

time he submitted his paper. He calls them “profoundly wrong,” adding that he has since stopped working with the group. But he says the funding in no way changed his views.

In other papers, Boffetta contested the carcinogenicity of substances such as dioxin and beryllium, while acknowledging funding from companies that expose their workers to them. Paolo Vineis, an environmental epidemiologist at Imperial College London, says there is a “pattern” of corporate influence in Boffetta’s recent output. “When someone supports the point of view of industry against the opinion of scientists working on the IARC monographs, it’s difficult to conceive that this person is really independent,” Vineis says.

Pearce doesn’t think most epidemiologists change their views because of industry

funding, but sees another danger: Industry support can give undue visibility to small scientific minorities, something that he says happens in the global warming debate as well. “Scientists say what they really believe [...] but industry chooses scientists whose views are predictable because they have [...] criticized similar studies in the past, and people get an unbalanced picture of what the consensus is among scientists,” he says.

In Boffetta’s case, some epidemiologists are also upset by a 2008 paper that they say undermined their field’s credibility. In the article, Boffetta and five others highlighted the problem of false positives in epidemiology; as an example, they mentioned a 1993 study suggesting that pesticide residues had caused a breast

cancer cluster in New York City, a widely publicized finding that caused a health scare but fell apart in subsequent, bigger studies. The authors called on fellow epidemiologists for more “modesty” and “humility” when interpreting results.

“I think Paolo is completely right to highlight this issue,” Hill says. But Vineis, who co-authored a rebuttal piece the following year, says the paper was one-sided and echoed industry’s arguments to dismiss epidemiology as a weak discipline. “Indeed, my arguments can be used this way,” Boffetta concedes, “but it’s better if epidemiologists discuss it. My intention was to make the discipline stronger and less vulnerable to attacks.”

—TANIA RABESANDRATANA

METEOROLOGY

Heat Wave Forecasts Debut in Scorching Australia

MELBOURNE, AUSTRALIA—Once again an inferno of a summer is bearing down on Australia, where heat waves claim more lives than storms, wildfires, tropical cyclones, and floods combined. Predicting the severity of heat waves, like one last month that saw temperatures top 50°C in some parts of the country, has largely eluded meteorologists, because their toll depends not just on high temperatures but also on how unusual they are. But the Australian Bureau of Meteorology (BOM) thinks it has hit upon a winning formula for converting forecasts of heat into a measure of its likely impact on communities.

Heat waves are notoriously difficult to define. Blistering temperatures for one city can be tolerable or even pleasant in another. “Wherever you live, you’ve got a climate that you’re adapted to,” says BOM meteorologist John Nairn, who led the development of Australia’s pilot system.

Several other countries and individual cities have implemented warning systems to cope with the rising tide of extreme heat events that climate change is bringing. Generally, these systems monitor forecast temperatures and compare them with locally defined thresholds. Australia’s system stands out for the high resolution of its 5-day forecasts—heat waves are mapped on a 5-square-kilometer grid nationwide—and its ability to predict heat wave severity.

To account for regional temperature variations, BOM’s system defines a heat wave as a period of at least three straight days

with forecasted daily average temperatures all falling in the hottest 5% of days for that region from 1971 to 2000. The system also employs a heat stress index that measures each 3-day period against the previous 30 days. If a heat wave is unseasonable in timing or is preceded by a relatively mild period, the likely impact will be greater, Nairn says. Heat waves occurring earlier in summer also tend to be more lethal, studies have found.

Nairn and his team set thresholds for severe and extreme heat waves by plotting on a graph all events from 1958 to 2011 according to the metric they had developed. “There was a transition point between relatively abundant low intensity heat waves and relatively infrequent high intensity heat waves,” he says. For the handful of chart-topping heat waves, “you’re really in a zone of trouble.”

The pilot system’s indices did a good job of rating the severity of historical heat waves, he says. “The major heat waves just fell out beautifully.” A 2009 heat wave that contributed to 374 deaths in the southeastern Australian state of Victoria, as well as heat waves in Paris in 2003, Moscow in 2010, and Chicago in 1995, all rated as extreme. Last month’s heat wave also ranked as an extreme event in southeastern Australia; authorities say it was responsible for 174 extra deaths in Victoria.

How health agencies respond will determine how useful the forecasts are, says Geoffrey Morgan, an environmental

epidemiologist at the University of Sydney. “It isn’t so much about defining what the best threshold is,” he says. “It’s more about how you communicate ... the effects of heat.”

Mathilde Pascal, an epidemiologist at the French Institute for Public Health



The heat is on. An Australian bush fire.

Surveillance in Paris, agrees. While France’s decade-old heat wave warning system helped avert an estimated 4000 deaths during a 2006 heat wave, she says, some 2000 extra deaths were still tallied. Saving more lives in future heat spells will require more robust public health outreach to ensure that people—especially the elderly—take precautions such as drinking enough water and avoiding prolonged exposure to the sun, she says.

BOM’s pilot heat wave forecast will run until the end of the next month. If it passes muster and receives funding, the bureau plans to roll it out as an official service in the next austral summer.

—DYANI LEWIS

Dyani Lewis is a writer in Melbourne, Australia.