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INFORMATION

INVESTIGATIONS OF THE SEDIMENT WAVES AND SEA MOUNTS IN THE EASTERN ATLANTIC (CRUISE No. 66 OF THE RV "AKADEMIK IOFFE")

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Abstract. This paper provides information on the integrated geological, geophysical and hydrobiological investigations, as well as on passing observations on cetaceans in the Eastern Atlantic (cruise 66 of the RV "Akademik Ioffe") in June–July 2024. The preliminary scientific results are discussed.

Keywords: *sediment waves, Guinea drift, Ivory Coast Rise, Canary Basin, sea mounts Pedro Nuñes, Bathymetrists, Rokel, Antarctic Bottom Water, contourites, sub-bottom profiling, magnetic anomalies, cetaceans, phytoplankton, Apstein net, metazoan microzooplankton*

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Complex geological-geophysical and hydrobiological studies during the expedition onboard the R/V "Akademik Ioffe" (66th cruise, 14.06.2024–29.07.2024) were carried out at the polygons in the Canary Basin, Cape Verde and Sierra Leone basins in the Eastern Atlantic, as well as along the entire route of the ship from the port of Kaliningrad (Fig. 1a). Geophysical surveys of seamounts were performed at the Iberia Proving Ground and also on the ship's return trip to the port of Kaliningrad during the 67th voyage. In addition, on the 66th and 67th cruises, cetacean sightings were carried out.

The main goals and objectives included seismo-acoustic and sedimentological studies of erosion-accumulative sedimentary systems, primarily sediment wave fields on contourite drifts; a hydromagnetic survey to map magnetic anomalies of seamounts; and water sampling and phytoplankton composition studies on a submeridional transect from 30° to 2°N.

Types and scope of work. During the expedition (including the return trip in the 67th voyage) 9428 nautical miles were traveled, including 6452 m. miles with the seismic profiler *SES-2000 deep* and 6372 m. miles with the magnetometer *Geomertrics-882*. A wide range of studies of magnetic anomalies, seismoacoustic structure and sediment composition at three polygons and along the ship's route, taxonomic composition and distribution of mammals at transitions along the route were carried out. Bottom sediment columns were obtained at 15 deepwater stations. At 20 stations, water samples were collected by Niskin bathometer from 5 horizons (0, 20, 40, 60, 100 m) and filtered for chlorophyll a (100 samples) and phytoplankton (107 samples); 19 samples were collected by Apstein net from horizons 0–60 m for determination of metazoan microzooplankton. Three micro-polygons were made at the most extensive polygon of Cape Verde – Sierra Leone on the Bathymetrist Seamounts, Guinea Drifts and Ivory Coast.

Preliminary Scientific Results. The heterogeneous genesis of submarine volcanoes has been established, reflecting the complex geotectonic history of the Iberian microplate. The submarine mountains Hugo de Lacerda and Almeida Corvalho began to form before the turn of the Iberian microplate in Aptian-Albian time and completed the cycle of activity after Iberia joined Eurasia, whereas Mount Andromeda was formed before this turn and Auriga – after. Mount Pedro Nunez has a special history that requires further study. The sedimentary filling of intermountain valleys with an apparent thickness of up to 70 m is characterized

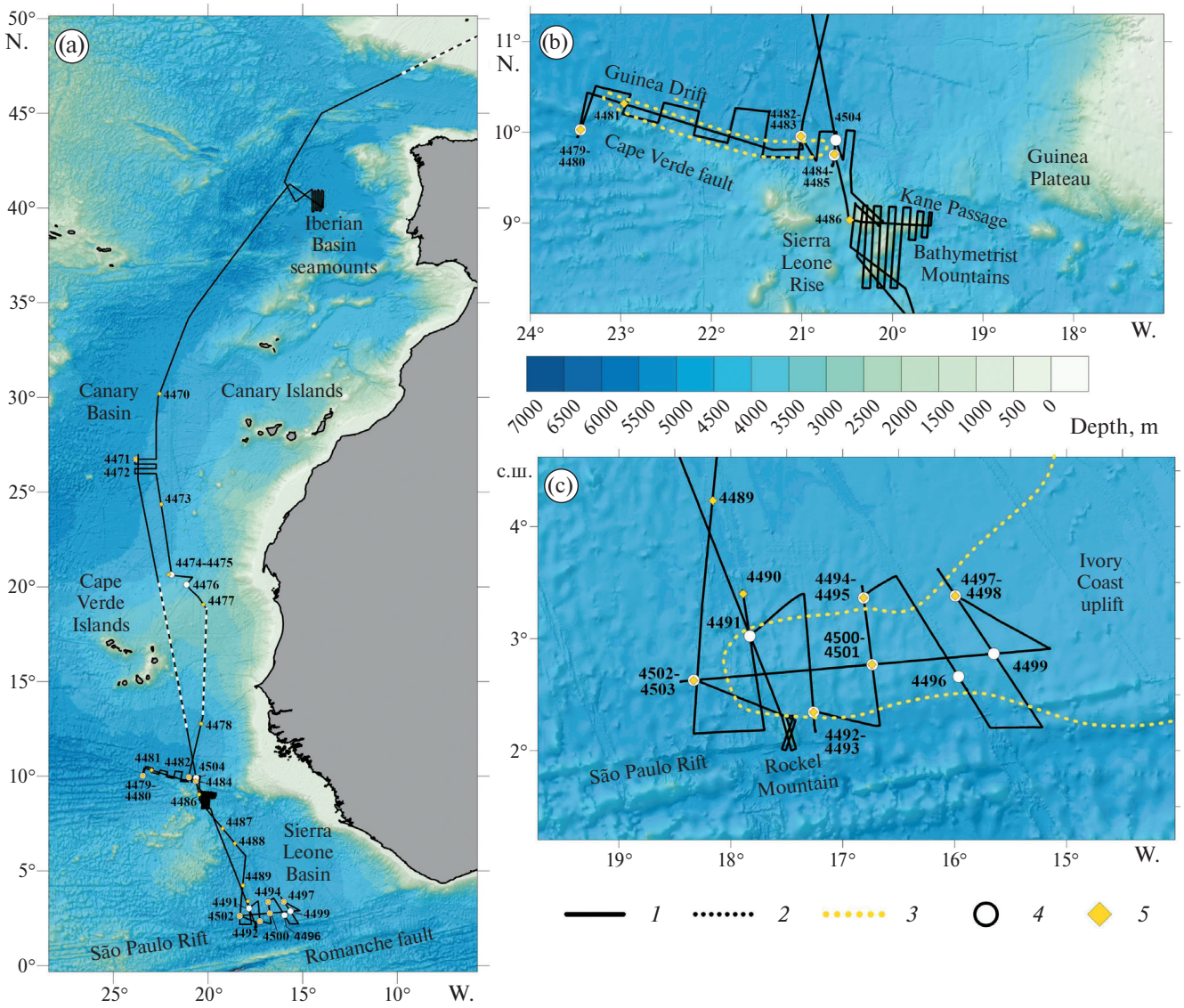

Fig. 1. Route (a) and polygons (b, c) of the detailed work of the 66th cruise of the expedition of the R/V "Akademik Ioffe": *1* – expedition route with accompanying studies, *2* – expedition route without accompanying studies, *3* – boundaries of contourite drifts at the polygons according to [1], *4* – bottom sediment sampling stations, *5* – biological stations.

by the concordant occurrence of seismoacoustic complexes.

A map of the anomalous magnetic field was synthesized for the first time for the northern cluster of Bathymetrist seamounts in the tropical Atlantic (Fig. 1b). The volcanic nature of the sources of magnetic anomalies confined to fault zones of northeastern strike has been established.

In the area of the Ivory Coast uplift, on the northern side of the São Paulo transform fault zone, the results of the hydromagnetic survey revealed extensive areas of multipolar magnetization of the lithosphere, probably confined to the numbered linear magnetic anomalies C32-C34. In the area of the Rokel seamount located at the edge of the northern side of the fault, the analysis of measured magnetic anomalies and satellite gravity data revealed an extensive zone of serpentinization of the upper mantle rocks, possibly associated with intense hydrothermal activity beneath the mountain.

Of particular interest on seismoacoustic profiles of the Canary Wharf Range is an acoustically transparent layer of consonant bedding, which has a large area and a complex morphology. It has no analogs at other test sites.

The structure of the so-called Guinea Drift [1] covered by sedimentary waves was found to be more complex than previously thought (Fig. 1b). Our data show that this is not one, but a series of drifts. For the first time, we were able to estimate the sizes and areas

of propagation of sedimentary waves covering the drifts and to propose our own hypothesis of their origin.

The results of seismoacoustic profiling on the Ivory Coast uplift in the south of the Sierra Leone Basin, which is a cover drift with an area of over 120 thousand km^2, showed that the structure of bottom sediments on its northern and southern slopes differs (Fig. 1c). Such changes are presumably related to the different degree of influence of the Antarctic Bottom Water branches on sedimentation, which according to [1] lasted for about 30 million years. For geological interpretation of seismoacoustic data, 8 columns of bottom sediments were sampled on the slopes and in the axial part of the drift. This will make it possible to study the Quaternary stage of the drift formation and investigate the history of changes in the benthic circulation in this region.

Cetacean observations were conducted along a 3,520-mile route. During 394 h of observations, 3 species of whales (13 sightings – 17 individuals), 1 species of beaked whales (1 sighting – 2 individuals), and 6 species of dolphins (22 sightings – 89 individuals) were observed. A total of 108 cetacean individuals (36) were recorded. From zooplankton catches by pleistone net, mass representatives of *Chaetognatha, Copepoda, Radiolaria, Porpita porpita* (Linne, 1758), *Siphononphora, Salpa sp*. were identified, as well as the rarely encountered *Pirosoma atlantica, Velella velella* (Linne, 1758), *Physalia physalis* (Linne, 1758), *Creseis acicula*.

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CONFLICT OF INTERESTS

The authors of this paper declare that they have no conflict of interests.

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