

Shinsei-maru “Cruise Report”
KS-19-10

Ocean processes driving centennial-scale decreases in
maximum Japanese sardine population size during the past
sardine regime in the Northwest Pacific

Slope regions off Kashima, Kesen-numa, Kuji, Rokkasho,
Tokachi, and Nemuro

Jun.18,2019-Jun.24,2019

Joint Usage/Research Center for Atmosphere and Ocean
Science (JURCAOS)
Japan Agency for Marine-Earth Science and Technology
(JAMSTEC)

1. Cruise Information

- Cruise ID: KS-19-10
- Name of vessel: Shinsei-maru
- Title of cruise: Ocean processes driving centennial-scale decreases in maximum Japanese sardine population size during sardine regime in the Northwest Pacific
- Chief Scientist [Affiliation]: Michinobu Kuwae [Center for Marine Environmental Studies, Ehime University]
- Cruise period: Jun.18,2019-Jun.24,2019
- Ports of departure / arrival: Yokosuka / Hakodate
- Research area: Slope regions off eastern and northern Japan (Fig. 1)

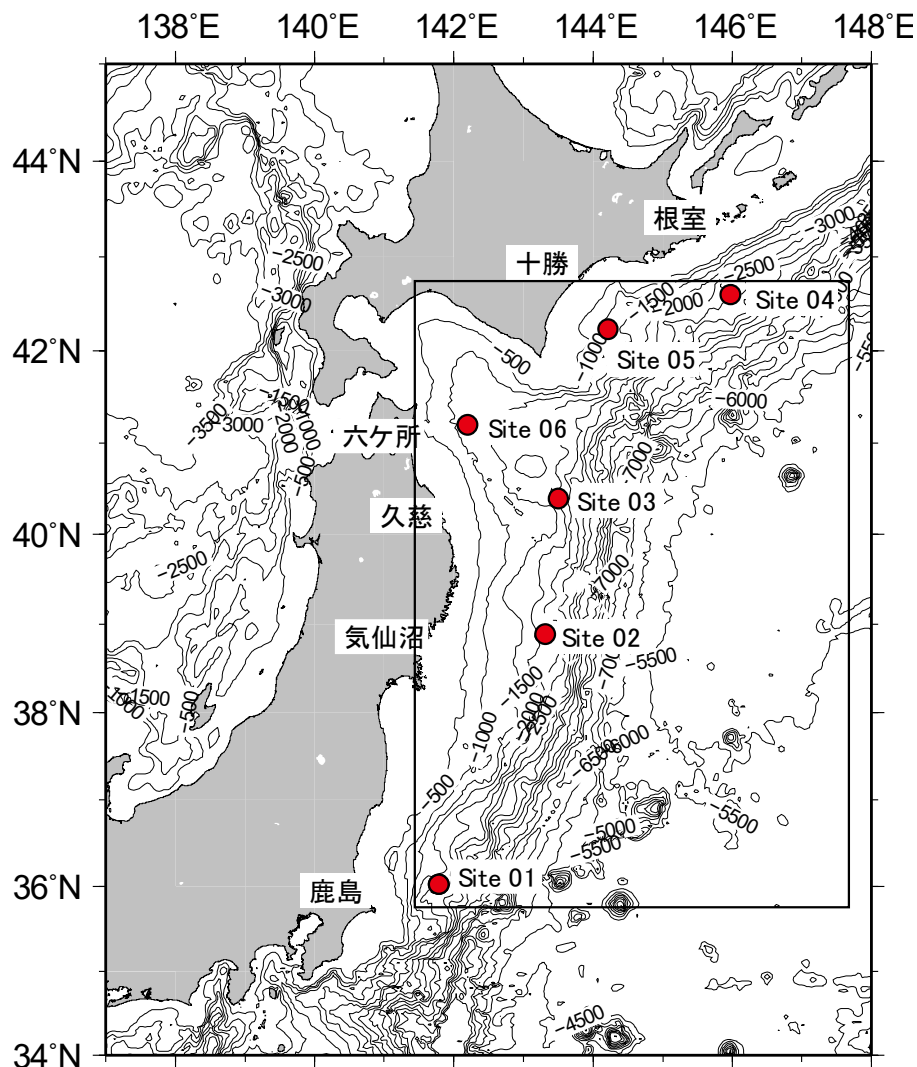


Fig. 1 Research area in this cruise.

- Research map (Fig. 2-7)

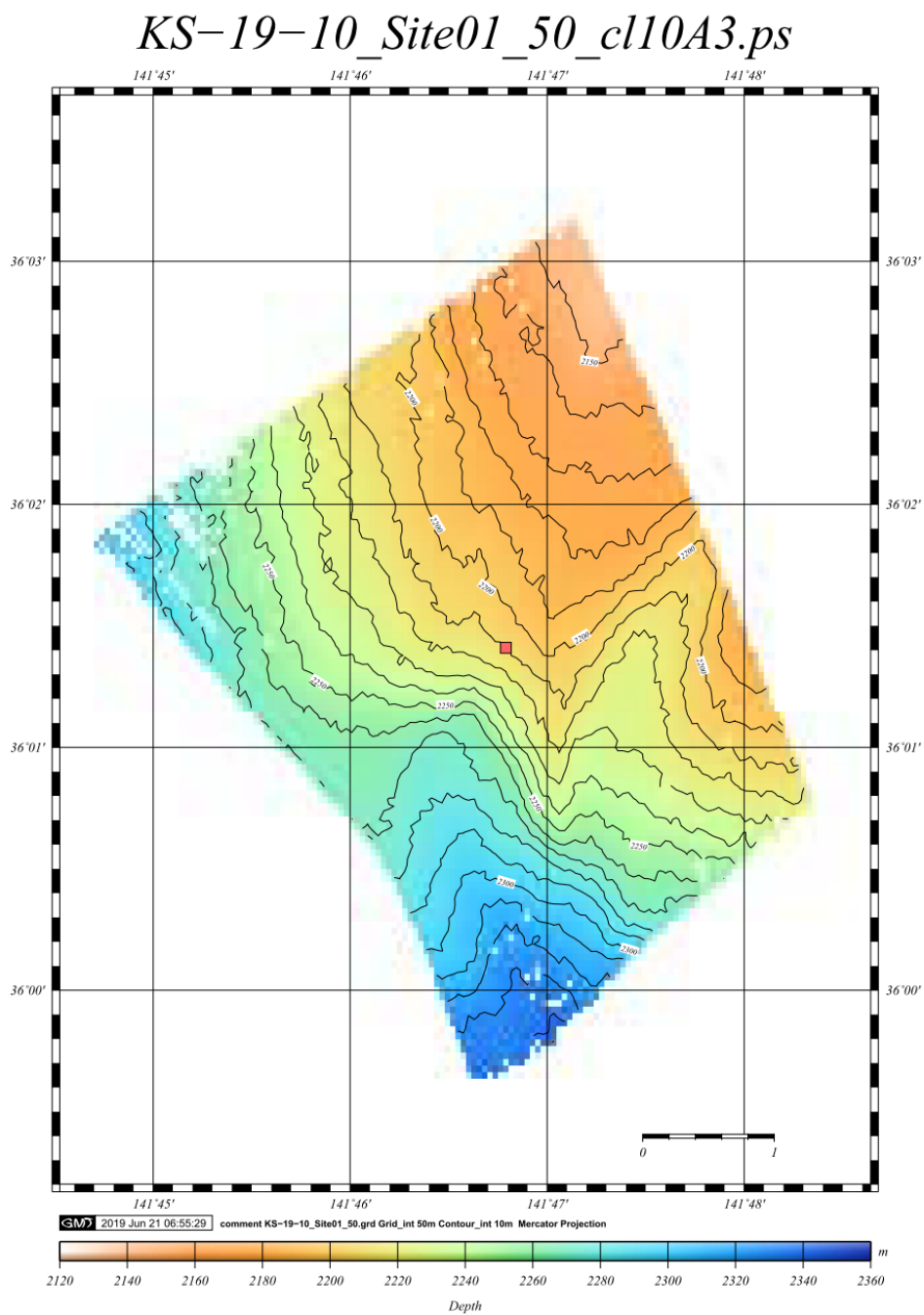


Fig. 2 Coring site 01

KS-19-10_Site02_50_cl10A3.ps

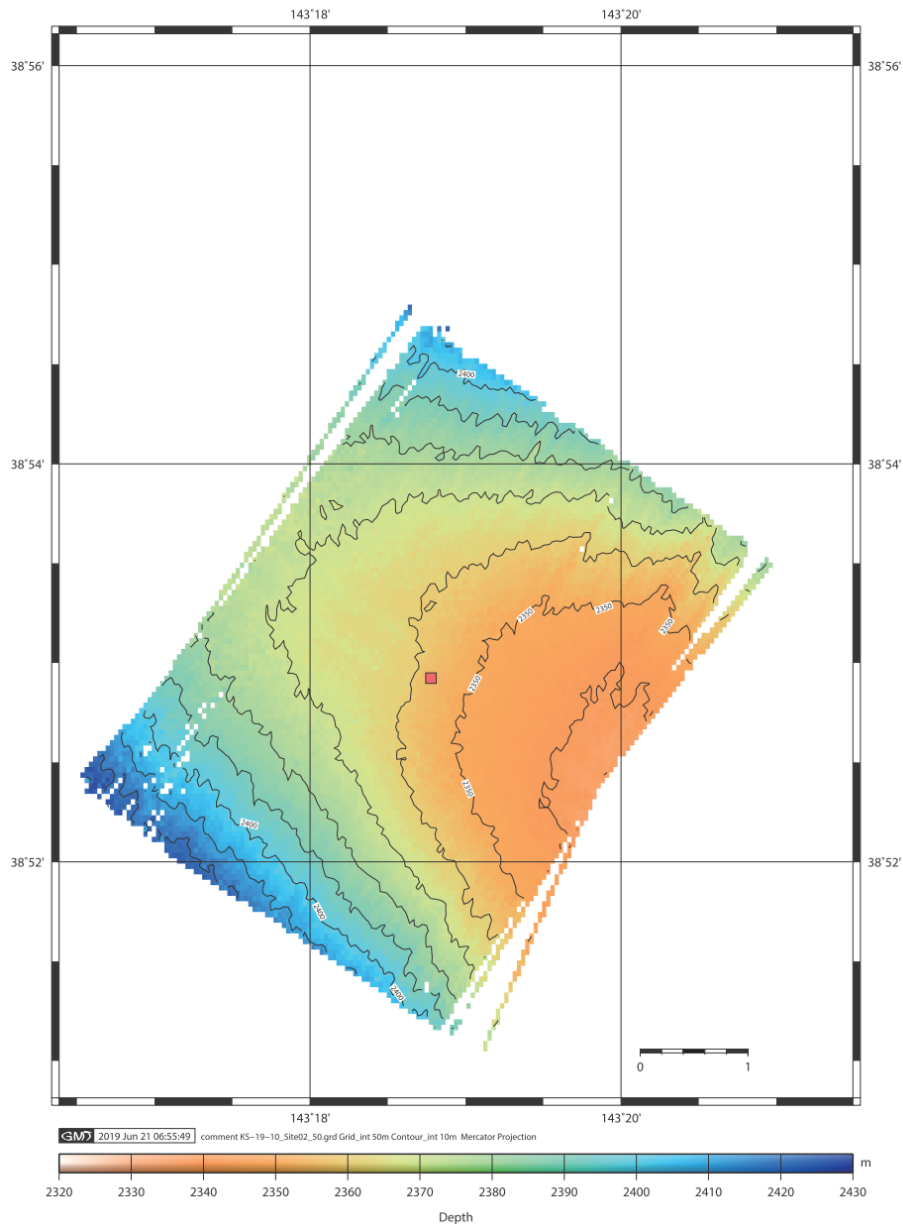


Fig. 3 Coring site 02

KS-19-10_Site03_50_cl10A3.ps

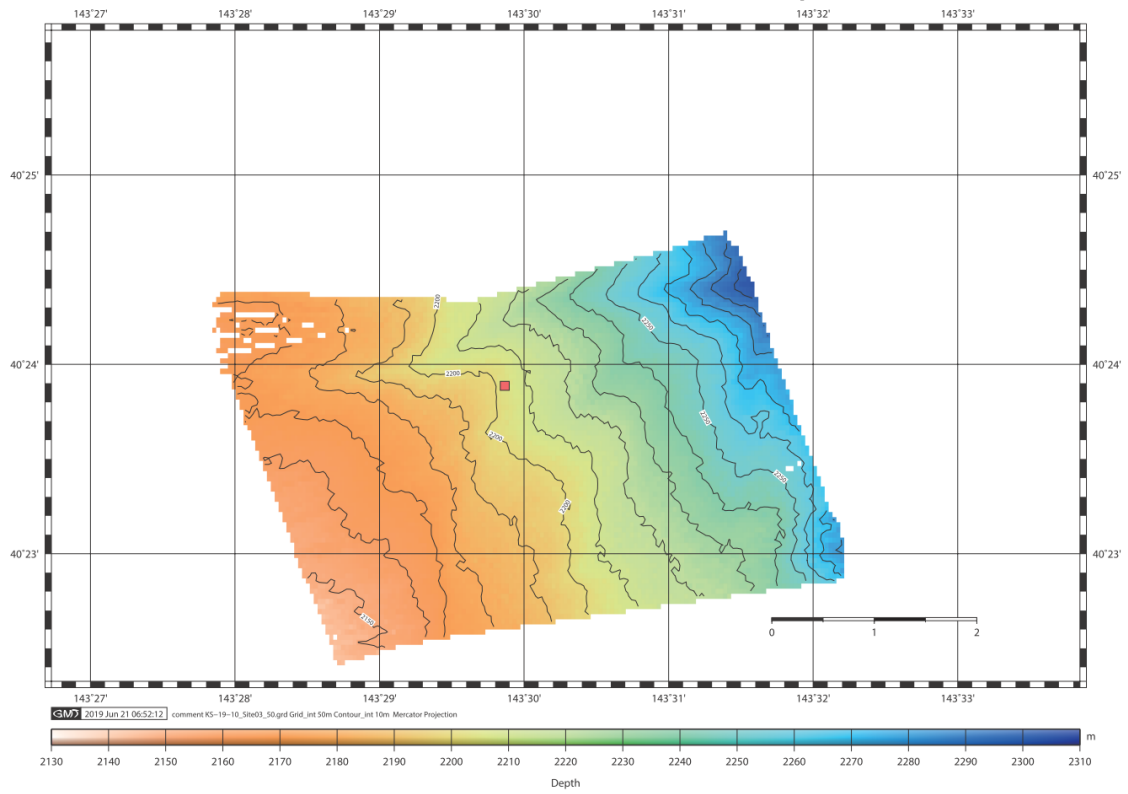


Fig. 4 Coring site 03

KS-19-10_Site04_50_cl10A3.ps

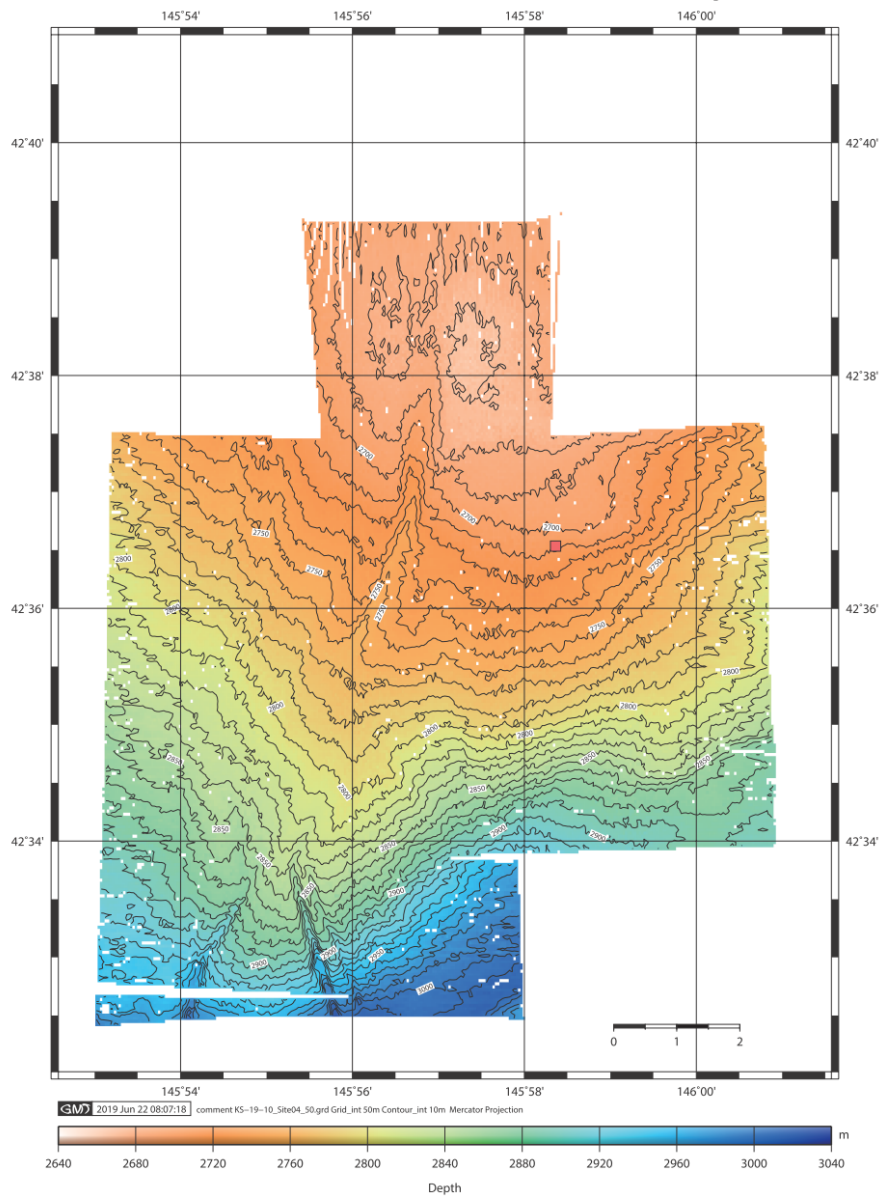


Fig. 5 Coring site 04

KS-19-10_Site05_50_cl10A3.ps

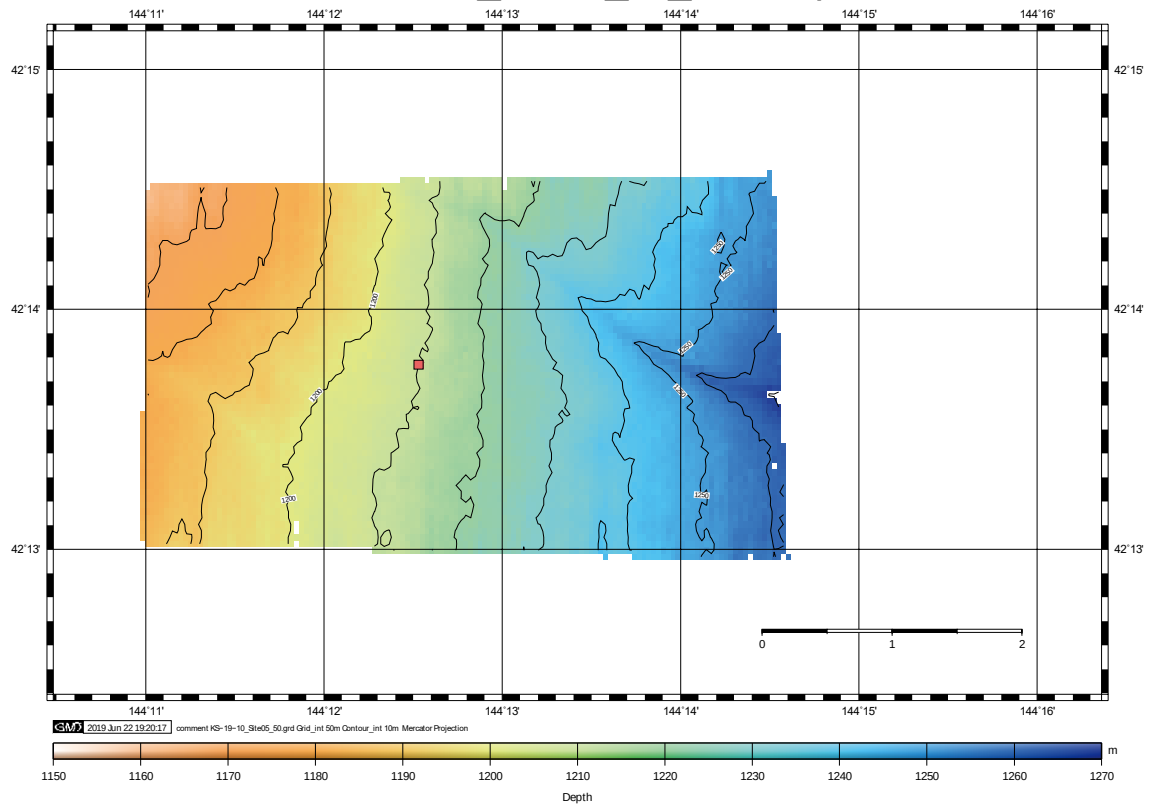


Fig. 6 Coring site 05

KS-19-10_Site06_50_d10A3.ps

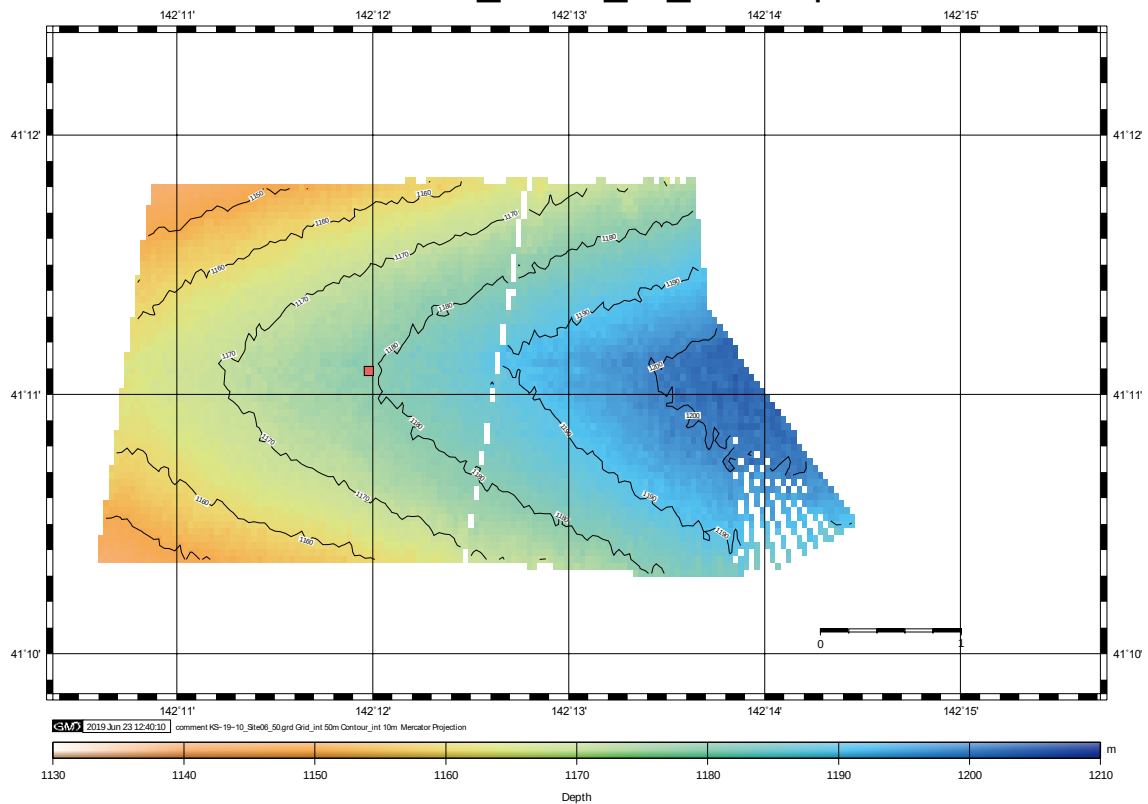


Fig. 7 Coring site 06

2. Research Activities

Title: Ocean processes driving centennial-scale decreases in maximum Japanese sardine population size during sardine regime in the Northwest Pacific

Objectives

From views of our previous paleoceanographic study, Japanese sardine shows multicentennial-scale oscillations in maximum sardine abundance in decadal sardine regimes during the past 1000 years (Kuwaie et al. 2017, Progress in Oceanography). The record shows a centennial positive phase (characterized by three high maximum abundance regimes) persisted for the last 200 years, suggesting a potential scenario to move into a negative phase in the next century. To explore the possibility of this scenario, we need to understand mechanisms and ocean processes driving the centennial-scale decreases in maximum Japanese sardine population size during sardine regime in the Northwest Pacific. Our hypothesis about this is that it is caused by centennial-scale depletion of iron supply to the Northwest Pacific from Sea of Okhotsk and the resultant reduction of primary and secondary productions in the area.

Methods

To test this hypothesis, we conduct core sampling in the slope waters off east and north Japan to reconstruct the productions by using biogenic opal, chlorophyll a, and SCEs

which is the best proxy of zooplankton productions. Moreover, we analyze assemblages of diatoms and its resting spores to elucidate iron availability for spring-bloom-related diatom species.

At this cruise we collected three-type core samples by using 7 m-long gravity corer, 10 m-long piston corer, and 0.6 m-long multiple corer.

Core samples obtained at this cruise

Samples we obtained are as follows. Site 01 (off Kashima): 8.5 m-long piston core sample, three multiple core samples and 2.5 m-long gravity core sample. Site 02 (off Kesen-numa): 8.8 m-long piston core sample, three multiple core samples, and 2.2 m-long gravity core samples. Site 03 (off Kuji): 7.9 m-long piston core sample, three multiple core samples and 0.5 m-long gravity core sample. Site 04 (off Nemuro): 1.5 m-long piston core sample. Site 05 (off Tokachi): 4.5 m-long piston core sample, three multiple core samples. Site 06 (off Rokkasho): 9.1 m-long piston core sample, a multiple core sample and 2.9 m-long gravity core sample. The list of samples we collected is shown below.

Location	Site	Core ID	Section ID	1 m-long section	Core length (m)	Core collection time	Latitude, Longitude	Positioning staff
Off Kashima	Site 01	PC01	Sec. 2-10	9	8.5	2019/6/19/08:05	36°1.4137'N, 141°46.7986'E	Transponder
		MC01	-1	1	0.3	2019/6/19/08:05	36°1.4137'N, 141°46.7986'E	Transponder
			-2	1	0.3	2019/6/19/08:05	36°1.4137'N, 141°46.7986'E	Transponder
			-3	1	0.3	2019/6/19/08:05	36°1.4137'N, 141°46.7986'E	Transponder
		GC01	Sec. 3-5	3	2.5	2019/6/19/11:33	36°1.4137'N, 141°46.7986'E	Transponder
Off Kesen-numa	Site 02	PC02	Sec. 2-10	9	8.8	2019/6/20/09:38	38°52.5986'N, 143°18.7786'E	Transponder
		MC02	-1	1	0.3	2019/6/20/09:38	38°52.5986'N, 143°18.7786'E	Transponder
			-2	1	0.3	2019/6/20/09:38	38°52.5986'N, 143°18.7786'E	Transponder
			-3	1	0.3	2019/6/20/09:38	38°52.5986'N, 143°18.7786'E	Transponder
		GC02	Sec. 3-5	3	2.2	2019/6/20/14:18	38°52.9336'N, 143°18.7942'E	Transponder
Off Kuji	Site 03	PC03	Sec. 3-10	8	7.9	2019/6/21/07:22	40°23.88764'N, 143°29.8652'E	Transponder
		MC03	-1	1	0.3	2019/6/21/07:22	40°23.88764'N, 143°29.8652'E	Transponder
			-2	1	0.3	2019/6/21/07:22	40°23.88764'N, 143°29.8652'E	Transponder
			-3	1	0.3	2019/6/21/07:22	40°23.88764'N, 143°29.8652'E	Transponder
		GC03	Sec. 5	1	0.5	2019/6/21/09:42	40°23.8987'N, 143°29.8981'E	Transponder
Off Nemuro	Site 04	PC04	Sec. 5-6	2	1.5	2019/6/22/07:35	42°36.5415'N, 145°58.3497'E	Transponder
Off Tokachi	Site 05	PC05	Sec. 2-6	5	4.5	2019/6/22/18:37	42°13.7736'N, 144°12.5265'E	Transponder
		MC05	-1	1	0.3	2019/6/22/18:37	42°13.7736'N, 144°12.5265'E	Transponder
			-2	1	0.3	2019/6/22/18:37	42°13.7736'N, 144°12.5265'E	Transponder
			-3	1	0.3	2019/6/22/18:37	42°13.7736'N, 144°12.5265'E	Transponder
Off Rokkasho	Site 06	PC06	Sec. 1-10	10	9.1	2019/6/23/07:03	41°11.0879'N, 142°11.9849'E	Transponder
		MC06	-3	1	0.3	2019/6/23/07:03	41°11.0879'N, 142°11.9849'E	Transponder
		GC06	Sec. 3-5	3	2.9	2019/6/23/09:06	41°11.0569'N, 142°12.038'E	Transponder

Bathymetric survey

Before coring, we conducted bathymetric survey using a multi beam echo sounder system (MBES), and a subbottom profiler (SBP) around each core site.

Bathymetry for each site are shown in Fig. 2 to Fig. 7. SBP images are shown in Fig. 8 to Fig. 12

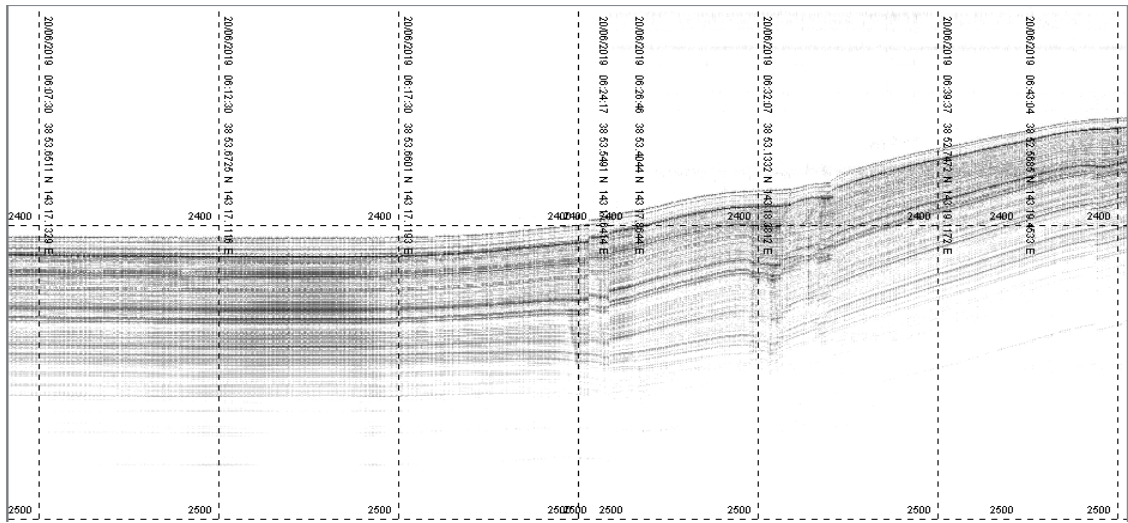


Fig. 8 SBP image for site 02

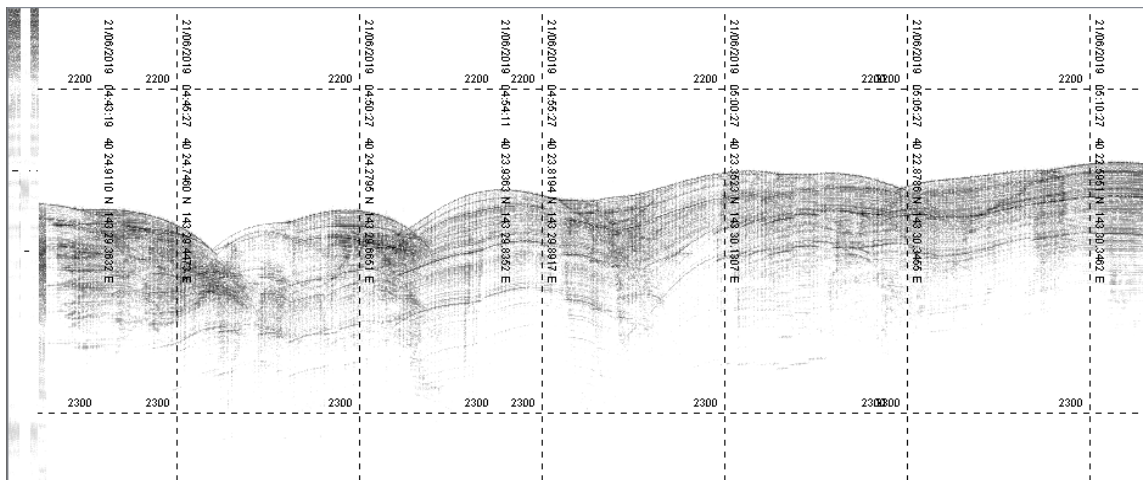


Fig. 9 SBP image for site 03

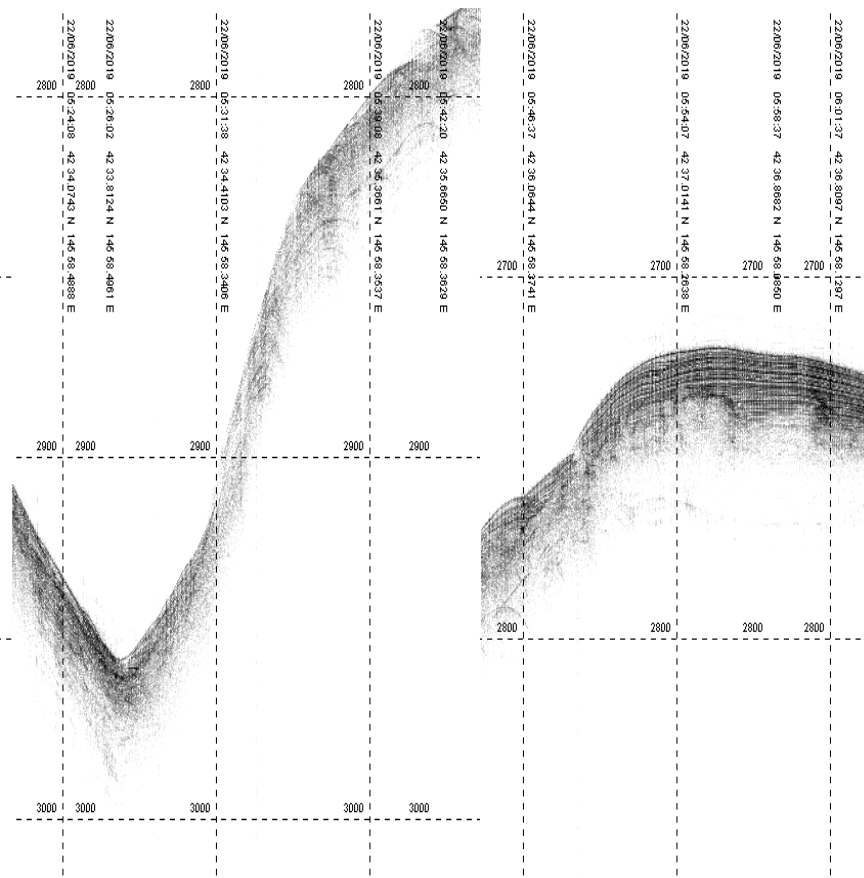


Fig. 10 SBP image for site 04

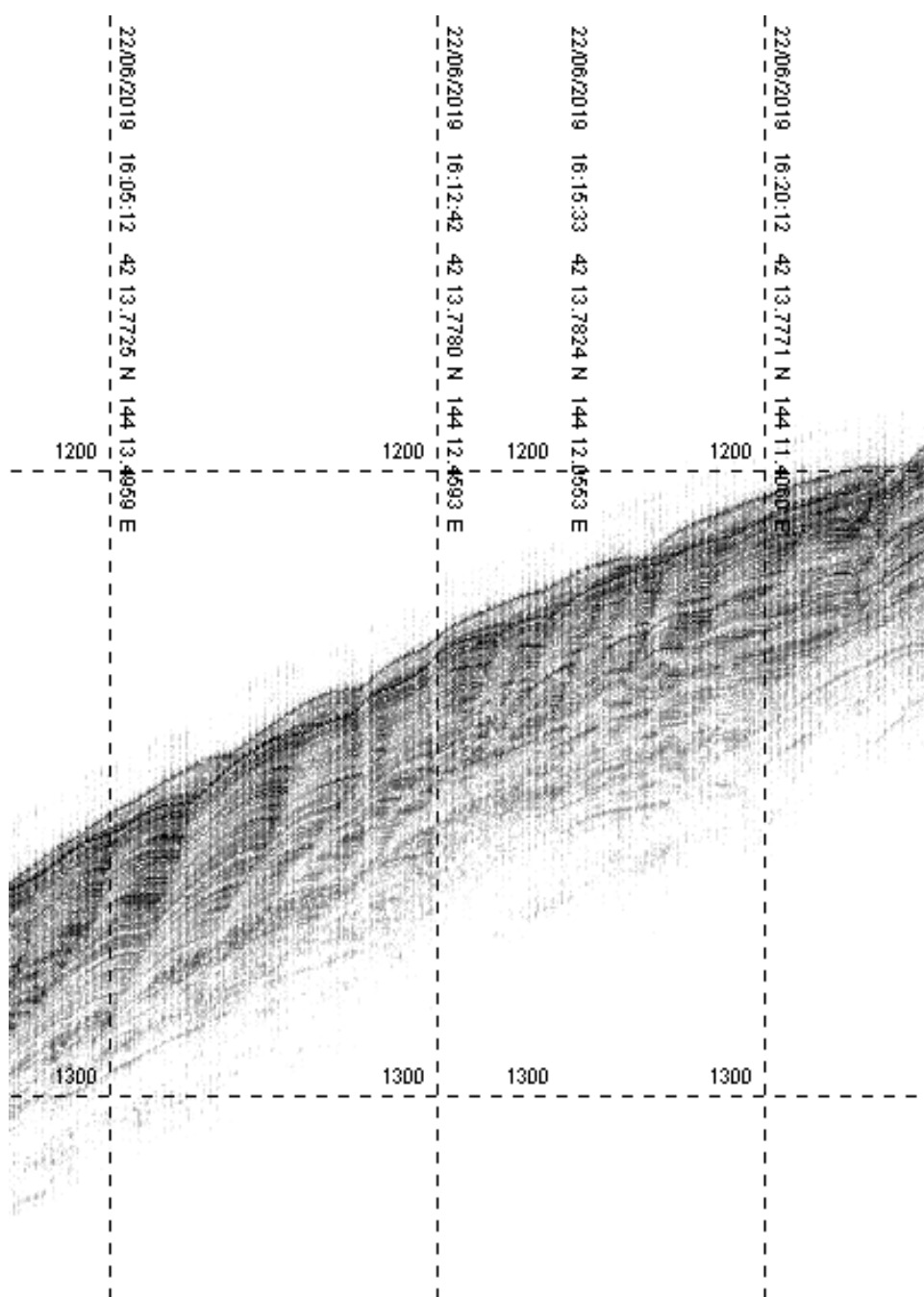


Fig. 11 SBP image for site 05

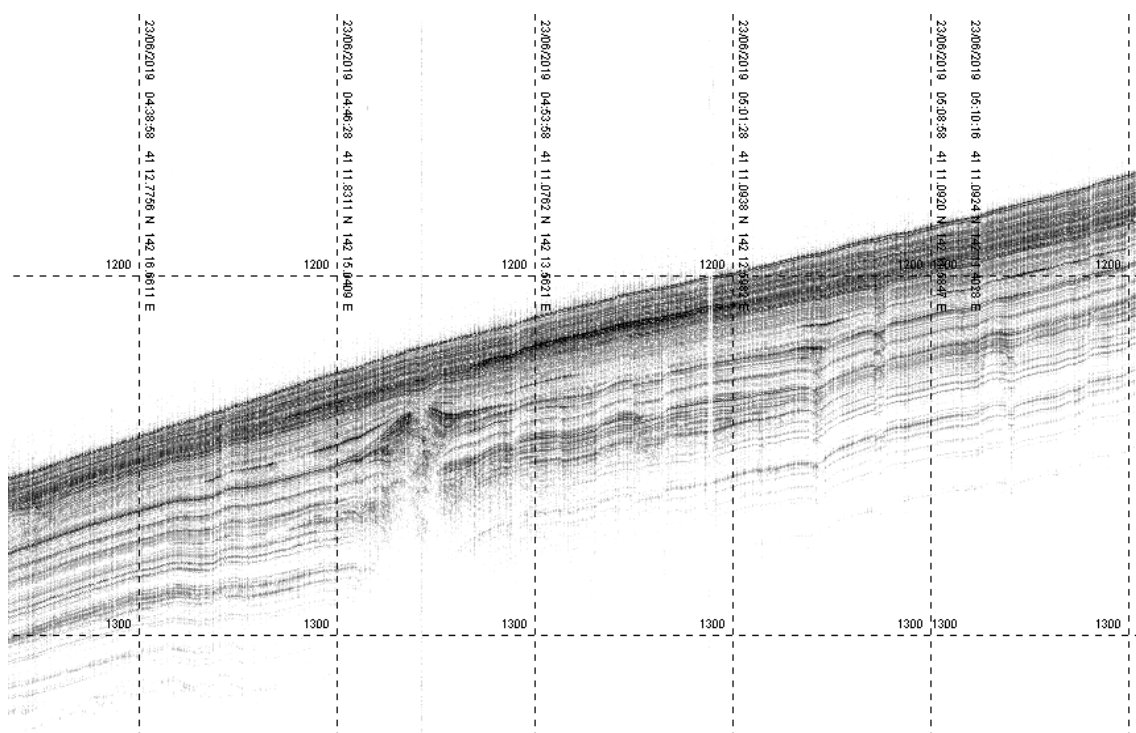


Fig. 12 SBP image for site 06

● 5. Notice on Using

This cruise report is a preliminary documentation as of the end of cruise.

This report is not necessarily corrected even if there is any inaccurate description (i.e. taxonomic classifications). This report is subject to be revised without notice. Some data on this report may be raw or unprocessed. If you are going to use or refer the data on this report, it is recommended to ask the Chief Scientist for latest status.

Users of information on this report are requested to submit Publication Report to Cooperative Research System Office.

E-mail: kyodoriyo@aori.u-tokyo.ac.jp