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Predicting changes in the Arctic with The Geotraces Project

## FEATURES FALL 2014

# Predicting changes in the Arctic with The Geotraces Project

Sitting on the patio outside the Peter Wall Institute for Advanced Studies building at UBC, Dr. Philippe Tortell points at a nearby plant.

"Imagine we put a big, gas-tight glass jar over it," he says. Shining a light on the plant, an observer could measure an increase in oxygen as the plant photosynthesizes. Likewise, they could measure an increase in CO<sub>2</sub> when the light was switched off. Doing this over the course of weeks or months or years, the observer would be in effect measuring the biological productivity of the system using just the gases as indicators.

"Plants are the basis of the ecosystem. If I can measure productivity in plants, then I can say, for example, how many fish, or how many humans for that matter I can support in that ecosystem," says the Associate Professor in UBC's Department of Earth, Ocean and Atmospheric Sciences, and 2014 Wall Scholar ([/programs-awardees/wall-scholars/](#)).

"If you can do that, you can start to understand how the system responds to environmental change."

This is the basis of Dr. Tortell's work in the Arctic – using dissolved gases in the oceans to measure the overall productivity of the system.



Dr. Philippe Tortell, UBC  
Department of Earth, Ocean and  
Atmospheric Sciences, and 2014  
Wall Scholar.



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Continuing sea ice melt is making it possible for scientists like Dr. Tortell and his colleagues to conduct research in large parts of the Arctic for the first time.

Two years ago Dr. Tortell was instrumental in bringing an international group of Arctic scientists together at the Peter Wall Institute for an urgent workshop, titled “*The Big Melt*”, on the physical state of the changing Arctic. His current work is a continuation of a working group that emerged out of that workshop, The Geotraces Project.

The project is trying to get “a snapshot of what current conditions are like, chemically, physically and biologically in the Arctic, to use as a yardstick to measure future impacts,” he explains. But it’s already late in the game. “We’re scrambling. We should have done this 20, 30 years ago.”

However, Dr. Tortell admits, now is the first time that this science is possible in some places. Ships could not have penetrated the sea ice in large parts of the Arctic until recently, making the work increasingly important just as it becomes possible to do. So far, it looks promising: in July and August 2015 he and a team of researchers will be aboard the Victoria-built CCGS *Amundsen* for six weeks measuring dissolved gases in the waters of the Arctic.

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Dr. Tortell and a team of researchers spent four days aboard the ship Laurence Gould (pictured above), travelling from South America to the Palmer research station on Anvers Island in Antarctica for a 2012/2013 research trip. Next, Dr. Tortell will travel to the High Arctic aboard the Victoria-built CCGS *Amundsen* for six weeks in 2015.

Just as the international workshop in 2012 involved a public panel at the Vancouver Aquarium, Dr. Tortell will bring some of next summer’s science home to Vancouverites too. He hopes to put on a program at the Vancouver Aquarium’s summer camps in which the scientists will interact with the students via satellite link from the High Arctic. He plans to put on more public panel events as well. To

High Arctic. He plans to put on more public panel events as well. In the long term, he hopes to raise money to create permanent displays for the aquarium's new Arctic gallery.

In order not to have to rely on expensive and limited sea time, there is another Arctic research resource that Dr. Tortell would like to be involved with. Ground was broken on the incomplete Canadian High Arctic Research Station in Cambridge Bay, Nunavut, just this past summer during Prime Minister Stephen Harper's annual Arctic visit, but Dr. Tortell is hoping that when built, it will include facilities for taking measurements from nearby bodies of water.



The new Canadian High Arctic Research Station in Cambridge Bay, Nunavut, under construction in September 2014. When complete, the station will serve as a hub for scientific research in Canada's North. Photo via CambridgeBayWeather (<http://commons.wikimedia.org/wiki/User:CambridgeBayWeather>).

Like "*The Big Melt*", the trip aboard the CCGS *Amundsen* next summer will be a multidisciplinary effort including scientists studying trace elements, gases, salinity, acidity, and other physical indicators in Arctic waters. It may be the culmination of a long planning process, but Dr. Tortell sees it more as a node on a longer timeline.

"It's very much a continuation of '*The Big Melt*'," he says. "I don't see this as a one-off; it's part of this big arc that I'm following."

Read more about "*The Big Melt*" in the fall 2012 issue of the Wall Papers, online here. ([/files/pdf/TheWallMag\\_oct3012\\_pages.pdf](/files/pdf/TheWallMag_oct3012_pages.pdf))

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