

WHP Ref. No.: PR6
Last updated: 3 May 1994

I. CRUISE REPORT: Repeat Hydrography on Line P

1. Cruise Narrative

a. Highlights

WOCE Section: PR6

EXPCODE: 18DD9401/1
Chief Scientist: Ron Perkin, IOS BC
Ship: John P. Tully
Port of call: Esquimalt, B.C.
Cruise dates: February 7 to February 18, 1994

With the Tully having just completed a major overhaul, the cruise began with some testing of engines, sounders and generators while proceeding to Esquimalt on a sunny and cold February morning. At Esquimalt, the WOCE survey winch(Lantec), was loaded using the large crane at the Esquimalt Graving Dock. Since the last cruise, the Lantec winch had been equipped with a new .322" dia., 8000 m cable and new controls allowing finer adjustment of the winch speed. Once again, a system of "bungee" cords was installed to afford a measure of heave compensation.

One Rosette cast to the bottom was completed at Station P4 on Feb. 8, but shortly thereafter the ship came under the influence of a North Pacific low with wind speeds of 30 knots, building to 45 knots and up to 60 knots in squalls. Initially, it was possible to do a few CTD casts but the seas soon built to such a state that it was dangerous to put anything over the stern. The low stalled over the northern British Columbia coast for the next few days and deepened somewhat giving us consistent head winds and opposing seas to the point where the Tully, in seas up to 15 m, was making little more than one knot toward Station P26 (Station Papa). By Feb. 13, it became apparent from weather forecasts that we would not be able to do the planned experiments at Station P26 even if the ship could reach it in time. We therefore did the upper ocean sampling and CTD cast to the bottom at a position between stations P23 and P24 on Feb. 13, and started the return leg, picking up missed stations as weather permitted on the way back. By Feb. 18, we were able to complete 18 CTD stations, 2 with Rosette water samples, and enough upper ocean sampling to allow completion of much of the upper ocean chemistry and productivity studies.

All of the CTD data and water samples were collected with a Guildline 8737 "WOCE CTD" in combination with a 24 bottle G.O. rosette equipped with digital reversing thermometers. For this trip, a transmissometer was added to the CTD's suite of sensors. New logging and processing software was tested and modified according to users' requests during the cruise. Nutrients, including ammonia for productivity studies, salinity and oxygen were analyzed on board. Net hauls, nitrogen cycle and productivity measurements were made.

2. Cruise Summary Information

a. Cruise track

The cruise took place along Line P (PR6) beginning at the mouth of Juan de Fuca Strait on the Canadian West Coast, and extending westward 1200 km toward Station Papa (MP26, 50° N, 145° W) but, this time, reaching only as far as 49° 07' N, 132° 40' W. The return leg, was along the same track.

c. Floats and Drifters deployed

- no drifters or floats could be safely deployed because of bad weather.

d. Principal Investigators:

| Measurements | Principal Investigator | Institution |
|-------------------|------------------------|-------------|
| CO2 | C. S. Wong | IOS BC |
| Productivity | Philip Boyd | UBC |
| Nutrients | Frank Whitney | IOS BC |
| Ocean Circulation | H. J. Freeland | IOS BC |

IOS BC - Institute of Ocean Sciences, 9860 West Saanich Road, Sidney, B.C., Canada, V8L 4B2
 UBC - University of British Columbia, Vancouver, B.C.

3. Preliminary Results

a. Narrative

The ship left the dock at IOS on the morning of Feb. 7 and proceeded with a series of shakedown tests of the refit (engines, generators, sounding equipment) in Saanich Inlet and in transit to Esquimalt. After loading the Lantec winch at Esquimalt Graving Dock, the cruise proceeded to Race Rocks to calibrate radio location gear then to the Straits of Juan de Fuca to begin the sampling program. After a good first day of sampling, mainly at station MP04, a period of high winds opposing seas began; up to 60 knots in squalls and up to 15 m wave height. This condition persisted until, on Feb. 13, it became apparent that the ship would not reach Station P in reasonable time and that the planned experiments could not be deployed. At some risk, sampling was done at the point of farthest progress, between station MP23 and MP24. The ship then returned, picking up the sampling program along Line P as conditions permitted. More moderate conditions on the return leg allowed completion of a large fraction of the scientific program. After unloading the Lantec winch and UBC equipment at Esquimalt, the ship returned to IOS on the evening of Feb. 18.

Although the cruise failed to reach Station P, most of the objectives of the cruise were met. A line of CTD/Rosette stations was done almost as far as station MP24; productivity experiments were completed; continuous sampling with the SAIL and RDI systems was done; trace metal, net tow, PAR and Tucker Trawl programs were at least partially accomplished; extra sampling for other researchers (Holdsworth, Strom and LaRoche) was done.

Our plans to intensify sampling and modify procedures for a WOCE one time survey in 1994 have been aided by this cruise. Thanks to our sea-going programmer, many improvements to the logging program were implemented. On-board analysis and processing of chemical and physical data will streamline the production of data reports and archive files. The transmissometer and back-up CTD were tested. Winch control was excellent and the Lantec performed well, even to the point of automatically slowing intake of line when wave motion generated large stresses.

The stern of the Tully is very active in a heavy sea, moving up and down by some 40 feet with the waves experienced on this cruise. Observations in heavy seas of the handling characteristics of the CTD/Rosette system and ship dynamics gave us confidence that we would be able to at least do a CTD cast in almost any weather. The technique of letting the ship settle into the wave troughs and keeping the ship under way by about 1 knot relieved part of the line stress associated with the wave motion.

b. Major Problems

Station P could not be reached in a reasonable time because opposing wind and heavy seas reduced ship speed to 1-2 knots.

c. Other incidents

None.