Newsletter

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# Weather-related natural disasters 2017: was this a reversion to the mean?

*Professor Roger Pielke Jr (University of Colorado, Boulder)*

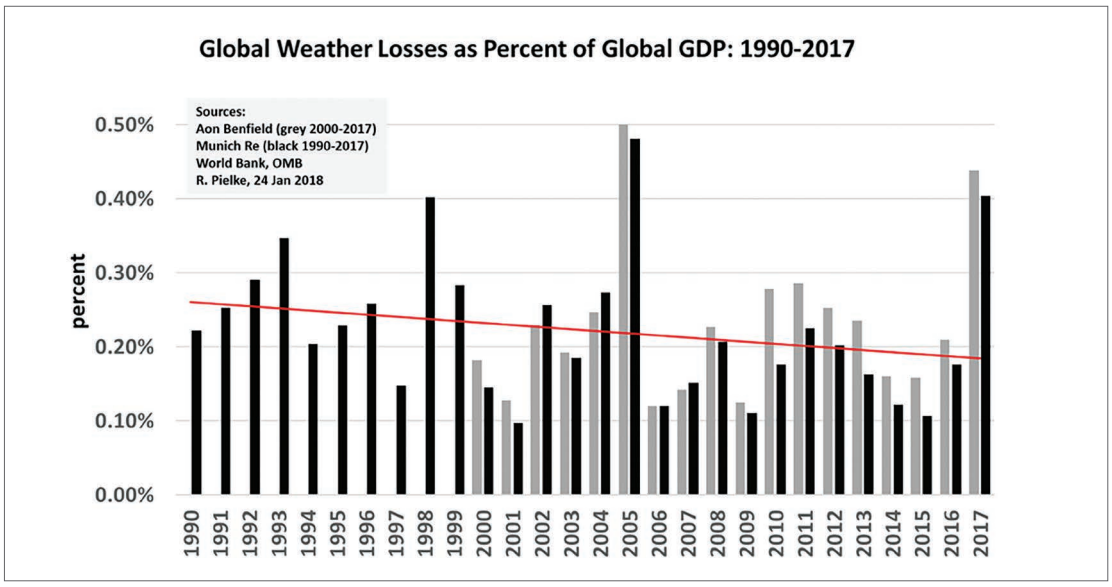
Last July, I observed here that the world had recently experienced an era of unusually low disasters and that streak of good luck was going to end sometime. Little could I know that less than one month later the United States would be hit by Hurricane Harvey, which was soon followed by Hurricanes Irma and Maria. Not only did these three major hurricanes emphatically break the more than decade-long drought in major hurricane landfalls in the US but, according to Aon Benfield (PDF), together they resulted in > $220 billion in total losses and >$80 billion in insured losses.

Hurricane Irma. Adobe Stock Photos

In this column I take a look back at 2017 and put its catastrophes into longer-term historical perspective. Media reports have sent mixed messages about the catastrophes of 2017. On the one hand, there have been headlines about the record insured catastrophe losses of 2017. On the other hand, the impact of record losses on pricing in insurance and reinsurance has been less than many had expected or hoped for. How might we reconcile these two perspectives?

The short answer is that 2017 did indeed result in record weather-related catastrophe losses, but understanding the significance of losses requires understanding the inexorable growth in global wealth in addition to patterns in weather extremes. Total global losses in 2017 were $344 billion worldwide according to Aon Benfield. In terms of total catastrophe losses, 2017 trails only 2011 which had $486 billion in losses. Insured losses followed a similar pattern, with $134 billion in total losses (almost all of which were weather-related), just below that of 2011 and just above 2005.

The figure below places total weather-related catastrophe losses into the context of increasing global GDP. The graph presents data on losses from Munich Re (1990-2017) and Aon Benfield (2000-2017) in relation to global GDP (World Bank) all expressed in constant 2017 dollars (US Office of Management and Budget) (OMB). The data show clearly that 2017 was indeed an extreme year, with losses exceeding 0.4% of global GDP.

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Yet, at the same time, since 1990 total global catastrophe losses are down by about one third, based on a simple linear trend. Over the past decade, reinsurance capacity, according to Aon Benfield, has increased by almost 80% (to $605 billion in 2017), whereas global GDP increased by about 24%. Simple math here helps to explain why reinsurance market pricing did not respond as much as some thought despite the 2017 record losses: (1) global GDP has increased, (2) reinsurance capacity has increased much faster than global GDP and (3) catastrophe losses have decreased as a proportion of global GDP. The consequence of these dynamics explain why it is that, even with losses in 2017 at a record levels, the market is nonplussed.

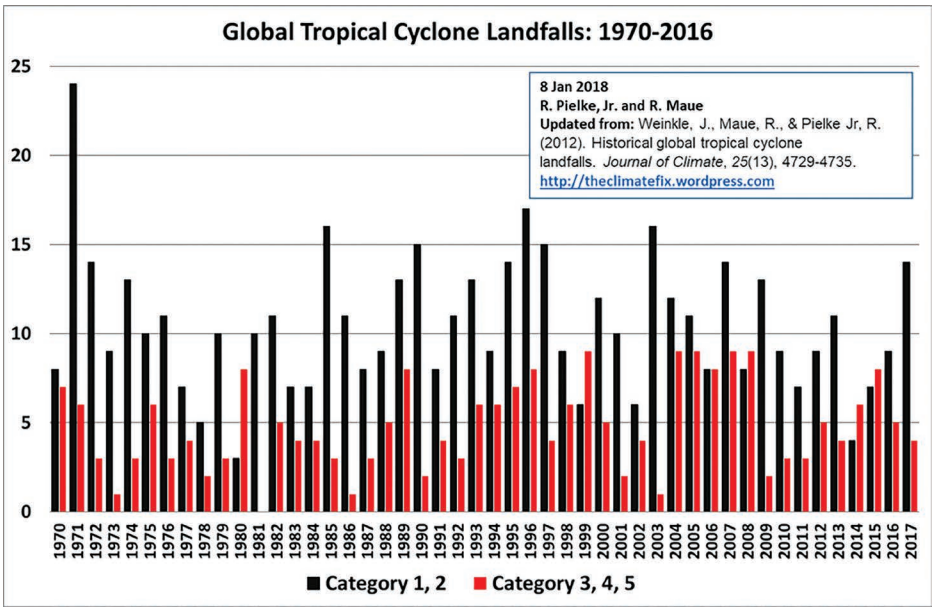
Hurricane Harvey. Adobe Stock Photos

The majority of 2017 catastrophe losses and vast majority of insured losses resulted from the three major Atlantic hurricanes. How should we understand the 2017 Atlantic hurricane season?

According to Phil Klotzbach of Colorado State University, 2017 saw the most active North Atlantic hurricane season since 2005. (This assessment uses a metric called ACE, accumulated cyclone energy.) Three of the previous four years were well below average. These data reinforce what I wrote last July: "A simple regression to the mean would imply disasters of a scale not seen worldwide in more than a decade." The active 2017 hurricane season reminds us that catastrophe luck cuts both ways.

Interestingly, in addition to the three major hurricanes that made landfall in the North Atlantic, there was only one other intense landfall worldwide (tropical cyclone Enawo struck Mozambique, killing 81 and causing >$20 million in damage). The figure below (based on updated data provided by Ryan Maue - @ryanmaue – based on our 2012 study) shows global tropical cyclone landfalls since 1970.

In 2017 there were 18 total landfalls at hurricane strength, above the long-term average of 15.3 (median = 15, record = 30 in 1971), but the four major landfalls were below the long-term average of 4.8 (median = 4; record = 9 (five times)). Overall, 2009 to 2016 were all below average for global landfalls, which helps to explain the good fortune experienced with respect to global weather catastrophe losses.




Despite the record catastrophe losses in 2017, according to Aon Benfield, the year continued a streak of well-below average (and below median) loss of life, according to longer-term data provided by Max Roser and Hannah Ritchie at Oxford University. However, large loss of life in 2004, 2008 and 2010 (>200,000 in each year) reminds us that the challenge of protecting lives in the face of disasters remains a crucial priority.

2017 saw a range of other catastrophes, including notable severe weather and wildfire events, together totaling more than $50 billion in losses, whereas flood losses were well below a longer-term average. However, despite these various catastrophes and associated losses, 2017 was notable primarily due to the three major hurricanes in the North Atlantic.

## What does 2017 portend for 2018?

My advice has not changed: Even with the record losses of 2017, over more than a decade the world has had a run of good luck when it comes to weather disasters. The hurricanes of 2017 show how quickly good luck can come to an end.

Understanding loss potential in the context of inexorable global development and long term climate patterns is hard enough. It is made even more difficult with the politicized overlay that often accompanies the climate issue. Fortunately, there is good science and solid data available to help cut through the noise. 2017 was far from the worst we will see: even bigger disasters are coming – will you be ready?

# The Hawaii nuclear alert: how did people respond?

*Andrew Gissing & Ashley Avci*

Nuclear tensions between the United States and North Korea have been extensively reported as both sides continue to posture via threats and propaganda and North Korea continues its missile tests. North Korea's leader Kim Jong-Un has promised to decimate the US and has referred to President Trump as mentally 'deranged'. A story in the New York Times based upon consultations with leading security experts recently suggested that the chance of war breaking out was between 15 and 50 percent (Kristof, 29/11/2017). Given the threat of an attack, U.S. government officials have encouraged residents to be prepared and have commenced monthly drills to test warning systems.

Within this environment of heightened geopolitical tensions, a single text message was sent in error to people in Hawaii on the 13th of January at 8.07am, warning of an imminent ballistic missile strike. The message read:

Emergency Alert. BALLISTIC MISSLE THREAT INBOUND TO HAWAII. SEEK IMMEDIATE SHELTER. THIS IS NOT A DRILL.

Officials alerted the public to the error via social media 13 minutes later, but it took 38 minutes to send a follow-up text message. In the meantime, the community was left to react as if a real missile was to strike Hawaii within twelve to fifteen minutes. It has been revealed that the delays were the result of local officials believing they required federal approval to cancel the alert.

The alert presents an opportunity to improve the understanding of how people react to warnings of extreme events. Risk Frontiers researchers conducted an analysis of media interviews with 207 individuals (respondents) who received the warnings to identify people's attitudes and responses after the alert was received. The media interviews were sourced from a search of global online media outlets that had reported on the false alarm. Interview responses were coded, analysed and are reported in this article.

## Results

Respondents commonly spoke of where they were when they received the alert. Locations varied, highlighting the importance of considering the many likely locations of people when an alert is issued. Most frequently respondents were in a hotel (n=39) or awake at home (n=38). Others were at home, but in bed (n=11); at work (n=10), in a car (n=10), at the beach (n=7) or in the ocean (n=3).

Most respondents received the alert via the official text message issued by the State (n=89), but a minority were informed by someone else: for example, a family member (n=17). Some respondents, however, spoke of being spared the stress of the false alarm as they did not receive the initial warning (Hawaii News Now, 16/1/2018).

Respondents often spoke about how they had trusted the alert because they had interpreted it in the context of existing North Korea and United States tensions (n=36) and therefore believed the alert to be plausible.

Those that chose to validate the warning did so through a multitude of different channels including social media (n=26), making contact with others (n=15), searching websites (n=16), listening for sirens (n=16), watching TV (n=11) or calling authorities (n=3). Based on interview statements in which residents stated how they had immediately responded to the warning, we estimate that a large number of residents may not have attempted to validate the warning (n=64).

Respondents often spoke about how they felt when they received the alert. Most often people described their emotions as fearful (n=51), concerned (n=23), panicked (n=21), upset (n=13) or calm (n=13).

Most respondents undertook protective actions in response to the warning (n=136), most often stating that they attempted to seek shelter within the building they were located in (n=43); called or texted others to alert them (n=23) or called or texted others to express their emotions (n=22). Other actions included packing emergency items (n=17); gathering family members (n=16); attempting to leave a building to seek shelter elsewhere (n=15) and leaving an open space to seek shelter (n=12). Eighteen respondents stated that they did not know what to do when they received the alert.

Respondents also commented on what they observed other people doing. Most commonly others were observed attempting to seek shelter (n=50), crying (n=26), running (n=25) or calling or messaging others (n=13).

When seeking shelter, respondents most often stated that they had attempted to seek shelter within their home (n=34), frequently within the bathroom (n=18). In addition nineteen respondents spoke about sheltering within their hotel. Some commented that they did not know where to seek shelter (n=18).

A small number of respondents stated that they did not take any action (n=16). Reasons for not responding were that respondents thought that there was nothing that could be done (n=7); the warning was false as sirens did not sound (n=4); the missile would be shot down or would miss (n=2); or the warning was a joke or hoax (n=2).

Those that mentioned how they had discovered the alert was false found this information through social media (n=21) or via a text message from authorities (n=12). On discovering that the alert was a false alarm, respondents described their emotions as relieved (n=23), concerned (n=7) or upset (n=7).

Respondents commented on how the situation was handled or how warnings could be improved in the future. Most often, respondents were concerned about the lack of safeguards to avoid such a false alarm and that it took too long for authorities to notify the public that the alert was false. In some cases, respondents reflected on their own personal disaster preparedness, noting specific actions that they had not undertaken to be prepared.

## Discussion and Conclusion

The Hawaii missile false alarm provides numerous insights into how people behave when warned of an extreme event. Practitioners should note the importance of social media as a communications mechanism, particularly for people to validate warnings and share with others.

The case study demonstrates the role of informal networks in both communicating and validating warnings. Hotels were clearly an important node of communication with their guests, and should always be considered an important network in communicating warnings in at-risk areas with large tourist populations.

Interestingly, it would appear that the population had been primed to respond to such an alert by their knowledge or concerns regarding tensions between North Korea and the United States. This demonstrates the importance of communicating long range forecasts to build the community's awareness of a risk so that individuals will recognise and respond to a warning when it occurs.

Given that the official advice as to what to do in the event of a real alert is for "all residents and visitors to immediately seek shelter in a building or other substantial structure", it appears that most respondents reacted appropriately. However, consistent with previous Risk Frontiers briefings on community responses to warnings, not everyone responded or knew how to respond. This is a further demonstration that even in extreme circumstances, emergency warnings cannot be relied on to achieve full compliance by communities. This finding should be considered when relying on warning systems to justify the permitting of development in high risk locations.

As for improving warning technologies, the Hawaiian Emergency Management Agency has suspended all future drills until a review of the event has been completed; instituted a two-person activation/verification rule for all tests and actual alarms and instigated a cancellation command that can be activated within seconds of a false alarm.

## References


HAWAII NEWS NOW. 16/1/2018. If you didn't get the false alert about an inbound missile, this might be why. Available: http://www.hawaiinewsnow.com/story/37269695/if-you-didnt-get-the-false-missile-alert-this-might-be-why [Accessed 27/1/2018].

KRISTOF, N. 29/11/2017. Are we headed toward a new Korean war. New York Times.


## Risk Frontiers' Multi-Peril Workbench 2.4 has now been released!

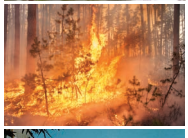
### Workbench 2.4:

- features a **major update** to our **Hail**AUS hail loss model to **national coverage**
- includes our **Demand Surge** model that can be applied to all Australian Perils
- contains updates to **Flood**AUS, **Fire**AUS, **Cycl**AUS as well as many enhancements to the Workbench itself

**Hail**AUS 7.0

**Flood**AUS 3.1

**Fire**AUS 2.2



**Quake**AUS 5.1

**Cycl**AUS 3.2

**Quake**NZ 3.0

### Changes are coming to QuakeAUS ... have you heard?

Prof. Paul Somerville of Risk Frontiers has been participating in the Geoscience Australia update of the seismic hazard model for Australia through the National Seismic Hazard Assessment (NSHA18) project. We have commenced preparations to update our Australian earthquake loss model, **Quake**AUS, and expect to have preliminary results in the first quarter of this year!

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