Antarctica works as living global warming laboratory

By Deborah Zabarenko, Environment Correspondent

MCMURDO STATION, Antarctica (Reuters) - For scientists at this ice-encircled outpost, global warming is not a matter of debate. It is a simple fact and crucial research questions center on what its consequences will be.

Antarctica is a prime place for this research because it serves as an early warning system for climate change and is a major influence on global weather.

Because about 90 percent of the world's ice volume and 70 percent of its fresh water is on the southernmost continent, any substantial warming could cause a rise in sea levels around the globe.

"It's a bellwether for the planet," Tom Wagner of the U.S. National Science Foundation said in an e-mail interview. "Its ice sheets are the main player in sea level rise; there is already evidence that they are shrinking."

It was easy to imagine melting ice sheets this week around McMurdo Station, the biggest U.S. science center in Antarctica, with temperatures in the relatively balmy range of -2 degrees and the 24-hour-a-day spring sunshine causing pools of melted water atop a 3-metre layer of ice around the base.

Much of the sea ice is cracked and the nearby Barne Glacier has had several major collapses onto the sea ice in recent days. Still, heavy tracked vehicles can navigate the ice on designated pathways.

While these are not specifically signs of global warming, Antarctica and the Arctic are key places to look for such signals because even a slight rise in temperature can precipitate melting ice, which would have dramatic effects on living things and land, as well as global climate implications, Wagner said.

For Ross Powell, an environmental geologist, one way to figure out what the future of climate change might be is to look some 10 million years back in to Antarctica's past.

READING THE ANCIENT ROCKS

"We want to go back through time and see the changes that the Antarctic has been through," said Powell, who is based at Northern Illinois University but is working on an international geology project here. "And one of the key things is finding the warm periods, because we are going into a warming phase now."

Powell is one of the chief scientists on the ANDRILL project -- shorthand for Antarctic Geologic Drilling Program -- where a massive drill burrows down about 80 metres of sea ice, 830 metres of
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Powell is one of the chief scientists on the ANDRILL project -- shorthand for Antarctic Geologic Drilling Program -- where a massive drill burrows down about 80 metres of sea ice, 830 metres of
ocean water and then into the sediments beneath to see what clues earlier warm periods left behind.

"We need to read the rocks to understand when the ice was there and when it wasn't and what the conditions were in the marine environment associated with the movement of the ice forward and backwards," Powell said in an interview.

So far, ANDRILL researchers have found tantalizing clues about periods when the Antarctic ocean was swarming with marine algae called diatoms, which still exist as one of the most basic links on the planet's food chain.

The glimpse back in time could examine a period in Antarctica's history when levels of the greenhouse gas carbon dioxide were high, but perhaps not as high as scientists predict it will get in the coming decades due to human activity.

Carbon dioxide, emitted by natural processes but also by power plants and motor vehicles, is one of several gases that trap the sun's heat near Earth's surface like the glass walls of a greenhouse.

If the ice sheets around Antarctica shrink substantially, that would not by itself cause the world's seas to rise, just as an ice cube melting in a glass of water would not cause much of a rise in the level of liquid in the glass.

But the ice sheets perform an important function by slowing down the flow of glacial ice. If the ice sheets go away, many scientists believe that glaciers will flow more swiftly, adding their ice to the oceans, and that could cause sea level rise.