October 2024

CliSciPol

Climate Science and Policy for Nonscientists

One picture is worth a thousand words.

A new Science Topic post is now available titled, “Methane Facts.”

Methane (CH4) is a greenhouse gas, and so rising levels of atmospheric CH4 cause global warming. But how strong is the CH4 warming effect? How does its strength as a greenhouse gas compare to the strength of CO2? What is the overall significance of rising CH4?

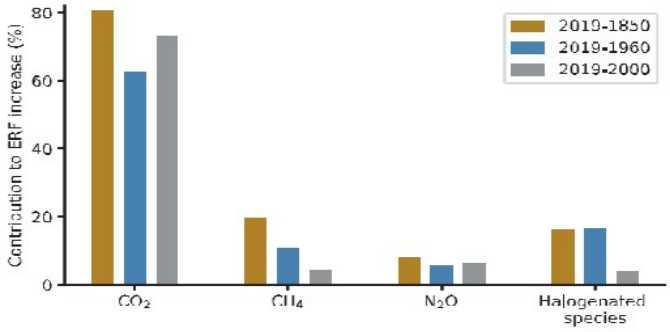


Figure 5.18 | Contributions of carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O) and halogenated species to the total effective radiative forcing (ERF) increases in 2019 since 1850, 1960 and 2000, respectively.

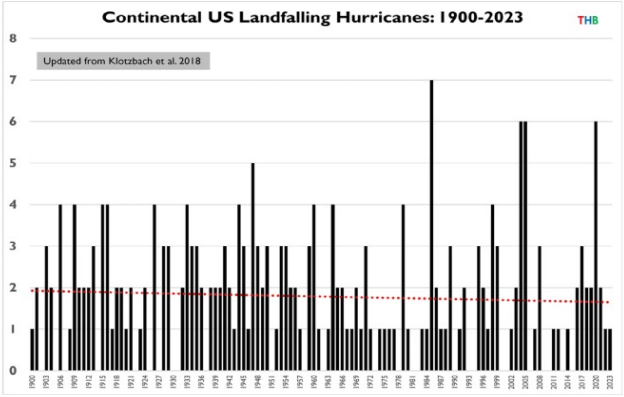
ATLANTIC BASIN HURRICANE INFORMATION

	NAMED STORMS	HURRICANES	MAJOR HURRICANES
Peak Sustained Wind Speed (mph)	>39	>74	>110
Average Number Per Season	14	7	3
NOAA Prediction	17-25	8-13	4-7
Actual to 10-15-24	13	9	4

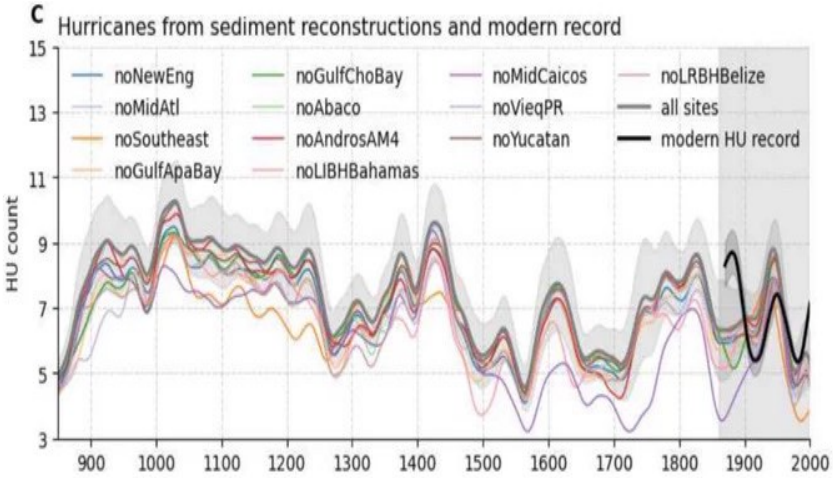
Hurricane Season To Date - Some Perspective

The 30 days from Sept. 15 to Oct. 15 have been unusually active with 6 tropical storms (wind speed 39+ mph), of which 5 were hurricanes (wind speed 74+ mph), and of which 3 were “major” (wind speed 111+ mph). The prior 30 days had been unusually inactive.

The most unusual number so far this season is that 5 hurricanes far have struck the US, including 2 major hurricanes (Helene and Milton), whereas the long-term average is only 2. There were 7 strikes in 1995, 6 in 2004, 2005, and 2020, and 5 in 1947. While scientists regularly predict the number of tropical storms, hurricanes, and major hurricanes in a season, they do not generally predict the number of US strikes. So far, of the 13 named storms 5 hit the US, 5 remained at sea, 2 hit Mexico, and 1 hit Bermuda.



Source: Updated from Klotzbach et al. 2018



Over the last 1,100 years hurricane frequency has slowly declined with significant cyclical variation. These variations were due to natural causes, but scientists do not have any consensus as to what these natural causes were. There appear to have been considerably more very strong storms (Cat 4 or 5) in the past.

Globally there has been a long history of devastating hurricane strikes with huge loss of life.

NOTABLE PAST HURRICANES

Between 1582 and 1991 nine of the hurricanes hitting Asia had death tolls of 120,000 or more, and 3 of these storms had a death toll of 300,000 or more.

In 1775 a hurricane hit Virginia and then went North to Newfoundland where it destroyed the British fishing fleet and killed over 4,000.

The Great Hurricane of 1780 killed 22,000-27,000 in the Caribbean.

In 1900 a Cat.4 storm destroyed Galveston, Texas, and killed 8,000-12,000.

In 1926 a Cat.4 storm substantially destroyed Miami, which at the time had a population of only around 100,000. The storm killed 400-500.


MIAMI DAILY NEWS EXTRA

Five Cents No More

HURRICANE HITS MIAMI

Tidal Wave Sweeps Bayshore Drive, Wrecking Boats

Fear Felt For Miami Beach, Pounded by Heavy Sea

laid waste Saturday by a raging hurricane, attended

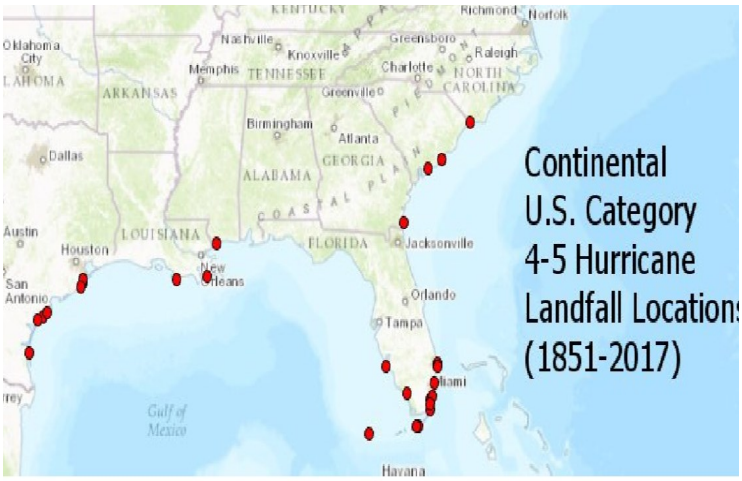
130 miles an hour velocity, and followed

ever experienced on the

When the Great Miami Hurricane of 1926 struck, the population of the entire state of Florida was only around 1,000,000. On an adjusted basis the damage was twice that of Katrina.

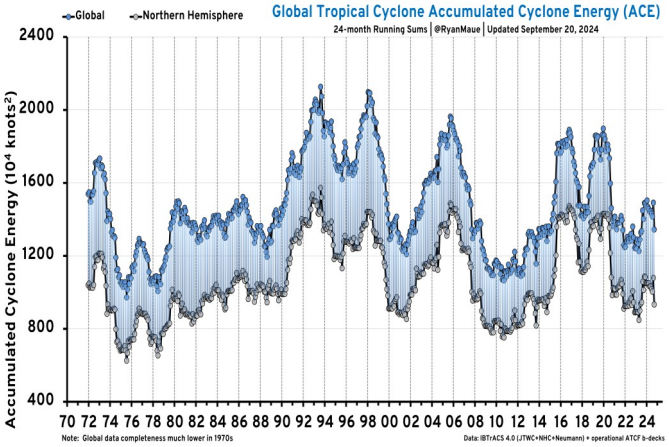
Miami remains pathetically exposed to a hurricane strike, and the population of the Miami area now exceeds 23,000,000. It is not clear that the roads out of Miami can handle an evacuation if a large storm approaches after a short -term course change.

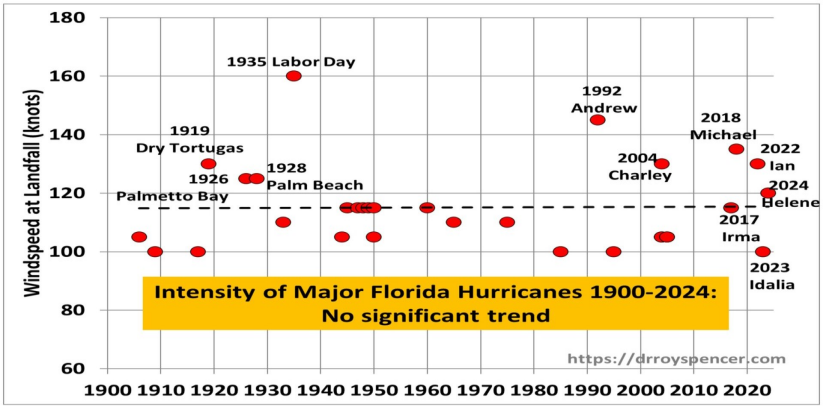
Much of Miami is built right up to the water's edge. On average, it's 6 feet above sea level.



Historically Southern Florida has been far more vulnerable to Cat 4-5 hurricane strikes than any other part of the US with Texas in a remote second place.

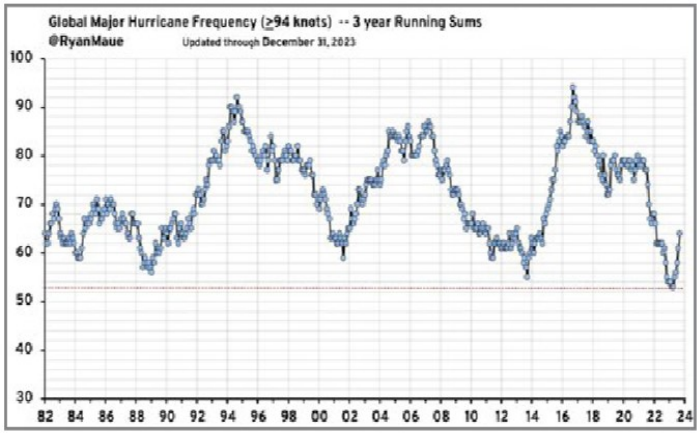
Some say that hurricanes are becoming more intense. Perhaps the best measurement of such intensity is Accumulated Cyclone Energy (ACE), which takes into account the number of storms per season, their lifetime and size, and their varying strength throughout their lifetime. The data shows significant cyclical variation going back to 1972, and we may be at the beginning of the upswing of the cycle. It is generally agreed that the El Nino cycle influences hurricane activity in the Atlantic, and some scientists attribute the ACE cycle to the El Nino cycle or to other ocean currents.

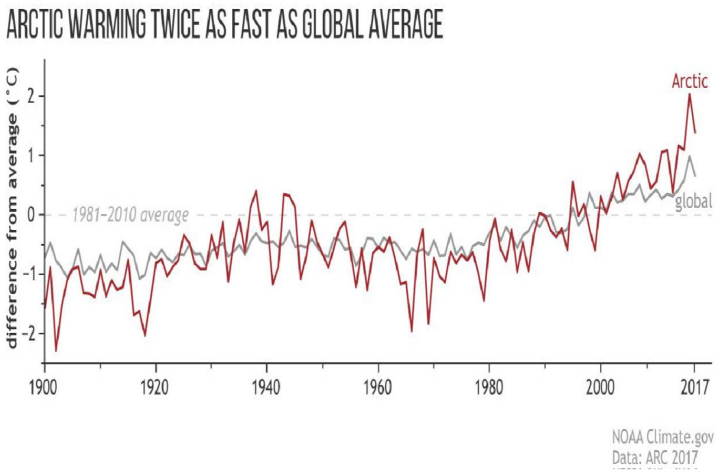




The number and intensity of major hurricanes hitting Florida do not show any particular trend or pattern.

The number of major (Cat. 3-4-5) hurricanes globally per year does not show any significant upward trend but does show a significant cyclical pattern with 2024 being at the start of an upswing of the cycle. This cyclical pattern does not correlate with the steadily rising atmospheric CO2 levels or the steadily rising world temperatures.

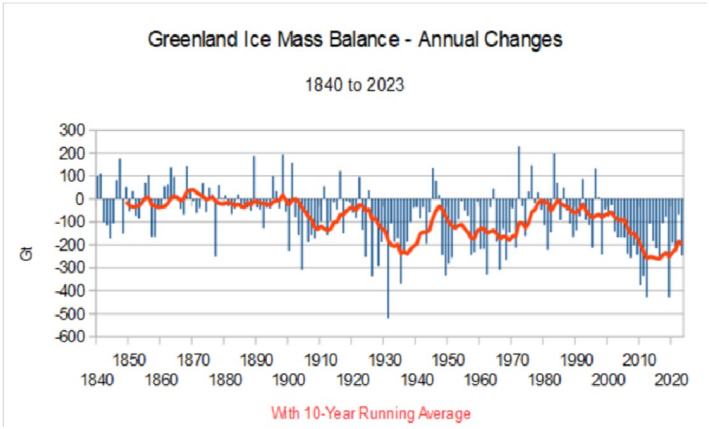




ARCTIC ICE

Scientists do not understand what is happening in the Arctic. In recent years Arctic air temperatures have been rising significantly faster than the rest of the world. Various scientists and the media have been warning about melting Arctic ice.

Arctic sea ice reaches its annual minimum in September. The minimum for September 2024 has now been measured, and the amount of sea ice is virtually the same as it was in 2007. The downward trend that extended from 1980 through 2007 has ceased, and the trend for the last 17 years has been level. Currently, due to unanticipated sea ice growth, Russia's Northern Sea Route is shutting down for the season, weeks earlier than scheduled.



The Greenland ice mass balance had a downward trend from 1980 through 2010, but for recent years through 2023 it has been increasing. Also the data shows significant cyclical movement since 1900. The minority view, which is gaining increasing attention, is that variation in ocean currents, in particular the Atlantic Multidecadal Oscillation, is more important in determining the extent of Arctic ice than atmospheric temperatures.

EVs

EVs have gone from pricey purchases to some of the biggest bargains on the used-car lot, as resale values for the vehicles have tumbled.

More than 1 million cars were stolen in the U.S. last year, an all-time record. The least vulnerable to theft were EVs. Thieves apparently don't think they're worth stealing.

A new car safety study concludes that EVs are too heavy to be restrained by the guardrails that line roads in case of accidents.

Battery Fires

On June 24 a battery factory in Hwaseong, South Korea, caught fire, triggering explosions and killing 22 workers. Experts estimate that most were killed by toxic gases emitted by the burning batteries. Scotland has suffered two major fires in battery-recycling centers this year.

E-bike battery fires are a leading cause of fires in New York City, causing 270 blazes last year and killing 18 people. On Aug. 24 a fire broke out in the parking lot of EV manufacturer Rivian in Normal, Illinois, and more than 50 vehicles were destroyed. The same plant also reportedly suffered three other battery fires in the last year and three more in 2021-22. The number of grid battery fires is growing.

An emerging lesson from Hurricanes Helene and Milton is that, when salt water storm surge floods a lithium battery, there is an elevated risk of battery fire.

Wind Turbine Failure Rates

As turbines and blades get larger, the time to first failure becomes shorter both onshore and offshore. Further, salt spray causes offshore turbines to fail sooner than onshore. Data from Denmark shows that the first-time failure rate (half-life) of large offshore turbines is less than 4.2 years. The New England states plan to rely heavily on such large offshore wind turbines. Will current planned designs survive a serious storm?

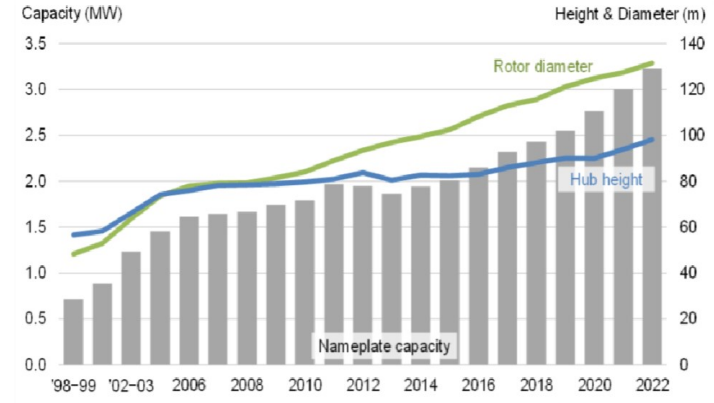
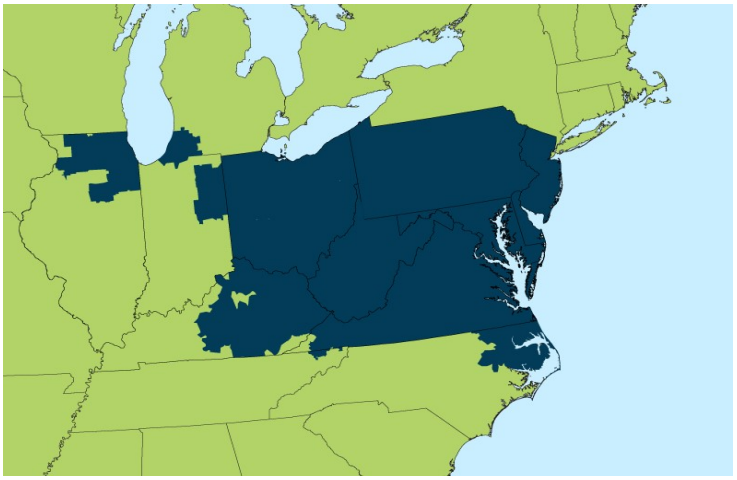


Figure 52: Graphic showing the increasing height and nameplate capacity of wind turbines, 1998 to 20222 (Source: U.S. Department of Energy Office of Energy Efficiency and Renewable Energy)

The graph shows how turbine hub height and rotor blade diameter have been steadily increasing. The result of these steady design changes is that there is limited operational history on the designs that are presently being installed. In particular there is virtually no operational history on floating offshore wind on which the New England states plan to rely.

Looming Blackouts

The PJM grid (as shown on the map) provides the electricity for Pennsylvania and for more than a dozen neighboring states from New Jersey and Delaware to Northern Illinois. It has been sounding alarm over a forecasted massive wave of fossil fuel power-plant closures, driven by EPA regulations, at the same time that demand for electricity is surging.



The surge is happening, in part, because of the push to electrify transportation and household appliances. "I think the PJM has a real crisis looming on its hands," Pennsylvania state senator Joe Pittman said recently. "I see no real reliable plan to replace the megawatts that are due to come offline in the next few short years."

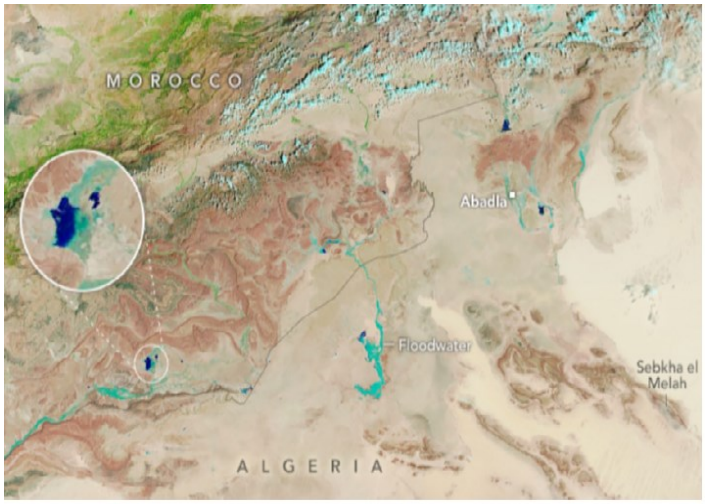


Image: NASA Earth Observatory

Sahara Lakes and Greening

Recent heavy rains have caused a number of usually dry lakes in the Sahara to fill. The North African Monsoon fluctuates on an estimated 21,000 year cycle. Roughly 6,000-10,000 years ago the Sahara was lush savanna with large lakes and rivers. Now the Sahara appears to getting more rain, perhaps caused by global warming., which is predicted to increase rainfall.

Over the period 1988-2018 the Sahara shrank along its Southern rim by about 8% due to greening brought on by rising temperatures and by rising CO2 levels. CO2 is plant food, and plants can grow using less water as CO2 levels rise. This is an example of a good result of climate change. Similarly countries like Canada, Great Britain, Scandinavia, Northern Europe, and Russia will experience a net benefit from the global warming expected through 2100.

Using satellite images, Venter et al. 2018 found an eight percent increase in woody vegetation in sub-Saharan Africa over the last three decades, underscoring the global "greening trend".

Recent study by Venter et al finds that the Sahara has shrunk by 8% over the past three decades. NASA image, public domain.