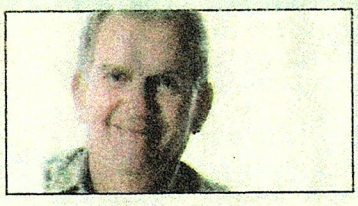
Too much is at stake for us to accept climate panel's 'don't-worry' conclusions

Hawai'i needs to demand more research on global warming and hurricanes

STORM WARNING



ISLAND VOICES

By Geoffrey E. Hill

Recently, the Intergovernmental Panel on Climate Change reported that "there is no clear signal in the data that hurricanes will become significantly more numerous or stronger in Hawaiian waters due to climate change, although that may be only because of lack of data about Pacific storms."

As a lifelong professional research meteorologist engaged primarily in the specialty of cloud physics, I question the idea that global warming is not a particular concern regarding the frequency and strength of hurricanes entering Hawaiian waters.

To understand the possible connections between global warming and hurricanes, it will be helpful to first consider the effects of El Niño. Much is already known about that connection. To identify an El Niño, the sea surface temperature measured over an area straddling the equator in the eastern Pacific is used as an index. To qualify as El Niño, the average sea surface temperature must be half a degree Celsius (roughly 0.9 degrees Fahrenheit) or higher than the long-term average for several months. In some El Niños, sea surface temperatures are as much as 2 C or 3 C (3.6 F or 5.4 F) higher.

A 1995 study found that nine tropical storms occurred in the six strongest El Niño periods,

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Voices

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with an average sea surface temperature anomaly of 1.3 C (roughly 2.3 F). By contrast, only one tropical storm on average entered in three years during non-El Niño periods. That's a factor of 4½ between El Niño and non-El Niño periods. This study clearly shows that hurricanes entering Hawaiian waters are greatly affected by less than a two-degree increase in the sea surface temperature.

Why should such a seemingly small increase in these temperatures have such a large effect on the number of tropical storms? The basic answer is that when moisture condenses from water vapor to liquid in the form of cloud droplets, there is a release of heat causing clouds to grow further. As the temperature increases, the release of heat increases exponentially. That adds buoyancy to the clouds and sometimes produces thunderstorms.

Tropical storms entering the vicinity of Hawai'i nearly always originate over warm waters off the Mexican coast west of Acapulco, where the sea surface temperature in late summer often exceeds 30 C (about 86 F). Above that critical temperature, tropical storms typically turn into hurricanes. The warmer the water, the stronger the storm. For example, when Katrina passed over a region of sea-surface temperatures of 35 C, it grew temporarily into a Category 5 hurricane.

When a large area of thunderstorms develops at least a few hundred miles from the equator, the effect of the Earth's rotation may produce a tropical storm. Whether the storm continues to grow depends upon the wind pattern at upper levels as well the sea surface temperatures.

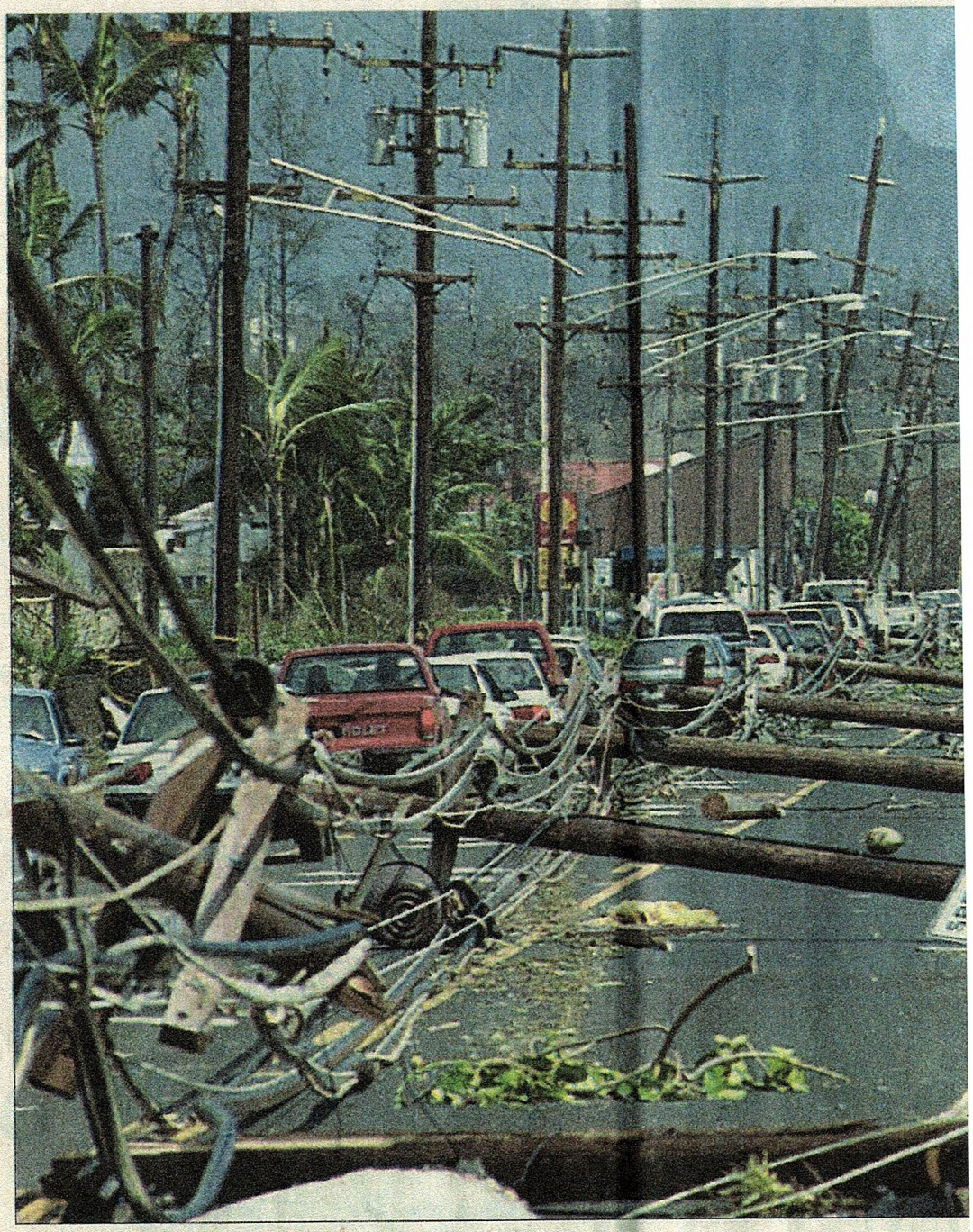
During the tropical storm season, upper-level winds are sometimes uniform and in a direction that keeps a storm over warm water, a scenario favorable for hurricane development; and other periods when winds change direction at higher altitudes thereby creating strong wind shear, a scenario unfavorable for hurricane development.

However, if the frequency of storms were to increase for any reason, the probability of having suitable winds increases accordingly. So whether tropical storms develop in a particular year depends primarily on the sea surface temperature.

A tropical storm heading in our direction can only grow in strength if it follows a track where sea surface temperatures are at least 27 C. Most tropical storms crossing the eastern Pacific travel over a wide swath of ocean dominated by a cold-water barrier centered about 1,400 miles east of O'ahu, where at latitude 20 degrees North, the sea surface temperature often hovers around 26 C (about 79 F) during the storm season. Iniki remained well south in warmer waters, avoiding the cold-water barrier. The recent tropical storm Cosme (very briefly a hurricane) grew in 28 C water, but rapidly weakened when it passed over sea surface temperatures less than 26 C.

Other conditions being equal, the buoyancy of a cloud will increase as the surface temperature and humidity are increased. Whether increases in cloud buoyancy due to global warming are of the same magnitude as increases found in El Niño years compared to non-El Niño years remains a question — but they well could be. If instead of a 2 C global warming, the increase were 4 C (according to some estimates), then the effects would be doubled and highly significant. Episodes of destruction and long recovery in Hawai'i from conditions such as those following Iniki in 1992 and in Florida in 2004 are not beyond reason.

It is imperative that we do not accept the statement that these issues "appear less worthy of concern." People of Hawai'i should demand that our government — especially the federal government — support increased research. We should also demand a much more detailed explanation of the limitations and uncertainties in the climate change panel's report. We need to go beyond that report and identify what effects can be expected from global warming on tropical storms and hurricanes in Hawai'i. There's far too much at stake.



Utility poles fell like dominoes on Kaua'i after Hurricane Iniki tore through the island in 1992. The destruction