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Mathematicians help predict global warming impact

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Floating between giant slabs of Antarctic ice, the RSV Aurora Australis rests, sheltering its inhabitants from the stark and freezing conditions outside.

Two residents of the Australian research ship are a U student and professor, who are studying the flow of salt water through ice, which can be applied to forecast the impact of global warming.

Ken Golden, a mathematics professor at the U, has been studying the properties of sea ice since he was a teenager. It wasn't until a trip to the Antarctic in 1994 where he discovered water spread out through ice layers -- a property he is still researching during his voyage to Antarctica.

Golden's recent discoveries show that brine flowing through floating masses of ice follow a formula of permeability that applies to other porous materials. The discovery could make forecasts about the effect of global warming on polar ice packs more accurate.

Though he is working mostly with sea ice biologists and sea physicists on his expedition, Golden's role as a mathematician is essential in the research process. His tasks include measuring ice and applying the numbers to a complex mathematical formula that he developed to assess how easily fluid flows through the ice, as determined by its temperature and salinity.

Not only applicable to sea ice, Golden's mathematical formula can be applied to various other permeability situations and functions. Similar formulas can describe how water flows through sedimentary rocks in the earth's crust or how osteoporosis can permeate bone, which has a similar density and structure to sea ice.

Accompanying Golden in Antarctica is Adam Gully, a bachelor's and master's mathematics student who has worked with him for the past three years.

"I feel very honored and lucky that I was selected by professor Golden to help with some of the research he is conducting here in Antarctica," Gully said. "The entire experience has been very memorable."

One of Golden's students is using his model to study lungs in bioengineering.

Megan Morris a bachelor's and master's student in biomedical engineering, has studied with professor Golden since her freshman year.

Golden's latest report on ice permeability properties, which he co-wrote with colleagues from the U, as well as with faculty from the University of Alaska Fairbanks, was published in the upcoming issue of the journal *Geophysical Research Letters*.

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Quote of the Day

"After a year like the one ASUU has had -- we have a Graduation Guarantee and tax-free textbooks -- it was a shame to see such a lack of ambition and so few thoughts that escaped the box. We had to base our decision on experience and promise. Focus obviously has the experience."

-- *The Daily Utah Chronicle* on the ASUU elections.

