

Drought, fire, ice: world is gripped by extreme weather

by Michael Marshall and Sara Reardon, *New Scientist* #2900, 19 January 2013

THE year has just begun, yet it is already shaping up to be an unusual one. Millions of people in Australia, Brazil, China and the US are having a rough January as extreme weather events wreak havoc around the world.

In the absence of natural climatic triggers like an El Niño event, such an accumulation of extremes is highly unusual, says Omar Baddour of the World Meteorological Organization in Geneva, Switzerland. Until further studies are carried out, it is impossible to rule out that some of the extremes are freak events. But they all coincide with regional increases in extreme weather linked to climate change.

The US, for example, is in the grip of worsening drought. Last week, the US Global Change Research Program released a draft of the third National Climate Assessment. This shows that the country is seeing longer periods of excessively high temperatures, and in places more severe droughts due to the accumulation of greenhouse gases in the atmosphere.

Global temperature records show that there is an 80 per cent chance that any new monthly heat record is caused by climate change (Climatic Change, doi.org/j7h). That means events like the heatwave that has set Australia ablaze (see "Australian fires offer insight into fire-prone future") have become more likely because of long-term warming, says Dim Coumou of the Potsdam Institute for Climate Impact Research in Germany. The effect of climate change varies regionally, and if a new monthly record is set in Australia at the end of January, there is a 50 per cent chance that the current heatwave was triggered by global warming, he adds.

US: The new dust bowl

The US is experiencing one of its worst droughts in a century. About 60 per cent of the country is affected. In 2012, a quarter of the corn (maize) crop was lost. The drought is set to continue, and its impacts will be felt around the world.

Last year was the hottest year on record in the US. News coverage of the resultant drought may have slowed, but the event is simply lying dormant through the winter.

The US provides about half of the world's corn and much of its grain. According to the US Department of Agriculture, the 2012 grain loss means global food prices will rise by 3 to 4 per cent in 2013, even if the drought abates.

That's unlikely to happen soon. The US National Oceanic and Atmospheric Administration's 2013 drought outlook predicts that conditions in the agricultural Midwest will continue or worsen until at least April. "There really isn't anything on the horizon that's showing an overall improvement to the drought situation," says Brian Fuchs of the National Drought Mitigation Center in Lincoln, Nebraska.

For states such as Kansas and Texas, which have been in drought since 2010, conditions are comparable to those of the 1950s and the 1930s Dust Bowl, Fuchs says. This month, the US Department of Agriculture declared 20 per cent of the agricultural US a natural disaster area.

Asia: Record low and storms of snow

Much of Asia has been freezing in the past few months. Since the end of November, China has seen its coldest temperatures in 28 years, according to its meteorological administration. Sea ice in Bohai Bay, to the northeast of the country, has grown to the largest extent for 25 years. The cold conditions have extended into western Russia, where temperatures have been 6 °C below average, and northern India - where over 200 have died as a result. Even the Middle East has been hit, with Israel and neighbouring countries suffering snowstorms and floods.

It is the fourth year in a row that the northern hemisphere has seen large, intense waves of cold, says Omar Baddour of the World Meteorological Organization in Geneva, Switzerland. Paradoxically, there is growing evidence that retreating Arctic sea ice, which hit a record low in September, is to blame, which links the trend to greenhouse gas emissions.

Normally, winters in the northern hemisphere are dominated by westerly winds, driven by the temperature gradient between the warm equator and the cold North Pole. But as the Arctic sea ice retreats, the polar ocean warms faster and the westerlies are weakened. This allows cold air to spill out of the Arctic, and into Eurasia.

Brazil: Drought threatens power

The north-east of Brazil is going through its worst drought in decades. It has dragged on for more than a year, according to the US National Oceanographic and Atmospheric Administration. The event offers a stark warning of the problems climate warming could cause for Brazil.

Brazil relies on two power sources that are vulnerable to drought. In 2010, hydroelectricity met 29 per cent of the country's energy needs, according to the US Energy Information Administration. And Brazil's production of ethanol biofuels more than doubled between 2001 and 2010 – although it fell almost 20 per cent in 2011.

This makes Brazil's energy supply sensitive to climate change, says André Frossard Pereira de Lucena of the Federal University of Rio de Janeiro. In 2008, his team looked at how the climate would affect these supplies by 2100. Ethanol, they found, was unlikely to be affected, but biodiesel was vulnerable. Hydroelectric power was worse off, as river flows were likely to shrink. The north-east of the country, already the poorest, is most prone to change.

So far, no study has directly linked this drought to climate change. But the latest report of the Intergovernmental Panel on Climate Change predicted that rising emissions will make semi-arid regions, including the north-east of Brazil, increasingly susceptible to such events.