

WEATHER

STORM CHASER

As the cleanup goes on after Africa's deadly Cyclone Idai, an Australian expert warns dangerous storms are becoming more frequent and destructive. Soon, he says, we will need a higher level of intensity to describe them

WORDS MICHAEL MCGUIRE

It's a terrifying prognostication. Sydney scientist and storm expert Robert Ellis predicts there will soon be a need for a new class of hurricane categorisation. He believes the rise in ferocity and destructive capacity of storms fuelled by climate change is such that the old descriptors will soon be redundant.

The National Hurricane Center in the US uses the Saffir-Simpson scale, which starts at Category 1 and tops out at Category 5. The Center's definition of a Category 5 storm says winds must be 252km/h or higher.

It says: "Catastrophic damage will occur: A high percentage of framed homes will be destroyed, with total roof failure and wall collapse. Fallen trees and power poles will isolate residential areas. Power outages will last for weeks to possibly months. Most of the area will be uninhabitable for weeks or months."

The devastating Hurricane Katrina, which hit the US in 2005 and 2017's Hurricane Maria, which resulted in 3000 deaths in Puerto Rico, were both classified as Category 5 hurricanes.

You wonder how it could be any worse.

"I expect soon they are going to have to increase the category of hurricanes to Category 6," Ellis says. "It doesn't exist yet, but it will happen."

What any definition of a Category 6 hurricane will be is obviously still unknown, but there has been speculation it would require sustained wind speed of around 320km/h. Hurricane Irma, which hit the US and Caribbean in 2017, was one of the most powerful in recent times. It had a top recorded wind speed of 285km/h. In 2015, Hurricane Patricia reached 345km/h.

Ellis says climate change is not making storms more frequent but it is making them fiercer and more destructive.

In his new book *Predicting Storms*, Ellis says that over the last 35 years the number of severe storms globally has doubled and there is more to come.

His reason for writing the book is to give people simple tools by which they can predict a coming storm. Ellis also outlines why a warming world leads to greater intensity of storm events such as hurricanes.

"What underlies it all is straightforward physics," he says. Since 1910, the world has warmed by around 1 degree. The oceans are also heating up, which Ellis says has resulted in an increase of moisture in the atmosphere. Around 7 per cent more is the measurement. The problem is that "moisture drives the engine, it is the fuel" of these storms.

The warm, moist air evaporates and rises as a column. As it rises, the air cools and releases the latent heat from the evaporation process, warms the atmosphere, and turns into clouds and rain. This also causes an air pressure drop,

which is crucial to the development of storms. The low pressure cells increase wind speed, through updrafts and downdrafts, which in turn increases the evaporation rate from the ocean.

As Ellis writes in his book: "Climate change caused by global warming of the sea surface layer means that the rate of pressure fall will be larger than it would be otherwise. This means the threshold for storms will be reached sooner. The storms will be more intense, with greater maximum wind speed and destructive potential."

Ellis says the recent storms in Queensland are examples of the trend to greater destruction. February saw record rainfall and flooding. Townsville received a year's worth of rain in nine days, caught beneath an active monsoon trough and a slow-moving deep pressure cell which was drawing its moisture from the

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Coral Sea. Later in the month, Cyclone Oma battered southern Queensland, bringing fierce winds, heavy rain and producing 10m waves along the coast.

"Queensland has always had downpours but they are getting much worse," he says. "Each decade that goes on you are getting more. The thing about global warming is essentially that the wet areas get wetter and the dry areas get drier."

The 66-year-old Ellis has always been interested in storms – as was his father Harry, who had his own weather station, and brother Garry. He believes storm-watching must be some kind of genetic trait. For 25 years he taught aircrew in the RAAF about mathematics and science of weapon systems, aerial photography, air navigation, 3-D geometry and the atmosphere.

Ellis took 10 years to write *Predicting Storms*. It involved hours of research at the US's National Oceanic and Atmospheric Administration and the Australian Bureau of Meteorology.

He also looked at centuries of accumulated lore that sailors used to live by to see what could be learned as well.

For example, the old favourite: "Red sky in the morning, sailors take warning" can be traced back to a message in the New Testament Jesus gave to fishermen. But its meteorological underpinning is that the red sky is caused by the dawn light bouncing off