IN THE OCEAN, A SEARCH FOR CLUES TO CLIMATE SWINGS

By

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Scientists hone robots that can dive deeper and measure sea temperature.

A few weeks ago, some 300 miles off the coast of New Zeland, scientists abroad the research vessel Tangaroa gently lowered two funky-looking orange orbs into the sea. Soon they disappeared, plunging of their own accord towards the depths of the Pacific Ocean.

They were prototypes, specialized robots designed to record temperature and other conditions all the way to the sea bottom, more than three miles down. Every few days since that June voyage, they have been surfacing, beaming their data to a satellite, then diving again.

With luck, a fleet of hundreds like them will be prowling the ocean in a few years, and the great veil of human ignorance will lift a bit further.

The starting reality is that in 2014, we know more about the surface of Mars than about the depths of the ocean. And that deficit is a huge problem as scientists try to understand how human activity is changing the planet.

As many people know, the warming of the earth's surface has slowed sharply over recent years. That slowdown did not match past computer projections of what the climate was supposed to do under the influence of greenhouse gases, and scientists have been struggling to explain it.

Their inability to do so raises questions about the reliability of the computer models on which long-term climate projections are based. Moreover, that scientific problem has become a political problem. "Global warming stopped 15 years ago"! is the favourite battle cry for climate-change skeptics these days, continually cited by politicians who want to block action on emissions.

In fact, global warming has not stopped. The greenhouse gases released by humans are still trapping heat, and the vast bulk of it is being absorbed by the vast ocean, as has always been the case. Researchers have deployed more than 3.000 robotic floats that can measure the temperature in the upper layers of the ocean, and they show continual warming there.

This documented ocean warming is hard evidence that scientists have gotten the basic story right when it comes to the effects of human emissions. It is also a problem in itself, because water expends as it heats up, so the warming is a major factor behind the rise of sea level – which, in turn, has worsened flooding from storms like Hurricane Sandy.

Despite the oceanic heating, it is true that at the surface of the planet, the increase of temperature has slowed quite a bit from the torrid pace of earlier decades. That has been a surprise, and trying to understand it has become an intense scientific focus.

The natural variability of climate could be playing a big role. The Pacific Ocean, in particular, oscillates in ways that can influence the temperature of the atmosphere. The cycling between El Nino and La Nina conditions is one of those oscillations, and over the past decade or so, La Nina, which has a cooling influence on global climate, has predominated.

Another possibility, strange as it may sound, is that the rapid rise of coal burning in China has temporarily slowed planetary warming. Coal releases greenhouse gases that will have a long-term warming effect, of course, but it also throws particles into the air that can reflect sunlight back to space over the short term.

Can this account for the temperature hiatus, or part of it? Experts do not know, and bad luck is one reason. A few years ago, NASA tried to send-up a satellite that could have helped answer that question by carefully measuring particles in the air, but it blew-up on launch.

Some scientists think the deep ocean is playing a significant role, absorbing heat that would otherwise be showing up at the surface. And the available evidence suggests this is the case, but measurements of the deep ocean are scant.

That is where the prototype robotic floats, developed at the Scripps Institution of Oceanography, come in.

The idea is to supplement the older robots that are already prowling the ocean. That system, known as Argo, is one of the scientific triumphs of the age, but even the most advanced of the floats can drive only a little more than a mile, so they miss the bottom half of the sea.

Developing robots able to go deeper has been a technical challenge, but scientists think they are about to lick it, permitting temperature measurements of virtually the entire ocean – a milestone in science. The experts say a replacement for the pollution measuring satellite that exploded is an urgent priority.

While scientists scramble for better information, this might be the most important thing for citizens to know about the warming hiatus : It has happened before.

Surface warming has always proceeded in fits and starts, with the longest hiatus lasting 30 years, from the 1940s to the 1970s. Scientists do not understand that one, either. But it ended, and a period of extremely rapid warming followed.