# Antarctic ice yields student research discovery

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While researching the “bottom of the world,” Jeffrey Geddes made a discovery
about sea ice formation that has the potential to provide scientists with another piece of the climate-change puzzle.

As part of a research project on the St. George campus last summer, Geddes, an undergraduate science student, was analysing data supplied by a NASA satellite when he detected a previously unknown multi-year ice formation cycle in Antarctica’s Cosmonaut Sea. Climate scientists and researchers study sea ice and its formation patterns in the polar regions because sea ice, or the lack of it, affects local climates and potentially impacts the global weather system. Geddes determined that large bodies of water surrounded by ice on three sides — known as embayments — tend to occur every three years in the Cosmonaut Sea.

“Our discovery that embayments occur approximately every three years at the same time in the same place seems to indicate there may be some inherent predictability in the variability of sea ice in that region,” said Geddes, now a fourth-year student at the University of Toronto Mississauga.

Working in the lab of Professor Kent Moore, chair of the chemical and physical sciences, Geddes studied NASA data on ice formations in the Cosmonaut Sea from 1979 to 2004. He found that while the volume of sea ice might change from year to year embayments and polynyas (embayments after they become enclosed on all four sides by the ice

pack) reappear at regular three-year intervals in the same areas.

Moore supervised Geddes' project, which was funded by a grant from the Natural Sciences and Engineering Research Council of Canada, and said studying the formation of sea ice is important because in Antarctic waters ice serves as an insulator that traps heat in the ocean. When large open stretches of water occur during the austral winter, there's no insulation and heat from the ocean can transfer to the atmosphere.

"The climate system is clearly under stress right now but we don't understand all the variables," Moore said, adding that Geddes' contribution has been to "place another piece into the puzzle. We now understand that in this part of the world, there are processes going on related to this repeating variation of sea-ice cover."

Geddes has published an article he wrote on his findings in a recent edition of *Geophysical Research Letters*, a leading journal of the geophysical sciences.

Moore noted that Geddes' paper has received positive reviews for its insights about sea-ice formation in the Cosmonaut Sea. He also noted Geddes accomplished the work and wrote his paper while an undergraduate.

"Generally, writing scientific papers is quite a challenge for most people. He wrote the paper, he produced everything and for an undergraduate to do that, I think, is a singular accomplishment," Moore said.

Source: University of Toronto

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