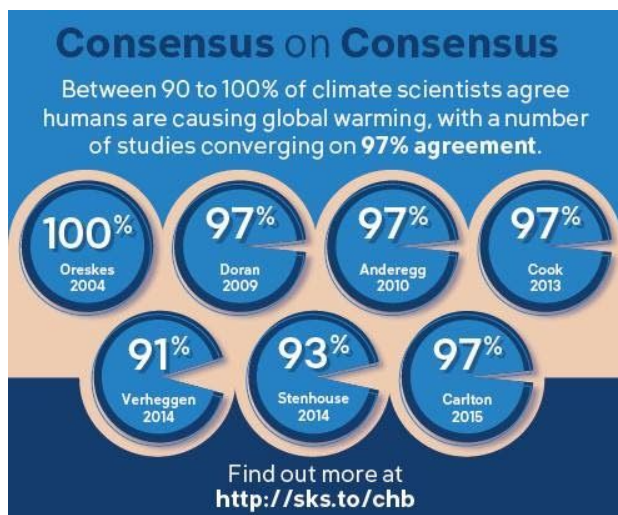
Peter Jacob's [UQx DENIAL101x 5.2.3.1 The role of clouds in climate change](#) (2015)

### Past

Stefan Rahmstorf: [The climate has always changed. What do you conclude?](#) (July 2017)

### Consensus

There's actually a [Consensus on Consensus](#) (Cook et al. 2016)



Climate Change basics and how they get distorted

Climate Primer posted from MIT and put together by Kerry Emmanuel:

[Home - Climate Science, Risk & Solutions](#)

["Climate change is real and important"](#) - by Josh Halpern, Greg Laden, Collin Maessen, Miriam O'Brien, Ken Rice and Michael Tobis (October 2015)