

MARIA S. MERIAN

MSM127/1 Las Palmas – Las Palmas

08.03. – 14.03.2024

Weekly Report (04.03.2024 – 10.03.2024)



The main objective of the MSM127-1 research expedition is to test a new type of cable design, which was developed in a cooperative project by the Prysmian Group / Norddeutsche Seekabelwerke GmbH for use with the MARUM-MeBo70 seabed drilling rig from the MARUM Center for Marine Environmental Sciences at the University of Bremen. This design is characterised by the fact that part of the steel reinforcement has been replaced by aramid fibres compared to a classic steel-reinforced deployment cable. As a result, the dead weight of this hybrid armoured cable in water has been reduced by more than half. In future, this should enable the maximum operating depth of the MeBo70 to be increased from approx. 2000 m to up to 4000 m without exceeding the load limit of the deployment cable and the stern boom of the larger German research vessels.

For the test, MARUM developed a frame with a weight of approx. 6 tonnes, which can be increased to up to 12 tonnes using additional steel plates. The test frame is equipped with telemetry and sensors to monitor the movement data of the test frame during the test and to be able to analyse the elongation and torsion behaviour of the hybrid cable during use. The test weight is deployed with the deployment system of the MARUM-MeBo70. This consists of the winch, on which the test cable was wound in preparation for the expedition, and a rail system on which the test weight can be brought safely into the water and back on deck. Together with a workshop container, the control container and another equipment container, a total of six containers with a total weight of approx. 85 tonnes were therefore lifted on board the research vessel MARIA S. MERIAN on 4 March 2024 at the start of the mobilisation in the port of Las Palmas.

After setting up the equipment brought on board over the following four days with the support of the crew of the MARIA S. MERIAN, terminating the hybrid cable and testing its load-bearing capacity in a final lifting test on the afternoon of 7 March 2024, we set off for the test area south of the Canary Islands on the morning of 8 March 2024. That same afternoon, the test frame went into the water for the first time to check the functionality of the telemetry, the sensors and the pressure compensation in the water at increased ambient pressure (Fig. 1).

On Saturday, 9 March 2024, we then carried out a cable test in which the 6-tonne test frame with the new hybrid cable was lowered to a water depth of over 2,200 m and then raised back on deck. Peak loads of over 140 kN were measured under the dynamic conditions at sea. We repeated this test on Sunday with additional weight plates so that the test frame could be used with its maximum weight of approx. 12 tonnes. The hybrid cable also withstood these increased load conditions without any abnormalities. Between the cable tests, a student from the Swiss Federal Institute of Technology in Zurich (ETHZ) travelling

with the ship is also using the ship's own rosette with a sound profile probe, a conductivity, temperature and pressure probe (CTD) and an additional acceleration sensor to take water samples and collect data for the development of a new type of sampler.



Fig. 1: In the last light of day, the test frame (here still without additional weight plates) on the hybrid cable comes back on board the research vessel MARIA S. MERIAN (Photo: M. Bergenthal)

Further tests are planned over the next three days, during which the test frame will be lowered to the seabed at different water depths, in particular to test the torsional behaviour of the hybrid cable under temporary load. We will then return to the harbour of Las Palmas to dismantle the test frame and instead take the MeBo70 and additional equipment on board for the next leg of the journey. We would like to thank Captain Ralf Peters and his crew for the great working atmosphere on board the MARIA. S. MERIAN. Only with their great support and exceptionally good co-operation are projects like this possible, which help us to explore the limits of what is possible in marine research.

Greetings from on board the MARIA S. MERIAN on behalf of all participants

Tim Freudenthal

MARUM Center for Marine Environmental Sciences, University of Bremen