

II. A Cloud Thermostat Controls the Earth's Climate, Not Greenhouse gasses! and I. Climate change is a myth!

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Part I. Climate change is a myth -1.

- The IPCC and its collaborators have been tasked with computer modeling and observationally measuring two very important numbers – the Earth's so-called power imbalance, and its power-balance feedback-stability strength. They have grossly botched both tasks, in turn, leading them to draw the wrong conclusion.
- I assert that **the IPCC has not proven global warming!** On the contrary, observational data are fully consistent with no global warming. **Without global warming, there is no climate-change crisis!**
- Their computer modeling (GISS) of the climate is unable to simulate the Earth's surface temperature history, let alone predict its future.

Part I. Climate change is a myth -2.

- Their computer modeling (GISS) is unable to simulate anywhere near the Earth's albedo (sunlight reflectivity). The computer simulated sunlight reflected power and associated power imbalance error, are typically about fourteen times bigger than the claimed measured power imbalance, and about twenty five times bigger than the claimed measured power imbalance error range.
- The IPCC's observational data are wildly self-inconsistent and/or are fully consistent with no global warming.
- The IPCC's observational data claim an albedo for cloudy skies that is inconsistent with direct measurements by a factor of two. Alternatively, their data **significantly violate conservation of energy**.

Part I. Climate change is a myth -3.

- Scientists performing the power-balance measurements admit that the available methodologies are incapable of measuring a net power imbalance with anywhere near the desired accuracy. This difficulty is due to huge temporal and spatial fluctuations of the imbalance, along with gross under-sampling of the data.
- The observational data they report are self-inconsistent and are visibly dishonestly fudged to claim warming. The fudged final reported values, herein highlighted and exposed, are an example of the **proverbial proliferation of bad pennies.**
- NOAA's claims that there is an observed increase in extreme weather events are bogus. Their own published data disprove their own arguments. A 100 year history of extreme weather event frequency, plotted frontwards in time is virtually indistinguishable from the same historical data plotted backwards in time.

Part I. Climate change is a myth -4.

- In Part II, I present the **cloud-thermostat feedback mechanism**. My new mechanism dominantly controls and stabilizes the Earth's climate and temperature. The IPCC has not previously considered this mechanism. The IPCC ignores cloud-cover variability.

The IPCC's two sacred tasks – both botched! -1

1. The IPCC and its collaborators have been tasked with computer modeling and observationally measuring two very important numbers – the Earth's so-called power imbalance, and its power-balance feedback-stability strength.
2. The Earth's net power imbalance is its sunlight heating power (its power-IN), minus its two components of cooling power - reflected sunlight and reradiated infrared power (its power-OUT).
3. Based on their claimed power imbalance and global-warming assertion, the IPCC and its collaborators assemble a house of cards argument that forebodes an impending climate change apocalypse/catastrophe.
4. Additionally, the IPCC and its contributors calculate the strength of naturally occurring feedback mechanisms that presently stabilize the Earth's temperature and climate.

The IPCC's two sacred tasks – both botched! -2

5. They claim only marginal effectiveness for these mechanisms, and correspondingly assert that there is a “tipping point”, whereinafter further added greenhouse gasses catastrophically cause what amounts to a thermal-runaway of the Earth's temperature.
6. The IPCC scapegoats atmospheric greenhouse gasses as the cause of global warming, and further mandates that trillions of dollars must be spent to stop greenhouse gas release into the environment with a so-called “zero-carbon” policy.
7. The IPCC also mandates multi-trillion dollar per year geoengineering projects including Solar Radiation Management Systems to stabilize the Earth's climate and CO₂ capture projects to reduce the atmospheric CO₂ levels.

The IPCC's two sacred tasks – both botched! -3

8. I assert that the IPCC and its contributors have not proven global warming, whereupon their house of cards collapses.
9. My cloud thermostat mechanism's net feedback "strength" (the IPCC's 2nd sacred task to estimate) is anywhere from -5.7 to -12.7 W/m²/K (depending on the assumed cloud albedo, 0.36 vs. 0.8), compared to the IPCC's botched best estimate for their mechanisms of -1.1 W/m²/K. My mechanism's overwhelmingly dominant strength confirms that it is the dominant feedback mechanism controlling the Earth's climate.
- 10. Correspondingly, I confidently assert that the climate crisis is a colossal trillion-dollar hoax.**

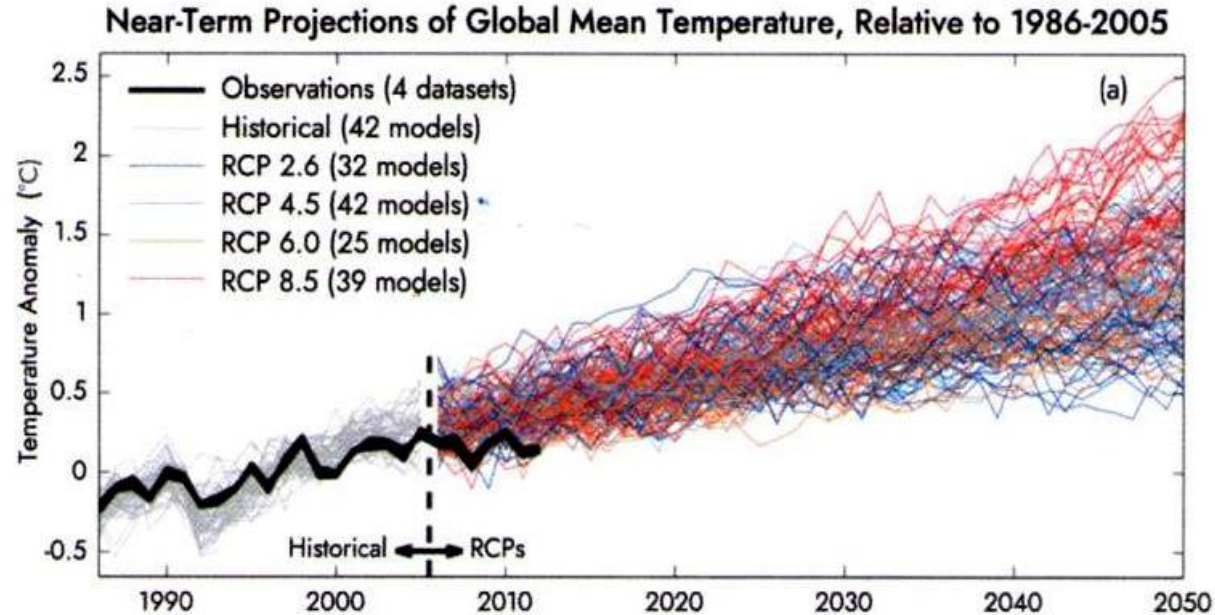
The IPCC's basic argument is a flawed house of cards: -1

1. The IPCC claims with great certainty that the Earth has a (proven) net power imbalance. It claims that there is more sunlight power incident on the Earth heating it, than there is lost power cooling it. The lost power has two forms reflected sunlight and reradiated far infrared radiation.
2. More power IN than power OUT defines global warming! The IPCC claims a net warming power imbalance!
3. Global warming leads to climate change.
4. Climate change leads to an increased frequency of extreme weather events and other bad phenomena.
5. An increased frequency of extreme weather events leads to global apocalypse and a climate crisis. NOAA claims to have observed an increase. (Their claims are visibly bogus.)

The IPCC's basic argument is a flawed house of cards: -2

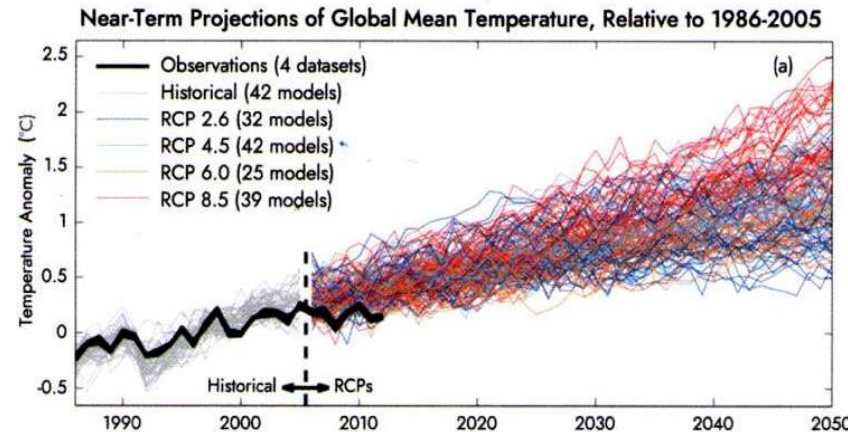
6. The IPCC's claimed net warming power imbalance is claimed to be caused by an atmospheric buildup of greenhouse gasses, especially of CO₂.
7. Trillions of dollars must therefore be spent to limit, prevent, and reverse the atmospheric buildup of greenhouse gasses.
8. **However, given that said claimed net warming power imbalance is not proven, and there is actually no global warming, then there is no crisis and the house of cards has collapsed.**
9. **I assert that the IPCC's claimed net power imbalance is not proven, and that there is no crisis. The house of cards has indeed collapsed! The requested trillions of dollars are a waste.**

The IPCC's computer modeling uses flawed physics to estimate the Earth's temperature history -1



- The above graph is copied from [AR5, (IPCC, 2013) Fig 11.25].
- It shows the IPCC's CMIP5 computer modeling of the Earth's temperature "anomaly". The various computed curves display the earth's predicted (colored) and historical (gray) "temperature anomaly".
- The solid black curve is the observed temperature anomaly.

The IPCC's computer modeling uses flawed physics to estimate the Earth's temperature history -2

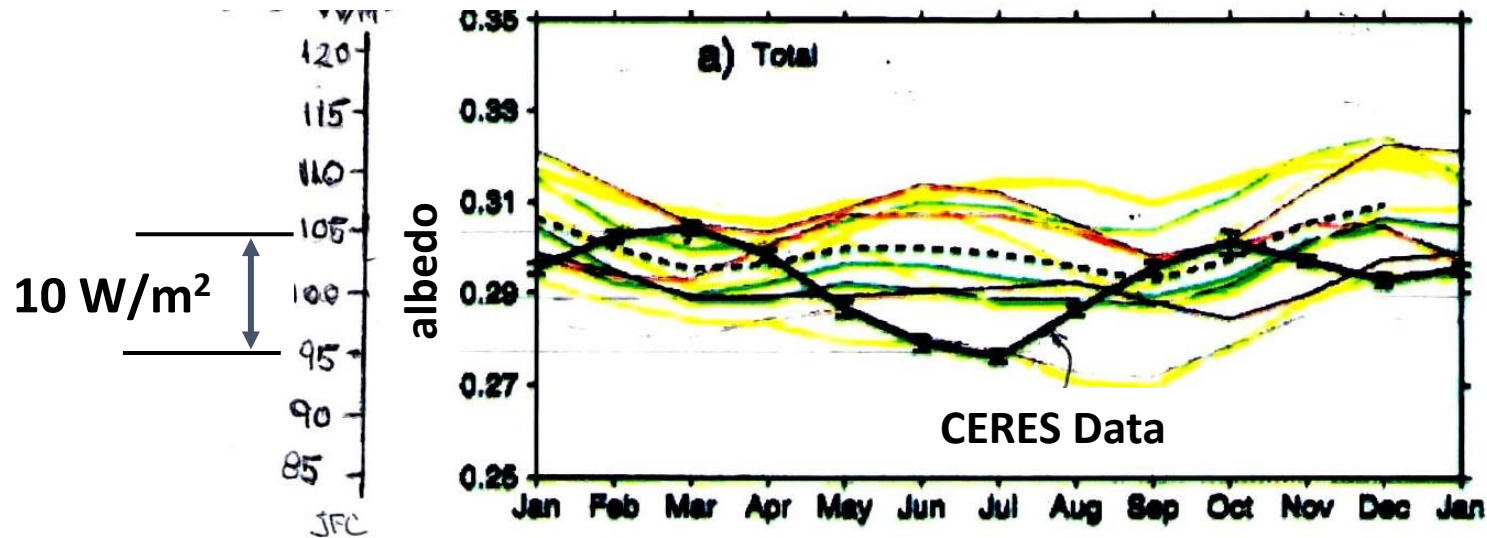


(Repeat 1)

- Note that all 40+ models are incapable of simulating the Earth's past temperature history. The total disarray and total lack of reliability among the CMIP5 predictions was first highlighted by Steve Koonin (former White House science advisor to Barack Obama) in his recent book- *Unsettled? What climate science tells us, what it doesn't, and why it matters*.
- **Something is obviously very wrong with the physics incorporated within the computer models, and their predictions are totally unreliable.**

The IPCC's computer modeling uses flawed physics to estimate the Earth's albedo -1

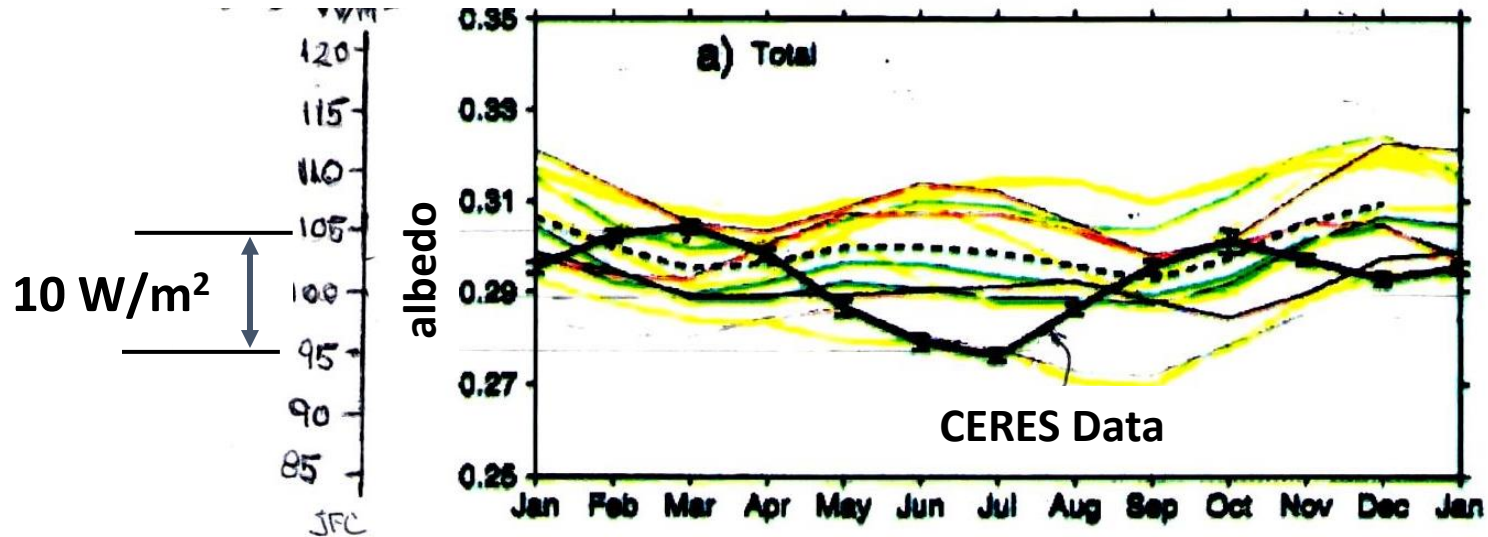
Outgoing Shortwave Radiation (W/m²)



- Albedo is the fraction of sunlight power that is directly reflected by the Earth back out into space. (OSR=100 W/m² portion of power-OUT)
- The above Figure, copied from Stephens et al. (2015), shows the IPCC's CMIP5 computer modeling (colored curves) of the Earth's mean annual albedo temporal variation. The solid black curve is the Earth's albedo measured by satellite radiometry. (The variation is not sinusoidal.)

The IPCC's computer modeling uses flawed physics to estimate the Earth's albedo -2

Outgoing Shortwave Radiation (W/m²)

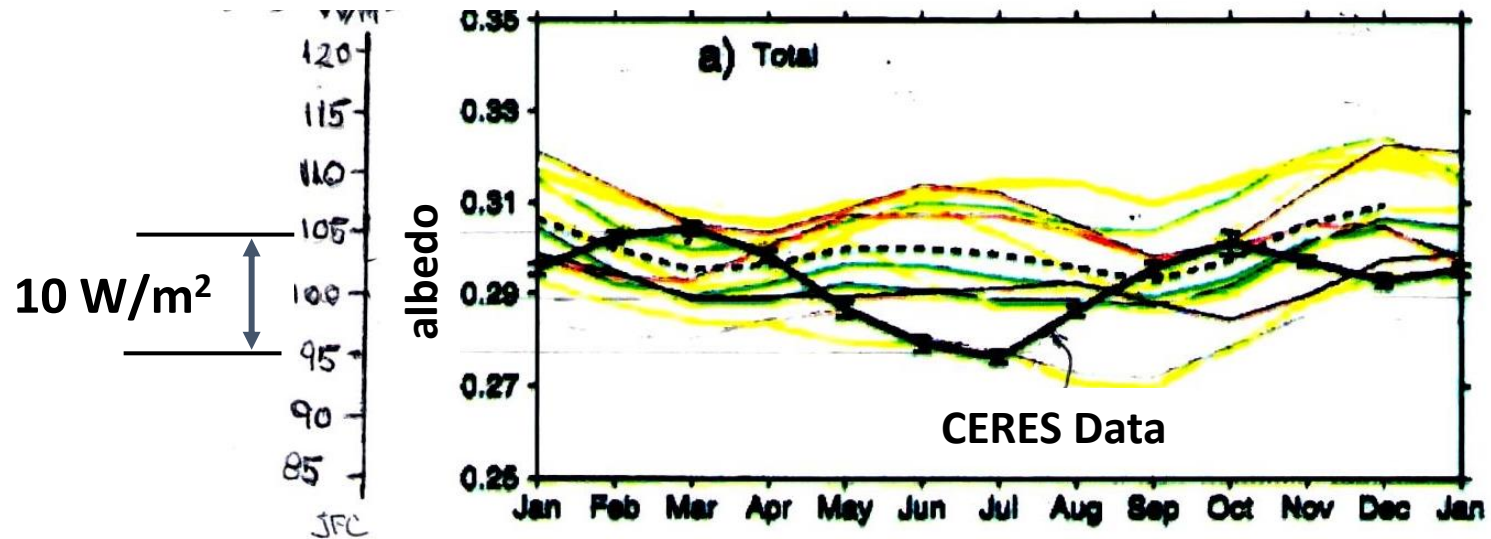


(Repeat 1)

- The added scale shows the associated reflected sunlight power. It assumes a constant solar irradiance – 340 W/m².
- Note that the IPCC's computer modeling is grossly incapable of simulating the observed Earth's reflected power, and especially incapable of simulating that power's dramatic temporal fluctuation.

The IPCC's computer modeling uses flawed physics to estimate the Earth's albedo -3

Outgoing Shortwave Radiation (W/m²)

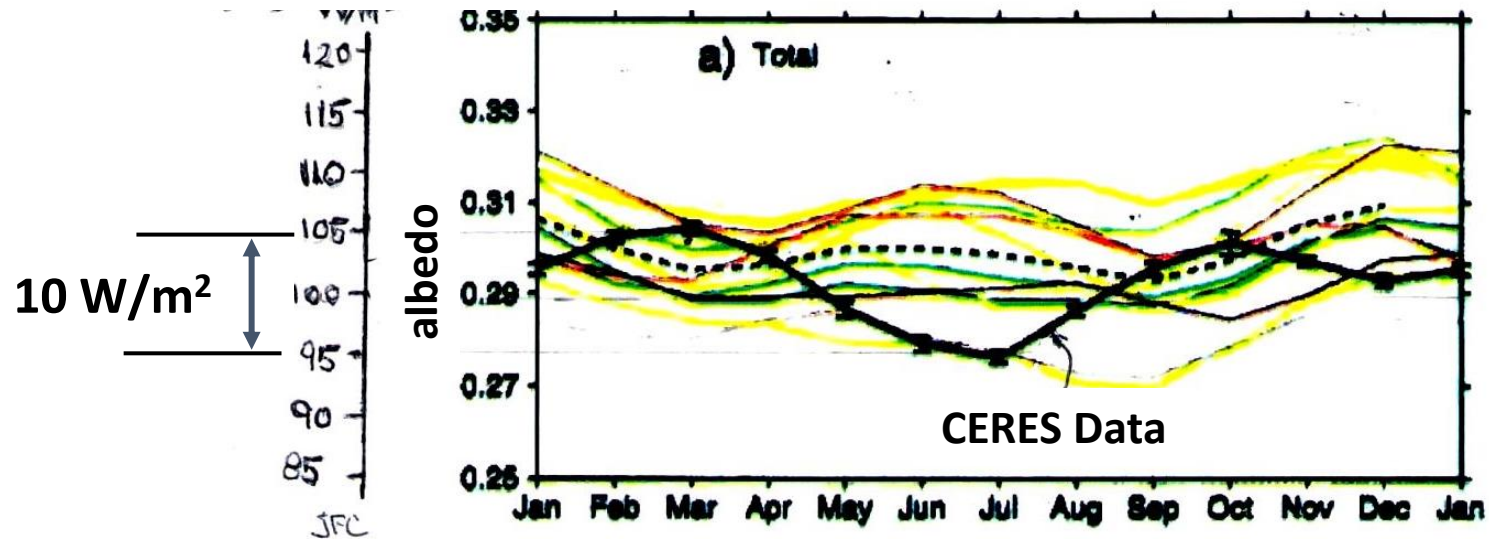


(Repeat 2)

- The actual power's annual variation is actually much greater than is shown by this Figure by about 18 W/m², due to the ellipticity of the Earth's orbit and the associated sinusoidal temporal variation of the so-called solar constant.

The IPCC's computer modeling uses flawed physics to estimate the Earth's albedo -4

Outgoing Shortwave Radiation (W/m²)



(Repeat 3)

- Despite more than 10 W/m² gross errors in the computer simulation's calculated reflected power, as is shown on the Figure, the IPCC [AR6 (2021)] still claims that it has computer simulated and precisely measured this power, yielding an imbalance that is equal to 0.7 ± 0.2 W/m². – **Huh?**

The IPCC's observational data are consistent with NO global warming - 1

- Power-IN is the sunlight power incident on the Earth. The IPCC and climate scientists call it Short Wavelength (SW) Radiation. It is about 340 Watts per square meter of the Earth's surface area. (It is not actually constant, but varies ± 9 W/m².)
- Power-OUT has two components:
 - One component is the sunlight energy that is directly reflected by the Earth back out into space, whereinafter it can no longer heat the planet. That component is claimed by the IPCC to be about 100 W/m².
 - The other component is the far-infrared heat radiated into space by a hot planet. It is claimed to be about 240 W/m². The IPCC calls the far-infrared heat radiation component, Long Wavelength (LW) Radiation.

The IPCC's observational data are consistent with NO global warming - 2

- Measuring the power imbalance consists of measuring power-IN, measuring power-OUT and subtracting. Simple enough? Not really. The problem is that power-IN, and power-OUT are huge numbers, and that the difference between them is miniscule - 0.2% of power-IN. That miniscule difference is the net imbalance that is sought, both experimentally and theoretically.

Unfortunately, it is so small that it is very difficult, if not impossible, to measure to the desired accuracy, 0.1 W/m^2 , or 0.03% of power-IN. It is much tougher to measure when power-IN and power-OUT are both also hugely varying in a seemingly random irreproducible fashion. Large variations occur both in time and in space over the surface of the Earth. As noted in a previous slide, this grossly under-sampled fluctuation is about 28 W/m^2 , compared with the IPCC's claimed imbalance, $0.7 \pm 0.2 \text{ W/m}^2$.

The IPCC's observational data are consistent with NO global warming - 3

- A variety of methods has been employed to measure these powers. They include satellite radiometry, (the ERBE, and CERES Terra and Aqua satellites), ocean heat content (OHC) measured using the ARGO buoy chain and XBT water sampling by ships, and finally by ground sunlight observations using the Baseline Surface Radiation Network (BSRN).
- The various measured values are all in wild disagreement with each other. Importantly, none of the reported data actually show a convincing net warming power imbalance. **Importantly, much of the reported data are totally fudged in a manner that dishonestly changes them from showing no warming to showing warming!**

What is the basic power-imbalance calculation? It is really quite simple - 1.

Observers' data are usually reported on a Figure that shows a map of the claimed power flow.

The imbalance is conventionally reported at the Top Of Atmosphere (TOA).

The three needed numbers are readily available from the top line of the power-flow diagram.

If you don't believe my claims of **fudging**, it's easy enough to freely download the articles, pull the numbers from the various power-flow diagrams, and verify the arithmetic yourself!

A typical calculation is shown on the next slide:

What is the basic power-imbalance calculation?

It is really quite simple - 2.

A typical calculation is as follows:

Incident ShortWave power	+340	W/m ²	± σ _{IN}
Outgoing ShortWave reflected power	-100	W/m ²	± σ _{SW-OUT}
Outgoing LongWave reemitted power	<u>-240</u>	W/m ²	± σ _{LW-OUT}
Sum=Net “observed” power imbalance	IMBALANCE ± σ _{IMBALANCE}		

$$\sigma_{\text{IMBALANCE}} = (\sigma_{\text{IN}}^2 + \sigma_{\text{SW-OUT}}^2 + \sigma_{\text{LW-OUT}}^2)^{1/2}. \quad (\text{RMS sum})$$

RMS sum crosscheck: $\sigma_{\text{IMBALANCE}} > \sigma_{\text{IN}}$, $\sigma_{\text{IMBALANCE}} > \sigma_{\text{SW-OUT}}$, $\sigma_{\text{IMBALANCE}} > \sigma_{\text{LW-OUT}}$.

no global cooling if $\text{IMBALANCE} \leq \sigma_{\text{IMBALANCE}}$

global warming if $\text{IMBALANCE} > \sigma_{\text{IMBALANCE}}$

Fudged arithmetic is highlighted in red on the next slides. (Follow the proverbial bad penny.)

The earliest data are reported by Stephen's *et al.* (1981) and Ramanathan (1987) - 1.

- Their results are based on only four partially analyzed months of observation by the ERBE satellite – (Apr. 1985, July 1985, Oct. 1985, Jan. 1986). (c.f. observed non-sinusoidal albedo annual oscillation.)
- Their resulting Top of Atmosphere net power imbalance results are as follows:

	Stephens <i>et al.</i> (1981)	Ramanathan (1987)
Incident ShortWave power (W/m ²)	+344	+340
Outgoing ShortWave power	-103.2	-106
Outgoing LongWave power	<u>-234±7</u>	<u>-237</u>
Net “observed” power imbalance	+9 ± 10	0
jfc calculation	+6.8	-3

- Both Stephens *et al.* and Ramanathan's data are fully consistent with zero net global warming and/or cooling.

The earliest data are reported by Stephen's *et al.* (1981) and Ramanathan (1987) - 2.

- The 2003 US National Academy / National Research Council report "*Understanding Climate Change Feedbacks* (p.112)" cites the Ramanathan (1987) data, and comments that "*The observations do not meet quality standards.*"

Loeb *et al.* (2009, 2012) use OHC data to “adjust” Ramanathan’s (1987) numbers, to show a net warming power imbalance - 1.

- Loeb *et al.* (2012, p.111) admit ”*A limitation of the satellite data is their inability to provide an absolute measure of the net TOA radiation imbalance to the required accuracy level.*”
- Loeb *et al.* (2009, 2012) reanalyze and arbitrarily replace Ramanathan (1987)’s (very sparsely sampled) EREB satellite data with new values that now show a net global warming power imbalance.
- They obtain their new preferred data values by switching modality from satellite-radiometry data to ocean heat content (OHC) data (also very sparsely sampled) from the ARGO buoy chain, and from XBT ship-based bathythermograph manually sampled water temperature data.
- They base their action on a claimed increase in ocean heat content, as per speculation by Hansen *et al.*, (2005, 2011).

Loeb *et al.* (2009, 2012) use OHC data to “**adjust**” Ramanathan’s (1987) numbers, to show a net warming power imbalance - 2.

- Unfortunately, the ARGO and XBT data have a woefully sparse area sampling, and much worse accuracy than Loeb *et al.* claim. **Data gaps are filled using totally fabricated data by Lyman and Johnson (2008).** (Data fabrication is one of our scientific little no-no’s.)
- Their resulting Top of Atmosphere net power imbalance results:

	<i>EREB</i> <i>satellite</i>	<i>OHC</i> <i>(2009)</i>	<i>OHC</i> <i>(2012)</i>
Incident ShortWave power (W/m ²)	+340	+340	
Outgoing ShortWave power	-107	-99.5	various
Outgoing LongWave power	<u>-234.6</u>	<u>-239.6</u>	<u> </u>
net power imbalance	-1.6	+ 0.9	+0.64 ± 0.11
	(cooling)	(warming)	(warming)

THE BAD PENNY

Remember this proverbial BAD PENNY. It will show up again and again, and again.

Power imbalance analysis by Stephens *et al.* (2012) with grossly admittedly-fudged error estimates - 1

- Following Loeb *et al.*, Stephens *et al.* (2012) also admit that satellite data are incapable of observing a net imbalance! The groups join forces and switch to the use of Ocean Heat Content (OHC) data, as per the suggestion by Hansen *et al.*, (2005, 2011).

- Stephens *et al.* (2012) use OHC data and the Outgoing ShortWave power “adjustment” (**fudge!**) reported earlier by Loeb *et al.* (2009, 2012) to claim a net global-warming power imbalance (**the BAD PENNY reappears!**):

Incident ShortWave power (W/m²) +340.2 ± 0.1

Outgoing ShortWave power -100.0 ± 2.0

Outgoing LongWave power -239.7 ± 3.3

Net “claimed observed” power imbalance +0.6 ± 0.4 ← recurring BAD PENNY (fudged warming)

Actual summation & assoc. RMS error (jfc) +0.5 ± 3.9 (no warming)

Power imbalance analysis by Stephens *et al.* (2012) with grossly admittedly-fudged error estimates - 2

- Stephens *et al.*'s use of (visibly) incorrect arithmetic is yet another one of our scientific little no-no's. RMS error sum crosscheck NG.
- Loeb *et al.* (2012)'s BAD PENNY error limits are increased from ± 0.11 to ± 0.4 .

An update on Earth's energy balance in light of the latest global observations

Graeme L. Stephens^{1*}, Juilin Li¹, Martin Wild², Carol Anne Clayson³, Norman Loeb⁴, Seiji Kato⁴, Tristan L'Ecuyer⁵, Paul W. Stackhouse Jr⁴, Matthew Lebsock¹ and Timothy Andrews⁴ 2012



Box 1 | Updated energy balance

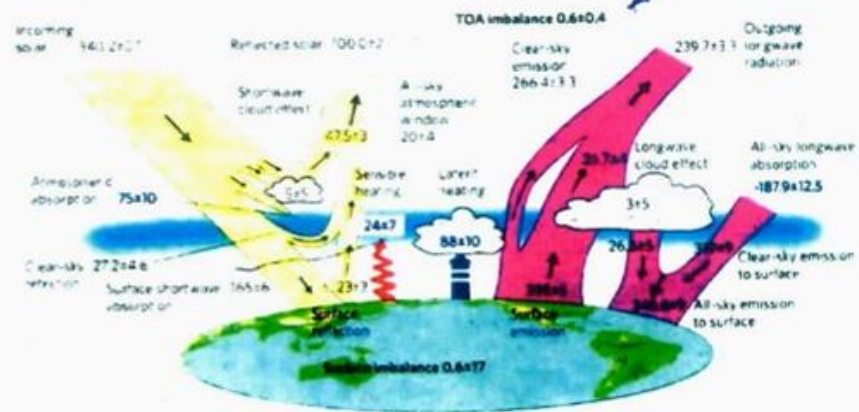


Figure B1 | The global annual mean energy budget of Earth for the approximate period 2000-2010. All fluxes are in Wm^{-2} . Solar fluxes are in yellow and infrared fluxes in pink. The four flux quantities in purple-shaded boxes represent the principal components of the atmospheric energy balance.

Stephens *et al.* (2012) power-flow diagrams show the **fudged numbers**

Figures 1 and B1 from Stephens *et al.* (2012), displaying the **bad arithmetic** and comparing it with the CMIP5 computer modeling.

L'Ecuyer *et al.* (2015) reanalyze the Ocean Heat Content (OHC) data and get different results and much larger error estimates than reported by Stephens *et al.* (2012)

- Following the Stephens *et al.* (2012) estimate of the Earth's power imbalance based on OHC data, L'Ecuyer *et al.* (2015) revise Loeb *et al.*'s (2009, 2012) ocean heat content data analysis.
- They correspondingly revise upwardly the (fudged) power imbalance error limits offered by Stephens *et al.* (2012). They do, however, provide their own "adjustments", that they instead call constraints.

	unconstrained	constrained
Incident ShortWave power (W/m ²)	+340.0 ± 0.5	+340.2 ± 0.1
Outgoing ShortWave power	-102 ± 4	-102 ± 4
Outgoing LongWave power	<u>-238 ± 3</u>	<u>-238 ± 2</u>
Net "observed" power imbalance	0 ± 5.0	0 ± 3.5
	(no warming)	(no warming)

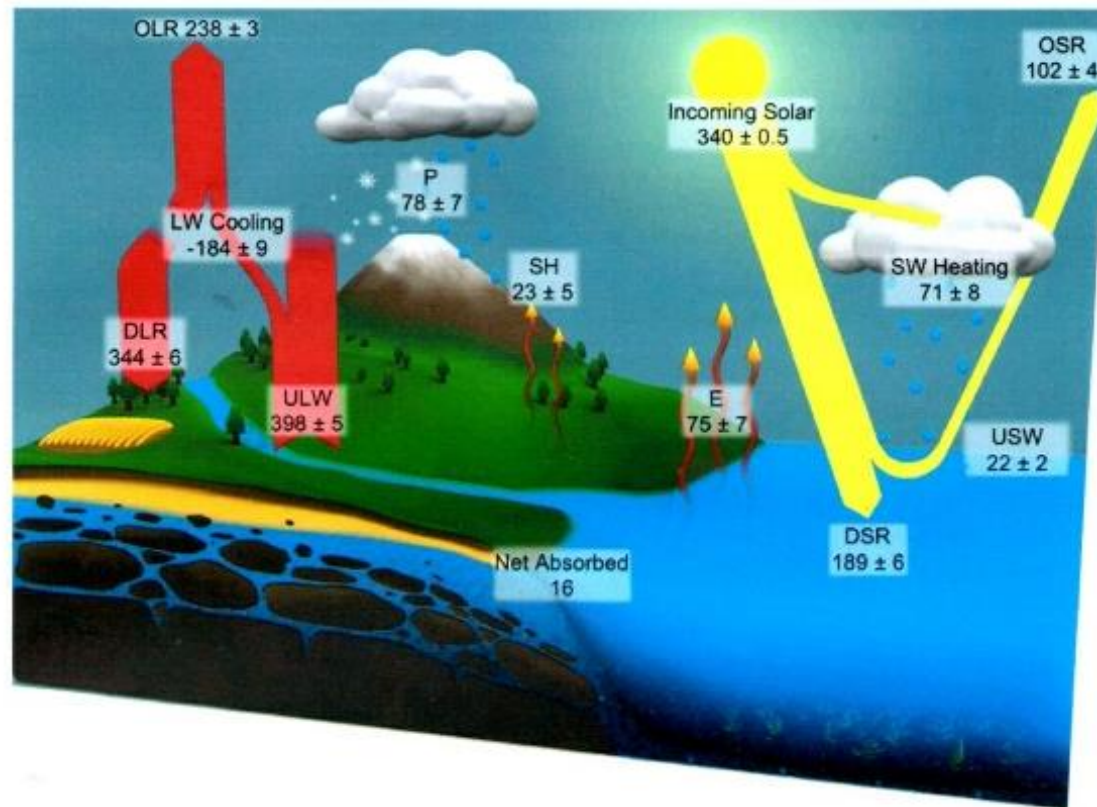
The Observed State of the Energy Budget in the Early Twenty-First Century

TRISTAN S. L'ECUYER,^a H. K. BEAUDOING,^{b,c} M. RODELL,^b W. OLSON,^d B. LIN,^e S. KATO,^e C. A. CLAYSON,^f
 E. WOOD,^g J. SHEFFIELD,^g R. ADLER,^e G. HUFFMAN,^b M. BOSILOVICH,^b G. GU,^b F. ROBERTSON,^h
 P. R. HOUSER,ⁱ D. CHAMBERS,^j J. S. FAMIGLIETTI,^k E. FETZER,^k W. T. LIU,^k X. GAO,^l
 C. A. SCHLOSSER,^l E. CLARK,^m D. P. LETTENMAIER,^m AND K. HILBURNⁿ

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Power flow diagram from
 L'Ecuyer *et al.* (2015, Fig.1.)

FIG. 1. The observed annual mean global energy budget of Earth over the period 2000–09 (fluxes in W m^{-2}). Note that each flux value corresponds to the aggregate from all surfaces around the globe. Longwave and shortwave fluxes are plotted over land and ocean regions, respectively, merely for convenience. The small fraction of DLR that is reflected by Earth's surface has been absorbed into the ULW.

Critiques by Trenberth *et al.* (2010, 2014) - 1

- Satellites measure the Top of Atmosphere energy balance, while Ocean Heat Content data apply to the surface energy balance. One may legitimately mix power-flux data at the two different altitudes, if and only if one fully understands all of the power-flow processes in the atmosphere that occur between the surface and the Top of Atmosphere. If the latter requirement is not true, then one ends up with an “apples to oranges” comparison.
- Trenberth *et al.* (2010, 2014) are highly critical of Loeb, Stephens, L’Ecuyer, and Hansen’s claimed “understanding” of the associated connection between the power flows at these two altitudes.
- Trenberth and Fasullo (2010) point to a huge “missing energy” indicated by the difference between the satellite data and the OHC data power-imbalance calculations, and specifically ask “*Where exactly does the energy go?*”

Critiques by Trenberth *et al.* (2010, 2014) - 2

- Hansen *et al.* (2011) dismiss Trenberth and Fasullo's alleged missing energy as being simply due to satellite calibration errors.
- Trenberth Fasullo and Balmesada (2014) further note that despite various considerations of the surface power balance, significant unresolved discrepancies remain, and they are skeptical of the power imbalance claims.
- In effect, Trenberth *et al.* are the earliest “whistle blowers” to the above-mentioned data fudges.

Stephens and L'Ecuyer (2015) together offer a *mea culpa* admission to having made an “**unjustified, ad hoc**” choice between OHC data and CERES satellite data, and miraculously **now claim simultaneously both zero and +0.6 +/- 0.4 W/m² power imbalance.**

- In response to criticism by Trenberth *et al.* (2010, 2014), Stephens and L'Ecuyer (2015) together offer what amounts to a *mea culpa* article regarding the aforementioned **data fudging**. They admit that “adjustments” do need to be made to obtain agreement (closure) between satellite data and ocean heat content data, and that these “adjustments” are very much larger (by about 10 W/m²) than their claimed power imbalance, **+0.6 +/- 0.4 W/m²**.
- Stephens and L'Ecuyer (2015) also admit that their choice of which data needs “**adjustment**” was made “*in a totally ad hoc*” fashion, and that “*there is no real evidence to support one adjustment approach over the other*”.
- Amazingly, Stephens and L'Ecuyer (2015) persist in reporting (in their abstract line 5) the power imbalance = **0.6 +/- 0.4 W/m²**. (The infamous Loeb *et al.* (2012) global-warming BAD penny reappears again!).

	OHC	CERES (satellites)
Incident ShortWave power (W/m ²)	+340.0 ± 0.1	+340.0 ± 0.1
Outgoing ShortWave power	-102 ± 4	-100 ± 4
Outgoing LongWave power	<u>-238 ± 4</u>	<u>-240 ± 4</u>
Power imbalance reported (abstract line 5)	+0.6 +/- 0.4 W/m²	(= warming)
Net “calculated” power imbalances (jfc)	0 ± 5.6	0 ± 5.6
	(no warming)	(no warming)

Power imbalance analysis by Wild *et al.* (2019) and AR6 (2021) – imbalance and error bars fudged - 1.

- Wild *et al.* (2019) report new Clear sky (cloud-free-sky) measurements to the data set using ground sunlight observations via the Baseline Surface Radiation Network (BSRN).
- Wild *et al.* (2019)'s observational data claim an albedo for cloudy skies that is inconsistent with direct measurements by a factor of two, and/or significantly violates conservation of energy. (See energy conservation theorem Part II and Appendices A,B.) Their data require a cloudy-sky albedo ≈ 0.36 , while direct measurements indicate a value ≈ 0.8 .
- The Wild *et al.* (2019)'s diagram is copied directly by AR6 (2021), except for added **fudges**. The power fluxes and error bounds presented here are copied directly from the top lines of their nearly identical power-flow diagrams. The **fudged** power imbalances are copied directly from the associated lower left-hand corners.

Power imbalance analysis by Wild *et al.* (2019) and AR6 (2021) – imbalance and error bars fudged - 2.

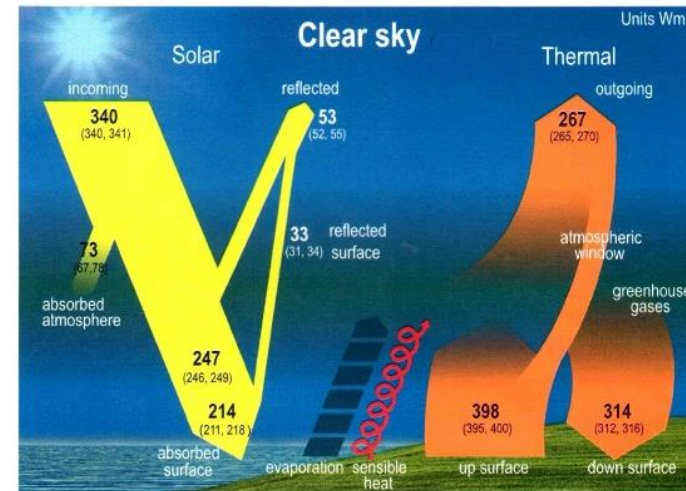
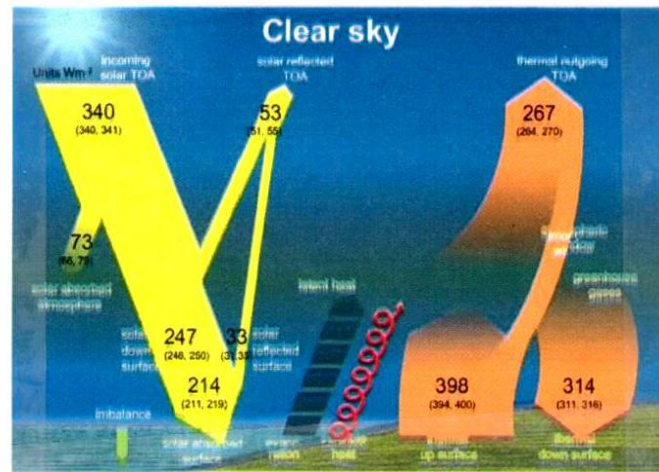
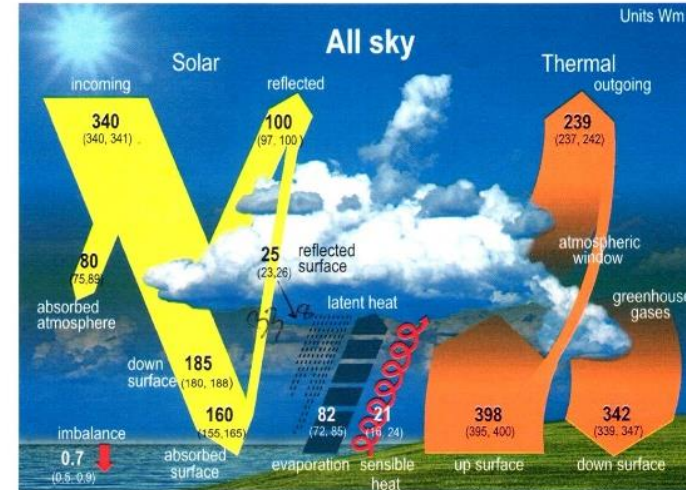
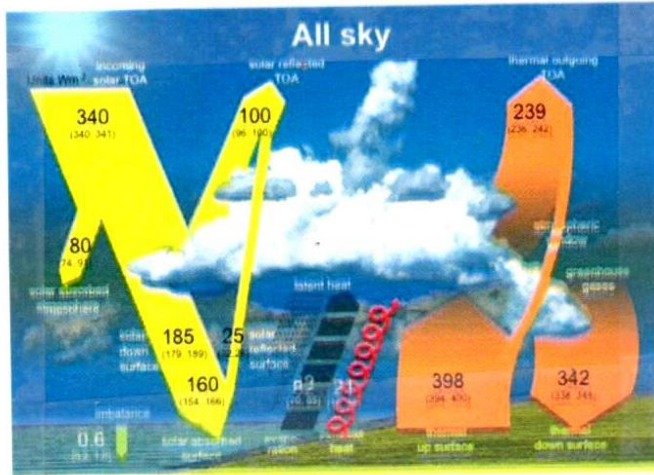
	Wild <i>et al.</i> (2019)	AR6 (2021)
Incident ShortWave power (W/m ²) see note**	+340.5 ± 0.5	+340.5 ± 0.5
Outgoing ShortWave power	-98 ± 2	-98.5 ± 1.5
Outgoing LongWave power	<u>-239 ± 3</u>	<u>-239.5 ± 2.5</u>
Power imbalance reported at bottom (lower left hand corner of Figures)	+0.6 +/- 0.4 (warming)	+0.7 ± 0.2 (strong warming)
Net “calculated” power imbalance (jfc)	3.5 ± 3.6 (no warming)	2.5 ± 3.0 (no warming)

- The infamous Loeb *et al.* (2012) global-warming BAD PENNY reappears once again in Wild *et al.*(2019).

Power imbalance analysis by Wild *et al.* (2019) and AR6 (2021) – imbalance and error bars fudged - 3.

- The arithmetically incorrect **fudged** numbers shown in red are the values reported at bottom of their power flow diagrams. My last line gives the correct summation.
- Wild *et al.* (2019) introduce an innovative technique for data fudging: The Incident ShortWave power reported by previous power-flow maps (e.g. by Stephens and L'Ecuyer (2015), is typically $340.0 \pm 0.1 \text{ W/m}^2$. Wild *et al.* (2019) and AR6 (2021) assume $340.0 \pm 0.5 \text{ W/m}^2$, round upwardly the center of their asymmetric error-limit range by $+0.5 \text{ W/m}^2$, and show both limits correspondingly rounded (upwardly) to the nearest whole number, as per 340 (340, 341) W/m^2 . Note that their upward rounding amount, $+0.5 \text{ W/m}^2$, similarly shifts upwardly their calculated power imbalance by almost all of their reported net power imbalances, $+0.6 \pm 0.4$ and $+0.7 \pm 0.2$.

Wild (2019, left pair) & AR6 (2021, p.934), right pair) power-flow diagrams.



NOAA's scientific disinformation hoax asserting that the frequency of extreme weather events is increasing



Predicting and managing extreme weather events

Jane Lubchenco and Thomas R. Karl

Earth's climate is warming, and destructive weather is growing more prevalent. Coping with the changes will require collaborative science, forward-thinking policy, and an informed public.

This is a challenging time for the US and for US science. The economy, though it is beginning to show some positive signs, is still in bad shape. Extraordinary numbers of Americans are without jobs. The public holds a record-low opinion of government. The integrity of the scientific process is being questioned, and pressure to reduce federal spending is fierce.

The irony is that the demand for services provided by agencies such as the National Oceanic and Atmospheric Administration is at an all-time high and growing. Our ability to deliver those services depends in part on our scientific enterprise. One significant reason why demand for services is growing is the increased frequency and intensity of extreme weather events. Last year, new records were set in the US for tornadoes, drought, wind, floods, and wildfires. Heat records were set in every state. At one time last summer, nearly half of the country's population was under a heat advisory or heat warning. In late November, hurricane-force winds hit parts of Wyoming, Utah, Nevada, Arizona, New Mexico, and California, with winds reaching 97 mph in Pasadena.¹

We at NOAA were able to predict most of the weather- and climate-related extreme events, but our capacity to continue to do so is seriously threatened by downward pressure on our budgets. Budgets and politics threaten NOAA's ability to observe and model weather and climate events and to deliver information to the public. NOAA's abilities to fund and conduct research aimed at understanding the causes of extreme weather and to improve the effectiveness of response to our warnings are all at great risk.

This article focuses on the unusual weather and climate patterns we've documented in 2011 and in previous decades and identifies several actions that would help us to better predict and manage them. Succeeding in this tough environment will take innovative new approaches, a collaborative effort from the scientific community, and a broader appreciation for what is at risk.

Going to extremes

The number of events that produced on the order of \$1 billion or more in damages in 2011 is the largest since tracking of that statistic began in 1980, even after damages are adjusted for inflation. NOAA estimates that there were at least 14 such events in 2011. (The previous record was nine, set in 2008; an average year would see three or four.) Collectively, the 14 events resulted in approximately \$55 billion in damage.² Furthermore, many events produced less than \$1 billion in damage, but are not included in the tally, although they collectively represent additional significant financial losses. Why did we see such expensive damage last year? There are likely a number of contributing factors, including upward trends in population and infrastructure, migration to vulnerable areas, and climate change. The contribution of each of these factors remains an important research issue.

Of course, the economic losses are far from the full picture. Weather- and climate-related disasters in the US claimed more than 1000 lives in 2011, almost double the yearly average. For the victims, each of the events was a huge tragedy. For our country, as for all countries, the events are an unprecedented challenge to the safety of our citizens, the bottom line for our businesses, and the smooth functioning of our society. Timely, accurate, and reliable weather warnings and forecasts are essential to our nation's ability to plan for, respond to, recover from, and prosper in the aftermath of disaster. Short-term forecasts are critical, but so are forecasts of slowly evolving events like prolonged droughts, snow- and ice-melt flooding, and heat waves.

We've emphasized how unusual 2011 was, but was it an anomaly or part of a broader change? Should we expect more of the same in the future? Globally, according to the insurance company Munich Re, the number of extreme meteorological and hydrological events, defined in terms of economic and human impacts, has more than doubled over the past 20 years.³

Jane Lubchenco is undersecretary for oceans and atmosphere at the US Department of Commerce and administrator of the National Oceanic and Atmospheric Administration. **Thomas Karl** is director of NOAA's National Climatic Data Center and chair of the US Global Change Research Program. This article is an edited version of the Union Agency Lecture given by Lubchenco at the 2011 fall meeting of the American Geophysical Union in San Francisco.

www.physicsjournal.org March 2012 Physics Today 31

- 2012, Physics Today article “*Predicting and Managing Extreme Weather Events*” – *Earth’s climate is warming, and destructive weather is growing more prevalent. Coping with the changes will require collaborative science, forward-thinking policy, and an informed public.*”
- Authors: Jane Lubchenco, undersecretary for oceans and atmosphere at the US Dept. of Commerce, and NOAA administrator, and Thomas Karl, Director of NOAA’s climatic data center and chair of the US Global Change Program.

NOAA's disinformation hoax regarding an impending climate apocalypse

- The article asserts that there is an increase in the extreme weather event frequency that is associated with climate change in the three decades ending in 2012.
- The article presents data in their Fig. 2a displaying NOAA's Weather and Climate Extremes Index. That index is NOAA's numerical composite measure of the frequency of so-called extreme weather events, including hot-spells, cold-spells, droughts, floods, land-falling hurricanes, etc. (EF3+ tornado frequency is conspicuously absent from the list, presumably because it was actually decreasing. See Koonin, pp.124-125)
- The authors assert that their climate extremes index has "obviously" grown steadily over the last three decades. I assert here that their own data in their Fig. 2a disprove their own assertion.

Lubchenco and Karl's Fig. 2a

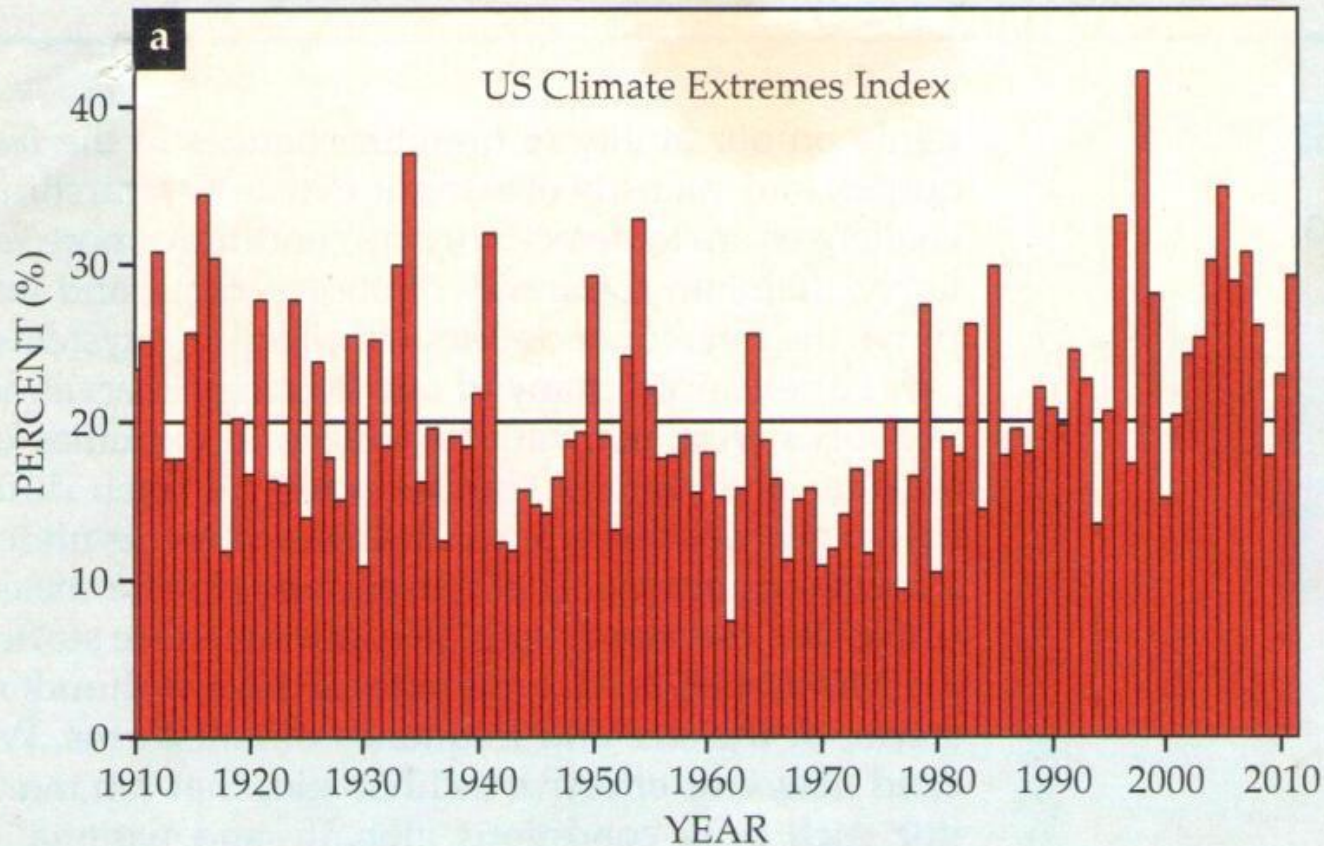
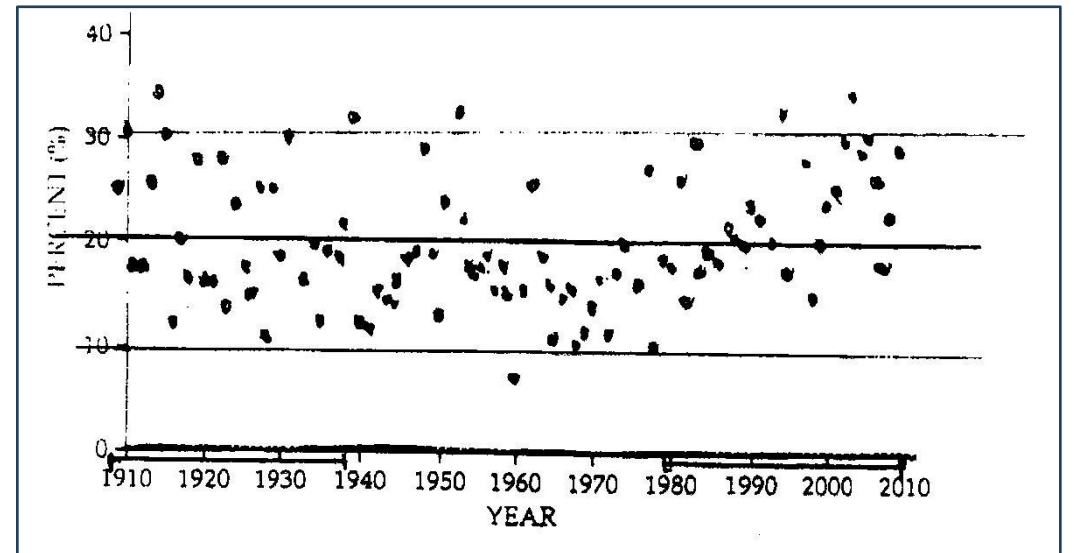
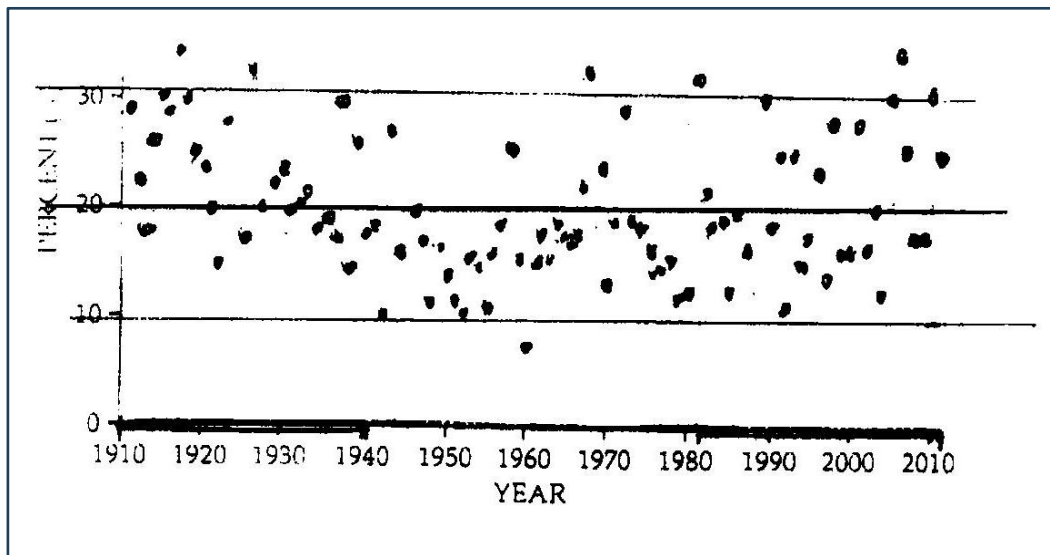


Figure 2. Weather and climate extremes.

(a) The US Climate Extremes Index shows that, collectively, the area percentage of the country experiencing extreme monthly temperature, drought severity, soil water surplus, days with and without precipitation, land-falling hurricane activity, and one-day heavy precipitation events in any given year has grown steadily over the past several decades. (Extremes are defined as monthly averages that rank in the top or bottom 10th percentile of all data on record.) The black line is the average from 1910 to 2011. **(b–e)** The area percentages of the country experiencing extremes in selected indicators.

The two graphs below are traced directly from Fig. 2a. They are identical, except that one is plotted left-to-right reversed, i.e. backwards with time increasing to the left. If you look carefully, you will see that they are mirror images. If you can't tell which one of these graphs is correctly plotted and matches the one on the previous slide, and which one is time-backwards, I assert that their claimed recent increase in extreme weather-event frequency is not obviously indicated by their data, as they claim. Their claim is false! Are you really confidently willing to bet trillions of dollars that you can tell which one is correct? **These data portend the impending apocalypse, so Lubchenko and Karl claim.**



Part I – Conclusions - 1

1. The IPCC and its contributors claim the Earth has a net-warming energy imbalance. I show here that those claims are false.
2. The IPCC bases its claims on computer modeling of the Earth's atmosphere, and on observational data from a variety of observational modalities. Both the computer models and the observational data are grossly flawed, **and fudged**.
3. The IPCC's computer modeling and its predictions are totally unreliable. There is something clearly very wrong with the physics incorporated within these computer models. Since the computer models can't even explain the past, why should anyone trust their prediction for the future?
4. Not one of the observational modalities for measuring the Earth's power imbalance convincingly shows net global warming.

Part I – Conclusions - 2

5. I show where various observers and the IPCC have dishonestly fudged their reported data, and have dishonestly changed it from showing No Warming, to showing Warming. Crucially important data fudges are revealed here and highlighted in red. If you don't believe me, check my arithmetic.
6. The IPCC and NOAA further claim that the purported power imbalance has already caused an increase in dangerous extreme weather events. **NOAA's own data disprove their own claims.**
7. **I thus offer Great News. Despite what you may have heard from the IPCC and others, there is no real climate crisis! The planet is NOT in peril!**
8. **The IPCC's (and NOAA's) claims are a hoax. Trillions of dollars are being wasted.**

Part II – The cloud thermostat - 1

1. So what is really happening? Why is the earth's climate actually as stable as it really is?
2. The cloud thermostat mechanism is clearly the overwhelmingly dominant climate controlling feedback mechanism that controls stabilizes the Earth's climate and temperature. It thereby prevents global warming and climate change.
3. The cloud-thermostat mechanism provides very powerful feedback that stabilizes the Earth's climate and temperature. Its great strength obtains from the observed large fluctuation of the Earth's power imbalance.
4. The mechanism gains its strength from the Earth's observed very large cloud-cover variation. The power imbalance is actually observed to be continuously strongly fluctuating by anywhere between 18 to 55 W/m².

Part II – The cloud thermostat - 2

5. Clouds modulate the outgoing Shortwave power and therefore control the Earth's power imbalance, minimally with a 18 W/m^2 available power range (ignoring the added 18 W/m^2 solar-constant variation), which is minimally 26 times the IPCC's 0.7 W/m^2 claimed power imbalance, and 45 times the IPCC's $\pm 0.2 \text{ W/m}^2$ power imbalance error range.
6. The above numbers use the IPCC's assumed data parameters. With more realistic assumptions, the cloud-thermostat mechanism controls the Earth's power imbalance with a 73 W/m^2 available power range, which is 100 times bigger than the IPCC's 0.7 W/m^2 claimed power imbalance, and 180 times bigger than the IPCC's $\pm 0.2 \text{ W/m}^2$ power-imbalance total error range.

Part II – The cloud thermostat - 3

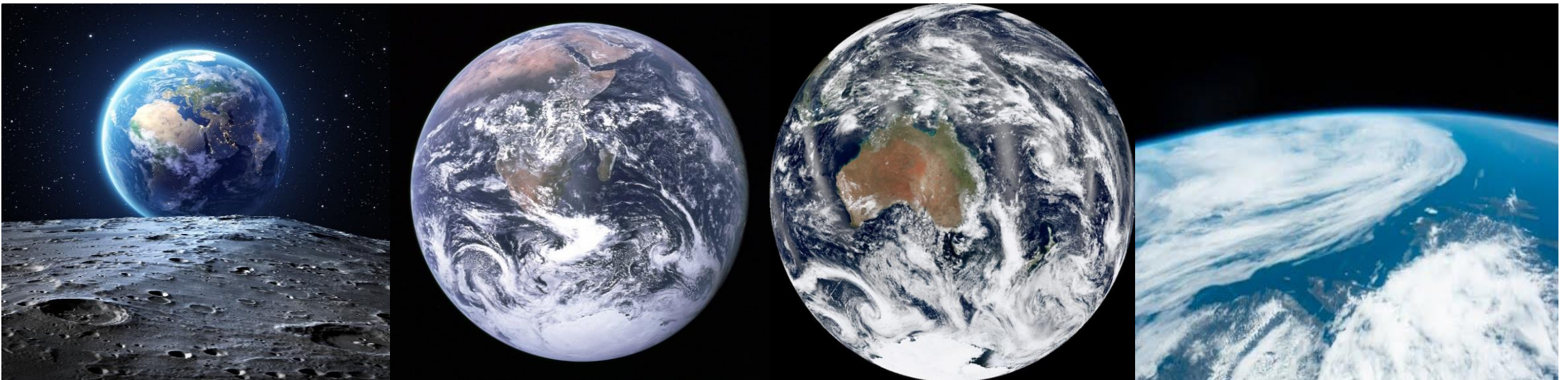
7. This seemingly random fluctuation of the power imbalance is not random at all, but is actually a crucial part of a thermostat-like feedback mechanism that controls and stabilizes the Earth's climate and temperature. It is observed by King *et al.* (2013) and by Stephens *et al.* (2015) to be quasi-periodic,
8. Just like the thermostat in your home, the power-imbalance is never zero. The furnace or AC is always either ON or OFF. The thermostat simply modulates the heating/cooling duty cycle.

Features of the cloud thermostat mechanism

1. In preparation for the introduction of this model, I first describe important, underappreciated, but conspicuous properties of clouds - their variability and their strong reflectivity of sunlight (SW radiation).
2. I show that the cloud-thermostat mechanism involves the dominant (73%) use of sunlight energy by the planet.
3. I show that when the cloud-thermostat mechanism is viewed as a form of climate-stabilizing negative feedback, it is by far the most powerful of any such mechanism heretofore considered.
4. The IPCC estimates that the net stabilizing feedback strength or the Earth's climate, including the destabilizing feedback strength of greenhouses is about $-1 \text{ W/m}^2/\text{°C}$.
5. I show that the cloud thermostat feedback increases the net natural stabilizing feedback strength to about anywhere between $-7 \text{ W/m}^2/\text{°C}$ and $-14 \text{ W/m}^2/\text{°C}$, depending on the assumptions used.

Some important properties of clouds

What does the Earth look like when viewed from space in sunlight?



There are 5 important take-home messages to be gleaned from these satellite photographs.

1. Clouds reflect dramatically more sunlight than the rest of the planet does!
2. Clouds of all types appear bright white!
3. The photos (along with a large number of careful measurements) strongly suggest that the average cloud reflectivity (of sunlight) is about 0.8 – 0.9. (For comparison, white paper has a reflectivity of ≈ 0.99 .) [Wild *et al.* (2019) claim that cloud reflectivity is 0.36.]
4. The rest of the planet appears much darker than the clouds. The average reflectivity of land (green and brown areas) and ocean (dark blue areas) is ≈ 0.16 .
5. Cloud coverage area is highly variable over the Earth.

Clouds cast dark shadows.

- Clouds cast dark sharply-defined shadows on the surface below them. Just stand on a hillside or look down from an airplane on a partly cloudy day and watch the cloud shadows cast on the land below.
- Watch your solar-panel output when a solitary cloud passes in front of the sun. Typically, the output drops to 50% or less.
- Try reading a book indoors on a heavily overcast day without turning on the lights. You can't. It's too dark! Where did all of the missing sunlight go? Since water droplets negligibly absorb sunlight, the missing sunlight (typically 80-90% of it) got reflected back out into space.

What does sunlight mostly do when it reaches the Earth's surface?

- It is commonly believed that sunlight that is absorbed by the Earth's surface simply warms the surface. That may be true over land. But land represents only about 30% of the surface.
- Oceans cover 70% of the Earth's surface. Correspondingly, about 70% of incoming sunlight falls on the oceans. Virtually all of the Earth's exposed water surface occurs in the oceans.
- Following the AR6 power-flow diagram, 160 W/m^2 is absorbed by the whole Earth, meaning that roughly $70\% \times 160 = 112 \text{ W/m}^2$ is absorbed by oceans.
- The AR6 power-flow diagram indicates that 82 W/m^2 is used for evaporating water, and not for heating the surface.
- Since clouds are mostly produced over the oceans (because that's where the exposed water is), then $82/112 = \underline{73\%}$ of the input energy absorbed by the Earth's oceans is used, not for warming the Earth, but instead simply for making clouds.

Satellite observations of cloud-cover fraction by King *et al.* (2013) -1.

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IEEE TRANSACTIONS ON GEOSCIENCE AND REMOTE SENSING, VOL. 51, NO. 7, JULY 2013

Spatial and Temporal Distribution of Clouds Observed by MODIS Onboard the Terra and Aqua Satellites

Michael D. King, Senior Member, IEEE, Steven Platnick, W. Paul Menzel, Steven A. Ackerman, and Paul A. Hubanks

Outgoing Short Wave Radiation W/m^2
 ARG, with total (2019) JFC
 TOASW_{inc} = $340 W/m^2$ $340 W/m^2$
 (AVE) $\alpha_{ALL-SKY} = 0.294$ 0.6
 $\alpha_{CLR-SKY} = 0.156$ 0.16
 $\alpha_{CLOZ} = 0.362$ $\alpha_{CLOZ} = 0.8$

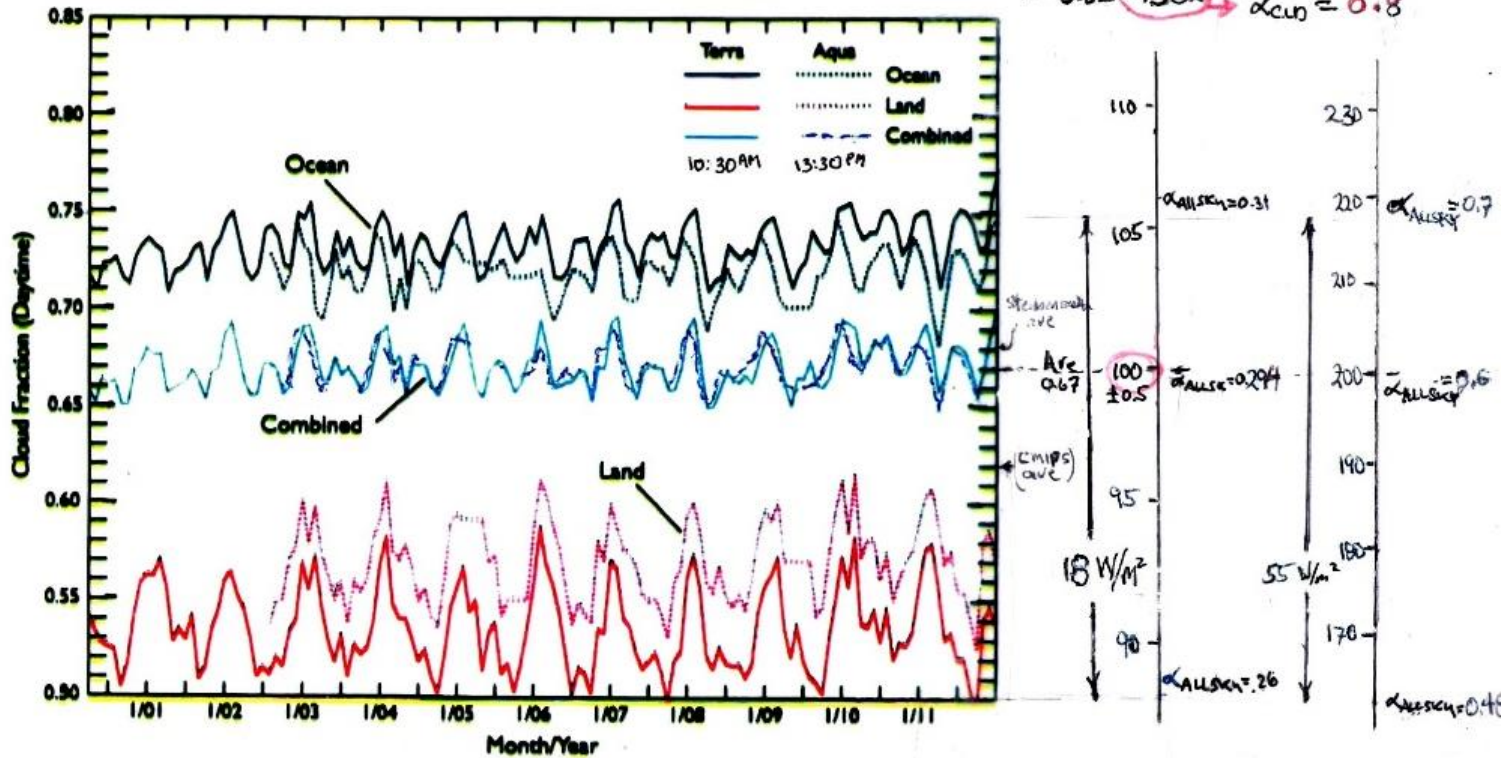


Fig. 3 Global mean daytime cloud fraction as a function of time for Terra and Aqua differentiated by surface type.

- King *et al.* (2013) analyzed more than 12 years of data from the CERES Terra and Aqua sun-synchronous satellites, and measured the daytime fractional cloud cover, over ocean, land, and combined.
- I have added Outgoing (reflected sunlight) SW power scales, assuming a constant solar input power, $340 W/m^2$.

Satellite observations of cloud-cover fraction by King *et al.* (2013) -2.

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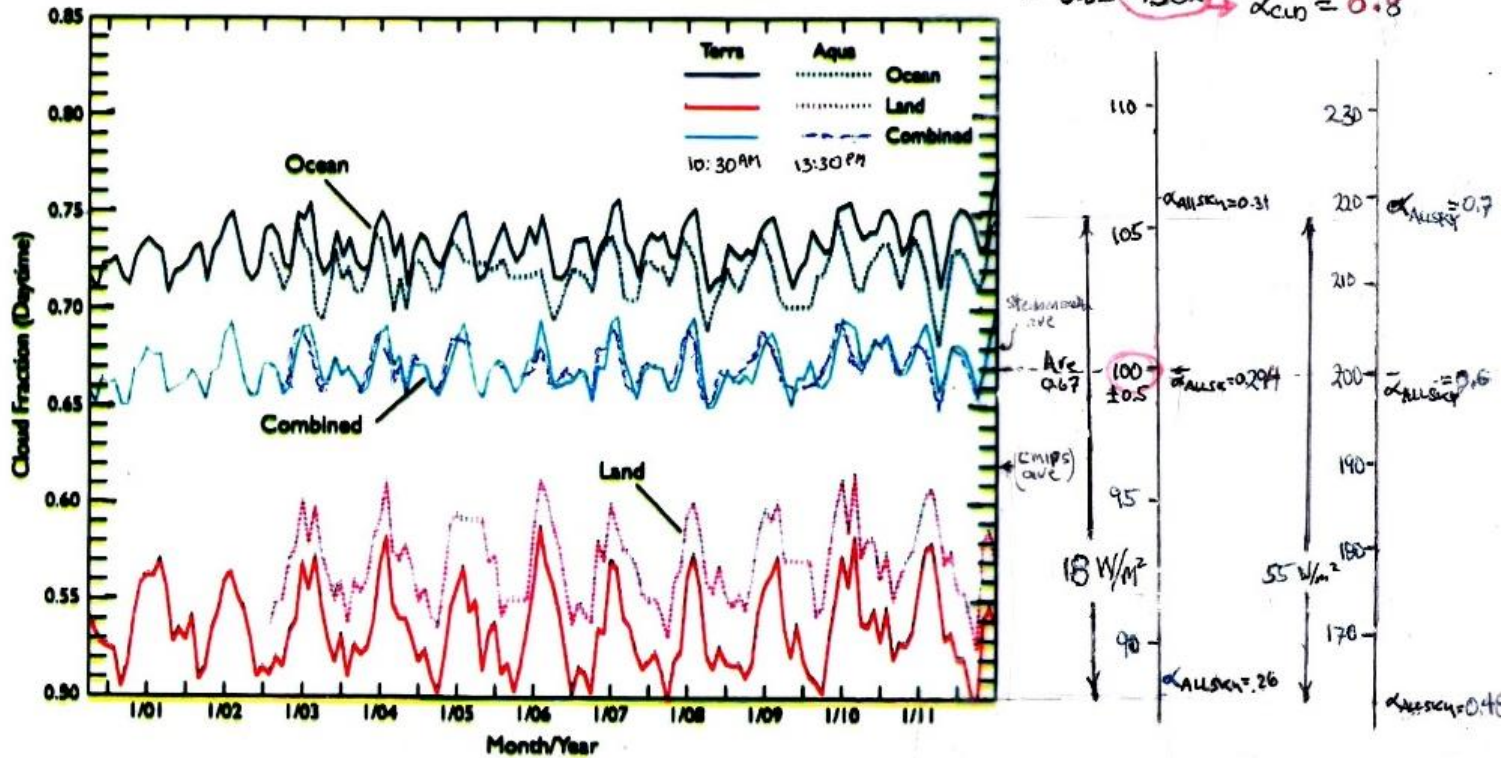


Fig. 3 Global mean daytime cloud fraction as a function of time for Terra and Aqua differentiated by surface type.

- The left-hand scale uses the parameters from the 2021 AR6 report. It assumes an all-sky albedo = 0.3, and a clear-sky albedo = 0.16. Energy conservation (see Appendix B) further requires a cloudy-sky reflectivity (albedo) = 0.36. (an unreasonable value). On this scale, reflected SW power fluctuates by as much as $18 W/m^2$.

Satellite observations of cloud-cover fraction by King *et al.* (2013) -3.

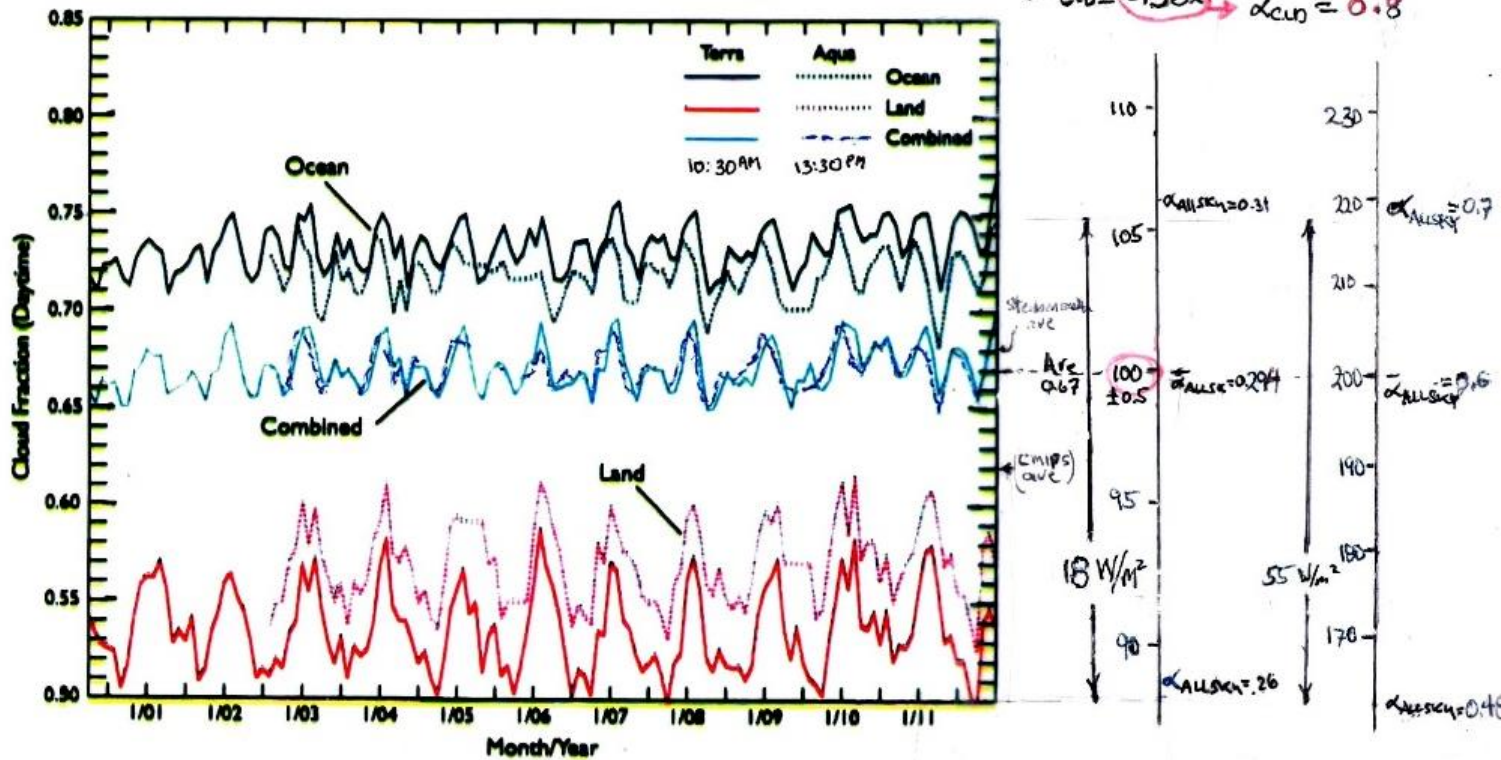
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 $\alpha_{CLO} = 0.362$ $\alpha_{CLO} = 0.8$



- The right-hand scale uses the same parameters, except that it assumes a cloudy-sky albedo = 0.8, as per the cloud photos and various measurements. Reflected SW power then fluctuates by as much as $55 W/m^2$.

Fig. 3 Global mean daytime cloud fraction as a function of time for Terra and Aqua differentiated by surface type.

Satellite observations of cloud-cover fraction by King *et al.* (2013) -4.

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Outgoing Short Wave Radiation W/m^2
 ARG, W. H. et al. (2014)
 TOA SW_{inc} = $340 W/m^2$ JFC
 ALL-SKY = 0.294 0.6
 CLR-SKY = 0.156 0.16
 CLOUD = 0.362 \rightarrow $\alpha_{CLOUD} = 0.8$

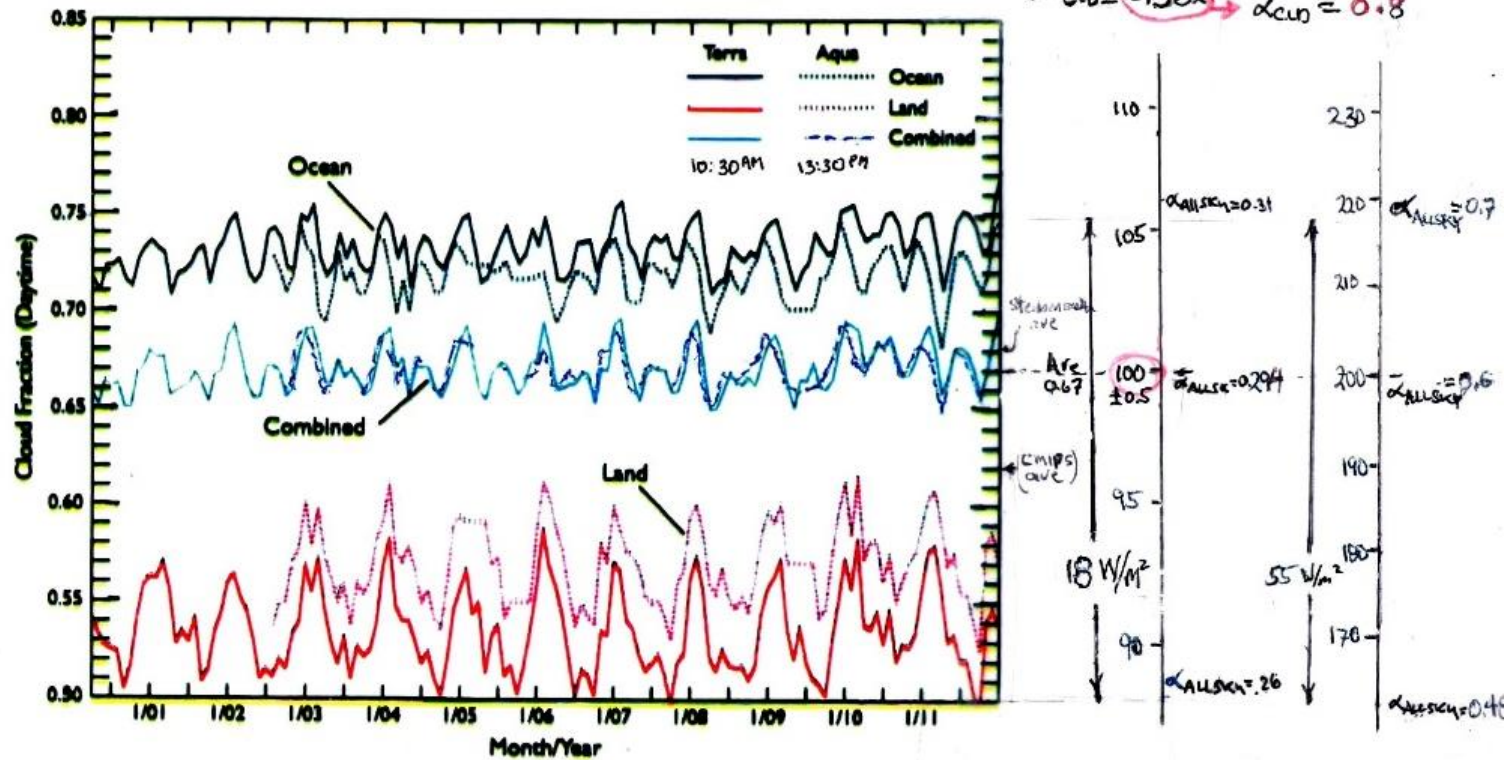


Fig. 3 Global mean daytime cloud fraction as a function of time for Terra and Aqua differentiated by surface type.

- The cloud-fraction variation is extremely strong and very rapid. The difference between the adjacent solid and dotted lines is the average everyday variation in only three hours – from 10:30AM to 13:30PM.
- Recall that the IPCC insists that the global average power imbalance is always precisely $0.7 \pm 0.2 W/m^2$.

Satellite observations of cloud-cover fraction by King *et al.* (2013) -5.

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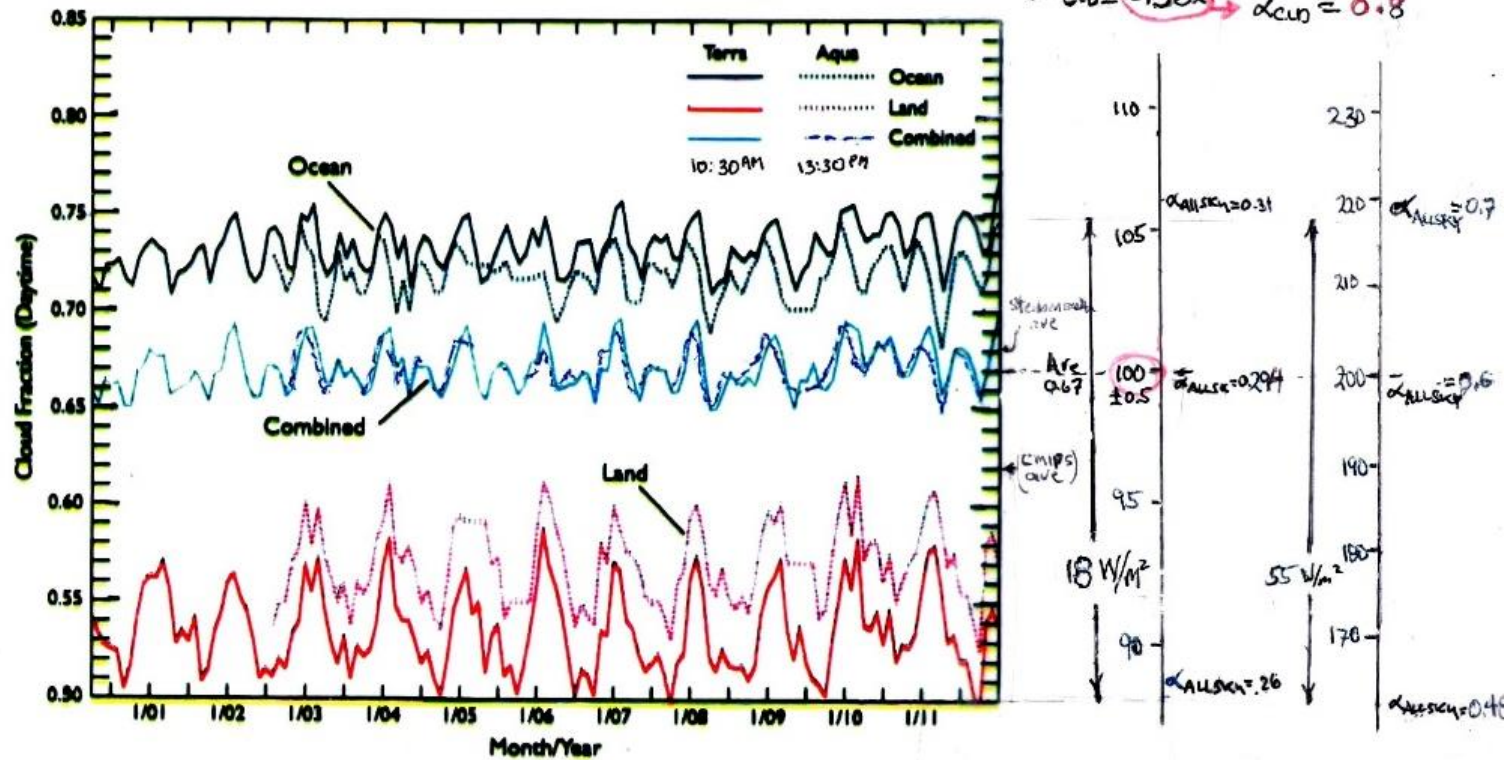


Fig. 5 Global mean daytime cloud fraction as a function of time for Terra and Aqua differentiated by surface type.

- The albedo fluctuation data presented by Stephens *et al.* (2015, see earlier slide), compared to this Figure, shows that the albedo fluctuation is due to cloud-cover fraction variation.
- Conclusion: Cloud-fraction variation, especially for clouds passing from ocean to land, strongly modulates the Outgoing sunlight power, and strongly affects the power imbalance.

My cloud thermostat model – how does it work-1?

1. Recall that the IPCC's AR6 power-flow map asserts that 73% of the input energy absorbed by the Earth's oceans is used, not for warming the Earth, but instead simply for evaporating seawater and making clouds, rather than for raising the Earth's surface temperature. Recall that the Earth has a strongly varying cloud cover and albedo.
2. Temperature control of the Earth's surface by this mechanism works exactly the same way as does a common home thermostat. A thermostat automatically corrects a structure's temperature in the presence of varying modest heat leaks. For the earth, the presence of significant CO₂ in the earth's atmosphere, manmade or not, provides, in fact, a very small heat leak (at most, about 2 W/m²). Note that, just like the Earth, the power imbalance for a thermostatically controlled system is never zero. It is always fully heating or fully cooling.

My cloud thermostat model – how does it work-2?

3. How does the cloud thermostat work? When the Earth's cloud-cover fraction is too high, then the earth's surface temperature is too low. Why? Clouds produce shadows. Cloudy days are cooler than sunny days. A high cloud-cover fraction equals a highly shadowed area. With reduced sunlight reaching the ocean's surface and lower temperature, the evaporation rate of seawater is reduced. The cloud production rate over ocean (70% of the earth) is low because sunlight is needed to evaporate seawater. The earth's too-high cloud-cover fraction obediently starts to decrease. Very quickly, cloud-cover fraction decreases, the temperature increases. The Earth's cloud-cover fraction is no longer too high. Equilibrium cloud cover and temperature are restored.
4. When the Earth's cloud-cover fraction is too low, the surface temperature is then too high, then the reverse process occurs. With low cloud cover, lots of sunlight reaches the ocean surface. Increased sunlit area then evaporates more seawater. The cloud-production rate obediently increases and the cloud-cover fraction is no longer too low . Equilibrium cloud cover and temperature are again restored.

My cloud thermostat model – how does it work-3?

- 5. Depending of one's assumption regarding cloud reflectivity (albedo), the cloud thermostat mechanism has anywhere between 18 and 55 W/m² power available from cloud-fraction variability to overcome a wimpy 0.7 W/m² heat leak (allegedly blamed on greenhouse gasses) and to stabilize the Earth's temperature, no matter what the greenhouse gas atmospheric concentration is!**
6. These two fluctuating opposing processes, when in equilibrium, provide an equilibrium cloud-cover fraction, and an equilibrium average temperature. The earth thus has a built in thermostat!

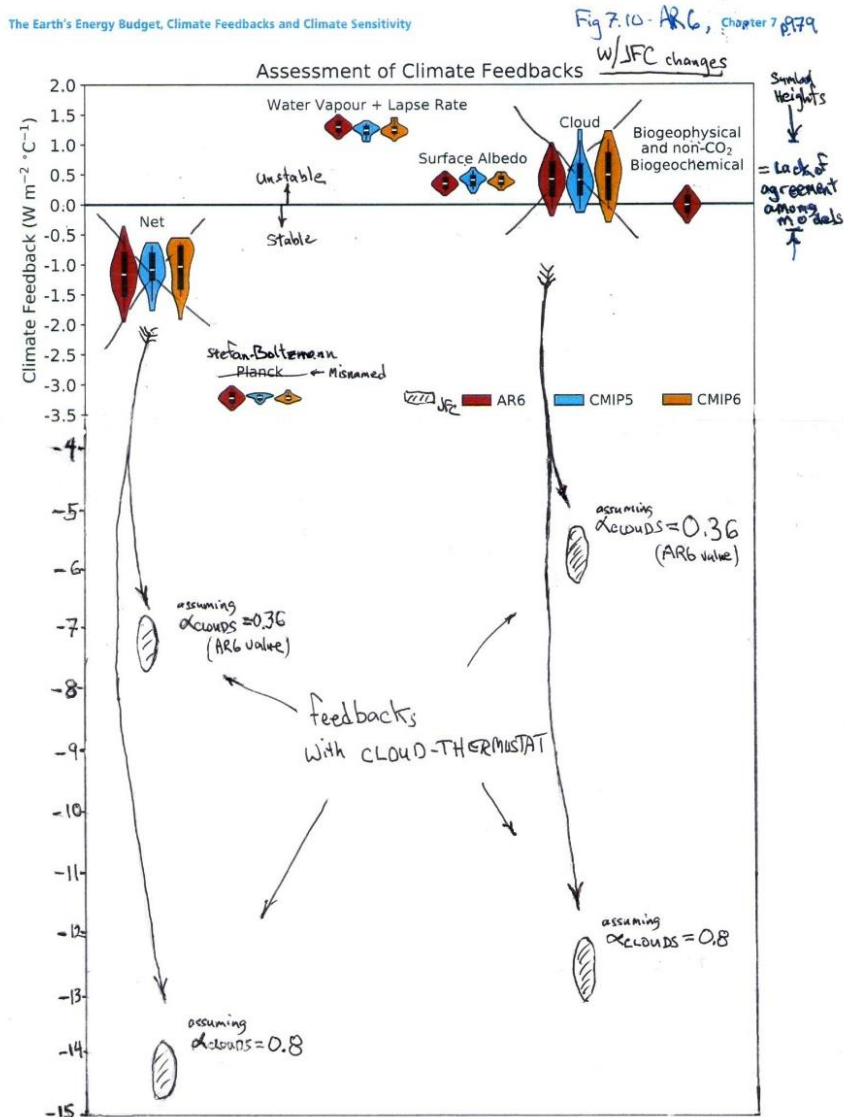
Analysis of atmospheric feedback systems

1. The IPCC's second sacred task was to estimate the so-called feedback stability of the Earth's atmosphere and its sensitivity to external perturbations, such as increased greenhouse gasses, volcanism, etc.
2. Given huge observed fluctuations in Outgoing power, the Earth obviously maintains a surprisingly stable long-term temperature. Why?
3. Climate scientists have proposed the existence of a variety of feedback mechanisms that account for the evident stability.
4. Climate feedback systems are discussed extensively by the 2003 National Research Council / National Academy report "*Understanding Climate Change Feedbacks*", by Sherwood *et al.* (2020 – the Ringsberg Castle study), and by AR6 (2021, Chapter 7.4).
5. The detailed calculation methodology used by Sherwood *et al.* (2020) is outlined in Appendix C.
6. By removing one of Sherwood *et al.* (2020)'s overly restrictive assumptions, their methodology becomes applicable to the cloud thermostat mechanism, as is shown in Appendix D.

Feedback strength of the cloud thermostat mechanism

1. The resulting cloud-thermostat mechanism's feedback parameter is now readily evaluated under the two scenarios associated with two choices for cloud albedo. The details of the calculation are shown in Appendix D.
2. Using the AR6 choice for cloud albedo, $\alpha_{\text{Clouds}} = 0.36$, we have $\lambda_{\text{Clouds}} \approx -5.7 \text{ W/m}^2 \text{ K}$, which is 1.7 times larger than (the misnamed) λ_{Planck} , heretofore the strongest feedback term.
3. Alternatively, using the more reasonable choice for cloud albedo, $\alpha_{\text{Clouds}} = 0.8$, we have $\lambda_{\text{Clouds}} \approx -12.7 \text{ W/m}^2 \text{ K}$, which is 3.8 times larger than (the misnamed) λ_{Planck} .
4. These values are plotted as an extension of the AR6 Figure 7.1, which shows the feedback strength for various mechanisms. The total system strength is shown in the left-hand column.
5. Viewed as a temperature-control feedback mechanism, in either scenario, the cloud thermostat has the strongest negative (stabilizing) feedback of any mechanism heretofore considered.
6. It very powerfully controls and stabilizes the Earth's climate and temperature.

Comparative feedback sensitivities for various mechanisms.



- AR6 (2021, Fig. 7.10, p. 979) estimates for the so-called feedback strengths (sensitivities) for various mechanisms.
- The AR6 Figure is corrected by replacing their estimate of λ_{Clouds} , with the estimates calculated here for the cloud-feedback mechanism, under two scenarios - assuming cloud albedo = 0.36, and 0.8. In both scenarios, the cloud-feedback mechanism is dominant. [See Appendix D]

Part II - Conclusions

1. I have introduced here the cloud-thermostat mechanism. It is clearly the overwhelmingly dominant climate controlling feedback mechanism that controls stabilizes the Earth's climate and temperature. It thereby prevents global warming and climate change.
2. The IPCC's 2021 AR6 report (p.978) claims that climate stabilizing natural feedback mechanisms have a net (total) stabilizing strength of -1.16 ± 0.6 W/m²/K. My cloud feedback mechanism has a net stabilizing strength of anywhere between -5.7 to -12.7 W/m²/K, depending of one's assumptions regarding the albedo of clouds.
3. My cloud thermostat mechanism provides nature's own *Solar Radiation Management System*. This mechanism already exists. It is built in to nature's own cloud factory. It works very well to stabilize the Earth's temperature on a long term basis. And, it is free!

“Recommendations for policy makers - 1”

1. There is no climate crisis! There is, however, a very real problem with providing a decent standard of living to the world's now enormous population. There is indeed an energy shortage crisis. The latter is being unnecessarily exacerbated by what, in my opinion, is incorrect climate science, and by government's associated incorrect muddled response to it.
2. Government and business are currently needlessly spending trillions of dollars on efforts to limit the greenhouse gasses, CO₂ and CH₄, in the Earth's atmosphere.
3. CO₂ and CH₄ are not pollutants. They must be removed from every list of defined pollutants. They have a negligible effect on the climate. Trillions of dollars can be saved by this one simple measure alone! Additionally, the CO₂ Coalition points out that atmospheric CO₂ is actually beneficial.

“Recommendations for policy makers - 2”

4. I recommend that all efforts to limit environmental carbon should be terminated immediately! Trillions of dollars can be saved by eliminating carbon caps, carbon credits, carbon sequestration, carbon footprints, zero-carbon targets, carbon taxes, anti-carbon policies and fossil-fuel limits, in energy policy and elsewhere.
5. Government requirements and subsidies for electric vehicles, all electric power, solar and wind power, etc. should all be eliminated.
6. Geoengineering programs to reduce global warming should be cancelled.
7. To paraphrase (and update for inflation) the late Sen. Everett Dirksen’s 1969 comment about the Vietnam war and Apollo programs, and redirect it to the IPCC’s anti-carbon policies - “A trillion *here*, a trillion *there*, and pretty soon you’re talking real money.”

Appendix A. An energy-conservation Theorem phrased in terms of albedos

Theorem: The albedo of a composite area is the area-weighted average of the individual component areas' albedos -

$$\alpha_{\text{ALL-sky}} = f_{\text{Clouds}} \times \alpha_{\text{Clouds}} + f_{\text{CLR-sky}} \times \alpha_{\text{CLR-sky}}$$

Definitions:

$OSR_{\text{ALL-sky}} \equiv$ Outgoing SW Radiation irradiance for the whole Earth.

$OSR_{\text{CLR-sky}} \equiv$ Outgoing SW Radiation irradiance in cloud-free areas of the Earth.

$OSR_{\text{Clouds}} \equiv$ Outgoing SW Radiation irradiance in cloudy areas of the Earth.

$TOA_{\text{INC}} \equiv$ Incident SW Radiation irradiance for the whole Earth.

$f_{\text{Clouds}} \equiv$ cloudy-area fraction of the Earth.

$f_{\text{CLR-sky}} \equiv$ cloud-free area fraction of the Earth.

$\alpha_{\text{ALL-sky}} \equiv OSR_{\text{ALL-sky}} / TOA_{\text{INC}} =$ albedo (SW reflectivity) for the whole Earth.

$\alpha_{\text{CLR-sky}} \equiv OSR_{\text{CLR-sky}} / TOA_{\text{INC}} =$ albedo for cloud-free areas of the Earth.

$\alpha_{\text{Clouds}} \equiv OSR_{\text{Clouds}} / TOA_{\text{INC}} =$ albedo for cloudy areas of the Earth.

Assumptions:

Conservation of area: $f_{\text{Clouds}} + f_{\text{CLR-sky}} = 1.$ (1)

Conservation of energy, $OSR_{\text{ALL-sky}} = OSR_{\text{CLR-sky}} + OSR_{\text{Clouds}}.$ (2)

Proof:

Evaluate the above expressions, using Equations (1) and (2) for $\alpha_{\text{ALL-sky}}$, α_{Clouds} , and $\alpha_{\text{CLR-sky}}$,

$$\alpha_{\text{ALL-sky}} = f_{\text{Clouds}} \times \alpha_{\text{Clouds}} + f_{\text{CLR-sky}} \times \alpha_{\text{CLR-sky}}, \quad (3)$$

Corollary:

$$\alpha_{\text{Clouds}} = \alpha_{\text{ALL-sky}} / f_{\text{Clouds}} - ((1/f_{\text{Clouds}}) - 1) \alpha_{\text{CLR-sky}} \quad (4)$$

This latter formula is useful for evaluating the cloudy-sky albedo when ALL-sky albedo, CLR-sky albedo, and cloud fraction are all known.

Appendix B. Application of the albedo conservation Theorem to data from the Fig. X.6 AR6 (2021 p.934) power-flow map data

The IPCC's numbers from AR6 are shown here to require the silly number, $\alpha_{\text{Clouds}} = 0.36$. (The notation used here is defined above in Appendix A.)

First note that the AR6 all-sky diagram implies that the all-sky albedo is

$$\alpha_{\text{ALL-sky}} \equiv \text{OSR}_{\text{ALL-sky}} / \text{TOA}_{\text{INC}} = 100 / 340 = 0.3.$$

The clear-sky diagram (lower power flow map), for $f_{\text{CLR-sky}} = 0.33$ (i.e. for 33% of the Earth's area), simultaneously implies that the clear-sky albedo is

$$\alpha_{\text{CLR-sky}} \equiv \text{OSR}_{\text{CLR-sky}} / \text{TOA}_{\text{INC}} = 53 / 340 = 0.16.$$

For the cloud fraction, $f_{\text{Clouds}} = 0.67$, the albedo conservation corollary (in Appendix A) shows that the cloudy sky albedo is $\alpha_{\text{Clouds}} = 0.36$.

This value for α_{Clouds} seems conspicuously wrong by about a factor of two! If true, then clouds in the NASA satellite photos of Fig. X.7 should appear as barely brighter (more reflective of light) than the whole-Earth average. They don't. For comparison, a sheet of white paper is about 99% reflective. Clouds in the photos appear visually a lot brighter than desert-color brown or ocean-color blue, and appear much closer to paper-color white,.

Also, note that the commonly accepted value for nearly all types of clouds is about $\alpha_{\text{Clouds}} = 0.8 - 0.9$. See, for example, the measurements and estimates by Griggs (1968), Cheylek et al. (1984), Wetherald and Manabe (1988), Stephens and Greenwald (1991). The measurements of α_{Clouds} for Pacific Ocean stratus clouds by Griggs (1968) were done from a DC3 aircraft, and, of course, do not include the added contribution from atmospheric (blue-sky) Rayleigh (back) scattering, that Top of Atmosphere albedos α_{Clouds} and $\alpha_{\text{CLR-sky}}$ must both further add.

Appendix C. Feedback Analysis of climate systems [as per Sherwood *et al.* (2020)]

- Sherwood *et al.* (2020) use the symbol $\Delta\mathcal{N}$, to represent the **downward-flowing energy imbalance**, calculated at the Top of Atmosphere. This is the quantity the IPCC has discussed above that is used by the IPCC to define global warming. It is the primary target of the IPCC's computer modelling and observational efforts.
- If the imbalance, $\Delta\mathcal{N}$, is negative, the earth is cooling. If it is positive, the Earth is warming.
- For any given feedback mechanism, Sherwood *et al.* (2020) calculate the overall feedback strength (sensitivity) as the derivative of $\Delta\mathcal{N}$ with respect to the Earth's surface temperature,

$$\lambda \equiv d\Delta\mathcal{N} / dT_{\text{Surface}}$$

If λ is negative, the feedback stabilizes the system. If, if λ is positive, the system is unstable.

- If the system has a variety of independent mechanisms, and each mechanism, labeled j , relies on an associated intermediate variable, x_j , then the total system's feedback strength is calculated using the chain rule for derivatives, as per

$$\lambda \equiv \sum_j \lambda_j = \sum_j (\partial\Delta\mathcal{N} / \partial x_j) \times (\partial x_j / \partial T_{\text{Surface}}).$$

- For example, the primary temperature stabilizing feedback mechanism is via the Stefan-Boltzmann law's σT^4 dependence of far-infrared (LW) energy reemission by the Earth. Here, σ , is the Stephan-Boltzmann constant. Sherwood *et al.* (2020, p.19) calculate the (misnamed) feedback parameter, λ_{Planck} , for Stefan-Boltzmann law negative feedback, as $\lambda_{\text{Planck}} = -3.3 \text{ W/m}^2/\text{K}$.

(The Stefan-Boltzmann Law was discovered in 1879. Planck's law was not discovered until 1900. The quantity called λ_{Planck} should properly be called $\lambda_{\text{Stefan-Boltzmann}}$.)

Appendix D. Feedback strength of the cloud thermostat mechanism

- To calculate the feedback strength for the cloud thermostat, note that the shadowing of the oceans by clouds modulates the sunlight irradiance reaching the surface, SW_{down} . In doing so, it similarly modulates $\Delta\mathcal{N}$. A first step in the calculation is to use the albedo conservation theorem, and the terminology introduced in Appendix A, to evaluate SW_{down} , as per

$$\begin{aligned} SW_{\text{down}} &\equiv (1 - \alpha_{\text{ALL-sky}}) TOA_{\text{INC}} \\ &= [1 - (f_{\text{Clouds}} \alpha_{\text{Clouds}} + f_{\text{CLR-sky}} \alpha_{\text{CLR-sky}})] TOA_{\text{INC}}, \end{aligned}$$

where TOA_{INC} is the incident sunlight power.

- For some strange reason, Sherwood *et al.* (2020) arbitrarily structure the allowable forms for $\Delta\mathcal{N}$ to prohibit the use of f_{Clouds} as an intermediate variable x_{Clouds} . I ignore this silly restriction here! [Cess (1976) did use f_{Clouds} as an intermediate variable and obtained similar results to those presented here.]
- The climate feedback parameter for the specific cloud thermostat process is

$$\lambda_{\text{Clouds}} \equiv d SW_{\text{down}} / dT_{\text{surface}}.$$

It may be expanded using the chain rule, and f_{Clouds} as an intermediate variable, yielding

$$\begin{aligned} \lambda_{\text{Clouds}} &= d SW_{\text{down}} / dT_{\text{surface}} = (\partial SW_{\text{down}} / \partial f_{\text{Clouds}}) \times (\partial f_{\text{Clouds}} / \partial T_{\text{surface}}) \\ &= - (f_{\text{Clouds}} \alpha_{\text{Clouds}}) TOA_{\text{INC}} (\partial f_{\text{Clouds}} / \partial T_{\text{surface}}). \end{aligned}$$

- Finally one may reasonably estimate the remaining important factor, $\partial f_{\text{Clouds}} / \partial T_{\text{surface}}$. It is found by noting that both the precipitation rate of clouds and the evaporation rate are sensitive functions of surface temperature. Both are *directly proportional to the vapor pressure of seawater, whose temperature dependence is about 7-8% per degree Kelvin (or Celsius)*. i.e. $\partial f_{\text{Clouds}} / \partial T_{\text{surface}} \approx 0.07/\text{K}$