

In the path of a cyclone

Steeled by the experience of living through the devastation of Cyclone Tracy, **greg holland** has taken his expertise in meteorology far beyond Australia's northern waters.

text

Richie Hodgson

photographs

Courtesy Dr Greg Holland



above

Dr Greg Holland

far right

The aftermath of Cyclone Tracy in Darwin.

Dr Greg Holland has researched and studied tropical cyclones and related severe weather for much of his life, and is considered one of the preeminent authorities in his field. He is also the innovator of a research tool that has revolutionised the study of cyclones and hurricanes.

After receiving a Bachelor of Science with First Class Honors in Mathematics from the University of New South Wales in 1972, the enthusiastic and bright-eyed Dr Holland was posted to Darwin's Bureau of Meteorology and was soon to receive his baptism of fire. The year 1974 started with Tropical Cyclone Wanda bringing torrential rain and flooding to Brisbane. It ended with another major Australian population centre being devastated by a cyclone.

As one of the forecasters on duty when Cyclone Tracy devastated Darwin in 1974, the memory is still as vivid and chilling as ever for Dr Holland some 35 years on.

"The central pressure of 950 hPa was not particularly special for severe tropical cyclones, but the winds were unusually strong," he said. "The anemometer at Darwin Airport recorded a gust of 217 km/h before the instrument was destroyed."

Tracy was first detected as a depression unusually close to the equator in the Arafura Sea on 20 December 1974 and had become a small but intense tropical cyclone at landfall, the radius of the gale force winds being only about 50 km.

"It moved slowly southwest and intensified, passing close to Bathurst Island on the 23rd and 24th. Then it turned sharply east-southeastward, and headed straight at Darwin, striking the city early on Christmas Day," he said.

"Warnings were issued, but perhaps because it was Christmas Eve, and

perhaps because no severe cyclone had affected Darwin in many years, many residents were caught unprepared. But even had there been perfect compliance, the combination of extremely powerful winds and the loose design of many buildings at that time, was such that wholesale destruction was probably inevitable."

Having survived the devastation of a major tropical cyclone within his first two years, Dr Holland packed his bags and headed to the United States to follow his passion. Attending Colorado State University, he received his Master in Atmospheric Science in 1981, followed by his doctorate in 1983.

Now Director of the Mesoscale and Microscale Meteorology (MMM) Division at the National Center for Atmospheric Research in Boulder, Colorado, Dr Holland has had a distinguished career in tropical meteorology including forecasting, teaching, research and community service.

At the Australian Bureau of Meteorology Research Centre he was Senior Principle Research Scientist, and founded and led the Mesoscale Meteorology Research Group, which has been active in research, major field programs in the Darwin area and support for forecast operations.

He has acted as chair of the Working Group on Tropical Meteorology for the WMO Commission for Atmospheric Sciences for 12 years, and championed the development and commercialisation of the Aerosonde Unpiloted Aerial Vehicle (UAV), which is a world leader in its field.

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"One of the big problems with tropical cyclones is they occur in remote areas. It's a very hostile environment. No-one wants to be there, but it's an area where you have to take observations," he said.

So, in collaboration with a Canadian engineer, Dr Tad McGeer, Dr Holland has developed a small autonomous aircraft powered by a small petrol engine. The aircraft has the option of being piloted from the ground or handed over completely to robotic mode.

"We communicate through to the low-earth orbiting satellite system, in this case the iridium telephone system, and the aircraft then is flying basically as a mobile phone. It actually has its own phone number – you can call it up and it calls you back – enabling transfer of new instructions to the aircraft and weather data to the ground."

The aircraft's ingenious design means that on a previous flight up in the Arctic, north of Alaska, the aircraft was under the command of a pilot sitting in Melbourne. "The aircraft

handles turbulence and the types of conditions in tropical cyclones extremely well. It has all the advantages of being small, which means it's very strong," he said.

"Essentially what this aircraft can do is fly in underneath the clouds in the really intense parts of the cyclone and take the temperature, pressure and humidity observations and, of course, the very important winds. And we know that will improve the forecast system by 30 to 40 per cent, which means we are much better able to warn vulnerable coastal communities."

Dr Holland's publications have included major contributions to six textbooks and forecast manuals, together with more than 100 research papers in atmospheric sciences and UAVs.

At age 60, when most would be thinking about a comfortable low-key retirement, Dr Holland's passion for meteorology, cyclones, and atmospheric research is as strong as ever.

He talks enthusiastically about his career and offers these words of advice for aspiring meteorologists: "This is one of the great careers. Because the weather is everywhere, we live in our own laboratory and every day you wake up and look out the window at something new and interesting."

The well-travelled researcher, however, is quick to remember where his journey began and the dramatic changes his career has brought to his life. "My time in the Top End is remembered with great affection. I came to experience the tropical weather and to learn how it ticks," he said.

"Darwin gets in your blood, the friendly and informal attitude, the outdoor lifestyle fishing for barra and just being out in the bush, and, of course Tracy, which firmly set me down an exciting and tremendously satisfying career path. Fortunately, this path brought me back to Darwin on several occasions as we established one of the major global meteorological experimental sites in the area."



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