

Arctic warming linked to combination of reduced sea ice and global atmospheric warming

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(Phys.org) -- The combination of melting sea ice and global atmospheric warming are contributing to the high rate of warming in the Arctic, where temperatures are increasing up to four times faster than the global average, a new University of Melbourne study has shown.

Professor Ian Simmonds from the University of Melbourne's School of Earth Sciences co-authored the study and said the new information showed this combined effect at both ground and atmospheric level played a key role in increasing the rate of [warming](#) in the [Arctic](#).

“Loss of [sea ice](#) contributes to ground level warming while global warming intensifies atmospheric circulation and contributes to increased temperatures higher in the Arctic atmosphere,” Professor Simmonds said.

Lead author, Dr James Screen of the School of Earth Sciences at the University of Melbourne said the sea ice acted like a shiny lid on the Arctic Ocean.

“When it is heated, it reflects most of the incoming sunlight back into space. When the sea ice melts, more heat is absorbed by the water. The warmer water then heats the atmosphere above it,” he said.

Professor Simmonds said as temperatures increase across the globe, so

does the intensity of atmospheric circulation.

“This circulation transports energy to the Arctic region, increasing temperatures further up in the atmosphere,” he said.

“Water vapour is a very strong greenhouse gas. As the atmosphere warms it can hold more moisture, which acts as a positive feedback signal, increasing the greenhouse effect. However, in the cold Arctic where there is less moisture in the air, this positive feedback is much weaker hence the ‘direct’ greenhouse effect is smaller in the Arctic than elsewhere.

“Even though the Arctic region has a relatively small [greenhouse effect](#), the effect of the melted ice combined with greater transports of heat from the south are more than enough to make up for this modest ‘local’ greenhouse warming.”

The study was published in the prestigious *Geophysical Research Letters* and featured in *Nature* as one of ‘The most viewed papers in science’.

Provided by University of Melbourne

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