



Wehrtechnische Dienststelle 71


Cruise Report


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Cruise- No. EMB 274

This report is based on preliminary data

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für Wasserschall und Geophysik
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1. **Cruise No.:** EMB 274
2. **Dates of the cruise:** from Kiel to Høyanger
23.08.2021 Entering the Sogne-Fjord and measurements, going to Høyanger
24.08.2021 Høyanger, measurements in Sogne-Fjord, Høyanger
25.08.2021 Høyanger, measurements in Sogne-Fjord, Høyanger
26.08.2021 Høyanger, measurements in Sogne-Fjord, Høyanger
27.08.2021 Høyanger, measurements in Sogne-Fjord, leaving Sogne-Fjord
3. **Particulars of the research vessel:**
Name:
Nationality: Germany
Operating Authority: WTD71;
4. **Geographical area in which ship has operated:**
Sogne-Fjord, Norway
5. **Dates and names of ports of call**
23.-27.08.2021 Høyanger
6. **Purpose of the cruise**
A towed array for the acoustic detection of small targets was to be tested. This towed array was constructed in form of a triplet array. With such an array a distinction between an echo coming from the starboard or the port side can be made possible. For these experiments deep water and good weatherforecasts are needed. This is given in the Sogne-Fjord. To conduct these acoustic experiments a transmitting buoy was placed in the fjord, while the towed array was driven by the ship. The trials which were conducted in the Sogne-Fjord should determine the
 - a) acoustic properties of the towed array
 - b) mechanic behaviour when towed at different speeds
 - c) measurement of the flow noise
 - d) right/left distinction of sound during measuring the roll angle of hydrophone sets
7. **Crew:**
Name of master: Steffen Künzel, WTD 71
Number of crew: 6
8. **Research staff:**
Chief scientist:
Steffen Künzel, WTD 71

Scientists:
Andre Drücker (Atlas Elektronik), Björn Borchers (Atlas Elektronik)

Engineers:
Christian Forst, WTD 71
Jörg Schulz, WTD 71

Technicians:

Klaus Balzer, WTD 71

9. **Co-operating institutions:**
ATLAS ELEKTRONIK GmbH

Sebaldsbrücker Heerstr. 235

28309 Bremen

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10. **Scientific equipment**

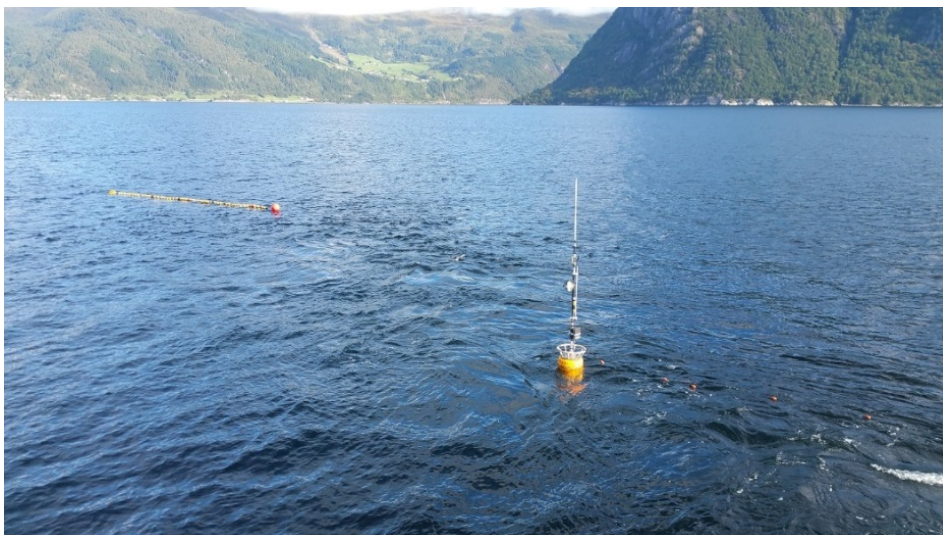
a) towed array with a total of 240 hydrophones divided into 80 triplets each consisting of three hydrophones. Two triplets were equipped with an accelerometer (40 in total) to determine the roll angle of each two triplets

b) a winch for unwinding the towed array and transferring it into the water



left: winch containing the towed array, right: towed array longing from the winch over the reel into the water

c) a buoy with a programmable transmitter for acoustic trials. The acoustic signals were received by the array. The signal could be varied by remote control.



remote control buoy for the transmission of different sonar signals

11. **General remarks and preliminary result**

Due to the acoustic measurements sound velocity profiles were measured every morning from the 23. – 27.08.2021 up to 200 m depth.

Results according to 6)

- a) The measured acoustic properties such as frequency depending receiving characteristics are still in evaluation.
- b) The investigated mechanic behaviour gave us the depth of the array as a function of the ship's speed and the tows length.
- c) The flow noise as a function of speed is still under evaluation
- d) The motion sensors of the array are accurate enough to perform the left/right distinction of the beamforming correctly.

Appendix: map and list of stations

The courses of the acoustical experiments are shown in the map below as a blue line. These courses were driven at day. At the end of the day our stay was in the port of Høyanger, shown as the red boat in the map below. The measuring of the sound velocity profile and the transmitting buoy were placed in the middle of the course.

