Scientists test powerful ocean current off Antarctica

April 25 2010

Oceanographers said on Sunday they had measured a system of mighty currents off Antarctica that are a newly-discovered factor in the equation of climate change.

The system, known as Antarctic Bottom Water (AABW), is generated in clockwise movement in four big sea shelves that abut Antarctica -- the Weddell Sea, Prydz Bay, Adelie Land and Ross Sea.

Extremely cold water sinks to the bottom of these shelves and slides out northwards along the continental shelf.

At the edge of the shelf, some of the water mixes with a well-known ocean movement, the Antarctic Circumpolar Current, which sweeps around the abyss off Antarctica.

The rest of the AABW, though, makes its way northward through a maze of ridges and gullies, reaching into the southern latitudes of the Indian and Pacific Oceans and into the Atlantic as far north as southern Brazil.

The study, led by Yasushi Fukamachi of Japan's Hokkaido University, is published online in the journal *Nature Geoscience.*

Fukamachi's team used an array of eight seabed sensors, anchored at a depth of 3,500 metres (11,375 feet) for two years over 175 kilometers (109 miles) on the Kerguelen Plateau, east of Antarctica, where current exits from the Prydz Bay shelf.

On average, about eight million cubic metres (280 million cubic feet) of water colder than 0.2 degrees Celsius (33 degrees Fahrenheit) were transported northwards over this narrow section, the researchers found.

That is four times more than the previous record documented in an AABW flow, at the Weddell Sea, on the other side of Antarctica.

Over two years, the Kerguelen monitors recorded the current's average speed at more than 20 centimetres (eight inches) per second, the highest ever seen for a flow at this depth.

The findings are important because ocean currents are major players in climate change.

They circulate heat, moving warm waters on the surface to the cold ocean floor. After this water is chilled, it is eventually shuttled back by currents to the surface, for warming again.

Currents also help determine the success of oceans as storage of carbon dioxide (CO2), the principal greenhouse gas.

Microscopic marine plants called phytoplankton take in CO2 at the surface under the natural process of photosynthesis.

When they die, the phytoplankton sink, but a current will determine whether they reach the ocean floor, thus sequestering the carbon for essentially forever, or whether they are swept back up towards the surface.