OASIS

Ocean Atmosphere Sea Ice Snowpack

BACKGROUND

Anyone who looks at a map of the world can easily see that the Arctic is located far away from the pollution created by cities, factories and farms. It is therefore often assumed that the Arctic is a pristine environment free from pollutants. In reality we now know that this is not the case. Many harmful chemicals that are foreign to the natural environment are found in the Arctic. We need to know from where these chemicals come, how they find their way to the Arctic and if the Arctic environment will tolerate these chemicals. Moreover, the effects of climate change in the Arctic are no longer theoretical, changes are happening today and these changes will also affect how these polluting chemicals travel around the Arctic and where they end up. The goal of the OASIS scientific research program is part of this enterprise. In particular, such questions will be addressed as how chemicals like ozone and mercury in the air behave over the frozen Arctic Ocean, and what the resulting impact on the Arctic will be.

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OASIS is an international research program that studies how chemicals move between the Ocean , the Atmosphere, the Sea Ice and the Snow pack. OASIS-CANADA is the Canadian part of OASIS-international.

INTRODUCTION

Every year when the sun comes up in the Arctic spring, the potent greenhouse gas OZONE and the toxic chemical MERCURY disappear from the air near the ground along the coast of the frozen ocean. It is thought that this is caused by a combination of sunlight, snow and ice, and the low temperature over the frozen ocean. With this project we hope to learn what truly causes the "disappearing act" of these two polluting chemicals, and whether the disappearing mercury ends up in the animals living in the marine world. Moreover, we hear yearly that the ice cover over the Arctic Ocean is decreasing, and we don't know what this will mean for this disappearing act. We can not answer that question until we know how it happens.

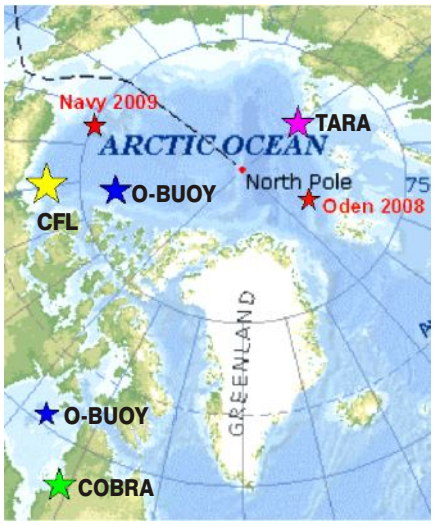
Until now all studies were taking place at the coast by the Ocean. The OASIS-CANADA project will take these studies over the ocean onto the ice.

Our planned research will take place in the following areas:

- On the Beaufort Sea on the icebreaker CCGS Amundsen
- On the Beaufort Sea and Hudson Bay using special ocean buoys left out on the ice to travel by themselves
- Over most of the Arctic Ocean on a drifting French sailboat named TARA
- Over the Arctic Ocean at an ice camp near Barrow, Alaska
- On Hudson Bay, accessed from Kuujjuarapik/Whapmagoostui, Quebec

OBJECTIVES

Our plan is to take samples of air from the research sites during the activities described under (Field Research Studies for OASIS-CANADA) and use the results from these samples to find out what causes ozone and mercury to disappear from the surface air.

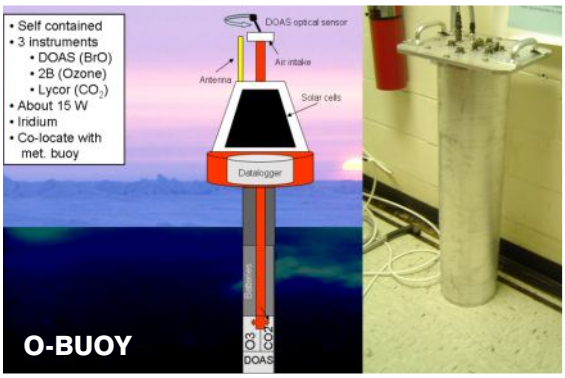


WHY IS THIS IMPORTANT TO KNOW?

Once we understand what makes the ozone and mercury disappear we can, with the help from other scientists, answer these broader questions:

- Does the mercury that disappears from the air end up in the Arctic food chain?
- There is pollution in the Arctic spring coming from down south. What will happen to this pollution if there is less ozone in the air?
- What will happen to the ozone and mercury if the ice goes away with global warming? Will this make things better or worse?

FIELD RESEARCH STUDIES FOR OASIS-CANADA



Circumpolar Flaw Lead Study (CFL)

We are participating in the CFL study on board the Canadian Amundsen ice breaker so we can collect air samples to measure mercury and ozone right on the Beaufort Sea. There will be many scientists on this ship collecting other types of samples and we will work with them to meet our common objectives.

OOTI (Out On The Ice)

An Arctic sled has been outfitted with sophisticated hi-tech equipment to measure how fast chemicals move between the air, and the snow and ice. This sled will sit right on the ice and samples will be collected and analyzed on the spot. To make this possible all the instruments on the OOTI sled are battery operated and samples can be taken when nobody is present. To help us keeping an eye out on what is going on, the instruments are supervised via a Web camera. These pictures, and the analysis results are sent directly by long range radio contact to a building at the coast, or to the icebreaker. The sled will be moved from one spot to the next close to open water and measure for a day or two at a time.

Ozone-buoys or (O-buoys)

We will design and construct ocean buoys that house instruments to measure year-long concentrations of ozone, carbon dioxide and other chemicals. These O-buoys will be released into the ocean at several spots and left to collect air samples as they travel with the sea ice and ocean currents. The data will be retrieved via satellites and the instruments will be powered with solar panels and batteries.

COBRA (Combined iodine and bromine release on the arctic atmosphere)

COBRA is a research project led by British scientists at Kuujjuarapik/Whapmagoostui, Quebec and we will join them on this study. The goal of this project is to understand how chemicals in sea salts (iodine and bromine) from the water in the Hudson Bay affect the disappearance of chemicals like ozone and mercury from the air. Moreover, scientists from Montreal plan to determine what happens with mercury once it has disappeared from the air.

TARA

We are sampling ozone in the air from the French sailboat TARA, which has been drifting in the frozen Arctic Ocean since September 2006.

We will also collaborate with many other OASIS scientists in a study called "OASIS-09" which will take place at Barrow Alaska, and the nearby US Navy Ice camp. Other venues in the planning stage include participation on the cruise of the Swedish Icebreaker Oden (summer 2008), and the North Pole Environmental Observatory (NPEO - spring 2009).