

RV Littorina 04/12 (2)

Cruise Report

Sagasbank (Mecklenburg Bay, Baltic Sea)

16th – 20th April 2012

Institute of Geosciences (IfG),
Sedimentology, Coastal and Continental Shelf Research
Christian-Albrechts-University (CAU), Kiel

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Kiel, April 2012

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1. Introduction

This cruise with the RV LITTORINA was the first of three planned legs to be carried out in the area of the Sagasbank (Mecklenburg Bay).

Sagas-Bank is an elevation east of the Wagrian peninsula with several elevations of up to 8 meters below sea level (Figure 1). The center of Sagasbank is marked by the 10 m contour line. Sagasbank and the adjacent submarine areas (in total 3.238 km²) are declared as FFH-site (flora-fauna-habitat).

Residual sediments (boulders, blocks, sand and gravel) of the last glacial period are ideal habitat for submarine flora and benthic organisms. Here, 115 macro-zoobenthic species (with at least 20 red list species) and 17 algae species (with 6 red list species) are living on Sagasbank. The shallow water area is also habitat for porpoises and one of the most important bird resting places in the Baltic Sea. The habitat is exposed to fishing industry, military and sporting and leisure activities.

This cruise is part of cooperation between the Institute of Geosciences at the University of Kiel and the local authority 'Landesamt für Landwirtschaft, Umwelt und ländliche Räume' (LLUR). The aim of this cruise (and the following two) is a full coverage, hydroacoustic mapping of Sagasbank and the surrounding area. The hydroacoustic data are calibrated by grab sampling and under water videos. Of special interest are the regions covered with hard substrate providing habitat for macro-zoobenthos and fishes.

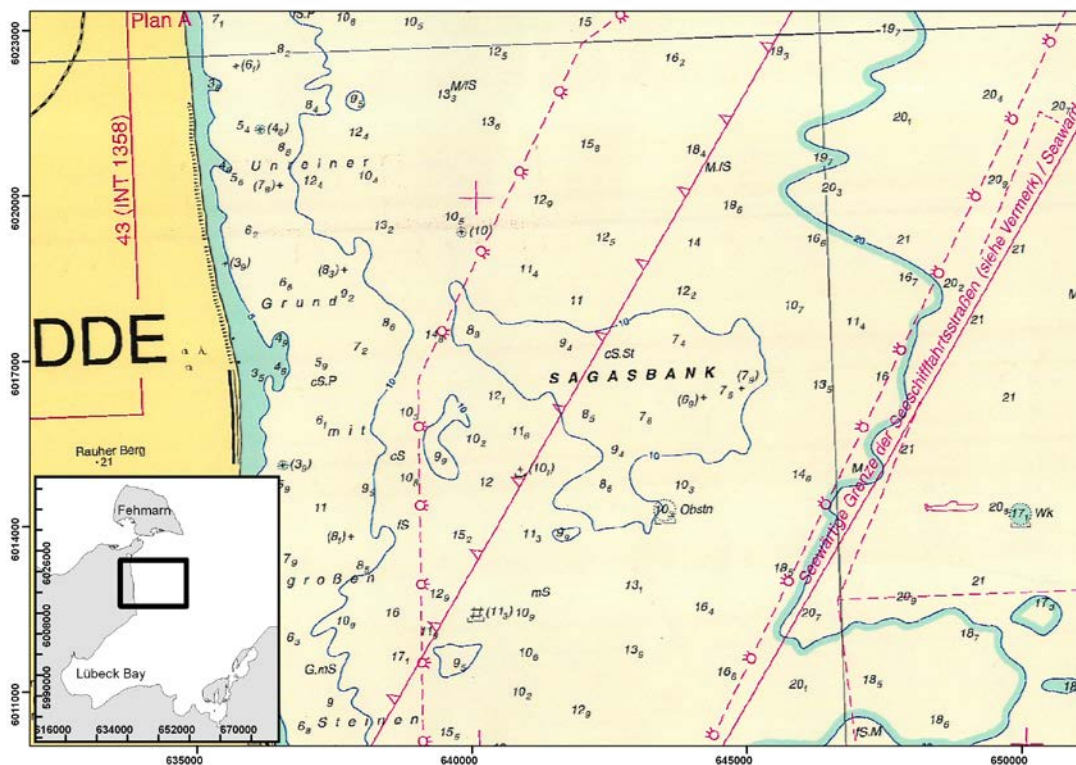


Figure 1: Overview of the area around the Sagasbank between Fehmarn Island and Lübeck Bay.

2. List of Participants

Svenja Papenmeier	chief scientist	IfG	16.04.-20.04.12
Ramona Hochbrügge	student	IfG	16.04.-20.04.12

3. Cruise Narrative

(all times are in UTC)

16th April 2012:

Departure: Kiel, 05:45
Activities: - 05:45 – 10:20 Transit to study area
- 10:23 Arrival in study area & CTD-profile
- 10:41-11:00 MBES calibration
- 11:00-12:45 Installation and check of scientific equipment.
- 12:45 – 15:20 MBES, SES, SSS, SPB (2 profiles)
Arrival: Burg, Fehmarn 16:20
Weather Conditions: Sunny, NW 4 Bft, wave 0.3-0.4 m

17th April 2012:

Departure: Burg, Fehmarn 05:15
Activities: - 6:22 CTD (1 profile)
- 6:48 – 14:20 MBES, SES, SSS, SPB (6 profiles)
- 14:52 – 15:09 MBES calibration
Arrival: Burg, Fehmarn 16:05
Weather Conditions: Sunny, partly cloudy, SW 3-4 Bft, wave 0.3-0.4 m

18th April 2012:

Departure: Burg, Fehmarn 05:20
Activities: - 6:41 – 15:26 MBES, SES, SSS, SPB (7 profiles)
Arrival: Burg, Fehmarn 16:30
Weather Conditions: Cloudy, S-SE 3 Bft, wave 0.5 m, in the afternoon: S-SE 2 Bft, wave 0.1 m

19th April 2012:

Departure: Burg, Fehmarn 05:15
Activities: - 6:35 – 11:19 Grab sampling (31 samples)
- 11:46 – 12:18 Under video profiling (1 profile)
- 12:40 – 17:02 MBES, SES, SSS, SPB (4 profiles)
Arrival: Burg, Fehmarn 18:05
Weather Conditions: Sunny, SE-E 2-3 Bft, wave 0.3 m, in the afternoon, E-NE 5 Bft, wave 0.6-0.7 m

20th April 2012:

Departure: Burg, Fehmarn 05:15
Activities: - CTD (1 profile)
- 06:14 – 09:10 MBES, SES, SSS, SPB (2 profiles)
- 09:10 – 14:45
Arrival: Kiel, 14:45 Transit & de-installation of scientific equipment
Weather Conditions: Cloudy, E 3 Bft, wave 0.4-0.5 m

4. Equipment

4.1 Side scan sonar (SSS)

To obtain high resolution sonographs of the sea floor the side scan sonar unit of the C3D (Teledyne Benthos) system was used. The device was towed behind the vessel in water depth of approximately 5 - 6 m running with a towing speed of 5 knots. The frequency of the device is 200 kHz. The survey was run with a range of 100 m to each side applied. Data were recorded and mosaiced with the Isis SONAR software “Triton Elics”.

4.2 Sub bottom profiler (SBP)

Seismic data were recorded with the sub bottom installed in the the C3D unit (Teledyne Benthos). The data were acquired in a low chirp frequency mode (1.5-10 kHz).

4.3 Multibeam echo sounder (MBES)

Multibeam surveys were performed with shipboard SeaBeam 1185 (L3-Communications, ELAC Nautik GmbH), which operates with a sonar frequency of 180 kHz. The system collects bathymetric and backscatter data simultaneously with a swath width of 153.5°. The profiles were run with a vessel speed of 5 knots. The data was acquired and recorded using the software Hydrostar (L3-Communications, ELAC Nautik GmbH).

4.4 Conductivity-Temperature-Depth probe (CTD)

Conductivity, temperature and depth profiles were measured with a CTD probe of Sea and Sun technology. The calculated sound velocity values are necessary to correctly record water depth values with the multibeam.

4.5 Grab sampler

Sampling for ground truthing was done with a 60 kg HELCOM standard grab sampler. Subsamples were taken for sedimentological lab analysis.

4.6 Underwater video

For optical ground truthing an underwater video camera of type Mariscope Micro was used. The device was dragged from the research vessel a few decimetres above the sea floor. The

video images are transferred via a coax-cable to a monitor in real-time. The images were stored on a hard disk.

5. Performed work and preliminary results

During this cruise the mosaic of the first and second leg was extended by 22 km² each in northern and southern direction (Figure 2). Additionally, one hydroacoustic profile in north-south direction west of the study area was recorded. Side scan sonar data of the total area were calibrated with 31 grab samples and one under water video profiles.

The complete side scan sonar mosaic shows two explicit areas covered with hard bottom substrate like rocks, stones and gravel (high backscatter) originated from the last glacial period (Schwarzer et al., 2008). The first one is located near the shore below 10 metre water depth. The second covers the eastern part of Sagasbank and extends up to 20 metre water depth. Between the near shore hard bottom substrate area and Sagasbank exist a north-south orientated band of mainly sandy deposits (low backscatter). Below 20 meter water depth low and very homogenous backscatter is observed representing mud deposits which are typical for areas of the western Baltic Sea below 20 m (Schwarzer & Diesing, 2006).

Sub bottom profiles indicate a backfilled sub bottom channel which runs approximately in north-south direction between the western 10 meter contour line and Sagasbank. The channel cuts up to 7 meter into the sub bottom.

Multibeam data are not processed so far. The surveyed area is due to a track distance of 180 meter not full covered. The bathymetric map, calculated from the water depth of the SES, highlights the plateau of the Sagasbank (Figure 3). Near shore exists a 3.5 metre deep channel, orientated in north-south direction.

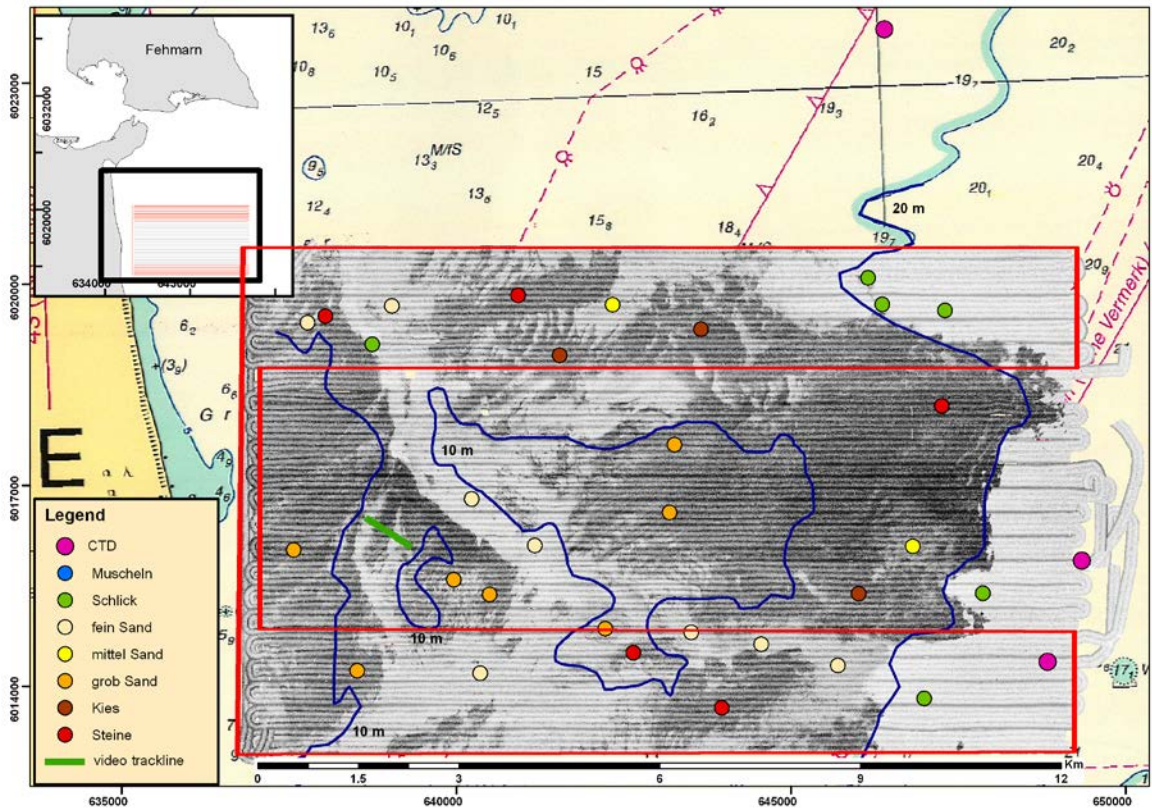


Figure 2: Side scan sonar mosaic (red rectangle) mapped together with data of the first and second leg (27.02.-02.03. 2012 & 2.-5. 04 2012), grab sampling stations, CTD stations and under water video profile.

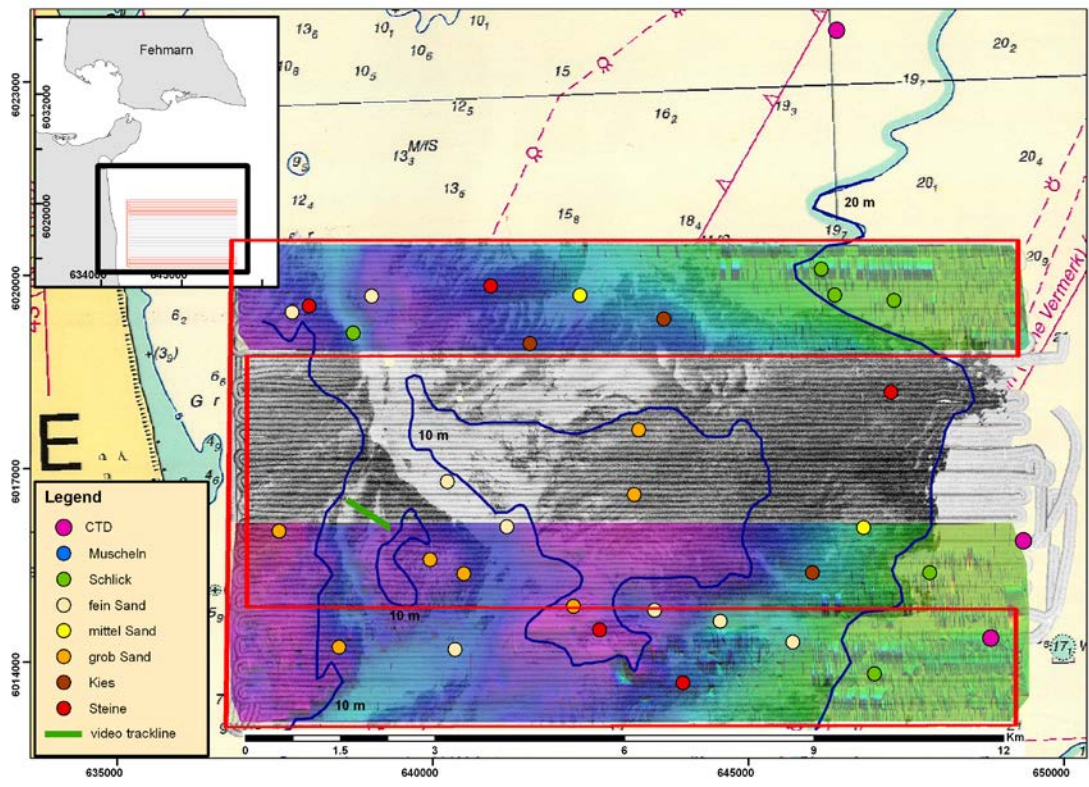


Figure 3: Side scan sonar mosaic with bathymetric map (originating on SES data), grab sampling stations, CTD stations and under water video profile.

6. Conclusion

Hydroacoustic measurements were run with good to excellent data quality. Grab sampling and under video profiles well complement hydroacoustic data. Hard bottom substrate, which present habitat for sea grass, algae, macro-zoobenthos and fishes, was found also beyond the Sagasbank down to 20 metre water depth. The hard substrate area is not yet completely mapped. Additional profiles in the north and south are necessary to record the entire hard substrate area.

Hard bottom substrate associated with Sagasbank mainly occurs on the eastern side. The exact extension of hard bottom substrate has to be investigated by further surveys.

7. Acknowledgements

We would like to thank master (B. Brockmann) and crew of RV LITTORINA for giving us all kind of support during this cruise.

8. References

- Schwarzer, K. and Diesing, M. (2006): Abschlussbericht – Erforschung der FFH-Lebensraumtypen Sandbank und Riff in der AWZ der deutschen Nord- und Ostsee.
- Schwarzer, K., Themann, S. and Krause, R. (2008): Abschlussbericht – Zusammenstellung der marinen Lebensraumtypen nach FFH. Institut für Geowissenschaften, Christian-Albrechts-Universität zu Kiel, 29 p.

9. Apendices

Coordinates are in UTM (WGS82, 32N)

9.1 *Hydroacoustic profiling*

Nr.	Date	Time (UTC)	Longitude	Latitude	Comment
1	16.04.2012	12:46	649143	6014704	Profile start
2	16.04.2012	14:02	637105	6014704	Profile end
3	16.04.2012	14:02	637105	6014524	Profile start
4	16.04.2012	15:19	649143	6014524	Profile end
7	17.04.2012	06:48	649143	6014344	Profile start
8	17.04.2012	08:04	637105	6014344	Profile end
9	17.04.2012	08:04	637105	6014164	Profile start
10	17.04.2012	09:21	649143	6014164	Profile end
11	17.04.2012	09:21	649143	6013984	Profile start
12	17.04.2012	10:36	637105	6013984	Profile end
13	17.04.2012	10:39	637105	6013804	Profile start
14	17.04.2012	11:53	649143	6013804	Profile end
15	17.04.2012	11:53	649143	6013624	Profile start
16	17.04.2012	13:07	637105	6013624	Profile end
17	17.04.2012	13:07	637105	6013444	Profile start
18	17.04.2012	14:20	649143	6013444	Profile end
19	18.04.2012	06:41	637105	6018844	Profile start
20	18.04.2012	07:57	649143	6018844	Profile end
21	18.04.2012	07:57	649143	6019024	Profile start
22	18.04.2012	09:12	637105	6019024	Profile end
23	18.04.2012	09:12	637105	6019204	Profile start
24	18.04.2012	10:30	649143	6019204	Profile end
25	18.04.2012	10:30	649143	6019384	Profile start
26	18.04.2012	11:46	637105	6019384	Profile end
27	18.04.2012	11:46	637105	6019564	Profile start
28	18.04.2012	13:01	649143	6019564	Profile end
29	18.04.2012	13:01	649143	6019744	Profile start
30	18.04.2012	14:14	637105	6019744	Profile end
31	18.04.2012	14:14	637105	6019924	Profile start
32	18.04.2012	15:26	649143	6019924	Profile end
35	19.04.2012	12:44	636882	6013084	Profile start
36	19.04.2012	13:28	636882	6020464	Profile end
37	19.04.2012	13:28	637105	6020104	Profile start
39	19.04.2012	14:43	649143	6020104	Profile start
40	19.04.2012	14:43	649143	6020284	Profile end
41	19.04.2012	15:54	637105	6020284	Profile start
42	19.04.2012	15:54	637105	6020464	Profile end
43	19.04.2012	17:02	649143	6020464	Profile start
46	20.04.2012	06:50	649143	6013264	Profile end

47	20.04.2012	08:02	637105	6013264	Profile start
48	20.04.2012	08:02	637105	6013084	Profile end
49	20.04.2012	09:10	649143	6013084	Profile start

9.2 CTD Profiling

Name	Date	Time (UTC)	Latitude	Longitude	Comments
20120416_001	16.04.2012	10:23	646392	6023802	
20120417_002	17.04.2012	06:22	649349	6015878	
20120420_003	20.04.2012	06:25	648834	6014370	

9.3 Grab Sampling

Name	Date	Time (UTC)	Longitude	Latitude	Water depth (meter)
20120419_01	19.04.2012	06:35	647298	6019610	21.00
20120419_02	19.04.2012	06:41	646151	6020095	20.30
20120419_03	19.04.2012	06:47	646365	6019699	19.50
20120419_04	19.04.2012	06:54	643655	6019327	14.80
20120419_05	19.04.2012	07:05	642332	6019691	15.07
20120419_06	19.04.2012	07:14	641541	6018941	13.10
20120419_07	19.04.2012	07:20	640919	6019837	13.04
20120419_08	19.04.2012	07:36	639033	6019676	11.80
20120419_09	19.04.2012	07:40	638740	6019103	14.60
20120419_10	19.04.2012	07:47	638043	6019525	12.87
20120419_11	19.04.2012	07:51	637775	6019426	11.56
20120419_12	19.04.2012	08:05	640228	6016799	11.02
20120419_13	19.04.2012	08:12	641171	6016100	11.80
20120419_14	19.04.2012	08:20	643187	6016598	9.20
20120419_15	19.04.2012	08:26	643260	6017604	9.60
20120419_16	19.04.2012	08:43	647249	6018186	16.07
20120419_17	19.04.2012	08:53	646821	6016090	7.70
20120419_18	19.04.2012	09:02	647868	6015389	21.30
20120419_19	19.04.2012	09:11	646008	6015386	15.90
20120419_20	19.04.2012	09:19	646991	6013820	20.90
20120419_21	19.04.2012	10:07	645701	6014312	17.40
20120419_22	19.04.2012	10:13	644552	6014632	17.00
20120419_23	19.04.2012	10:21	643963	6013678	13.66
20120419_24	19.04.2012	10:27	643508	6014806	12.00
20120419_25	19.04.2012	10:35	642643	6014502	~10
20120419_26	19.04.2012	10:39	642225	6014863	~10
20120419_27	19.04.2012	10:48	640354	6014198	~15
20120419_28	19.04.2012	10:54	640494	6015373	11.70
20120419_29	19.04.2012	10:58	639957	6015590	11.40
20120419_30	19.04.2012	11:06	638516	6014234	12.02
20120419_31	19.04.2012	11:15	637568	6016035	7.70

9.4 Video Profiling

Name	Date	Time (UTC)	Latitude	Longitude	Comments
20120419_01	19.04.2012	11:34	639322	6016146	Profile start
20120419_01	19.04.2012	12:18	638677	6016497	Profile end