

よこすか／しんかい6500 研究航海報告

- * 航海番号 YK21-09S 次研究航海
- * 航海名称 深海底におけるマントル遷移層探査：改良型深海地球電場観測システム (EFOS-X) と広帯域海底地震観測システム (NX-2G) の開発
Geophysical sounding of mantle transition zone from deep seafloor: development of improved deep-sea electric field observation system (EFOS-X) and broad-band ocean bottom seismic observation system (NX-2G)
- * 観測海域 青ヶ島東方沖海域
Sea area off the eastern coast of Aogashima
- * 航海期間 令和 3 年 6 月 2 日 (水) ～令和 3 年 6 月 6 日 (日)
- * 出港日時・場所 6 月 2 日 9 時 横須賀日産6号岸壁
- * 入港日時・場所 6 月 6 日 11 時 JAMSTEC 横須賀岸壁
- * 寄港期間・場所 なし
- * 研究課題 深海底におけるマントル遷移層探査：改良型深海地球電場観測システム (EFOS-X) と広帯域海底地震観測システム (NX-2G) の開発
- * 主席研究員 (氏名・所属・職名)
清水久芳・東京大学地震研究所・教授
- * 研究内容, 主調査者, 観測項目
 1. 深海底におけるマントル遷移層探査：改良型深海地球電場観測システム (EFOS-X) の開発、清水久芳、地球電場 (EFOS-X)・地球電磁場 (OBEM)
 2. 深海底におけるマントル遷移層探査：広帯域海底地震観測システム (NX-2G) の開発、塩原肇、地震 (NX-2G、BBOBS)・流速 (OBDC)

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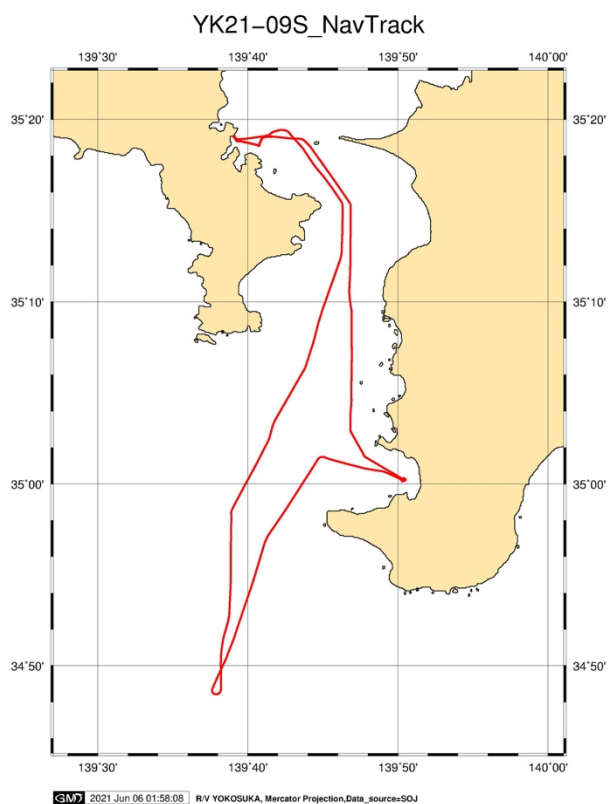
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* 航跡・測点図

航跡図



[前線の影響により海況が悪く、観測機器設置予定地点に未到達]

* 研究活動・観測の詳細や成果等について

Ocean Bottom Electro-Magnetometers (OBEM) have been used often for electromagnetic sounding of the upper mantle. However, the OBEMs do not have sufficient sensitivity to observe electric field variations in the period range that is suitable to obtain information on the mantle transition zone because the antenna length (the length between electrodes) is not long enough to detect the signal. A deep-sea Electric Field Observation System (EFOS), which was composed of a 1~10 km cable, electrodes, and a recording unit, had been developed and used for observations at deep ocean. The observed electric field had been employed to obtain the electrical conductivity structure in the mantle transition zone and also analyzed jointly with seismic data to obtain better constraints on the dynamics of the upper mantle and the transition zone. Installations and recoveries of EFOS have been relied on ROV Kaiko 7000II (JAMSTEC). It is desirable to develop a system which does not rely on the ROV in order to expand the opportunity to perform a long-baseline electric field observation.

A broadband seismometer system, BBOBS-NX, of which seismic sensors were buried in the seafloor to reduce noise, were developed and observed data were used to study lithosphere and asthenosphere. Deployment of BBOBS-NX requires operations by a submersible, and it has been aimed to develop a system that can operate autonomously during deployment to increase opportunities of observation.

We developed an improved electric field observation system in the deep ocean, EFOS-X, that can be installed and recovered by a manned submersible such as Shinkai 6500. Also, an advanced broadband seismometer system, NX-2G, which was designed to operate autonomously, was developed and preliminary observations were made using the system.

Installation of EFOS-X, including laying of 1 km cable using Shinkai 6500, was planned for this cruise. An OBEM was also arranged to be installed from R/V Yokosuka in order to observe magnetic field that was necessary to estimate electrical conductivity structure in the mantle transition zone with electric field data taken by EFOS-X.

Deployment of NX-2G and monitoring of its behavior at the seafloor by Shinkai 6500 were planned for the cruise. In addition to NX-2G, a standard Broad-Band Ocean Bottom Seismometer (BBOBS) and an Ocean Bottom Doppler Currentmeter (OBDC) were planned to be installed to examine the performance of NX-2G and the impact of joint analysis of electromagnetic field and seismic data on the study of Earth's deep interior.

All the instruments mentioned above were ready to be installed on R/V Yokosuka. However, because of high wave and wind caused by fronts, it was not possible for the vessel to access the planned research area. No instruments were installed, and we need to seek another opportunity to install them in the future.

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

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