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KAIYO Cruise Report

KY09-08 Leg 2

Finestructure measurements in subthermocline oceans for vertical mixing parameterisation using seismography

Izu-Ogasawara Area

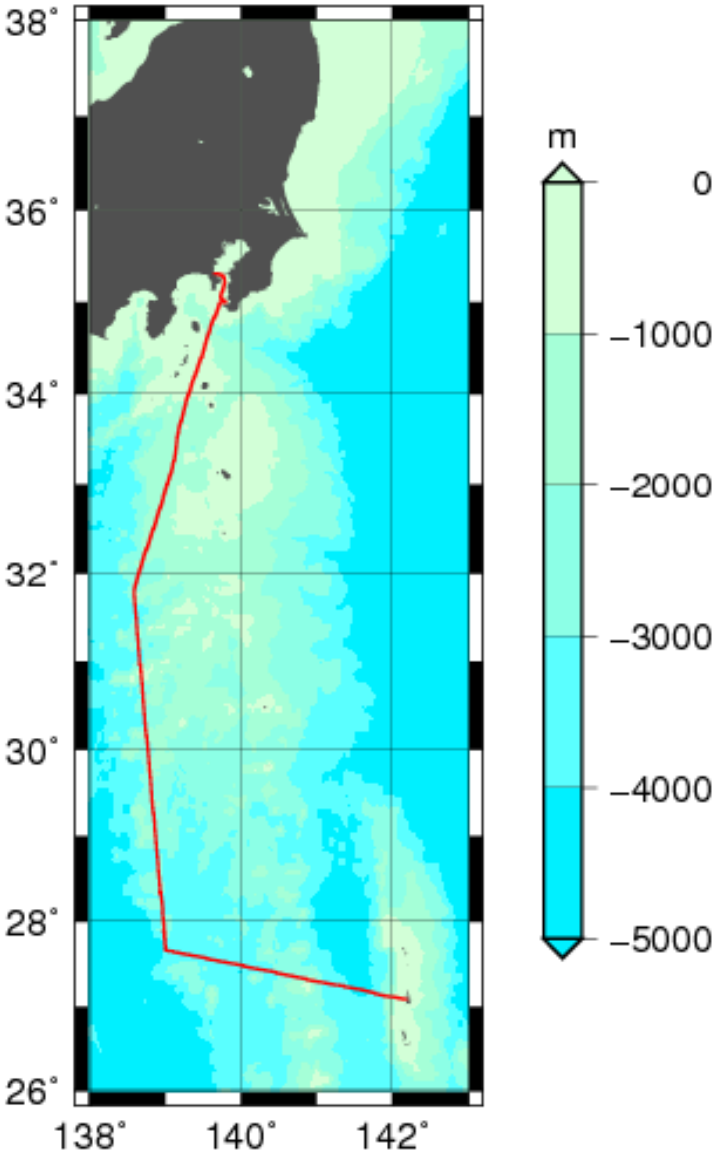
28 September 2009 – 2 October 2009

Japan Agency for Marine-Earth Science and Technology (JAMSTEC)

Contents:

1. Cruise Information

- Cruise number: **KY09-08 Leg2**
- Name of vessel: **R/V Kaiyo**
- Title of cruise: **Finestructure measurements in subthermocline oceans for vertical mixing parameterisation using seismography imaging**
- Title of proposal: **Finestructure measurements in subthermocline oceans for vertical mixing parameterisation using seismography imaging**
- Cruise period: **28 September 2009 – 2 Oct 2009**
- Port of call: **Futami, Chchijima to JAMSTEC Yokosuka Headquarter**
- Research Area: **Izu-Ogasawara**



2. Researchers

- Chief Scientist: **Katsuro KATSUMATA [JAMSTEC]**
- Representative of science party**: Katsuro KATSUMATA [JAMSTEC]**
- Science Party**: Kanako YOKOTA[JAMSTEC]**

3. Overview of the Observation

- **Objectives:** Wiggly fine structures with horizontal scales of tens of kilometers have been visualised in impedance plots from multi-channel seismic reflection systems. The structures have been often found where the temperature drop with the depth is large (thermocline). We attempted to examine possible relationships between the fine structures and the velocity fine structures using XCP and CTD observations.
- **XCP measurements :** Expendable Current Profiler (XCP) measures the vertical profile of the horizontal current velocity down to about 1500 meters along with the temperature. The probe is deployed by hand over the side of the ship. The data are transmitted via radio while the ship steams away from the probe at about 2 knots. The measurement system including the probes are a product of Lockheed Martin, USA. Because of recent experiences of failure in the probe's triggering system, we deployed the probe firstly in a bucket on the deck filled with sea water. After ensuring that the triggering system successfully initialises the electric circuits and releases the sensor, we deployed the probe and the sensor over the side of the ship into the ocean. The depths, therefore, are not correct in the raw data. Out of 20 probes prepared, 1 failed the pre-deployment test; 2 failed after deployment with unknown reasons, 1 stopped prematurely (around 1200 dbar). Other 16 probes yielded good full-depth results.
- **CTD Measurements :** Conductivity-Temperature-Depth Profiler (CTD) measures the conductivity, temperature and pressure. From these quantitites, salinity hence density of the sea water is estimated. In this expedition, the CTD was used to estimate statistics of the finescale density stratification. After the first deployment, the altimeter and the internal pump stopped. No electrical problems were found. The problem appeared fixed during the downcast of the second deployment, but the data were extremely noisy during the upcast. It was found out after the second cast that the pressure housing of the CTD actually had flooded. It was suspected that the leak had started well before the present cruise because the electric parts were badly corroded.
- **Shipboard ADCP:** Relative currents were recorded continuously by Acoustic Doppler Current Profiler.

Cruise Log

2009/9/28 Departure from Futami, Chichijima

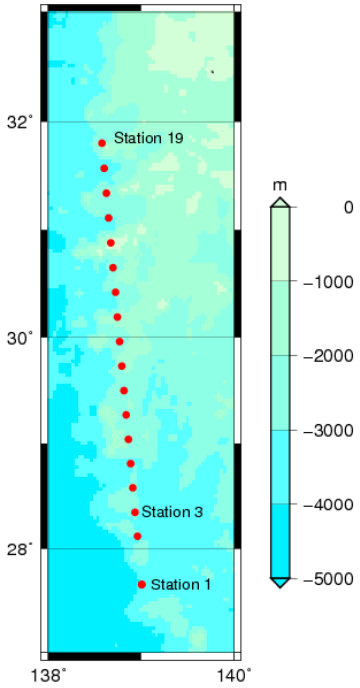
2009/9/29 XCP observation

2009/9/30 XCP observation

2009/10/1 Steam to Yokosuka

2009/10/2 Arrival at JAMSTEC, Yokosuka

XCP Stations



Cast	Station	Time	Latitude (N)	Longitude (E)	Remark
1	1	09/29 07:38	27-39.4059	139-00.6270	Follows CTD cast #1, Bad probe
2	1	09/29 11:12	27-39.1319	139-00.3455	
3	3	09/29 15:28	28-07.0039	138-57.6946	Follows CTD cast #2
4	4	09/29 17:09	28-20.7304	138-56.0576	
5	5	09/29 19:54	28-34.6246	138-54.6916	
6	6	09/29 21:28	28-48.4570	138-53.2650	Premature termination at 1200 dbar
7	7	09/29 22:55	29-02.3097	138-51.8460	
8	8	09/30 00:24	29-6.1282	138-50.4501	
9	9	09/30 01:50	29-29.9546	138-49.0370	
10	10	09/30 03:16	29-43.7480	138-47.6021	Bad probe
11	11	09/30 04:40	29-57.5111	138-46.1942	
12	12	09/30 06:07	30-11.3569	138-44.7626	
13	13	09/30 07:32	30-25.1857	138-43.4255	
14	14	09/30 09:04	30-38.9943	138-41.9116	
15	15	09/30 10:35	30-52.7856	138-40.4951	
16	16	09/30 12:06	31-06.5884	138-39.0779	
17	17	09/30 13:36	31-20.3926	138-37.6496	
18	18	09/30 15:07	31-34.2159	138-36.2545	

19	19	09/30 16:39	31-48.0670	138-34.8291	

4. Notice on Use

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