YK17-E01 Cruise Summary

1. Cruise information (Honda)

(1) Cruise designation (research vessel)

YK17-E01 (R/V YOKOSUKA)

(2) Cruise title and introduction

=Title=

Emergency Cruise for recovery/re-deployment of drifting NOAA KEO buoy

=Introduction=

The KEO time-series station in the western Pacific subtropical gyre was established in 2004 by Pacific Marine Environmental Laboratory (PMEL) of National Ocean and Atmosphere Administration (NOAA). For the sake of investigation of air-sea heat and carbon fluxes, a surface buoy mooring which is equipped with various physical and meteorological sensors has been deployed at KEO and has been turned around approximately once a year. In July 2017, the latest mooring system (S/N: KE-015) was deployed (sinker position: 32°25.24'N / 144°31.83'E) and started time-series observation. Since July 2014, adjacent to KEO buoy, JAMSTEC time-series sediment trap experiment has been conducted in order to investigate nutrient supply mechanism to the oligotrophic subtropical upper layer. For this purpose, JAMSTEC backscatter meters with fluorometer were also installed on KE-015 KEO buoy mooring line.

However, KEO buoy accidentally started to leave its nominal position on 19th October 2017. According to position data from GPS system on KEO buoy, in the early stage, KEO buoy drifted westward. Based on sensor signal, mooring system was suspected to be partitioned below 425 m and KEO buoy was suspected to drift with sensors upper 425 m including JAMSTEC backscatter meters. After KEO buoy met the Kuroshio current, it headed to north. Sequentially, in middle November, KEO buoy started to drift eastward along the Kuroshio extension. Although we were afraid of the worst scenario: KEO buoy would drift too far east to be recovered, fortunately, drifting KEO buoy left the Kuroshio extension in late November and headed to south. In early December, along weak clockwise flow south of the Kuroshio extension, KEO buoy was getting closer to its initial position. Indeed, it could have been worse.

After occurrence of this accident, NOAA informed this accident to the world and looked for any ships available for rescue of drifting KEO buoy, including ships from government (US / Japan coastguard) and private salvage company. On the other hand, NOAA consulted JAMSTE

about rescue of drifting KEO buoy. After long discussion, negotiation and big efforts, JAMSTEC decided to send JAMSTEC research vessel, R/V Yokosuka, for this mission under umbrella of Memorandum of Understanding (MOU) between JAMSTEC and NOAA.
After rigging mooring gears such as winch and winding machine and loading NOAA equipment, R/V Yokosuka sailed on 19th December 2017 from JAMSTEC Yokosuka headquarter pier.

(3) Principal Investigator (PI)

Makio Honda

Principal Research Scientist

Research and Development Center for Global Change (RCGC)

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

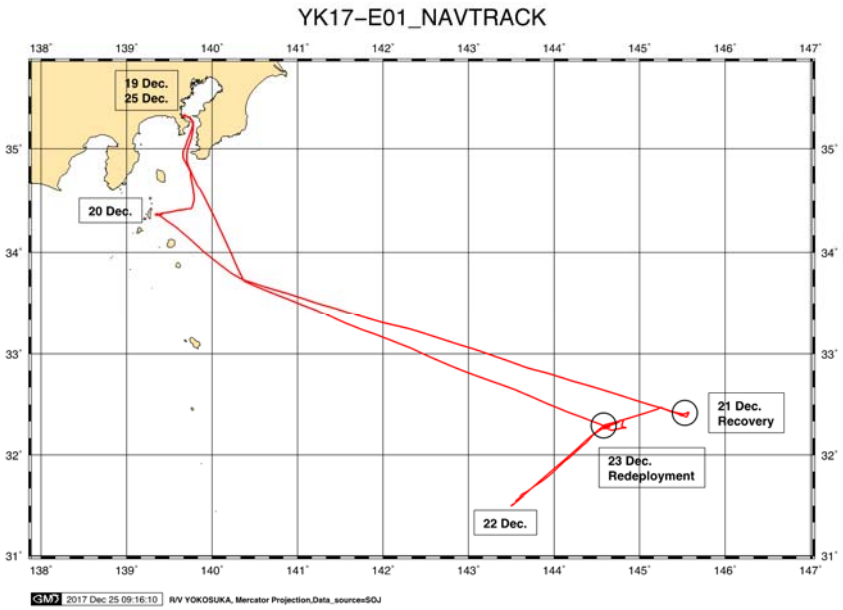
(4) Cruise period (port call)

19 December 2017 (JAMSTEC Yokosuka HQ) - 25 December 2017 (JAMSTEC Yokosuka HQ)

(5) Cruise region (geographical boundary)

The western North Pacific Subtropical area (30°N – 35°N / 140°E – 150°E)

(6) Cruise track



2. Outline of YK17-E01 (Honda)

(1) Objective of this cruise

To recover drifting KEO buoy

To re-deploy KEO buoy

To recover partitioned mooring remnants

(2) Cruise summary

Weather and sea condition was not always good for mooring work. We were forced to wait days of recovery and redeployment of KEO buoy for one day each. However, we successfully completed this “mission impossible”.

1) Recovery of drifting KEO buoy

In the early morning on 21st December 2017, the drifting KEO buoy was found at only about 60 miles eastward form the latest anchor position.

Recovery work was conducted safely and successfully. It was found that wire rope was partitioned at about 425 m water depth, just below 425 m CTD sensor. Curiously, there was a knot (or hitch) of wire rope about 13 m above 425 m CTD sensor.

2) Redeployment

After one day wait / preparation, KEO buoy was successfully re-deployed on 23rd December 2017. Anchor position was determined by using onboard SSBL system. Real time data obtained by KEO buoy mooring is available on NOAA PMEL Kuroshio extension observatory homepage (https://www.pmel.noaa.gov/ocs/). KEO buoy will be turnaround in summer 2018.

3) Recovery of partitioned mooring line

Because of bad weather / sea condition and possibility that buoyancy of glass floats was not enough for glass floats, which connects long pp / nylon rope, to be back to sea surface, NOAA decided that recovery of mooring remnant was cancelled during this cruise.

(3) Cruise log

December 2017

19th 9:00 (JST) Sail (Yokosuka Headquarter pier)

21st 8:00 (JST) - Recovery of drifting KEO buoy

23rd 8:00 (JST) - Redeployment of KEO buoy

25th 9:00 (JST) Port call (Yokosuka Headquarter pier)

(4) Cruise participant

Name	Affiliation	Appointment
Makio Honda (PI)	RCGC, JAMSTEC	Principal Research Scientist
Denise Kester	University of Washington	Research Engineering Technician
Ryan Wells	University of Washington	Research Scientist / Engineer
Satoshi Ozawa	Marine Works Japan Inc.	Marine Technician
Shungo Oshitani	Marine Works Japan Inc.	Marine Technician