

Cool summer of 2013 boosted Arctic sea ice

July 20 2015

The volume of Arctic sea ice increased by a third after the summer of 2013 as the unusually cool air temperatures prevented the ice from melting, according to UCL and University of Leeds scientists. This suggests that the ice pack in the Northern hemisphere is more sensitive to changes in summer melting than it is to winter cooling, a finding which will help researchers to predict future changes in its volume.

The study, published in *Nature Geoscience* today and funded by the Natural Environment Research Council (NERC), used 88 million measurements of sea ice thickness recorded by the European Space Agency's CryoSat-2 mission between 2010 and 2014. It showed that there was a 14% reduction in the volume of summertime Arctic sea ice between 2010 and 2012, but the volume of ice jumped by 41% in 2013 (relative to the previous year), when the summer was 5% cooler than the previous year.

Lead author and PhD student, Rachel Tilling from the Centre for Polar Observation and Modelling (CPOM), UCL Earth & Planetary Sciences, said: "The summer of 2013 was much cooler than recent years with temperatures typical of those seen in the late 1990s. This allowed thick sea ice to persist northwest of Greenland because there were fewer days when it could melt. Although models have suggested that the volume of Arctic sea ice is in long term decline, we know now that it can recover by a significant amount if the melting season is cut short."

The volume of Arctic ice has been steadily falling since the late 1970s but was difficult to assess accurately before CryoSat-2, which measures



ice-thickness across the whole region. When compared to ~772,000 readings from an airborne laser, 430 measurements from electromagnetic sensors and 80 million upward-looking sonar observations, the team found that CryoSat's measurements of sea ice thickness agreed to within 2mm.

Miss Tilling added: "Until CryoSat-2 was launched, it was tricky to measure the volume of Arctic sea ice as the pack drifts and measurements could not be taken across the whole region. Together with maps of sea ice extent, our measurements of sea ice thickness now complete the picture because they reveal what's going on below the water, where most of the action happens."

The team say although the first five years of CryoSat-2 measurements have revealed important information on the state of Arctic sea ice, the record is still short to establish a long-term trend.

Co-author Professor Andy Shepherd, Professor of Earth Observation at UCL and at the University of Leeds, said: "Understanding what controls the amount of Arctic sea ice takes us one step closer to making reliable predictions of how long it will last, which is important because it is a key component of Earth's climate system. Although the jump in volume means that the region is unlikely to be ice free this summer, we still expect temperatures to rise in the future, and so the events of 2013 will have simply wound the clock back a few years on the long-term pattern of decline. Our goal is to make sure we do not lose this unique capability to monitor Arctic sea ice when the mission ends."

The team now plan to use CryoSat-2's measurements of changing sea <u>ice</u> <u>thickness</u> to help improve the models that are used to predict future climate change, and also to assist maritime activities in the Arctic region, which can be dangerous and costly to navigate.



More information: *Nature Geoscience*. DOI: 10.1038/ngeo248

Provided by University College London

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