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# International Hydrography Summer Camp 2010

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# International Hydrography Summer Camp 2010

An article by *Tanja Dufek, Kristoffer Eberle, Ute Gallbach, Andreas Prokoph, Nils Tietgen* and *Christin Wolmeyer*

In 2010 the fourth International Hydrography Summer Camp (IHSC) took place at the fjord Schlei in Schleswig-Holstein. It was organized by Prof. Böder and master students of the HafenCity Universität Hamburg. The idea behind this two week excursion was to give international students the possibility to experience the broad field of hydrographic surveying and to give the master students a last chance of getting practical training before their graduation. Therefore nearly all measurement instruments of hydrographic surveying had been used like multi-beam echo-sounder, side-scan sonar, sub-bottom profiler, magnetometer and ADCP.

Schleih | IHSC | HCU | archeology | seabarrier | multi-beam data | side-scan data



The Schlei was chosen as location for the IHSC because of archeological artefacts from the Viking time in that area. One of the most important settlements of this period was located at the end of the fjord. The Schlei was one of the main trading routes that time, connecting the Baltic Sea via the river Treene with the North Sea. Due to the fact that the main water level changed since the Viking time, a lot of remains from the Vikings can be found at the bottom of the Schlei. These include ship wrecks and a seabarrier, which was built to protect the harbour against enemies.

The survey areas where chosen in cooperation with the archaeologists Dr. Nakoinz and Dr. Segschneider of the State Archaeological Department of Schleswig-Holstein, considering the results of the IHSC 2008, which was also held at the Schlei. In Fig. 1 an overview of the areas of investigation is shown.

Besides the data acquisition different presentations from experts of different companies and agencies were hold to give the participants with less hydrographic background an introduction and overview of hydrography and its applications. Also an excursion to the archaeological excavation took place to get a better understanding of the archaeological context.

The measurements were carried out with the surveying vessel »Level-A« of the HafenCity Universität Hamburg. It has a length of 8 metres, a width of 2.5 metres and a draft of 0.35 metres. For the determination of the position a Leica SR 530 GPS-receiver was used. To compensate the ship's movements, the »Level-A« is equipped with an

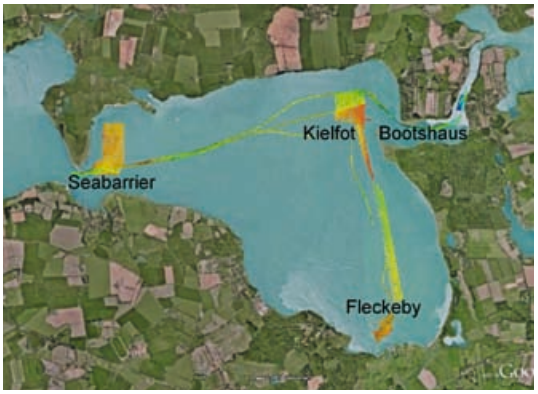


Fig. 1: Overview of the survey areas 2010

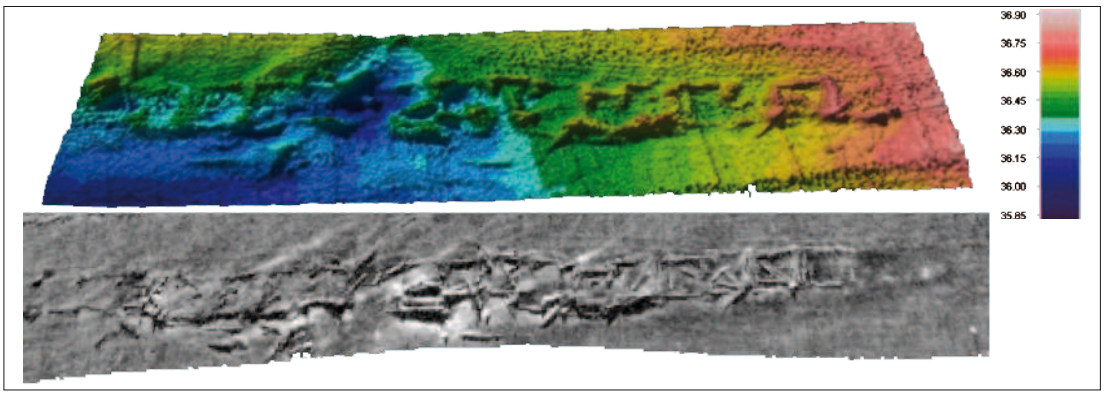


Fig. 2: Multi-beam (resolution 0.1 meters) and side-scan data of the seabarrier

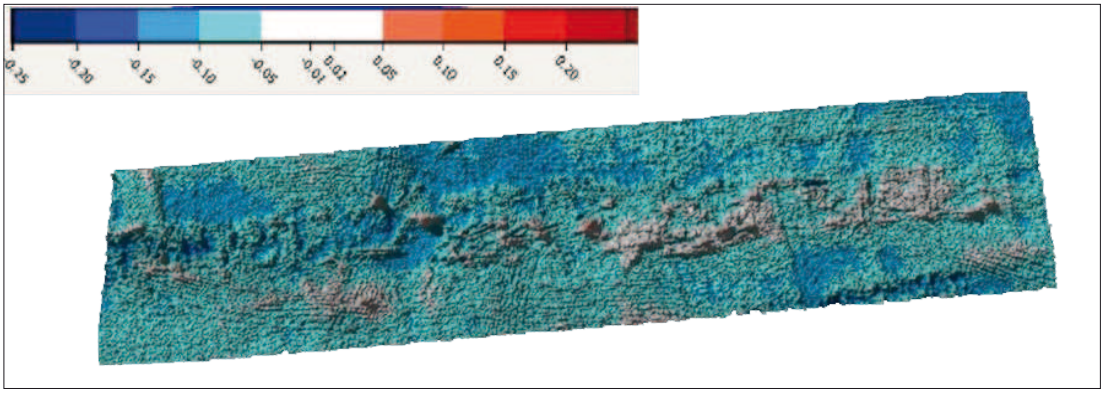


Fig. 3: Difference surface of the multi-beam data of 2008 and 2010

Octans III motion sensor. The single-beam system installed on the »Level-A« is a Fahrentholz LituGraph XL which allows simultaneously working multi-frequency surveys, ranging from 12 to 700 kHz. The installed multi-beam echo-sounder was a SeaBat 8101 with an operating frequency of 240 kHz. During the summer camp two different side-scan sonars were used. The first one was the Innomar SES-2000 System. This sonar works with a frequency of 100 kHz and the transducer is fixed under the ship. The second side-scan system used was the C-MAX CM2 Digital Towfish ranging up to a frequency of 780 kHz. This system was modified, so that it could be installed at the side of the vessel, instead of being towed. For sub-bottom measurements an Innomar SES-2000 Standard parametric sediment echo-sounder was used.

The datasets from the different systems were examined and processed. This included the cleaning of the multi-beam data and the creation of mosaics from the side-scan sonar. For the cleaning of the MBES data the software QPS Qloud was used. A filter for an automatic cleaning was created to reduce the amount of work. The mosaics from C-MAX data were generated by using the Geocoder from IVS3D. These datasets and echograms of the sub-bottom profiler were brought together in IVS3D Fledermaus to create an overview of the collected data in the survey area.

The area of the seabarrier was of special interest. This investigated wooden structure has a length of 100 metres and a width of 12 metres. The height above the seafloor is around 30 centimetres. The seabarrier was also investigated during the IHSC 2008. It was interesting for the archeologists to check whether any changes occurred during these two years. In Fig. 2 the MBES and the side-scan data of the seabarrier is shown. The single poles are clearly visible in the side-scan data.

Fig. 3 shows a difference surface from the MBES data from 2008 and 2010. Most of the surface is presented in blue, which indicates a decrease of the surface about 5 to 10 centimetres. Just a few peaks are coloured in red, which means an increase in height. The reason for that could be the erosion of the sediments. Another possibility could be a systematic offset between the two datasets. A further examination to determine the cause for that is required.

Close to the seabarrier holes in the seafloor were visible in the MBES data. They have a diameter of 4.5 metres and a depth of 20 centimetres at most. No side-scan data was available for that part. Their origin is an anchorage stone of a buoy (Fig. 4).

In the data also scratches with a length of 350 metres, a width of 1 metre and a depth of 10 centimetres were found (Fig. 5). It might be possible that they were caused by anchorage. Scour marks like that were found in each of the survey areas.

Another object was found in the data, which could not be clearly identified (Fig. 6). It has a U-shape, a diameter of around 10 metres and a height above sea floor of 0.2 metres.

All data were processed during the third master semester and the results were forwarded to the archeologist group. Further interpretation and investigation from the archaeologists is essential to evaluate the importance of surveyed structures.

In conclusion the combination of several instruments brought good results; especially the combination of side-scan sonar and multi-beam echo-sounder was very useful. □

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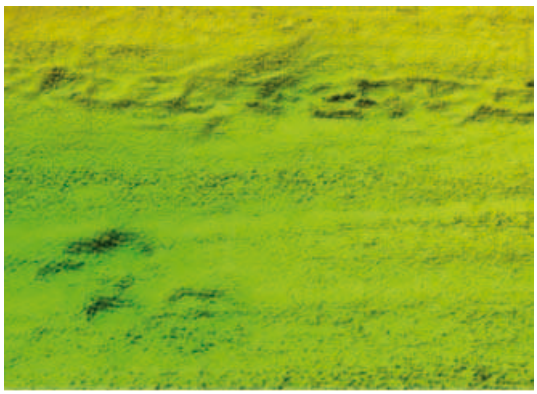

Fig. 4: Multi-beam data of the seabarrier in the background and the holes in the foreground

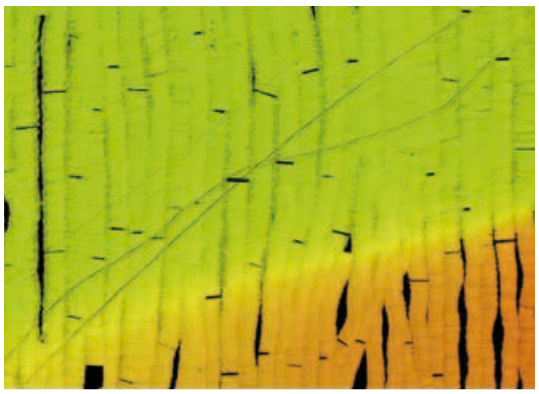

Fig. 5: Scour marks in the multi-beam data

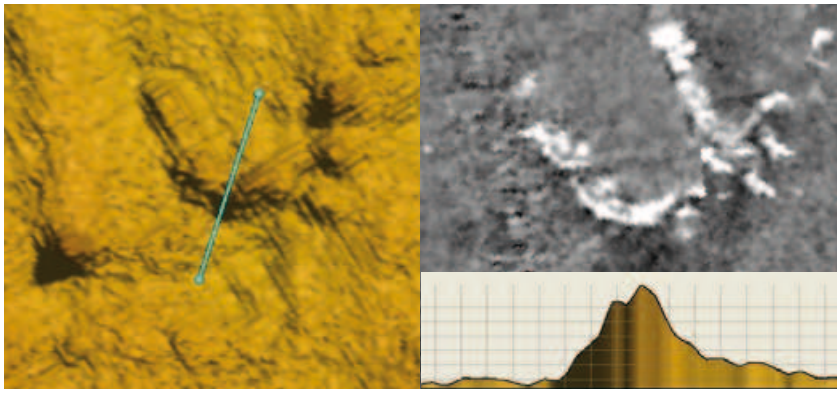

Fig. 6: Multi-beam and side-scan data with cross profile of unidentified structure