

Summary of ArcticNet 2005 Leq 1 physical operations

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On August 5th 2005 the CCGS Amundsen left Québec City with 34 scientists on board from Canada, Spain, Finland, England and Japan. For six weeks, the ship sailed across Baffin Bay, the Northwest Passage and Beaufort Sea, collecting physical data to study how climate changes will affect the Canadian High Arctic and how those changes will vary from West to East. Here, we present an overview of the physical oceanography sampling operations. The whole West to East transect was sampled with priority given to the regions already covered in the past by the NOW and CASES programs. On top of the ArcticNet CORE data, turbulence measurements will allow us to better study mixing processes in the ocean surface layer.

ROUTE

ArcticNet sampling campaign began on August 14 near Pond Inlet. For 19 days, we sailed across the NOW polynya region where we did a series of CTD transects and deployed four moorings. On August 23rd, we started our journey across the Northwest Passage where time and ice conditions limited our sampling capacities. On October 1st, we finally reached the Gulf of Amundsen and the Beaufort Sea where we did intensive sampling and moorings retrieving and deployment. On Figure 1, the sailing route is represented as a red line and the yellow stars are the mooring locations. The positions of CTD and SCAMP casts are not shown.



locations are shown as yellow stars.

INSTRUMENTS

Table 1 present a summary of the physical sampling effort done during this mission.

The rosette was equipped with a CTD SeaBird 911+ and was one of the most useful instruments. It provided vertical profiles of CORE water column parameters and water for more than half of the teams on board the ship.

The SCAMP (Self Contained Autonomous MicroProfiler) was used each time the schedule allowed it. It provided measurements of temperature and salinity fluctuations at the micro-scale (1 mm) allowing estimations and study of the turbulent mixing occurring in the surface mixed layer.

The moored instruments, once recovered, will provide us with data about temperature, salinity, currents speed and direction for a whole year. The ship-mounted ADCP (Acoustic Doppler Current Profiler) measured the water column currents speed variability along the ship route. Finally, the thermosalinograph installed in the ship continuously recorded the temperature and salinity at 4 m along the cruise track.

RESEARCH PROJECTS

We will focus on the mixed layer formation and evolution. Also of interest are the processes controling water exchange between the Eastern and Western Canadian Arctic

Physics team sampling

Rosette	SCAMP	Moorings lines	Hull ADCP
 137 casts 54 in NOW region. 19 in NW passage. 64 in Beaufort Sea and Amundsen Gulf. 1611 bottles closed 8 transects 6 in NOW polynya region. 1 in Beaufort Sea. A 13 hours time series in Beaufort Sea. The following parameters were recorded: Temperature, salinity, oxygen, fluorescence, transmissivity, pH, irradiance, nitrates. 	 44 casts 10 different stations Sampling was limited to the surface layer. Between 2 and 7 casts were recorded in the same locations- Most of the casts were recorded close in time to CTD casts allowing comparison. The following parameters were recorded: Temperature, salinity, fluorescence and irradiance. 	 6 moorings lines were retrieved All in Beaufort Sea. They were deployed during CASES program. 8 moorings lines were deployed 4 in NOW polynia region. 4 in Beaufort Sea. Sampling frequency of once every hour or half an hour. They included: 17 Aanderaa current meters. 6 RDI ADCP (Acoustic Doppler Current Profiler). 	 42 days of constant recording Covering the first 300 m. 20 recordings / minute. Thermosalinograph 42 days of constant recording Inflow depth: 4 m.

Table 1 : Summary of physical sampling during ArcticNet 2005 Leg 1

Preliminary Results

ROSETTE

Some CTD transects plots were drawn during the cruise. Of course, those are uncorrected raw data and will be reprocessed as soon as the quality control will be done. Some of those transects correspond in time and position to other transects sampled during NOW and CASES programs.

Figure 2 represent the same transect

period.

sampled many time during NOW program and again this year during ArcticNet. The comparison of the plots suggests a surface layer up to 2°C warmer in August 2005 than during any previous sampling



Figure 2 : West to East temperature (°C) transect in the southern portion (76°N) of the NOW polynia region sampled during different months and years.

SCAMP

Vertical turbulence profile in Victoria Strait (- w'T' = K dT/dz).The temperature microstructure is an indicator of the turbulent mixing rates. In Figure 3, observe that vigorous mixing is occurring between 2 and 5 m.

