1,000 Predictions:

What's New and What's Old in a Retrospective Analysis of the Sea Ice Outlook, 2008–2020

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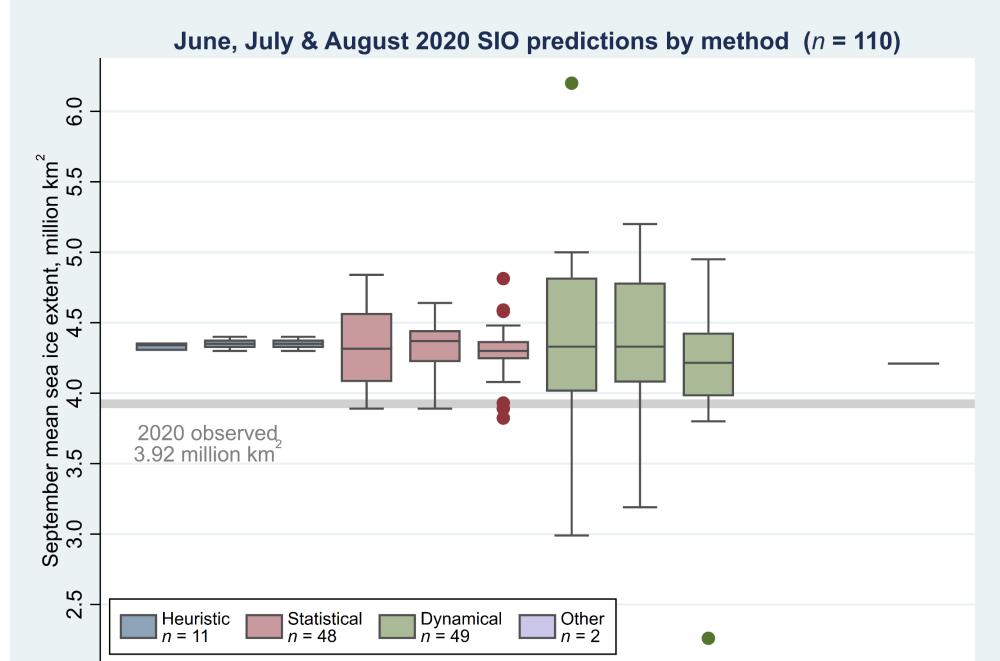




Each Arctic summer since 2008, the Sea Ice Outlook (SIO) has invited researchers and the engaged public to contribute predictions regarding the September extent of Arctic sea ice.

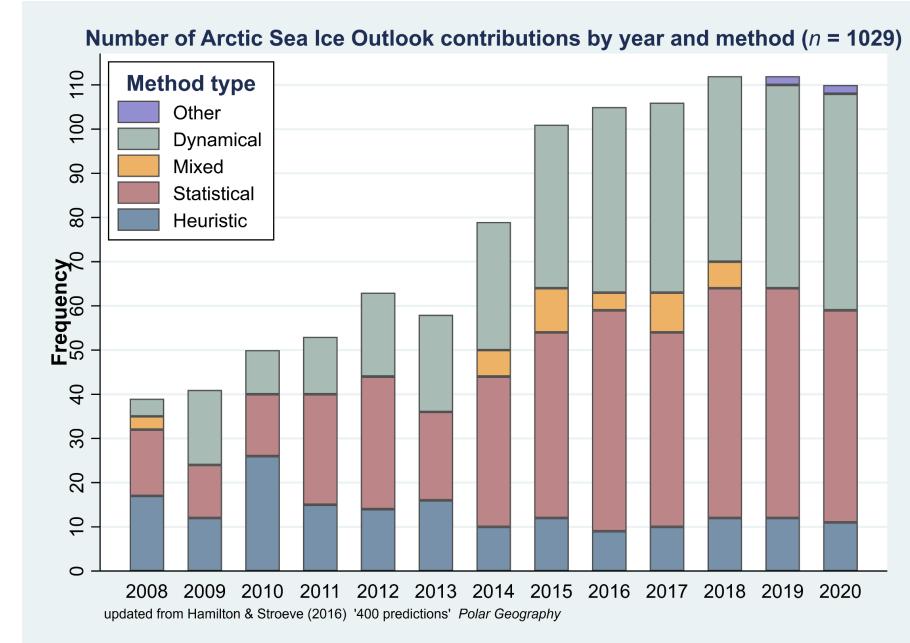


Then, each
September,
we see the
accuracy or
inaccuracy
of those
predictions



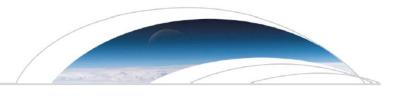
updated from Hamilton & Stroeve (2016) '400 predictions' Polar Geography

More than 1,000 individual predictions, based on many different methods, were contributed from 2008 to 2020



Earlier papers analyzed the ensemble skill of the first few hundred SIO contributions through 2013 (Stroeve et al. 2014)





Geophysical Research Letters

RESEARCH LETTER

10.1002/2014GL059388

Key Points:

- Analysis of Sea Ice Outlook contributions 2008-2013 shows bimodal success
- Years when observations depart from trend are hard to predict despite preconditioning
- Yearly conditions dominate variations in ensemble prediction success

Supporting Information:

- Readme
- Supplementary Text

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Predicting September sea ice: Ensemble skill of the SEARCH Sea Ice Outlook 2008–2013

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Abstract Since 2008, the Study of Environmental Arctic Change Sea Ice Outlook has solicited predictions of September sea-ice extent from the Arctic research community. Individuals and teams employ a variety of modeling, statistical, and heuristic approaches to make these predictions. Viewed as monthly ensembles each with one or two dozen individual predictions, they display a bimodal pattern of success. In years when observed ice extent is near its trend, the median predictions tend to be accurate. In years when the observed extent is anomalous, the median and most individual predictions are less accurate. Statistical analysis suggests that year-to-year variability, rather than methods, dominate the variation in ensemble prediction success. Furthermore, ensemble predictions do not improve as the season evolves. We consider

... and through 2015 (Hamilton & Stroeve 2016)

POLAR GEOGRAPHY, 2016 http://dx.doi.org/10.1080/1088937X.2016.1234518



3 OPEN ACCESS

400 predictions: the SEARCH Sea Ice Outlook 2008–2015

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ABSTRACT

Each Arctic summer since 2008, the Sea Ice Outlook (SIO) has invited researchers and the engaged public to contribute predictions regarding the September extent of Arctic sea ice. The public character of SIO, focused on a number whose true value soon becomes known, brings elements of constructive gamification and transparency to the science process. We analyze the performance

ARTICLE HISTORY

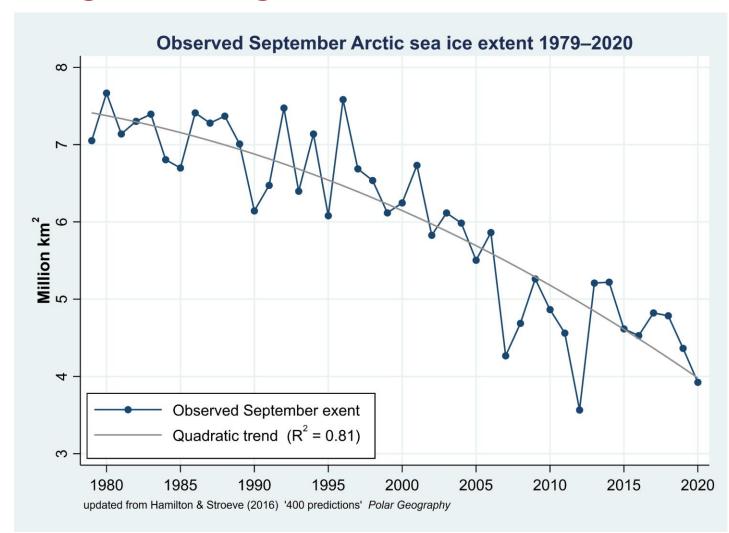
Received 11 March 2016 Accepted 22 August 2016

KEYWORDS

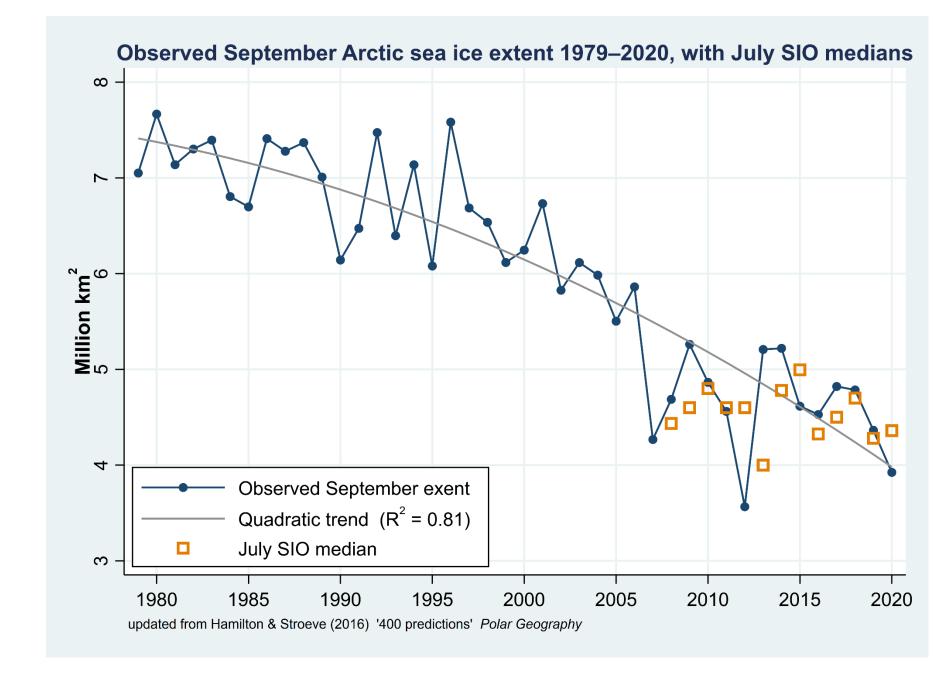
Arctic; sea ice; prediction; SEARCH; SIPN; modeling

Here, I bring those analyses up to date with data through 2020. The main conclusions from earlier papers have proven to be robust, but unexpected new insights emerged as well.

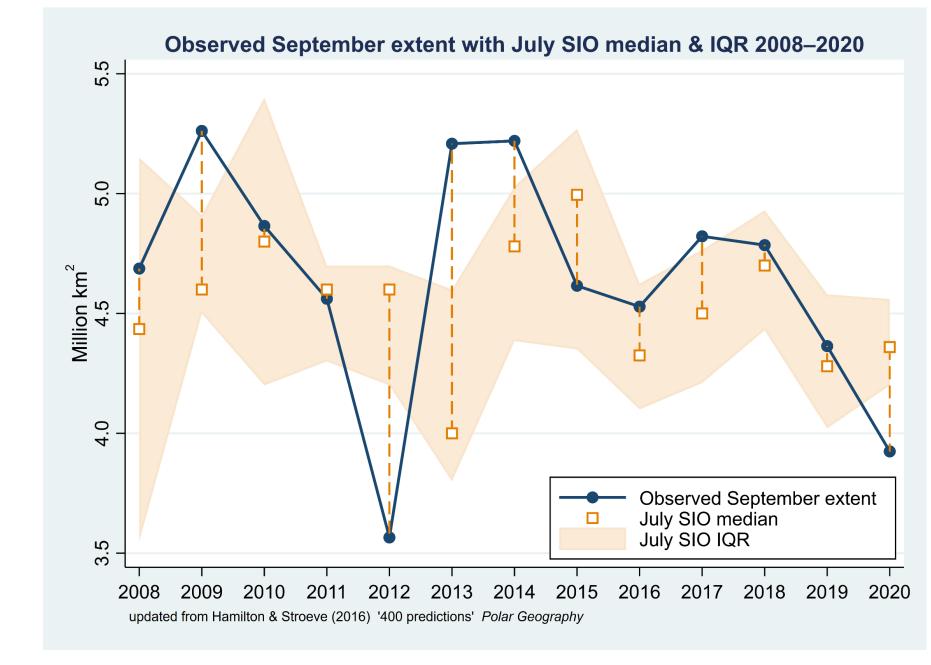
The long-term downward trend in ice extent is reasonably well described as linear ($R^2 = 0.79$) or quadratic ($R^2 = 0.81$).



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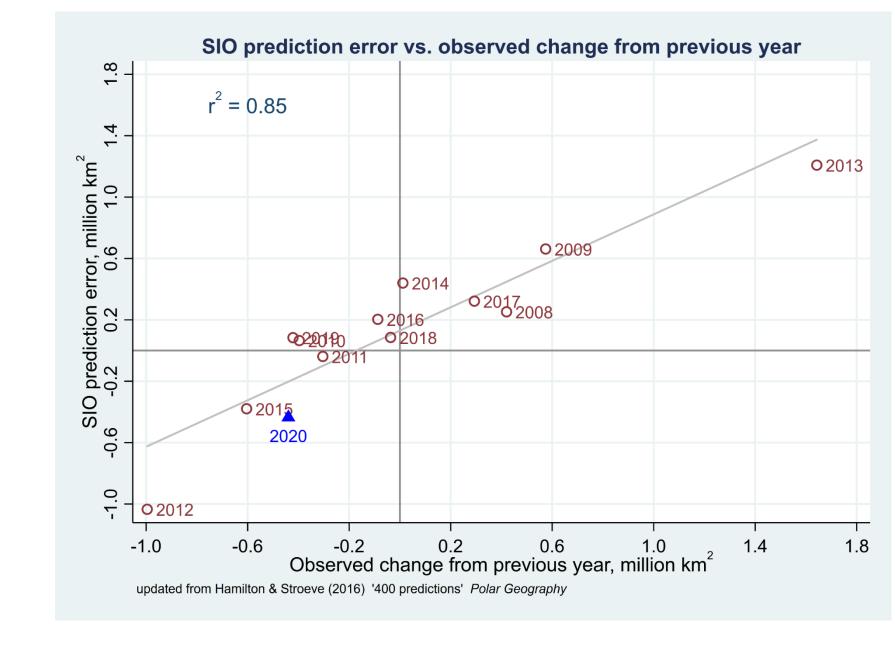


We see a pattern of "easy" and "difficult" years

- In "easy" years the ensemble predictions (and many individuals) are close to the observed extent.
- In "difficult" years the ensemble predictions (and most individuals) are not close.
- "Difficult" years occur when there is a large change from the previous year's extent—reflecting summer storms and weather.

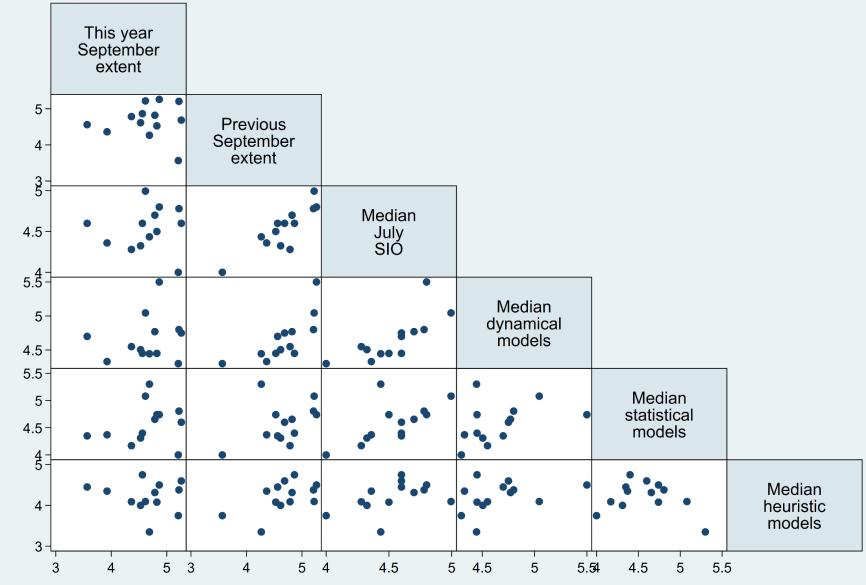
Very large changes from the previous year's extent in 2012 and 2013 resulted in the largest prediction errors.

Both errors reflect one 2012 cyclone.



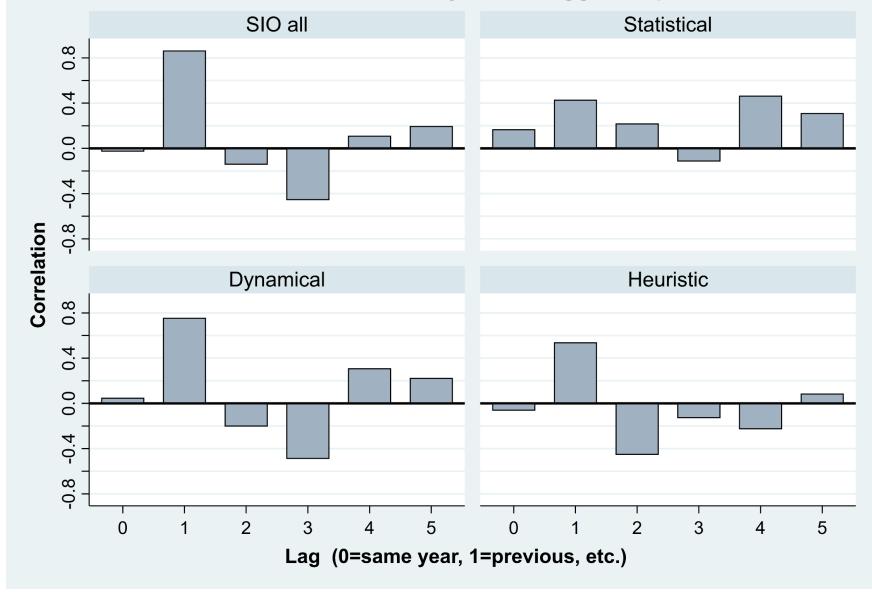
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Correlation between median July SIO & lagged September extent



Work in progress (2020)

 J. V. Lukovich, Julienne Stroeve, Alex Crawford, Lawrence Hamilton, Michel Tsamados, Harry Heorton & François Massonnet "Summer extreme cyclone impacts on Arctic sea ice"

François Massonnet & Lawrence Hamilton "Predicting sea ice predictions"

Previous SIO Ensemble Analyses

- Hamilton, L.C. & J. Stroeve. 2016. "400 predictions: The SEARCH Sea Ice Outlook 2008–2015." Polar Geography 39(4):274–287.
 https://doi.org/10.1080/1088937X.2016.1234518
- Hamilton, L.C., C.M. Bitz, E. Blanchard-Wrigglesworth, M. Cutler, J. Kay, W. Meier, J. Stroeve & H. Wiggins. 2014. "Sea ice prediction has easy and difficult years." Witness the Arctic (Spring 2014). Fairbanks, AK: Arctic Research Consortium of the U.S. http://www.arcus.org/witness-the-arctic/2014/2/article/21066
- Stroeve, J., L.C. Hamilton, C.M. Bitz & E. Blanchard-Wrigglesworth.
 2014. "Predicting September sea ice: Ensemble skill of the SEARCH Sea Ice Outlook 2008–2013." *Geophysical Research Letters* 41:2411–2418.
 https://doi.org/10.1002/2014GL059388