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The Vanishing Arctic

By Stefan Rahmstorf

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Largely unnoticed, a silent drama has been unfolding over the past weeks in the Arctic. The long-term consequences will far outstrip those of the international debt crisis or the demise of the Libyan dictatorship, the news stories now commanding media attention. The drama — more accurately, a tragedy — playing out in the north is the rapid disappearance of the polar ice cap, the Arctic Ocean's defining feature.

In September, the sea-ice cover on the Arctic Ocean melted all the way back to the record-low level recorded in September 2007. At 4.4 million square kilometers, it was the smallest ice cover since satellite observations began 40 years ago, with 40 percent less ice than in the 1970s and 1980s.

Back in 2007, the record low stunned climate scientists, who considered it an outlier in an otherwise much slower decline in sea-ice cover. We blamed unusual wind conditions in the Arctic that year. But satellite data since then have proved us wrong. This year, we reached the same low level without exceptional wind conditions. It is now clear that we are not just seeing a steady decline of sea-ice cover, but a rapidly accelerating decline.

If this continues, we will probably see an ice-free North Pole within the next 10 to 20 years. Yes, that sounds shocking. But there is good reason to fear that the rate of decline will indeed continue to rise, and that satellite images of a blue polar ocean will grace the covers of news magazines sooner rather than later.

The reason is that the ice is also getting thinner. This is harder to measure than the area of ice cover, which is easily viewed by satellites. But various data, including measurements from ships and aircraft, confirm that the ice has thinned by roughly half since the 1980s. This also makes physical sense, given the rapid warming in the Arctic.

If the ice cover simultaneously shrinks and gets thinner, then the shrinkage in area is first steady but then accelerates toward the end, when the remaining ice becomes ever thinner and more vulnerable to melting.

Yearly estimates show that 2011 set an all-time low for overall ice volume in the Arctic Ocean. Ice volume is already down to about one-third of what it was in the 1980s. If the downward trend in ice volume of the past 20 years merely continues at a constant pace, practically no ice will be left in 10 to 15 years.

Global warming, caused by our greenhouse-gas emissions, is thus far continuing unabated. 2010 was one of the two hottest years on record globally, despite extremely low solar activity. Thus, it is almost certain that warming — including in the Arctic — will continue in the coming decades. And the ice will continue to melt.

This loss of ice will not only turn the Arctic ecosystem upside down, affecting many animals that are adapted to a life with sea ice. It will affect all of us. If the Arctic ice disappears in the summer months, we will lose a giant mirror that reflects solar heat back into space and helps keep the planet cool. The ice loss will amplify global warming and upset weather patterns.

Moreover, disproportionate Arctic warming is already affecting one of the most important components of the global climate system: the Greenland Ice Sheet. If this giant structure melts, sea levels worldwide would rise by about 7 meters.

And this melting, it appears, has already begun. As NASA data revealed earlier this year, the Greenland Ice Sheet is losing mass at an accelerating pace. As tide gauges from around the world show, sea levels are indeed rising.

While future sea level is hard to predict, most experts would agree that unabated global warming could lead in the coming centuries to a rise measured in meters, threatening the very existence of many coastal cities and entire island nations. Already at the end of this century, sea level could well be 1 meter higher than it is now, unless we act rapidly and decisively to curb our greenhouse-gas emissions.

This is why we ignore the silent meltdown in the north at our own peril. It is a sign of global warming — and a grave warning sign for us all.

Stefan Rahmstorf is a professor of physics of the oceans at Potsdam University. His most recent book is “The Climate Crisis.” © Project Syndicate

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