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CLIMATE SCIENCE

Artificial Worlds Hold Key To Figuring Out A Real Problem

by Frederic Garlan
Paris (AFP) Jan 24, 2007

Small, brown-haired and soft-voiced, Pascale Braconnot cuts an unlikely figure as Master of Planet Earth. But with a few deft movements of her fingers, Braconnot can conjure up our planet and spin it until the end of the century. At her command, oceans rise. Tropical Africa becomes stricken by drought. Rainstorms sweep South Asia, the Arctic icecap shrivels and bit by bit, Amazonia tragically becomes savannah.

Braconnot is head of computer modelling at the Laboratory for Climate and Environment Sciences (LSCE) near Paris, run by France's top scientific agencies to get a fix on where Earth's troubled climate system is headed.

Climate models are simulations of the global weather system, run on number-crunching supercomputers.

Less than a decade ago, these programmes were acknowledged by their own creators as being flawed by lack of computing power and poor data about the complex ballet between oceans, land, atmosphere, ice, greenhouse gases and solar radiation.

Today, though, the best climate models are able to recreate Earth's climate in the past, and forecast with confidence the global temperature and rise in mean sea levels by 2100 depending on future levels of carbon pollution in the air.

They can also make some prediction, albeit less accurately, about regional impacts -- which areas of the world will be most hit by a changed climate and which areas may potentially benefit.

These models provide the backbone of a long-awaited report by the UN's top panel of climate experts, due to be issued in Paris on February 2.

What has happened between then and now?

One big change has been a rush of robust data about Earth's climate in the past.

This has come from sources as diverse as carbon dioxide (CO₂) in 600,000-year-old Antarctic ice cores; from ancient tree stumps preserved in peat bogs; and from coral, whose growth rates are influenced by temperature and water salinity.

These have guided scientists about the climate of the distant past, helping them



Climate science is still a new discipline, and every year experts uncover new complexities or uncertainties. "One of them is cloud cover," says Pascale Braconnot, explaining that the type of cloud and its altitude either cool the surface below -- or conversely trap solar heat instead of letting it escape into space. "We have had to implement a number of simplifications, even oversimplifications about clouds in our model."

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to factor out natural variations in the warming scenario and confirming that man-made greenhouse gases are to blame for today's scary temperature rise.

Added to that are data from newly-launched Earth-monitoring satellites, oceanographic buoys and improved meteorological surveillance in poor countries, adding many pixels to the snapshot of the climate today.

Despite these strides, climate science is still a new discipline, and every year experts uncover new complexities or uncertainties.

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Another area of doubt is aerosols -- dust, such as industrial particulates, that is thrown high into the atmosphere and which reflects solar rays (thus having a cooling effect) but which also serves as a seed for raindrops, thus shifting patterns of precipitation.

Pascale Delecluse, deputy director of research at Meteo France, says models are also crimped by a newly-discovered phenomenon called "positive feedbacks."

These, in essence, are vicious circles. For instance, warming will thaw the permafrost in northern latitudes, releasing methane that had been stored for millennia in the frozen soil. The methane, a potent greenhouse gas, thus stokes the warming.

Other likely feedbacks include saturation of the oceans, whose plankton also absorb CO₂, and loss of snow and ice cover in high latitudes and altitudes (snow and ice reflect the Sun, so when they disappear, the uncovered ground warms quickly, thus melting more snow on neighbouring ground).

"Most scenarios work with the state of the Earth as we know it today. Models are still incapable of factoring in the effects of feedbacks," admits Delecluse.

The Intergovernmental Panel on Climate Change (IPCC), the UN's paramount scientific authority on the causes and effects of global warming, will issue a much-awaited report next week.

Source: Agence France-Presse

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CLIMATE SCIENCE

Bush Refuses To Yield On Global Warming



Washington (AFP) Jan 25, 2007

President George W. Bush refused to back down on his position on tackling global warming as he unveiled a new energy initiative this week that failed to convince environmentalists. Bush briefly discussed global warming during his annual State of the Union address to Congress Tuesday, proposing a plan to slash America's dependence on foreign oil by using new technologies.

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