Effect of Melting Glaciers in the Northern Seas Examined

MELISSA BLOCK, host:
The effects of global warming may not just come on gradually. One of the most dramatic scenarios suggests that changes in ocean circulation can trigger abrupt climate change. This idea was popularized in the movie *The Day After Tomorrow.* New research is helping scientists work out what's going to happen in real life. NPR's Richard Harris has the story.

RICHARD HARRIS reporting:
For 25 years, Ruth Curry has been steaming out from the Woods Hole Oceanographic Institution to the far northern seas. In order to figure out what's happening with ocean currents, she's been trying to measure how salty the ocean is there and how much fresh water is pouring in from rain and snow, streams, melting glaciers, and disintegrating iceberg. She says it's a lot.

RUTH CURRY: Each year, about an Amazon River-size amount of fresh water flows out of the Arctic and into the North Atlantic.

Mr. HARRIS: Naturally, this freshwater dilutes the ocean water as it goes. And that, in turn, can have all sorts of effects far from these remote and frigid waters.

Ms. CURRY: If you put too much fresh water in the right places in this part of the world, it can actually alter the portion of the ocean circulation that transports heat from the Tropics up toward the Pole.

Mr. HARRIS: Salty water is part of a huge system of currents that carries warm water north. This current is sometimes called the ocean's conveyor belt. Cold, salty water from the Arctic sinks to the bottom and creeps south, while warm, surface water from the Tropics moves north. Fresh water doesn't sink, so it has the potential to disrupt this conveyor.

Ms. CURRY: If that water becomes fresh enough and less dense, then that flow will slow down. And if you'd add a whole lot of extra freshwater, that flow could actually stop.

Mr. HARRIS: And that could make a huge difference to the climates of England, Scandinavia, and Canada. Those countries are actually warmed up by heat carried north in the ocean. One big unknown, until now, is how much fresh water is actually pouring into the northern seas. Curry and a colleague now answer that question in the latest issue of *Science* magazine.

Ms. CURRY: From this study, we've estimated that it would take about a century or so to have a substantial impact, something that we could actually measure on the ocean conveyor.

Mr. HARRIS: Here's where science and fiction get uncomfortably close. Some scary scenarios suggest that if this conveyor stops, the ocean will stop transporting warm water north along the Gulf Stream current, and Western Europe will suddenly find itself in the deep freeze. But not so fast, says Peter Wadhams from Cambridge University.

PETER WADHAMS (Cambridge University): The Gulf Stream is not going to vanish because most of the Gulf Stream or a lot of the Gulf Stream is driven by the wind directly. And so the wind-driven circulation will continue in the same way.

Mr. HARRIS: Even so, Wadhams is concerned about changes in the ocean that are happening right now. He's been studying sea ice in the Arctic Ocean Basin, or the lack thereof.

Mr. WADHAMS: We can now sail ships around in the Beaufort Sea in summer quite happily without seeing any ice, and that never used to be the case.

Mr. HARRIS: Wadhams says changes in the sea ice are affecting the ocean currents right now. He's seeing signs that the deep circulation is slowing down.

Mr. WADHAMS: This will have an impact on the circulation of the Atlantic and will reduce the amount of heat that reaches Europe.

Mr. HARRIS: Wadhams says this change will tend to cool the climate slowly, and at the same time, the air temperature is expected to rise due to global warming. Nobody really knows how these two effects will play off against each other, but Wadhams says one computer simulation suggests a plausible scenario.

Mr. WADHAMS: Western Europe will warm more slowly than the rest of the world, and by the end of this century, we'll probably be back at about the same temperature we are now and on a cooling trend. So we'll come to a peak and then start to cool down while the rest of the world will continue to warm.

Mr. HARRIS: It's tricky at best to predict what will happen a century from now. Ruth Curry says the first step is to better understand everything that's happening today.

Ms. CURRY: We can see that evaporation and precipitation patterns are changing. We can see that glaciers are melting on global scales. And what we want to know is exactly how fast that whole system is changing. It seems to be tipping out of balance as a consequence of global warming.

Mr. HARRIS: The change in ocean circulation in the northern seas is one small but critical piece of that puzzle. Richard Harris, NPR News.