

Picture by: Elizabeth Jones

# COLD FACTS

Rothera Station 2014 - 2015

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## Objectives

Human activity has rapidly increased the carbon dioxide (CO<sub>2</sub>) in the atmosphere, leading to global warming. About 40% of the CO<sub>2</sub> is taken-up by the oceans which changes the ocean chemistry by reducing the pH and leads to ocean acidification – the other CO<sub>2</sub> problem.

The West Antarctic Peninsula region has the most rapidly increasing temperatures of the Southern hemisphere, which leads to warming of the ocean and increased melting of the sea ice and glaciers. The increasing CO<sub>2</sub> in Antarctic surface and deep waters is changing the ocean chemistry, which has implications for the whole Antarctic ecosystem.

Rothera Research Station, Marguerite Bay, is an excellent 'natural laboratory' to study the effects of melt of sea ice and glaciers alongside the changes in ocean chemistry.

The overall aim of this project is to improve our understanding of the oceanic CO<sub>2</sub> in the changing Antarctic by:

1. Starting a new weekly time series of oceanic CO<sub>2</sub> in Marguerite Bay – collecting data through the Antarctic summer and winter.
2. Comparing the effects of plankton, deep CO<sub>2</sub>-rich (low pH) water and sea ice and glacial melt at different sites during the summer.
3. Studying CO<sub>2</sub> in sea ice – drilling for ice cores during spring-summer sea ice melt and winter sea ice formation seasons.
4. Carrying out biological experiments of the seawater plankton community with future high-CO<sub>2</sub> (low pH) conditions.

## Team



**Dr. Elizabeth Jones - Postdoctoral Researcher,  
University of Groningen and the Netherlands Institute  
for Sea Research (NIOZ)**

Postdoctoral scientist passionate about the planet in a changing climate. Key interests include (1) carbonate chemistry in polar oceans and the role of sea ice, (2) carbon cycle in coral reefs and (3) ocean acidification. Dedicated to research and outreach through Antarctic expeditions and international collaborations.

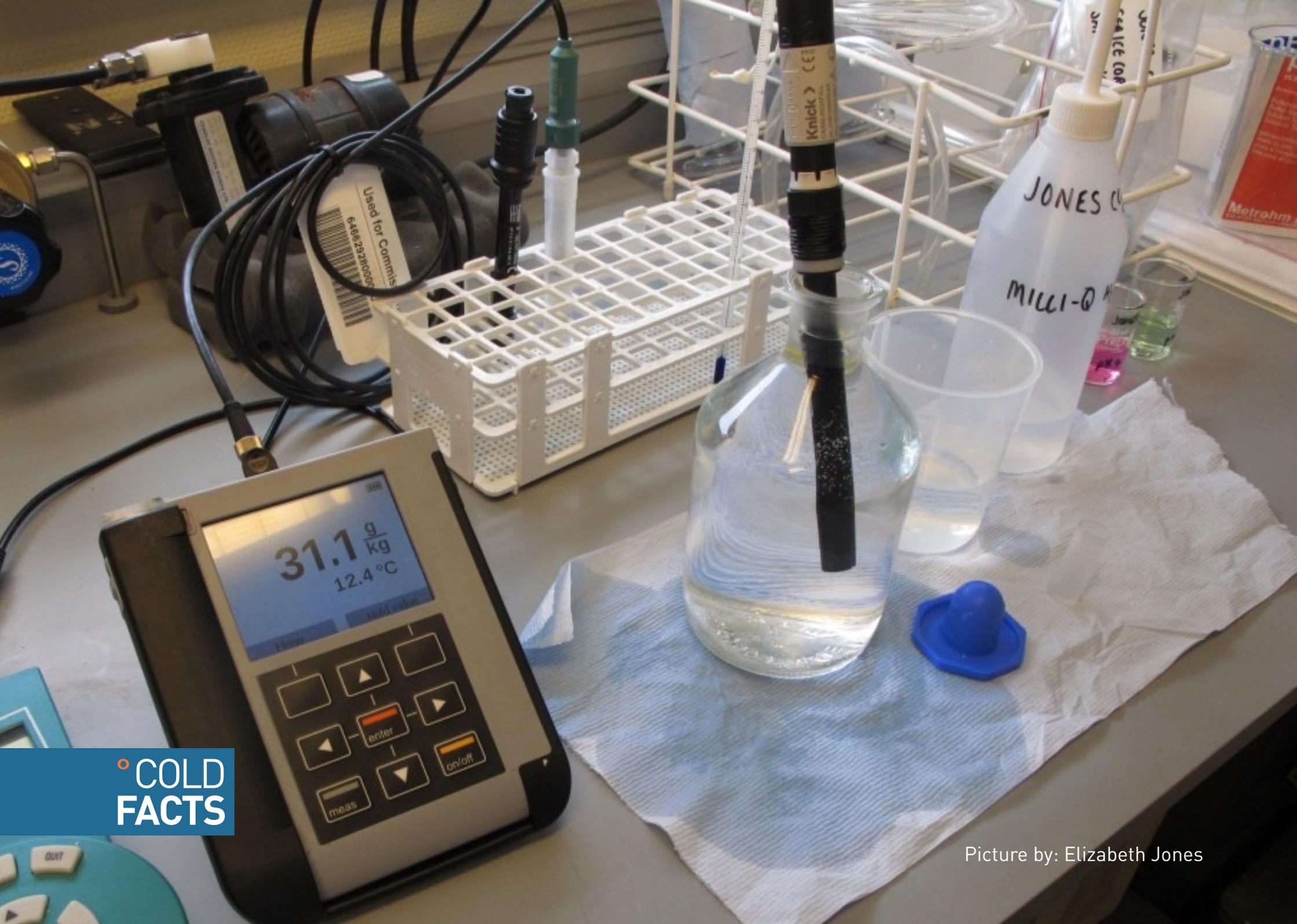


## Activities in the field

Seawater samples are taken at different locations across the bay, e.g., in front of the glaciers, over the deep central part of the bay, furthest offshore. Ice cores are drilled at the same location when sea ice covered the bay. A handheld unit and sensors (Portavo by Knick, Germany) were used out in the field for measuring salinity (conductivity) and pH as an instant indicator of changes to the seawater, e.g., sea ice melt or deep mixing of water layers after storms.

Ice cores are cut into sections and allowed to melt in the lab. The Portavo unit and sensors are being used in the lab to measure salinity and pH of melted ice core sections, seawater and experiment samples to provide essential supplementary data. This way changes in seawater properties can be tracked as part of the project objectives. All samples are then analysed on a VINDTA instrument (Marianda, Germany) for the total CO<sub>2</sub> chemistry.

This project is funded by the new Netherlands Polar Program of NWO in collaboration with the British Antarctic Survey at Rothera Research Station, Antarctica. Laboratory equipment, expertise and technical support is provided by the Netherlands Institute for Sea Research, University of Groningen and the Alfred Wegener Institute for Polar and Marine Research. Handheld seawater sensors were supplied by Cold Facts and sponsored by Knick.



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