

# Antarctic seals can help predict ice sheet melt

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Credit: University of East Anglia

Two species of seal found in Antarctic seas are helping scientists collect data about the temperature and salinity of waters around vulnerable ice sheets in West Antarctica.

Environmental scientists at the University of East Anglia (UEA) have been investigating ways of studying warm, salty, deep [water](#) in the Amundsen Sea, in the Southern Ocean. Understanding more about how this water gets towards the ice shelves by measuring its temperature, salinity and depth, will help climate change modellers make more

accurate predictions about how rapidly the Antarctic ice sheet is melting.

As the ice in west Antarctica melts, it has been estimated that sea levels could rise by up to 3.2 metres, with much of the water draining through two glaciers – Pine Island Glacier and Thwaites Glacier – in the Amundsen Sea. Estimates of future [sea level rise](#) vary a lot and scientists need year-round observations to assess and improve climate change models.

Gathering data in summer months is relatively straightforward but getting ships near the area during the winter is impossible because the area is covered in a thick blanket of sea ice. The only information available is from 'moorings,' strings of measurement devices anchored to the sea floor. These can collect data from a few fixed locations, but they cannot measure near the sea surface at all because the huge icebergs would collide with them.

To address this, the UEA team set up a collaboration with the Sea Mammal Research Unit at the University of St Andrews who were interested in recording the feeding behaviours of seals in the region. The expedition built on an idea originally suggested by scientists at the British Antarctic Survey when they became aware of a large elephant seal haulout on islands near the Pine island Glacier.

Funded by the Natural Environment Research Council's Ice Sheet Stability Research Programme (iSTAR), the experiment began in February 2014, when the team tagged seven southern elephant seals and seven Weddell seals with devices that can send information via satellite. Measurements of the warmth and saltiness of the water were sent by the seals as they moved around the area and dived from the surface of the ocean down through the water to the sea bed in their hunt for food.

Over a period of nine months, throughout the Antarctic winter, the team

collected data from more than 10,000 dives over an area of around 150,000 square km. The seals continued to send back signals until they moulted and the devices dropped off.

Analysing the findings, published in *Geophysical Research Letters*, the researchers discovered that not only is the layer of CDW thicker in winter, it is also warmer and saltier than during summer months. This suggests that there is likely to be more melting of the ice sheets during the winter months. The temperature differences were less marked closer to one of the glaciers, in a region called Pine Island Bay, possibly because ocean currents, called gyres, recirculate the water.

"We knew very little about what to expect from this research, since this is the first time that data has been collected in this way in this area," says Helen Mallett, who led the study at UEA. "We were able to collect much more information from the seals than all the previous ship-based surveys in the area combined and it was clear that, at least during the seasons we observed, there were substantial differences in temperature between the seasons.

"Although more will need to be done to measure these differences over a number of years, it's clear that enlisting seals to collect this kind of ocean data will offer useful insights for climate change modellers who are attempting to predict how fast sea levels will rise."

The data will be useful to marine biologists as well, as it will provide new understanding of the foraging behaviour of seals in the Amundsen Sea, and how that might be affected by [climate change](#), as well as commercial fisheries.

The UEA and St Andrews team are heading back to the Amundsen Sea in 2019 to enlist the help of another group of seals to monitor this remote region as part of the recently announced International Thwaites

Glacier Collaboration.

"Variation in the Distribution and Properties of Circumpolar Deep Water in the Eastern Amundsen Sea, on Seasonal Timescales, Using Seal-Borne Tags" is published in *Geophysical Research Letters* on Tuesday, May 15.

**More information:** K. M. Assmann et al. Variability of Circumpolar Deep Water transport onto the Amundsen Sea Continental shelf through a shelf break trough, *Journal of Geophysical Research: Oceans* (2013).  
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Provided by University of East Anglia

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