The Antarctic ozone hole has started to 'heal'

BY CHRIS MOONEY
THE WASHINGTON POST

In a major new paper in the influential journal Science, a team of researchers reports strikingly good news about a 30-year-old environmental problem. The Antarctic ozone "hole" — which, when it was first identified in the mid-1980s, focused public attention like few other pieces of environmental news — has begun, in their words, to finally "heal."

"If you use the medical analogy, first the patient was getting worse and worse, and then the patient is stabilized, and now, the really encouraging thing, is that the patient is really starting to get better," said MIT atmospheric scientist Susan Solomon, lead author of the study and former co-chair of the United Nations' Intergovernmental Panel on Climate Change.

Moreover, that patient — the Earth's vital ozone layer — is getting better, directly because of our choices and policies.

The initial, Nobel Prize winning discovery that ozone depleting chemicals called chlorofluorocarbons (CFCs) carried in refrigerants, spray cans, foams and other substances could damage the stratospheric layer that protects us from ultraviolet solar radiation (and thus, skin cancer) came in 1974. But it wasn't until the sudden discovery of a vast seasonal ozone "hole" over Antarctica in 1985 that the world was shocked into action.

The so-called "hole" represents a region of the stratosphere over Antarctica, between about 10 and 25 kilometers in altitude, where "the ozone gets destroyed completely," explains Solomon. However, some ozone remains above and below this region, amounting to a 40 or 50 percent loss of atmospheric ozone overall in a very large area of air.

Ozone has been depleted in the stratosphere all across the globe, to be sure. But Antarctica in the spring — which is autumn in the northern hemisphere — presents uniquely conducive conditions for it to happen, as extremely cold polar stratospheric clouds provide a surface that enables the chemical reactions in which destructive forms of chlorine are created.

Discovery of the "hole" galvanized action and in 1987, the Montreal Protocol, which is still today hailed as the epitome of a successful environmental agreement, led to a phase out of the use of ozone depleting chemicals. Here was a case that now appears so very different from the story of climate change, because everything basically functioned like it was supposed to — scientists identified a problem, the public grew concerned and politicians acted to solve it.

"You have to put yourself back in the time when the ozone hole was discovered," remembers Solomon, who has been studying the issue for more than three decades. "We thought we were going to see a few percent change in the ozone layer in a century. And then all of a sudden, boom, we've got half as much ozone in a part of the world where nobody ever expected it, already happening in 1986."

Ever since the Montreal Protocol's adoption, then, it has been a process of waiting for ozone depletion in the atmosphere to slow down, then for decline to cease entirely, and then finally, seeing the ozone layer turn the corner and begin to grow back. And it is this last observation that is finally here for the Antarctic ozone hole in particular, the new study asserts.

In the research, the researchers used satellite and balloon data to examine the seasonal Antarctic ozone hole in for a 15-year period between 2000 and 2015. And they found that in the month of September, the size of the hole has generally declined by more than 1.5 million square miles, and that this is a trend that can be statistically separated from the "noise" of natural variations.

"The September size of the ozone hole shows this very systematic trend of getting smaller, and the September [measurements] also show that the ozone has begun to recover just exactly in the height range where the polar stratospheric clouds are," she says. The study also found that "roughly half" of the improvement seen in September is "chemical" in nature, or in other words, the result of less ozone depleting chemicals in the stratosphere.

October, the peak month for Antarctic ozone depletion, is another matter. October of 2015 actually showed a quite large ozone hole over the ice continent. At its peak size, it was 10.9 million square miles.

But another part of the new study is to explain why October remains a highly variable month for ozone depletion over Antarctica — one where it is hard to detect a healing signal — and why last October was so bad, even as the ozone hole is clearly healing. And the answer is volcanoes — specifically, the eruption of a volcano named Calbuco in Chile.

Large volcanic eruptions fill the stratosphere with sulfur dioxide, and depending upon where they occur, this can circulate around much of the globe. Southern hemisphere eruptions spread sulfate across that hemisphere, said Solomon, and the sulfur dioxide aids in the formation of polar stratospheric clouds, thus once again enhancing ozone depletion.

The study used a climate model to simulate how volcanic contributions enhanced the ozone hole in October. Therefore, the paper was able to conclude that one bad October doesn't detract from an overall, if slow, early ozone recovery.

Granted, there is a long way to go. The study suggests that the October ozone hole over Antarctica will still be with us until around 2050, and depending on volcano behavior, there could be more setbacks and large swings along the way.

Still, it's hard to interpret the current paper as anything other than a piece of (rare) good news when it comes to the interactions between humans and their planet. And it tempts one to think bigger about its broader significance.

The precise lesson to draw here, though, is less than clear. On the pessimistic side, you could say that the contrast basically proves that a modest-sized global environmental problem can be solved by the world, while a mega-sized one is another matter entirely.

Yet Solomon says the evidence that the Antarctic ozone hole is finally getting better makes her optimistic about our capacity to ultimately come to grips with climate change as well.

Rocket science hits the hiking trail

This backpack can lift 150 pounds of gear, even though you shouldn't

BY BRIAN FUNG
THE WASHINGTON POST

History is littered with technologies that wound their way from the defense and aerospace industries into our everyday lives. From radar to GPS, civilians have benefited greatly from advances that were once the domain of deep-pocketed contractors and corporations.

Now, one of these technologies is coming down to earth in the form of a backpack frame. The frame is made of carbon fiber, which means it's light and sturdy. But what's new about it isn't the use of high-tech materials; it's the way the material was crafted. And according to its maker, the outdoors gear manufacturer Kuiu, this process means you can fit a lot more weight into the hiking pack, all else being equal.

> Kuiu's gear targets mainly hunters who may find themselves carrying parts of their prey

If you're not familiar with hiking backpacks, the basic idea behind many of them is to slap a fabric bag on top of a stiff internal or external frame; this helps distribute the weight you're carrying and increase your stability. Often, these frames are made of aluminum. But carbon fiber is an attractive material for frames because it's incredibly light; it's often found, too, in race cars and high-end bicycles.

The type of carbon fiber Kuiu uses in its new backpack, which was announced Thursday after a two-year development period, is a variant known as "spread tow." What this means is that instead of weaving together round bundles of carbon fiber strands to create a surface, you flatten the bundles so that all the strands are arranged in a long rectangle, and these flat rectangles are stitched together.

"Because the fibers are no longer woven, and because there is no bend in the fiber, it's stiffer, stronger, and there's less resin built up in between the fibers due to their shape," said Jason Hairston, who founded Kuiu after a neck injury in the 1990s took him off the San Francisco 49ers and out of a short career in professional football.

The difference in frame construction means the pack can handle 150 pounds of gear, Hairston claims, up from the 100 pounds that represents the limit of Kuiu's current Ultra backpack.

Of course, most backpackers won't — and probably shouldn't — be carrying that much weight around. The conventional wisdom for backpacking is generally to carry no more than a third of your own weight. But Kuiu's gear targets mainly hunters who may find themselves carrying parts of their prey.

Whether or not you're a hiker, Kuiu's new pack is another example of what happens when investments in cutting-edge technology make it down to the rest of us.

Air and Space Museum marks 40th year

BY KOUICHI SHIRAYANAGI
REUTERS

WASHINGTON — The Smithsonian's National Air and Space Museum kicked off its 40th anniversary festivities Friday with a first-ever overnight celebration, long enough for the International Space Station to orbit the Earth nearly eight times.

The festival at the world's largest publicly displayed collection of historic aircraft and spacecraft will also officially open the newly renovated "Milestones of Flight" hall.

It houses the Apollo 11 command module Columbia, which achieved President John F. Kennedy's goal of delivering a crew to the moon. The Bell X-1 that Chuck Yeager flew faster than the speed of sound and the Mercury capsule Friendship 7 flown by John Glenn, the first American to orbit Earth, are also on view.

The event will include members of the Wright Brothers family and a 12-hour overnight film festival.

"This is the Mecca of space exploration. You can see both sides of space exploration here, including the Russian side," said Max Kaiserman, 28, of Philadelphia.

The museum includes a model of the Soviet Union's Vostok 3KA capsule, which transported Yuri Gagarin into space.

The museum also houses the original model of the star ship Enterprise, from the hit 1960s television show, Star Trek.

The museum's main site and the Steven F. Udvar-Hazy Center in Chantilly, Virginia, outside Washington, attract 8.5 million visitors annually. Spokeswoman Allison Mitchell said it is the most visited museum in the United States.

Chesapeake Bay blue crabs seen rebounding

BY KOUICHI SHIRAYANAGI
REUTERS

WASHINGTON — The summer crab season has begun on the mid-Atlantic seaboard and supplies of the crustaceans in the largest U.S. estuary are improving, according to a survey, meaning crab lovers will enjoy bountiful feasts.

A study released by the Chesapeake Bay Program this week said the "blue crab" population in the bay is growing, though numbers are below healthy target levels.

State and federal agencies have been monitoring a variety of environmental problems in the bay that are thought to have hurt wildlife, resulting in higher water temperatures. The report did not draw conclusions on the reason for the current uptick in crab populations.

The total population of blue crabs increased from 411 million in 2015 to 553 million in 2016, according to the survey. The population peaked at around 800 million in the 1990s and in 2012, it said.

"It is encouraging to see adult females rebound from a depleted state only two years ago," said Glenn Davis of the Maryland Department of Natural Resources.

Bob Higgins, owner of Higgins Crab House North in Ocean City, Maryland, said the rising crab population has allowed him to offer his customers "heavier, larger crabs — the type most in demand."

Higgins, in the business for 50 years, said he expects to sell 565 bushels of crabs over the July Fourth weekend.

WHAT IS IT?

ROBERT CROUL

Send your answers for this week's What Is It (right) to: Robert Croul, 1095 North Road, Newburgh, Maine 04444. Readers may respond by email to recestate@myfairpoint.net. Be sure to write "What is it?" in the subject line.

The "What Is It" in the June 18 edition of the Bangor Daily News was correctly identified as a weight used to anchor or tether a horse by Don Eldridge, Vicki Stanley of Mattawamkeag, Pete Lammert of Thomaston, O.K. Blackstone of Caribou, Jan Bryan of Corinth, Stephen Dickinson of Presque Isle, Dick DeGraaf of Camden, Roger Belanger, Marguerite Haskell of Levant and Phyllis Wardwell of Bucksport.