Award Details

Gaseous tracers of deep-water formation, mixing and ocean productivity

Research Details

Competition Year:	2006	**Fiscal Year:**	2006-2007
Project Lead Name:	Hamme, Roberta	**Institution:**	University of Victoria
Department:	Earth and Ocean Sciences, School of	**Province:**	British Columbia
Award Amount:	24,200	**Installment:**	1 - 5
Program:	Discovery Grants Program - Individual	**Selection Committee:**	Environmental Earth Sciences
Research Subject:	Chemical oceanography	**Area of Application:**	Oceans, seas and estuaries
Co-Researchers:	No Co-Researcher	**Partners:**	No Partners

Award Summary

The recent increase in atmospheric carbon dioxide and its potential effects on our climate have made understanding the way carbon moves between different parts of the environment of utmost importance to our society. Because many processes that produce carbon dioxide consume oxygen and vice versa (fossil fuel combustion, photosynthesis, and respiration for example), it is increasingly important to understand the cycling of oxygen as an additional tool to better determine the movement of carbon. My proposed research program focuses on what drives the air-sea exchange and internal oceanic cycling of these climatically important gases. The oxygen and carbon dioxide content of the oceans is controlled by both biological and physical processes, which can be challenging to sort out. I overcome this challenge by making measurements of gases dissolved in the ocean that have little or no biological role (inert gases like neon, nitrogen, argon, krypton and xenon), and then using those measurements to figure out how physical processes like temperature change, mixing, and air-sea gas exchange affect oxygen and carbon dioxide. This research program focuses on determining the rates of processes important to gas cycling in select places, like the Labrador Sea, where extreme winter conditions create cold, dense surface water that descends to fill the deep ocean. I will also use gas measurements to help determine the rate at which cold and warm waters mix in the ocean. Combining measurements of oxygen and inert gases allows me to distinguish the amount of oxygen produced by photosynthesis in the ocean from the amount added by physical processes. Samples of dissolved oxygen and the inert gases will be collected from the ocean west of Vancouver Island and used to determine the rate of biological productivity, which controls the transport of carbon from the surface to the deep sea by falling particles. Together these studies will help us to understand the current state of carbon dioxide and oxygen cycles and to better predict their future changes.