Reflections on a record minimum

The numbers are in – 2012 broke the record for minimum sea ice extent and is still heading down (see Figure 1). The sea ice extent data tell an unequivocal story of ice decline in recent decades – first a downward trend, then a massive decrease in 2007, a failure to recover, and now a new record minimum. The numbers are critical for observing and understanding the ongoing decline of the Arctic sea ice cover.

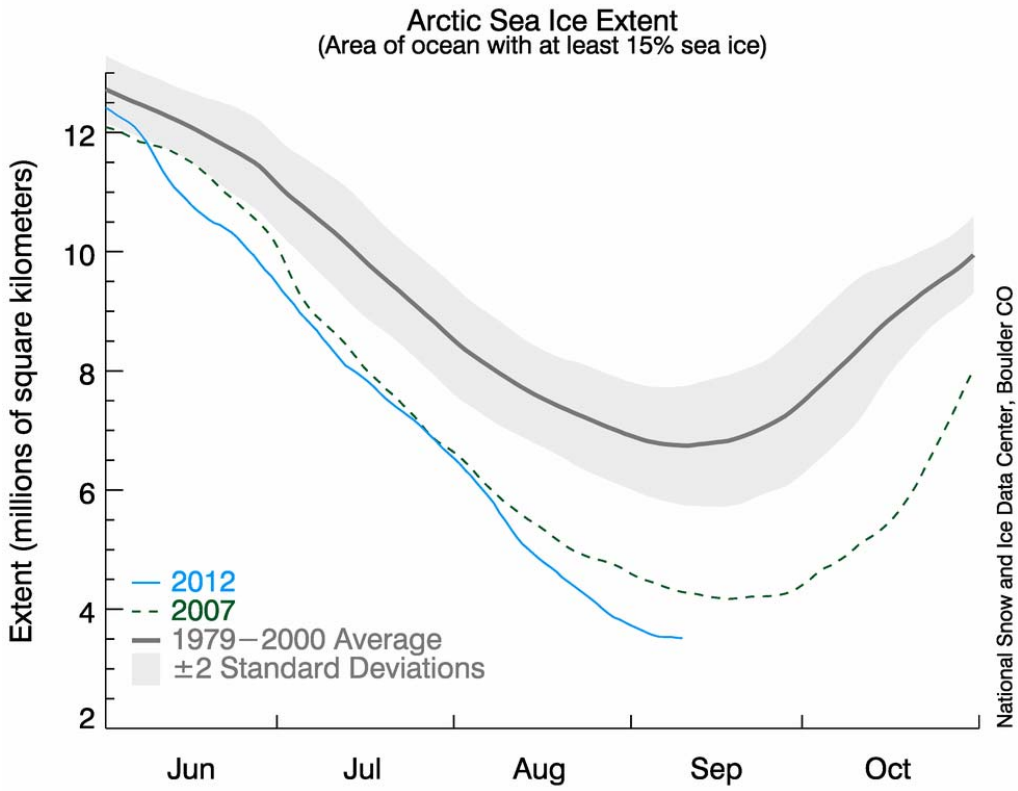

Figure 1. Sea ice extent for 2007, 2012, and the 1979-2000 average. Graph courtesy of National Snow and Ice Data Center (http://nsidc.org/arcticseaicenews/).

There are also stories that personalize the magnitude of these changes. Tales of changing ice and changing times may only be anecdotes, but they do provide a reference frame. For me, it's the story of a search for an ice floe. Fifteen years ago we were beginning the SHEBA drift experiment. The goal was to enhance our understanding of the ice albedo and cloud radiation feedbacks and use that understanding to improve the treatment of sea ice in climate models. The approach was to freeze an icebreaker into the pack ice and drift for a year making integrated measurements of the atmospheric, ice, and ocean.

The first step – find a suitable ice floe for a yearlong drift. We had many discussions in planning meetings about what is a suitable ice floe. The consensus was nothing too thick. Make sure the floe was less than 3 meters. It was important to resist the temptation to pick the thickest (and safest) ice floe. Fifteen years ago we headed north from Tuktoyaktuk to find this Goldilocks floe. A floe that was not too thick, but not too thin; not too close, but not too far. It turned that too thick was not a problem. We searched in heavy fog and light ice, rejecting many thin, melting floes. Finally, at 75oN, 142oW we found a 1.8-m-thick floe that would be our home for the next year. We also found our first scientific results, that there was extensive melting in the summer of 1997 and the ice was much thinner than expected. Extensive melting and thinner ice proved to be a foreshadowing of the years to come.

Just recently an autonomous measuring station was deployed on the ice in the western Arctic. The station consists of instruments measuring properties of the atmosphere, ice, and ocean. These measurements are similar to SHEBA, but are now done autonomously thanks to technological advances. This expedition also had problems locating thick ice and finally found a floe that was 1.5-m-thick. However, this floe was at 81°N, roughly 700 km north of the SHEBA starting site. The SHEBA site? It was in the open ocean, hundreds of kilometers from the ice edge (Figure 2). Just as it has been for the past 5 Septembers.

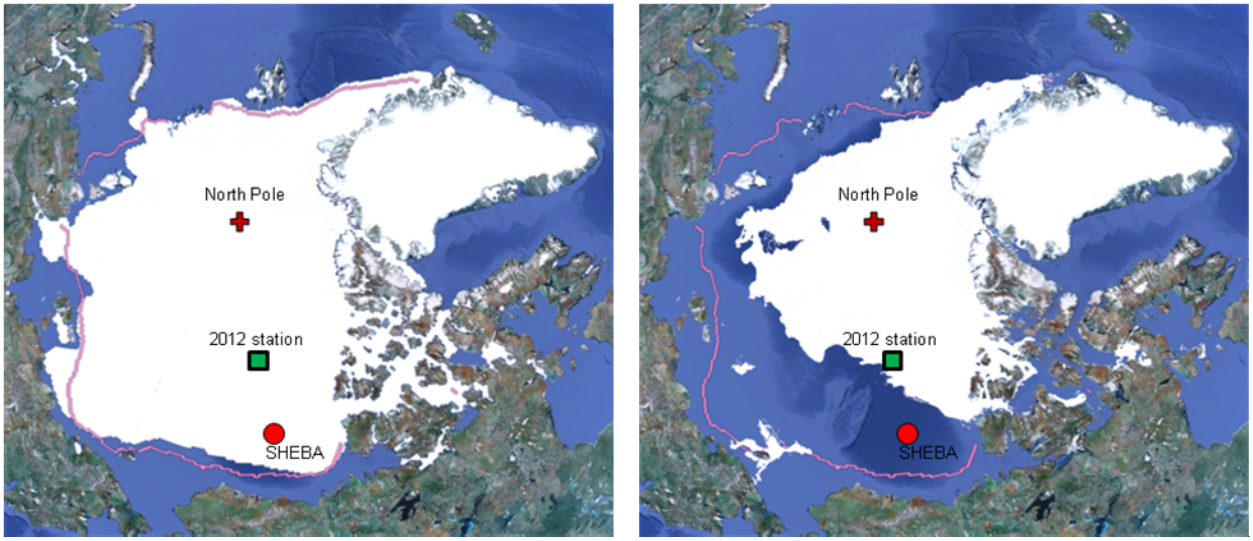

Figure 2. Ice conditions in September 1997 and September 2012. The red dot denotes the position of Ice Station SHEBA at the start of the year long drift. The green square is the location of the autonomous buoy station deployed in August 2012.