Studies link global warming with increased hurricane intensity

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The devastation following in the wake of Hurricane Katrina is part of the price Americans have been forced to pay as a result of decades of reactionary policies on the part of the American ruling elite, including the gutting of social infrastructure and federal regulations. One aspect of this policy has been the repudiation of measures designed to limit global warming. There is a considerable body of scientific evidence that the intensity of hurricanes has increased over the last several years, and that this is tied to long-term climate change.

Generally, hurricane season is considered to run from June 1 though November 30, with the peak activity taking place between mid-August and October. The reason for this seasonality is that in order for a hurricane to form, a certain amount of heat is necessary. The sea surface temperatures (SST) are only high enough to form tropical storms during these months.

It has long been known that storms tend to be stronger during times in which SSTs tend to be higher. These temperatures tend to fluctuate naturally over time in a process called Atlantic Multidecadal Oscillation (AOM), which causes the SST to oscillate with an amplitude of between 0.1 and 0.2ºC.

A common explanation that has been given throughout the past decade for the increase in strong hurricanes is that we are in an “upturn” of this cycle. However, the SST of the Atlantic has increased 0.5ºC since our last upturn in the early 1990s, two to five times higher than the temperature increase historically associated with AOM fluctuations.

Studies on the statistical record of the occurrences of the strongest category of storm, maximum hurricane wind speeds, and minimum central pressures suggest a systematic increase in the strength and intensity of tropical storms. These assertions were made by Thomas R. Knutson and Robert E. Tuleya of the government-funded Geophysical Fluid Dynamics Laboratory (GFDL).

Knutson and Tuleya based their assertions on a study they have conducted using a highly sophisticated computer model. Their computer simulation uses future climate projections from nine different global climate models and four different versions of a new higher-resolution version of the GFDL hurricane model (the model used to predict and forecast hurricanes).

Their report was published in *Journal of Climate* in September 2004. According to their study, an 80-year buildup of atmospheric carbon dioxide at a rate of 1 percent per year (compounded annually) would result in a one-half category increase in hurricane intensity on the commonly used Saffir-Simpson scale (which ranks hurricanes from a low-intensity category one to a very severe category five). Their study also indicated that there would be an 18 percent increase in precipitation near the center of storms.

The Saffir-Simpson scale is based on wind speed: a category one storm has wind speeds of 74-95 miles per hour (mph), a category two storm 96-110 mph, category three 111-130 mph, category four 131-155 mph, and a category five storm has wind speeds above 156 mph. So a one-half category increase means that wind speeds will increase by just over 10 mph. This implies that every storm will have the potential to do much more damage than it would if global temperatures were as they are today.

The link between the strength of tropical storms and global warming was first presented as a theory in 1987 by Dr. Kerry Emanuel of the Massachusetts Institute of Technology. On July 31 of this year, Dr. Emanuel published a paper unveiling a new method of measuring hurricane strength. He believes that this new measurement is much more useful than the old standards of measuring wind speed, core pressure, etc.

While conducting a survey of tropical storms of the last 75 years, instead of measuring the peak strength of a

hurricane, the number of them, or the amount of rain they dropped, Dr. Emanuel measured the amount of energy they dissipated. The measurement is called the "Power Dissipation Index," or "PDI," which is obtained by measuring both the time that the hurricane lasts and its strength as time passes.

"The best way to put it is that storms are lasting longer at higher intensity than they were 30 years ago," said Dr. Emanuel. The new measurements give us new insight into the trends that the storms are following. Dr. Emanuel made note that hurricane and cyclone durations have increased by approximately 60 percent since 1949; and average peak wind speeds have increased by about 50 percent. Average Atlantic storm PDI is about 230 percent what it was in 1949 and about 160 percent what it was at the peak of the early 1950s, which was the highest measured prior to the 1990s.

Hurricane patterns also show that as temperatures rise, Atlantic hurricanes go farther east and have a higher likelihood of making landfall on the US East Coast. So not only are hurricanes becoming stronger, but they are making landfall more often. This trend will continue to get worse as global temperatures rise.

In addition to this problematic trend, the proportion of the US population living on the coast is increasing. This means that more people are moving into the path of the hurricanes, and the cost of damages caused by hurricanes will increase even faster than their strength.

It is widely accepted by the scientific community that global warming is fueling larger, stronger hurricanes. The link between global warming and hurricane frequency, however, is not so well established.

The Intergovernmental Panel on Climate Change (IPCC) made the connection between global warming and the amount of precipitation and wind speed of average hurricanes backed by scientific data and experimentation as early as 2001 in its report *Climate Change 2001: The Scientific Basis*. The report did, however, explicitly mention that there was no evidence that global warming would increase the frequency of hurricanes and tropical storms.

Scientific organizations such as PEW and Realclimate, along with countless others, have undertaken painstaking studies on the frequency of hurricanes over the last century. The data shows that there has not been an increase in the frequency of hurricanes over the last century, though the data is much more accurate after the appearance of weather satellites in the 1970s. The past decade has not been particularly bad in this respect. These scientists cite the fact that in the 2004 season, although four hurricanes hit Florida, this is not all that out of the ordinary. For example, in both 1926 and 1964, three hurricanes hit Florida.

But people's fears about an increase in hurricanes are not unfounded. According to a National Weather Service report, "Hurricane seasons during 1995-2004 have averaged 13.6 tropical storms, 7.8 hurricanes, 3.8 major hurricanes, and with an average ACE index of 159 percent of the median.... In contrast, during the preceding 1970-1994 period, hurricane seasons averaged 9 tropical storms, 5 hurricanes, and 1.5 major hurricanes, with an average ACE index of only 75 percent of the median."

By the very nature of weather dynamics, it is impossible to assign a specific cause to any particular hurricane. Weather patterns are very complex, and the specific reason for any one event cannot be determined. However, the recent studies indicate that the probability of having a strong storm such as Katrina make landfall in the US is higher today than it would be if global temperatures were not rising. This is because even without knowledge as to the specific cause for a specific event, patterns can be recognized and suspected causes tested.

Traditionally, academics, scientists, economists and environmentalists have all agreed that global warming is a byproduct of industrialization and economic growth. Some of these groups would say that it is a necessary evil, others that it is an unnecessary travesty, but all say that it will inevitably accompany industrialization.

But a careful examination of the data makes clear that the vast majority of the CO2 emissions that play such a large role in global warming have taken place since 1990. It was during this same period that much of the research on clean energy and technology used for air pollution reduction has taken place. The technology is available to vastly reduce the emissions of industry. The problem is not industrialization and economic growth, but the lack of either a planned economy or regulations to implement the technology necessary to reduce emissions, global warming and, as it appears, an increase in storm strength.