

New tests seek peace in climate conflict blame game

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Researchers are hoping to work out how climate change affects risk of conflicts, such as the one in Somalia in which this tank was destroyed. Image credit: Carl Montgomery, via Flickr Creative Commons license

After researchers last year went through every paper linking climate changes and human violence, finding a strong connection, new findings suggest that one rare study disagreeing used the wrong maths. [Kyle Meng](#) from Princeton University in New Jersey and [Solomon Hsiang](#) from the University of California, Berkeley, now hope they've settled previous conflicts over the climate-conflict link. "We think this allows the community to move forward onto what I believe are the next set of important questions," Kyle told me. "Why exactly does climatic change affect violence and what can we do to lessen the effects of climate on violence?"

In last year's paper, Solomon and his Berkeley colleagues [Ted Miguel](#) and [Marshall Burke](#) brought together 45 sets of evidence spanning 10,000 years. Reanalysing worldwide measurements from scratch they found that [2°C global temperature rise could make conflicts like civil wars more than 50% more common in many parts of the world.](#)

[One paper](#) that didn't fit with their findings had been published in 2010 by [Halvard Buhaug](#) at the Peace Research Institute Oslo, Norway. Halvard's study used the same data as a 2009 paper that found a climate-conflict link in Africa, written in 2009 by a team including Ted and Marshall. However, Halvard used different models indicating that political and economic factors were more important and that climate was 'not to blame'.

Halvard's argument revolves around a mathematical 'robustness check' into the statistics used by the 2009 paper. Such checks are common in social science, Kyle explained. "However, it is important to note that not all robustness checks are valid," he said. "In general, robustness checks are designed to examine whether, given a particular outcome, a statistical model may be producing biased results, such as when improper comparisons are being made amongst observations."

War by numbers



Princeton University's Kyle Meng has given Halvard Buhaug's 'robustness check' of research on the climate-conflict link a robustness check of its own. Image credit: Kyle Meng

In a *Proceedings of the National Academy of Sciences of the USA* [paper](#) published Monday, Kyle and Solomon argue Halvard's checks actually increase bias. Their first criticism is that the statistical models he uses overlook differences between countries in the original study and assume they're all the same. And Halvard then looks at different ways to measure the conflicts that climate might affect. In the original 2009 paper, Ted and Marshall's team had counted years during which there has been conflict in a country. But they had only looked at large conflicts, with over 1,000 casualties in a year, missing out civil wars like the one in Sierra Leone between 1991 and 2000. So Halvard included conflicts with at least 25 battle deaths a year.

But there's a big probability difference between the two measures, with wars causing over 1,000 deaths happening only once a century per country in Africa. Conflicts causing at least 25 deaths happen every four years per country. Kyle and Solomon argue that probability difference needed to be considered in Halvaug's statistical model, but wasn't, and means he wasn't making a fair comparison. "Think of the original main result as equivalent to saying 'smoking causes lung cancer'," Kyle explained. "This amounts to stating that 'smoking may or may not cause breast cancer' – the two measures are different and may be caused by different factors."

So, taking the same original data that Halvaug used, Kyle and Solomon looked at 25 death-per-year conflicts, but this time doing what they think are the right statistical calculations. They also examined the effect of assuming no difference in conflict likelihood between African countries, and compared the results to the 2009 paper. In that original study, Marshall and Ted's team had found that a 1°C global temperature rise would make 1000-death-per-year wars in Africa 40% more likely. Switching to the 25 death-per-year measure and assuming no country differences made the uncertainty range so vast that they could not say Halvard's paper disagreed with that original finding. Having done this using statistical tests, including one called an [F-test](#), Kyle and Solomon urge other researchers to use their methods more often.

Polite fight



Halvard Buhaug from the Peace Research Institute Oslo in Norway doesn't feel his paper has been proved wrong, but doesn't reject the idea of a climate-conflict link either. Image credit: PRIO

Unsurprisingly, Halvard doesn't agree that the new paper shows his earlier one was wrong. "They include a couple of 'tests' that make little sense in this particular context but derail the attention from what should be at the core: the extent to which temperature is robustly associated with conflict risk," he argued. He added that it's Kyle and Solomon doing the wrong maths: they shouldn't compare his paper with Marshall and Ted's, but with the "null hypothesis" that temperature doesn't affect conflict. In that context, the huge uncertainty ranges in the latest paper would suggest "temperature is not robustly and significantly related to civil conflict", he said.

While Halvard stands by his work, he stressed that he does think that climate can contribute to causing conflict. "I certainly do not question anthropogenic climate change and I also do not dispute the notion that climatic extremes may be associated with certain forms of political violence under given conditions," he says. "It's just that we haven't yet been able to pin down all the unknowns in such a complex causal relationship. But we will, eventually."

The continuing debate, even as Solomon, Kyle and their colleagues expand their dossier of evidence linking climate and conflict, is typical of the way science hammers ideas into shape. And though Kyle is confident in his new paper's findings, he highlighted that the desire to get deeper into the workings of the link unifies all the scientists. "To use our earlier example: we're now able to state that 'smoking causes lung cancer', but we are far from being able to explain why exactly this occurs and what type of intervention can be employed to lower lung cancer risks," he explained. "At the end of the day, we're all on the same team, trying to understand a fiendishly complicated aspect of our world. Now that the existence of the relationship has been solidly established, we'll need everyone in the research community, of all backgrounds, to find out why is this going on and how might we address it."

- Halvard has just published his [full response to Kyle and Solomon's new paper](#) (subscription required).

Journal references:

Marshall B. Burke, Edward Miguel, Shanker Satyanath, John A. Dykema and David B. Lobell (2009). Warming increases the risk of civil war in Africa *Proceedings of the National Academy of Sciences of the USA* DOI: [10.1073/pnas.0907998106](https://doi.org/10.1073/pnas.0907998106)

H. Buhaug (2010). Climate not to blame for African civil wars *Proceedings of the National Academy of Sciences of the USA* DOI: [10.1073/pnas.1005739107](https://doi.org/10.1073/pnas.1005739107)

Solomon M. Hsiang, Marshall Burke, Edward Miguel (2013). Quantifying the Influence of Climate on Human Conflict *Science* DOI: [10.1126/science.1235367](https://doi.org/10.1126/science.1235367)

Solomon M. Hsiang and Kyle C. Meng (2014). Reconciling disagreement over climate–conflict results in Africa *Proceedings of the National Academy of Sciences of the USA* DOI: [10.1073/pnas.1316006111](https://doi.org/10.1073/pnas.1316006111)

Halvard Buhaug (2014). Concealing agreements over climate–conflict results *Proceedings of the National Academy of Sciences of the USA* DOI: [10.1073/pnas.1323773111](https://doi.org/10.1073/pnas.1323773111)