

CLIMATE

2015 breaks heat record

Pacific Ocean warming helped to make last year the hottest in history.

BY JEFF TOLLEFSON

It's official: 2015 was the hottest year on record. Global data show that a powerful El Niño system, marked by warmed waters in the tropical Pacific Ocean, helped to drive atmospheric temperatures well past 2014's record highs. Some researchers suggest that broader Pacific trends could spell even more dramatic temperature rises in years to come.

Released on 20 January, the temperature data come from independent records maintained by NASA, the US National Oceanic and Atmospheric Administration and the UK Met Office. All three, along with an analysis released by the World Meteorological Organization on 25 January, document unprecedented high temperatures in 2015, pushing the global average to at least 1 °C above pre-industrial levels and 0.16 °C above 2014.

Although El Niño contributed to the warmth late in the year, US government scientists say that the steady increase in atmospheric concentrations of greenhouse gases continues to drive overall warming.

The current El Niño is predicted to continue to boost average global temperatures over the next several months. This could translate into another year of record heat. But the question facing scientists is whether this near-record El Niño has helped to flip the Pacific Ocean into a warmer state.

The Pacific Decadal Oscillation (PDO) is a 15- to 30-year cycle that increases sea surface temperatures across the eastern Pacific in its positive phase and produces cooler temperatures in its negative phase. Since 1998, after the last major El Niño and a subsequent La Niña cooling, the PDO has been mostly negative. Some scientists say that the cooling helped to suppress the increase in global temperatures in the early part of the millennium. But since early 2014, the PDO has been mostly positive.

Jerry Meehl, a climate modeller at the National Center for Atmospheric Research in Boulder, Colorado, has a study under review that suggests that the PDO is likely to remain in a positive state over the coming decade. "Over the next ten years," he says, "we see higher rates of warming." ■



Fires in Indonesia last year contributed greatly to the nation's greenhouse-gas emissions.

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Paris deal strains carbon accountancy

Developing countries need help to meet reporting rules.

BY JEFF TOLLEFSON

Indonesia's Central Kalimantan province, a lightly populated swathe of Borneo, is a hotbed for greenhouse gases that are emitted through deforestation, family farming and industrial palm-oil production. Last year, these activities fuelled devastating fires that torched more than 400,000 hectares in the province and at least 2.5 million hectares across the developing nation. By some estimates, the fires released into the atmosphere more than twice as much carbon as Germany emits in a year.

Calculating the volume of greenhouse gases emitted across such a dynamic landscape is not an easy task. Nevertheless, the climate agreement made in Paris last month dictates that nearly every country will need to begin assembling detailed inventories of their greenhouse-gas emissions in a few years' time. In Indonesia, the national government has delegated much of that responsibility to provincial governments. Soon, administrations that often struggle to provide basic public services will be required to master the complex science of carbon accountancy.

"We cannot rely on the local governments," says Rizaldi Boer, who heads the Centre for Climate Risk and Opportunity Management in Southeast Asia and the Pacific in West Java. "We need to

integrate this kind of training into the local universities."

It is a challenge that is being faced by developing countries across the globe. The Paris agreement relies on a 'pledge and review' programme to reduce emissions and halt global warming over the course of the twenty-first century. Under that strategy, countries must document their progress towards voluntary commitments to limit carbon emissions. Solid and transparent data will be needed to verify that they are living up to their promises.

"This is really the compliance regime for the Paris agreement," says Alden Meyer, director of strategy and policy for the Union of Concerned Scientists in Washington DC. "This is how you really tell how well you are doing."

Developed countries have been submitting detailed reports on greenhouse-gas emissions to the United Nations for years. But until now, developing countries — which produce nearly two-thirds of global greenhouse-gas emissions — were not required to provide such comprehensive reports on a regular basis. Under the Paris agreement, most countries will need to supply inventories of greenhouse-gas emissions every two years — and although the deal includes some flexibility, the details have yet to be resolved.

Efforts are under way to build a network of professional carbon accountants across

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