

SHORT CRUISE REPORT

Ship: R.V. METEOR Cruise 51, Leg 1

Dates: September 12. - October 15., 2001

Port Calls: Warnemünde / Germany to Malaga / Spain

Institute: GEOMAR Research Center

Number of Scientists: 23

Chief scientist: Prof. K. Hoernle

Observers: Agouzouk, A. (Morocco),
Dadji, M.(Algeria)
Muiños, S. (Portugal)

Project: Causes and Consequences of
Volcanism in the Eastern North Atlantic
and Alboran Sea: VULKOSA

Project Homepage: www.geomar.de/projekte/vulkosa

Research areas: Northeastern Atlantic:
Azores-Gibraltar Fracture Zone,
Madeira-Tore-Rise,
Madeira Archipelago and Hotspot Track,
Seamounts north of the Canary Islands;
Western Mediterranean:
Alboran Sea
Alboran Island

The final preparations for cruise M51/1 were carried out on the Research Vessel METEOR in the harbor of Rostock-Warnemünde (Germany) on September 11 after the delivery of two containers from GEOMAR Research Center in Kiel. All 23 scientists including the Moroccan and Portuguese observers boarded the ship and began preparing the laboratories for the expedition. A reception

and ship's tour were held for science referees from countries to be visited during the M51 expedition and for German officials.

The METEOR disembarked from Rostock-Warnemünde on the morning of September 12. On board were 25 guests of the Rostocker Institut für Ostseeforschung, who disembarked during the half-hour stay in the locks in Kiel on the same afternoon. A journalist from the Northern German Radio Station briefly interviewed ship's officers and scientists. Many visitors including family members and friends of cruise participants watched as the Meteor passed through the locks.

After passing through the Kiel Canal during the night, the Meteor entered the German Bight the next morning and began her transit through the North Sea, English Channel and Bay of Biscay to the first working area west of Portugal. The scientists used the five day transit to introduce themselves to the ship's hydroacoustic systems (Hydrosweep and Parasound), to prepare the dredges and laboratories for sampling and to determine the detailed sampling plan. In addition, the scientists held a daily seminar with 20 individual presentations over the diverse research objectives of the cruise. The chief scientist held a special presentation to summarize the major scientific objectives of the cruise to the ship's crew.

Because of favorable weather conditions, the first site in area I (see attached map) was reached one day earlier than scheduled. The hydroacoustic observations and mapping of the seafloor began on the evening of September 17 as the ship approached the Azores-Gibraltar fracture zone - the boundary between the European and African plates. Sampling of volcanic rocks from the sea floor along the fracture zone, as well as mapping and structural interpretation of this plate boundary, was an important aim of this part of the cruise. The first dredging station, Ormonde Seamount located on the Gorringe Bank west of Gibraltar, was reached on the morning of September 18 and was successfully sampled. A total of seven dredge hauls were completed on Ormonde, Gettysburg (both belonging to Gorringe Bank) and Hirondel Seamounts. They contained volcanic and serpentinite rocks, as well as clastic continental sedimentary material.

On the September 20, the METEOR reached Josephine Seamount, located on the Madeira-Tore Rise. While on station, the

crew performed a drill maneuver with the scientists using the ship's Zodiac rubber raft. During the following four days, 18 dredge hauls were carried out in the northern part and flanks of the Madeira-Tore Rise, including Josephine North, Teresa, Julia, Josephine and Erik Seamounts and Toblerone Ridge (working names). Mafic volcanic rocks were obtained from each of these volcanic structures. Sandstones were also obtained from Josephine North and Teresa Seamounts, which lie on the Azores-Gibraltar Fracture Zone. Vesicular olivine basalt samples were dredged at 4600 m on the northwest edge of the Madeira-Torre Rise. The cruise continued further south along the Madeira-Tore Rise to Lion Seamount. Volcanic and carbonate rocks were sampled during 7 dredge hauls. Between September 25 and 27, volcanic rocks (5 dredge hauls) were recovered from Unicorn and Seine Seamounts. These seamounts are located east of the Madeira-Torre Rise and form isolated volcanoes, belonging to the Madeira hotspot track. The METEOR then returned to the Madeira-Torre Rise. On the way, a new seamount was discovered and successfully sampled. The last stations of Area I were Dragon Seamount and an unnamed seamount in the southwestern end of Madeira-Tore Rise where five dredge hauls were carried out. Area I was left on the evening of September 28.

On September 29, the METEOR reached the first dredge station of Area II - a small ridge located west of Madeira Island. On the same day, a submarine volcanic ridge south of Funchal was discovered. Eight dredges were recovered from volcanic cones along the length of this ridge structure. On the morning of October 1, the weekly safety drill was held south of São Lourenço Peninsula. The drill included the rescue of two volunteers in survival suits and a maneuver with the ship's lifeboats. Five dredge hauls were carried out on the Desertas rift arm south of the São Lourenço Peninsula. A warden from the Parque Natural do Madeira, stationed on the Deserta Grande, approached the ship by rubber raft contacting some of the scientists whom he had previously assisted during field studies on the Desertas Islands.

Area III was reached on the afternoon of October 2 after half a day transit to the southeast. The first locality was Dacia Seamount, the southernmost station of the cruise. Eight dredge hauls were carried out yielding a variety of volcanic rocks. The METEOR continued to Annika Seamount (working name) further northeast where five dredge hauls were taken. On the evening of October 4,

the Meteor began her transit towards the northeast, reaching the Straits of Gibraltar on the morning of October 6.

After entering Area IV in the western Mediterranean (Alboran Sea), the METEOR headed eastward. Four dredge hauls were taken at each of the following localities: Ibn Batouta Seamounts, Eastern Djibouti Bank and Alboran Ridge. On October 8, five scientists disembarked on Alboran Island (volcanic in origin) using the ship's zodiac. These scientists spent the day carrying out field studies and sampling the different volcanic units on the island, which consisted of ignimbrites and lava flows as well as conglomerates containing volcanic clasts. While the scientists carried out field studies, the Meteor dredged the northwestern flank of the Alboran Ridge. The ship continued to Cabliers Bank where four dredge hauls were carried out. An official Algerian observer came on board at sea on October 9 around noon and remained on board until the end of the cruise. Five dredge hauls were subsequently carried out on Yusuf Ridge and Al Mansour Seamount respectively, both are volcanic structures. Dredging had to be stopped on the evening of October 10 as a result of storm conditions. Over the course of the next day, the METEOR carried out hydroacoustic mapping on the Maimonides Ridge and Macizo de Chella and then continued eastward towards Cresta de los Genoveses. Despite the bad weather, the Carboneras Fault system in the Gulf of Almeria and the Palomares fault system southeast of Cabo de Gata were successfully mapped using Parasound, providing evidence that both fault systems have recently been active. Dredging resumed late on the evening of October 11 at Cresta de los Genoveses and subsequently in the Polacra area to the north with 8 dredge hauls being carried out.

On October 13 the METEOR returned to the Cabo de Gata shelf area where six sediment cores were taken by coring along two transect lines. She then continued to the Gulf of Almeria for further hydroacoustic mapping of recent off-shore fault systems and proceeded to Mazico de Chella, where the last of the 106 dredge hauls of the cruise were conducted. The METEOR called at the port of Malaga on the morning of October 15, having successfully completed cruise M51/1.

