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Scientists debate humanity's role in warming

By Rex Springston

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VIRGINIA BEACH

On a lonely lighthouse 13 miles off the Atlantic coast, NASA scientists are helping detect the plight of the planet.

Futuristic-looking instruments atop the Chesapeake Lighthouse measure, among other things, how much radiation the sun sends into our atmosphere, how much is reflected back and how much the Earth absorbs and releases as heat.

The NASA work and related efforts by experts across the globe are aimed at determining how and why Earth's climate is changing.

"The whole idea is to try and determine what the issues are before it's too late," NASA scientist Greg Schuster said over the wind atop the 110-foot-tall lighthouse tower.

Scientists such as Schuster, with the space agency's Langley Research Center in Hampton, know the planet is warming. Years ago, the question was whether humans played a role.

"Nowadays," said Schuster, a dark-haired, youthful 49-year-old, "people are trying to tease out the details" about how much of the warming is manmade, and what might happen in the future.

There is a lot that scientists don't know about climate change. There is also a lot they know. These facts are beyond dispute:

--Earth is warming.

--Certain gases such as carbon dioxide trap heat in our atmosphere. That's what makes Earth habitable.

--We add carbon dioxide to our atmosphere by burning oil, coal and natural gas, among other activities.

"1/8There3/8 is a strong, credible body of evidence, based on multiple lines of research, documenting that climate is changing, and that these changes are in large part caused by human activities," said a study last month by the prestigious National Academy of Sciences.

The science of climate change dates to the 1800s, when scientists theorized that gases in the

atmosphere might trap heat from the sun.

As people burned fossil fuels to power the Industrial Revolution, carbon dioxide levels rose in the atmosphere, and the planet indeed warmed.

Since modern measurements began in 1880, the Earth's temperature has increased about 1.5 degrees, according to NASA. That might not sound like much, but tiny changes in average global temperatures make a big difference.

For example, the Earth is only about 9 degrees warmer now than it was during the last ice age thousands of years ago.

An international panel of experts in 2007 projected the climate to warm at least 2 degrees more, and possibly 11.5 degrees, by 2100. Human civilization, which evolved during the fairly stable climate of the past 10,000 years, appears headed for unknown territory.

Scientists say global warming is already raising sea levels, causing frequent flooding in low-lying areas. Other potential effects include stronger hurricanes, hardships for wildlife, degraded oceans and more stress on the Chesapeake Bay.

Warming could bring benefits, but they come with tradeoffs, experts say. Virginia farmers could enjoy longer growing seasons -- but be hit with worse droughts, forest fires and pests that survive mild winters. Virginians could benefit from increased rain -- unless it comes in torrents that cause floods and erode soil. Fewer people could die of cold in winter -- but more could die from the heat of summer.

Some see the benefits as negligible or illusory. "There is no good news with climate change," said Doug Dwoyer, a former NASA manager.

Global warming has intensified since the 1970s, with 20 of the hottest years on record coming since 1981, according to NASA.

The agency says 2005 was the warmest year. Tied for second place are the years 1998, 2002, 2003, 2006, 2007 and 2009. Many experts say 2010 is shaping up to be the new warmest year.

Viewed another way, 2000-2009 was the warmest decade on record. The 1990s were the second-hottest decade.

Data over the past 33 years show the planet has warmed about 1 degree while Virginia has warmed about 1.5 degrees, said Jerry Stenger, director of the University of Virginia's climatology office.

The trends are revealed in analyses of global and state warming that Stenger prepared for the Richmond Times-Dispatch. "They are very real, very significant trends," Stenger said.

The measurements are particularly reliable because satellites put into use during that period added extra data to the record, Stenger said.

The National Academy of Sciences last month suggested limiting emissions of heat-trapping gases

by setting a price on them -- through a tax on carbon-dioxide releases, for example.

Patrick J. Michaels, a Virginia climatologist affiliated with the libertarian Cato Institute, is a widely quoted climate-change skeptic.

Michaels acknowledges that the Earth is warming and that people are at least partially responsible. However, he takes issue with doomsday scenarios. And he fears that taking actions to cut carbon emissions significantly would cause major economic harm.

Scary projections are based on the assumption that "we're going to continue to have a carbon-based economy that puts large amounts of carbon dioxide into the air," Michaels said. "I just don't think that's a very tenable assumption."

More likely, someone will invent a replacement energy source, Michaels said. After all, no one knew about nuclear power 100 years ago. "There is probably somebody out there in the world who has an equally loony idea that just might work."

Governments can help by holding down debt, Michaels said. Instead of paying taxes to settle the debt, people would have more money to fund that new-energy entrepreneur.

While scientists understand the basics of climate change, they are still working on many of the specifics. Clouds, for example.

It is not clear whether clouds will increase or decrease as the planet warms, said Bruce A. Wielicki, a NASA Langley climate scientist. Beyond that, some clouds block lots of sun and exert a cooling influence, while others trap more heat than they block. Might one type -- the heat blockers or trappers -- win out?

Many power plants, cars and other sources spew tiny airborne particles called aerosols. Some aerosols warm the planet, and some cool it. Will one type prevail?

No matter what these wild cards do, scientists say we are in for a certain amount of warming, even if we magically ended greenhouse-gas emissions today. That's because the carbon dioxide we have released lasts more than 100 years in the atmosphere.

In a controversy dubbed Climategate, skeptics maintained that e-mails stolen from some British climate researchers last year showed that the researchers had overstated the case for warming. Many experts said the e-mails were taken out of context, however, and two investigations have cleared the researchers of scientific malpractice.

A study printed Jan. 20 in *Eos*, a publication of the American Geophysical Union, a respected science organization, found that more than 96 percent of climate scientists say the planet is warming and human activity is a significant cause.

By comparison, the study noted that a recent Gallup poll showed that only 58 percent of the general public believes people are a significant cause of the warming. Other polls have shown even lower numbers.

The evidence for manmade climate change is "about as persuasive scientifically" as the evidence that smoking is bad for you, said John Cairns Jr., a professor emeritus of environmental biology at Virginia Tech.

Yet as the evidence builds, some polls show that the public's concern about climate change is going down, Cairns said. "What that says to me is the scientific groups have done a rotten job of communicating these things."

Some skeptics say global warming is a hoax -- that scientists and respected organizations such as the National Academy of Sciences and the American Association for the Advancement of Science are deluding the public.

The "NAS and AAAS are both still in the warmist camp," and climate scientists and the media cannot be trusted, one reader recently e-mailed The Times-Dispatch.

NASA's Schuster pondered the controversy atop the Chesapeake Lighthouse, a Coast Guard structure that dates to the 1960s.

"It's good to have a discussion back and forth about the science," Schuster said. "But they're not even talking science when they're talking conspiracy theory. If that's all they have, there is nothing to discuss."

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