



With Extreme Weather Prediction, Time Saves Lives

University College London





On the Tropical Storm Tracker map at University College London's TropicalStormRisk.com, the weather disturbances show up as colored lines—from green for tropical depressions through blue, two yellows, orange and red, to purple for Category 5 hurricanes, cyclones and typhoons.

Tropical depressions, tropical storms, hurricanes, typhoons, cyclones, European windstorms: They're all variations of big wind disturbances and they're all the focus of scientists at Tropical Storm Risk (TSR) and EuroTempest, Ltd., ventures developed from work by Professor Mark Saunders and his fellow climate researchers at the university's Aon Benfield UCL Hazard Research Centre.

Using sophisticated computer models, the University College London (UCL) team works to assess storms' strength, where they will go, when they will get there – and what damage they're likely to cause. While Tropical Storm Risk tracks extreme weather events worldwide, EuroTempest focuses on the destructive wind storms that often sweep onto the European continent off the north Atlantic.

Advance Warning

"Time saves lives," says Michael Arnott, Senior Business Manager at University College London's Technology Transfer Office. "For specific weather events, these ventures can predict extreme weather behavior up to five days in advance. This can warn people to evacuate and it can alert governments and relief organizations to mobilize medical and food supplies.

"Even when there are shelters, people need to know to go to them."

A case in point: Storm Tracker warnings about Cyclone Sidr, which drove off the Indian Ocean onto the coast of Bangladesh in November of 2007. Sidr was the most powerful storm to affect Bangladesh since a cyclone in 1991 killed 140,000 people.

Sidr left millions homeless but TSR warnings helped the Bangladeshi government plan mass evacuations and keep casualties at around 3,500, a fact praised by Bangladeshi officials. "The UCL tropical storm tracker played a crucial role the day before Sidr struck," one noted. "The UCL warnings helped save thousands of lives," another added.

It's an ongoing service. Since 2004, TSR has worked in partnership with ReutersAlertNet, a humanitarian news site that distributes real-time TSR alerts for active extreme weather events worldwide.

Modeling is Critical

To arrive at their forecasts, the UCL computer models process input data through proprietary storm assessment and prediction models, correlating factors as diverse as ocean surface temperatures, wind speeds, atmospheric pressures, the intensity of the North Atlantic Oscillation and the variability of the El Niño phenomenon in the Pacific. The basis of the work is weather data drawn from National Oceanic and Atmospheric (NOAA) satellites.

"The value lies in what you do with the data," notes Saunders. "The modeling is critical. We've developed systems that can forecast the intensity of the coming hurricane season, display the path of tropical storms as they develop and move, and anticipate the likelihood of damage they may cause before and after they make landfall."

Tropical Storm Risk is the older of the two projects, an outgrowth of British government-funded research on cyclones in the late-1990s. The Web site, TropicalStormRisk.com was launched in 2000. In 2007, the site received more than 1.6 million hits.



A Commercial Application

The modeling capabilities have an economic role as well as a humanitarian one: In 2008, UCL spun off EuroTempest, Ltd., as a commercial arm for subscribers focusing on windstorms affecting the European continent. The venture has attracted several high-profile insurance clients.

The winds in question are the powerful storms that sweep in off the North Atlantic rather than the hurricanes, typhoons and cyclones that affect the tropics. Services range from five-day warnings of impending significant storms to predictions of aggregate losses that will result from them.

“In Europe,” Arnott says, “the greatest insurance losses are due to wind storms. Because the continent is so densely populated, even a mild storm can cause millions of dollars in damages. And, since weather zones vary enormously throughout Europe, the forecasts need to be as localized as possible. If we have an understanding of a client’s assets, we can develop a vulnerability curve that predicts its risk from a given event.

“Recently,” he adds, “a company was being told to raise a huge amount of funding to cover losses following a big windstorm. We were able to advise – accurately – that only a tenth of that amount needed to be tied up. This capability can mean significant savings for the companies and more rapidly settled claims and repaired property for their customers.”

Tropical Storm Risk remains based within University College London. But UCL began licensing TSR services to subscribers in 2008, and anticipates the possibility of incorporating the program in the future. Saunders serves as the lead scientist for Tropical Storm Risk and technical director for EuroTempest.

Awards and Capabilities

The Tropical Storm Tracker has proved so useful to insurers that it has won two British insurance industry awards – for “Innovation of the Year” in 2004 and for “Risk Management” in 2006. A statistical analysis published in *Nature* in 2005 concluded that buyers and sellers of reinsurance could improve their returns by more than 30 percent over a period of years by using Tropical Storm Risk forecasts. This model also successfully predicted the active U.S. hurricane season in 2008.

“There are a lot of people forecasting these days,” Arnott notes. “What’s critical is how far out you can forecast and how accurately you can predict the damage likely to be experienced. TSR consistently has an advantage in lead time. We can usually give an extra day’s notice over other systems.”

Long-range forecasting, on the other hand, is more art than science—often difficult to predict with precision. When the group releases its forecasts well ahead of the season, it’s not the end of the story. They continue to update them on a monthly basis.

The team provides seasonal forecasts for three regions—the North Atlantic (hurricanes), the Northwest Pacific (typhoons) and the Southwest Pacific and Southeast Indian Oceans (cyclones). Although hurricanes attract the attention in the United States, China, Japan and the Philippines actually experience more typhoons than the U.S. does hurricanes.

“This is very satisfying work,” Saunders says. “It’s particularly pleasing to have researched and developed a product which has helped to save many lives.” 