How do they do it? Predictions are in for Arctic sea ice low point

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It's become a sport of sorts, predicting the low point of Arctic sea ice each year. Expert scientists with decades of experience do it but so do enthusiasts, whose guesses are gamely included in a monthly predictions roundup collected by Sea Ice Outlook, an effort supported by the U.S. government.

When averaged, the predictions have come in remarkably close to the mark in the past two years. But the low and high predictions are off by hundreds of thousands of square kilometers.

Researchers are working hard to improve their ability to more accurately predict how much Arctic sea ice will remain at the end of summer. It's an important exercise because knowing why sea ice declines could help scientists better understand climate change and how sea ice is evolving.

This year, researchers from the University of Washington's Polar Science Center are the first to include new NASA sea ice thickness data collected by airplane in a prediction.

They expect 4.4 million square kilometers of remaining ice (about 1.7 million square miles), just barely more than the 4.3 million kilometers in 2007, the lowest year on record for Arctic sea ice. The median of 23 predictions collected by the Sea Ice Outlook and released on Aug. 13 is 4.3 million.

"One drawback to making predictions is historically we've had very little

information about the thickness of the ice in the current year," said Ron Lindsay, a climatologist at the Polar Science Center, a department in the UW's Applied Physics Laboratory.

To make their prediction, Lindsay and Jinlun Zhang, an oceanographer in the Polar Science Center, start with a widely used model pioneered by Zhang and known as the Pan-Arctic Ice Ocean Modeling and Assimilation System. That system combines available observations with a model to track sea ice volume, which includes both ice thickness and extent.

But obtaining observations about current-year ice thickness in order to build their short-term prediction is tough. NASA is currently in the process of designing a new satellite that will replace one that used to deliver ice thickness data but has since failed. In the meantime, NASA is running a program called Operation IceBridge that uses airplanes to survey sea ice as well as Arctic ice sheets.

"This is the first year they made a concerted effort to get the data from the aircraft, process it and get it into hands of scientists in a timely manner," Lindsay said. "In the past, we've gotten data from submarines, moorings or satellites but none of that data was available in a timely manner. It took months or even years."

There's a shortcoming to the IceBridge data, however: It's only available through March. The radar used to measure snow depth on the surface of the ice, an important element in the observation system, has trouble accurately gauging the depth once it has melted and so the data is only collected through the early spring before the thaw.

The UW scientists have developed a method for informing their prediction that is starting to be used by others. Researchers have struggled with how best to forecast the weather in the Arctic, which

affects ice melt and distribution.

"Jinlun came up with the idea of using the last seven summers. Because the climate is changing so fast, only the recent summers are probably relevant," Lindsay said.

The result is seven different possibilities of what might happen. "The average of those is our best guess," Lindsay said.

Despite the progress in making predictions, the researchers say their abilities to foretell the future will always be limited. Because they can't forecast the weather very far in advance and because the ice is strongly affected by winds, they have little confidence beyond what the long-term trend tells us in predictions that are made far in advance.

"The accuracy of our prediction really depends on time," Zhang said. "Our June 1 prediction for the Sept. 15 low point has high uncertainty but as we approach the end of June or July, the uncertainty goes down and the accuracy goes up."

In hindsight, that's true historically for the average predictions collected by Study of Environmental Arctic Change's Sea Ice Outlook, a project funded by the National Science Foundation and the National Oceanic and Atmospheric Administration.

While the competitive aspect of the predictions is fun, the researchers aren't in it to win it.

"Essentially it's not for prediction but for understanding," Zhang said. "We do it to improve our understanding of sea ice processes, in terms of how dynamic processes affect the seasonal evolution of sea ice."

That may not be entirely the same for the enthusiasts who contribute a

prediction. One climate blog polls readers in the summer for their best estimate of the sea ice low point. It's included among the predictions collected by the Sea Ice Outlook, with an asterisk noting it as a "public outlook."

Provided by University of Washington