KY13-09 Cruise Summary

1. Cruise Information

1.1 Cruise ID: KY13-09

1.2 Name of vessel: KAIYO

1.3 Title of the cruise: Research on characteristics of clouds and aerosols over the Kuroshio Extension by simultaneous observations with an aircraft

1.4 Chief scientist: Yoshimi Kawai
Ocean-Atmosphere Interaction Research Team
Ocean Climate Change Research Program
Research Institute for Global Change (RIGC)
Japan Agency for Marine-Earth Science and Technology (JAMSTEC)

1.5 Representative of the science party: Yoshimi Kawai RIGC/JAMSTEC

1.6 Cruise period: 28 June – 12 July 2013

1.7 Ports of call: From / To: Wharf at Yokosuka Works, Sumitomo Heavy Industries

1.8 Research area: Kuroshio Extension Region

1.9 Research map: (see Figure 1)

2. Overview of the observation

2.1 Purpose and outline

The purpose of this cruise was to investigate the effects of the Kuroshio Extention on clouds, aerosols, and the structure of the atmospheric boundary layer through sea surface heat and momentum fluxes.

Recent studies have revealed that the structure of the lower atmosphere and clouds change across the sea surface temperature (SST) fronts. Furthermore, the SST fronts may modify the strength of the effect of aerosols on cloud physics, which has recently attracted attention as one of important mechanisms in

climate changes. The impacts of the SST fronts on aerosols and cloud physics have not been sufficiently investigated. We investigated the characteristics of aerosols and clouds across the SST front of the Kuroshio Extension by combining SST and atmospheric observations by a ship, and aerosols and clouds observations by an aircraft. Another purpose of the observations was the validation of new satellite data (AMSR2).

2.2 Observations and activities

1) Atmospheric sounding using GPS radiosonde, and aircraft observations
   Aircraft observations were performed during 12:11-12:56 on 8 July, and during 11:27-12:18 on 10 July (JST).
2) Oceanographic survey using XCTD
3) Underway marine meteorological measurements on the vessel
4) Underway oceanic measurements on the vessel
5) Sampling of aerosol particles in the lowest atmosphere
6) Recovery and deployment of the K-TRITON buoys
   We recovered the K-TRITON buoy (JKEO6) which was deployed on 19 June 2012. Another K-TRITON buoy (JKEO7) was deployed on 1 July 2013, but its nylon rope was broken just after the deployment and the buoy was recovered on 3 July 2013. This buoy was not re-deployed in this cruise.
   We also recovered the mooring remnant of the K-TRITON buoy deployed at NewKEO (NKEO) site on 7 July 2013. (The wire cable of the buoy was broken on 9 March 2013. The top buoy was recovered on 24 March by R/V Mirai.)
7) Recovery and deployment of the KEO buoys (PMEL/NOAA)
   We deployed the KEO buoy (KEO11) on 5 July 2013. The KEO buoy (KEO10) which was deployed on 4 July 2012 was drifting from 7 June 2013. This drifting KEO buoy was recovered at 34°21.124' N, 143°45.546'E. Its nylon rope was broken. We recovered the mooring remnant of KEO10 at KEO site on 6 July 2013.
8) Water sampling at JKEO and KEO sites

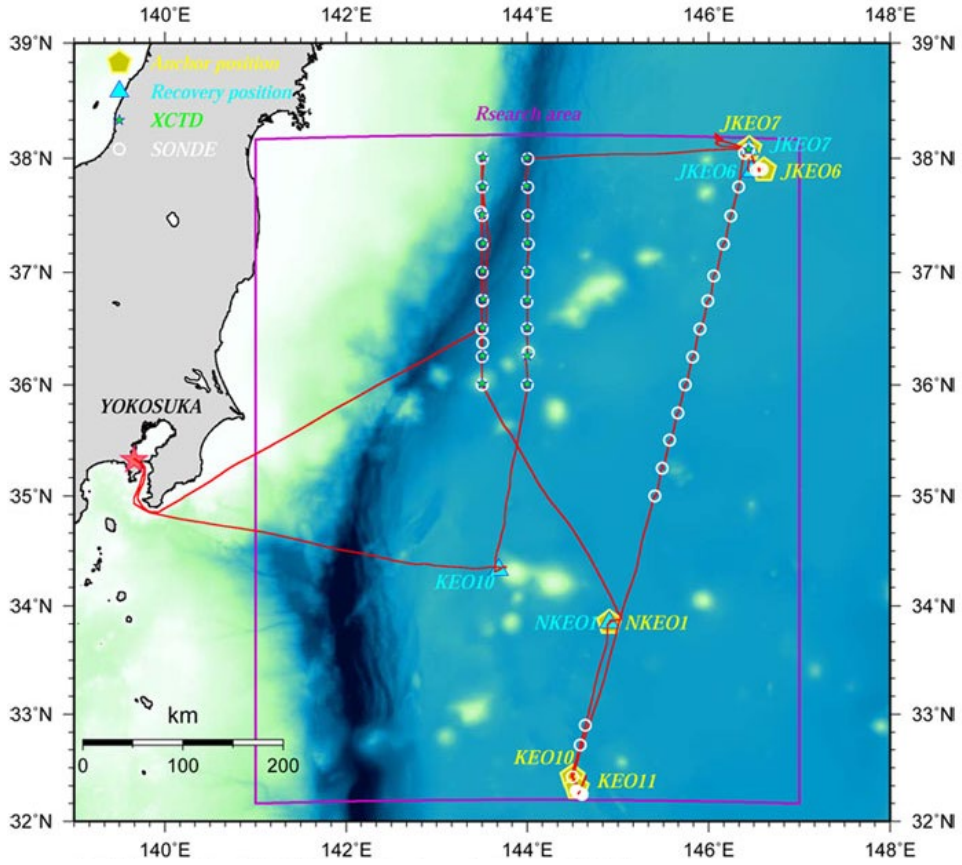

Figure 1. Locations of XCTD (star), GPS radiosonde (circule) observations, and the buoy deployment/recovery operations.

2.3 Instruments

XCTD	XCTD-1 (Tsurumi Seiki)
GPS Radiosonde	RS-06G (sensor), RD-08AC (receiver) (Meisei)
Thermometer/hygrometer	CVS-HMP-45A (Climatec)
Shortwave radiometer	CM-21, CMP-21 (Kipp&Zonen)
Longwave radiometer	CG-4, CGR-4 (Kipp&Zonen)
Weather multi-sensor	WXT520 (Vaisala)
Ceilometer	CL51 (Vaisala)
Microwave radiometer	MP1500 (Radiometric)
All-sky camera	(Prede)
GPS receiver	Trimble NetR9 (Nicon-Trimble) (for precipitable water measurement)
Optical particle counter	KC-01E (Rion)
Aerosol particle sampler	Cascade Impactors (PIXE International Corp.) PUMP FOR AIR MAS-01 (AS ONE Corp.)

K-TRITON buoy	JAMSTEC
KEO buoy	PMEL/NOAA

2.4 Observation results

One of the examples is shown in Figure 2.

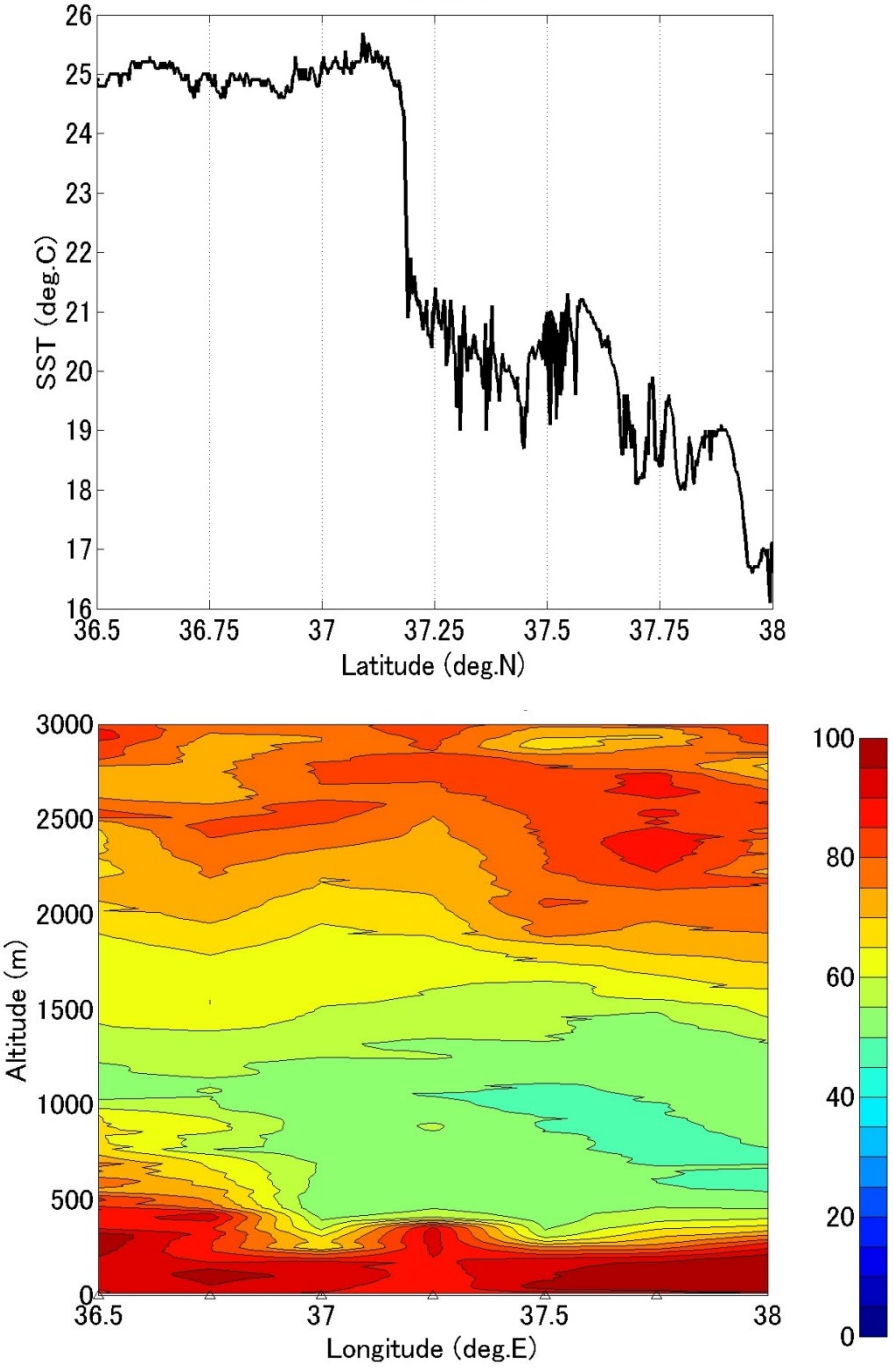

Figure 2. SST (upper panel, °C) and Relative humidity (lower panel, %) along 143°30'E on 10 July. Aircraft observations were done over around 37°30'N and 36°30'N.