

Posted on Sun, Dec. 08, 2002

After mild winters, a possible sea change

Some say a freshwater crimp in the Gulf Stream could bring a sudden shift to biting cold.

By Anthony R. Wood
Inquirer Staff Writer

Scientists have been warning that the Earth is slowly heating up, that the recent run of gentle winters in the United States is no fluke, but the warm-up to the big meltdown.

Now, however, comes a chilling prediction from some of the same experts. Before the climate gets balmy, they say, it could take a sudden turn toward the frigid - and stay that way for decades, if not centuries.

In the Northeast, subzero temperatures could become standard winter fare, filling rivers with ice chunks, cutting short the growing season, and altering bird migrations. The cold and snow of the last week would feel like spring break.

Behind that brutal scenario is a baffling ocean phenomenon that experts have watched with rising angst: an expanding mass of freshwater in the usually salty North Atlantic that has spread alarmingly in the last seven years. It now reaches south from Greenland to just off the coast of the Carolinas, an area of 15 million square miles.

If the buildup continues, they say, it could impede the Gulf Stream, a major climate-maker that transports warm air to northern latitudes in winter. Were that critical current to be slowed by the freshwater, let alone stopped, average winter temperatures in the Northeastern United States and in Western Europe could abruptly plummet 10 degrees - a change not experienced by anyone alive today. A five-degree drop would be in store for the rest of the States.

Exactly when it might occur, scientists generally are loath to speculate.

"None of us could tell you whether that event happens next year or 100 years from now," said Raymond W. Schmitt Jr., senior scientist at the Woods Hole Oceanographic Institution in Massachusetts, which has taken the lead in studying the freshwater pool.

Researchers find themselves toeing a fine line between informing the public and setting off a panic, Schmitt added. The U.N. committee on global warming has put out the reassuring word that "such a shutdown is unlikely by 2100." But John Gagosian, head of Woods Hole, had not even cold comfort to offer in a recent paper.

"In just the past year, we have seen ominous signs that we may be headed toward a potentially dangerous threshold," Gagosian wrote. "If we cross it, Earth's climate could switch gears and jump very rapidly - not gradually - into a completely different mode of operation."

One climate scientist suspects the Gulf Stream already is slowing down. At a time when other glaciers around the world are in retreat, the Scandinavian glacier has been growing. Andrew Weaver, of the University of Victoria, British Columbia, says it may be the result of less warm air reaching that far corner of the North Atlantic.

The prospect of a deep freeze, whether sooner or later, so concerns the British government that it is sinking \$30 million into figuring out what's going on in The Pond. For while no one disputes the freshening is real, no one is sure why it is happening.

Some researchers believe that, ironically, global warming could be to blame, that melting Greenland glaciers and Arctic sea ice could be diluting the salt water of the North Atlantic. Others theorize it could be a phase in a natural cycle, one that ice-core evidence suggests might have happened several times in the last 100,000 years - and perhaps as recently as America's colonial era.

Oceans are turbulent, chaotic places, and their circulation is at least as complex as the atmosphere's.

The Gulf Stream, which originates in the Caribbean, is no exception. Oceanographers typically describe it as part of a "conveyor belt," because in order to keep the current moving, the cold, salty water in the North Atlantic must sink beneath it. That creates a void that is filled by the rush of more Gulf Stream water. And so it moves north-northeast toward Iceland at about 5 m.p.h., warming the overlying atmosphere for more than 2,000 miles.

The heated air moderates the frigid blasts out of Canada before they can reach London, Paris or Rome. Without the Gulf Stream, London would feel like Montreal, but gloomier.

Fresher water is a threat to the conveyor because it is lighter and sinks so slowly that the Gulf Stream could sputter and even stop.

"If you don't sink that [cold] water and move it into the south, there's no reason for the Gulf Stream to move the warm water to the north," said James Wright, a Rutgers University paleoceanographer. The current "would turn toward Portugal and go to the Canary Islands."

Even subtle changes in salinity can have a substantial effect on the rate at which water sinks, said Weaver, of the University of Victoria. On average, a gallon of seawater contains 4.7 ounces of salt. Even the freshest water in the ocean still has about 4.2 ounces per gallon - far from potable, but fresh enough to potentially affect the Gulf Stream.

Conveyor-belt disruptions and sudden climate changes are nothing new - only the realization that they have occurred, says Richard B. Alley, a professor of geosciences at Pennsylvania State University.

Conventional wisdom used to hold that climate change, like aging, happened gradually. In the last 15 years, however, researchers studying ice cores dating back 100,000 years have documented sudden shifts.

"Large, abrupt and widespread climate changes occurred repeatedly in the past across most of the Earth, and many followed closely after freshening of the North Atlantic," said Alley, who is also chairman of the National Research Council's Committee on Abrupt Climate Change, which published a report last spring.

Perhaps the most famous of these was the "Younger Dryas" event, so named for the Arctic shrub that appeared in temperate European climes during a dramatic cooldown about 12,000 years ago, 6,000 years after the last Ice Age. And it happened in a hurry, a matter of just a few years.

Changes in the Gulf Stream also are suspect in the onset of the so-called Little Ice Age, which began in the 15th century and ended about 1850. That coincided with Gen. George Washington's encampment at Valley Forge during the fatally frigid winter of 1777-78; the winter of 1779-80 was even worse. It

also encompassed the era of Washington Irving and frosty images of skaters on the lower Hudson in December. No one skates there these days.

While abrupt shifts may be nothing new, this one would be unprecedented in one important respect: Science is trying to get to the bottom of it. But even as researchers measure the freshwater mass by dropping instrument packs into the ocean, one thing is certain: They won't be able to stop it.

Any human effort to control the buildup, Weaver said, would be "like one person standing on a railroad track trying to stop a train."

Contact Anthony R. Wood at 610-313-8210 or twood@phillynews.com.

<http://www.philly.com/mld/inquirer/4689103.htm?template=contentModules/printstory.jsp&1c>