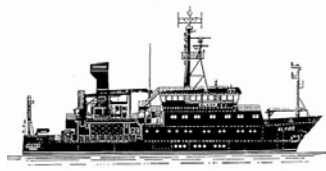


## **Short Report**

### **ALKOR Cruise No. 459**



#### **Field Tests of a Flexible Long-term Monitoring Tool (FlexMoT) in the southern Kosterfjord, eastern Skagerrak**

**Kiel – Kiel: 03. - 09. 07. 2015**

**Cruise Lead: Dr. Sascha Flögel**

**GEOMAR Helmholtz Centre for Ocean Research Kiel**

**Kiel, Germany**

#### **I. Objectives of the cruise**

The expanding use of the shelf seas and continental margins for industrial resources such as oil, gas, wind energy, pipelines, ship transports requires a flexible environmental monitoring strategy and the development of new observation tools.

Cruise ALKOR 459 was dedicated to the testing of a new flexible monitoring tool for environmental parameters such as off-shore gas concentrations. The FlexMoT observation platform is constructed and built in the framework of the German nationally funded project "TIMM-FlexMoT". The Federal Ministry of Economy (BMWi) finances the project. It is carried out by three industry partners (Oktopus, Contros, Leoni), one Fraunhofer institute (IGD Rostock) and one scientific partner, the GEOMAR Helmholtz Institute for Ocean Research. For further testing of the second improved version of the new lander system, a working area in the southern Kosterfjord was chosen, namely an area around the island of Ramsö within the Swedish EEZ. Here, it was possible to test the array at variable depth levels between 80 and 120 m and on varying substrates.

During cruise AL 459 various short surveys with a video-guided CTD/ Rosette water sampler, deployments of the FlexMoT observation system and a small SLM lander for reference measurements were carried out.

The FlexMoT systems consists of a lander type frame (FlexMoT Base Module) which is deployed on the sea floor with an on-line video controlled launching device for targeted positioning. The FlexMoT Base Module houses a profiling instrument with sensors (e.g. CTD,

methane). This instrument travels on a cable profiling the water column in both directions. The profiling cable is released and expanded into the water column by a float that is released through the disconnection of the launcher from FlexMoT Base Module (Fig. 1).

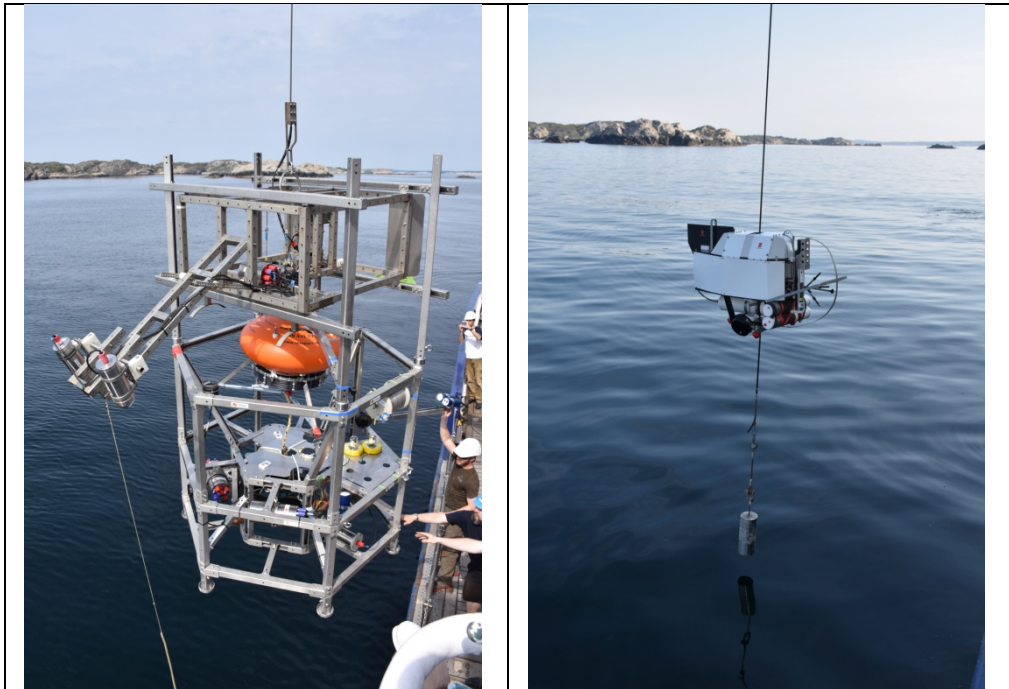


Fig. 1: The FlexMoT Base Module with the video launcher on top. The head-float for the profiling cable is in the centre (left). The profiling instrument SPI just before deployment (right).

Additionally, we tested the data transfer using small floats that are released from the base module (Fig. 2). Once at the surface they establish a GSM connection via an internal SIM-card and transfer the data.

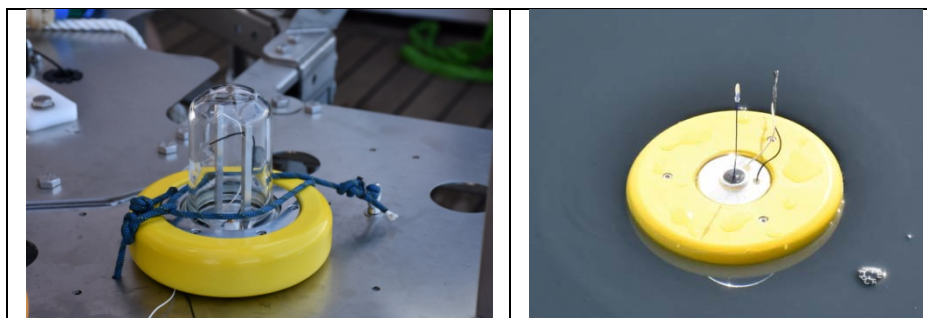


Fig. 2: The FlexMoT data floats in the base module (left). The data float after release from the lander at the surface (right).

## II. Narrative of the cruise

Friday, 03-07-2015: R/V ALKOR left the GEOMAR eastshore pier in Kiel harbor at 08:00 and headed through the Great Belt and Kattegat towards our working station in the southern Kosterfjord in the Swedish EEZ.

Saturday, 04-07-2015: Due to very calm seas during the transit, we arrived within the working area south of the island of Ramsö at 08:00. We began our station work with a Video-CTD survey (Stat. 561) of the working area in order to find possible target sites for the deployment of the satellite lander system (SLM) and the FlexMoT module. After the Video-CTD, we deployed the SLM lander (Stat. 562-564) to measure reference oceanographic parameters until the end of station work. Later in the day, we deployed the FlexMoT module (FBM, Stat. 565) and began to test its various functions.

Sunday, 05-07-2015: We started our daily work with a very successful test (Stat. 566) of the improved SPI (Sensor Profiler Instrument). The SPI traveled repeatedly up- and down on the cable while measuring CTD and methane data. The next station (Stat. 567) was dedicated to the first test of the data floats which were able to establish a data connection (sending and receiving) via GSM. Stat. 568 saw the second test of the FBM incl. the acoustic release of the data floats. Additionally, we performed two Video-CTDs to calibrate a camera software package for image analysis (Stats. 569 and 570). The last station (Stat. 571) for the day was the recovery of the satellite lander. Due to a severe weather warning with seas exceeding 3.5 m in the eastern Skagerrak, we left the working area at 18:15 and headed south towards the German EEZ and the new working area at "Boknis Eck".

Monday, 06-07-2015: Continuing the transit to the new working area at "Boknis Eck", passing the Little Belt. Various modifications of the FBM and SPI. Arrival at Boknis Eck at 21:00.

Tuesday, 07-07-2015: We began the station work at 08:00 with the deployment and subsequent data transfer of the data floats (Stat. 572). Later, at 10:15 we conducted a successful second test of the SPI (Stat. 573), this time with ground weight and submerged head float. Next, we deployed the FBM incl. release of the data floats (Stat. 574). We stayed in Eckernförde over night.

Wednesday, 08-07-2015: At 08:00, we deployed multiple video-CTDs to calibrate the camera system and to get stereographic video footage (Stat. 575-578). During the day, winds increased up to 8 Bft. This was followed by the final deployment of the FBM (Stat. 579). At 15:30 we left the working area at Boknis Eck and started our transit back to Kiel where we arrived at 17:00 at the GEOMAR eastshore building, thus finishing ALKOR cruise 459.

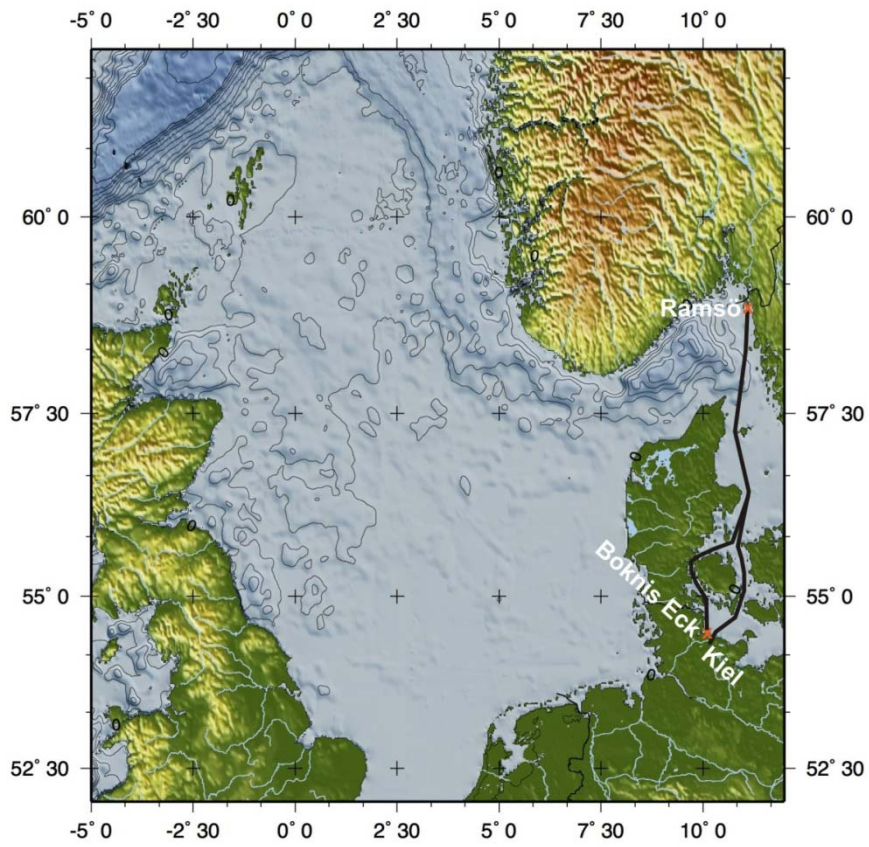


Fig. 2: Cruise track and areas of investigation (Island of Ramsö and Boknis Eck).

### III. Participants and participating institutions

Name	Profession	Institution / Company
Flögel Dr. , Sascha	Chief Scientist	GEOMAR
Appel, Frank	Engineer	Oktopus GmbH
Audersch, Stefan	Engineer	Fraunhofer IGD
Berghäuser, Thorben	Engineer	GEOMAR
Bohlen, Janna	Technician	Contros GmbH
Brinkmann, Harald	Engineer	Contros GmbH
Kühn, Manfred	Engineer	Oktopus GmbH
Rother, Kristian	Technician	Oktopus GmbH
Rudorf Dr., Uwe	Engineer	LEONI GmbH
Ruth, Thomas	Engineer	Fraunhofer IGD
Saturov, Dimitar	Engineer	GEOMAR
Zabel, Jakob	Student	Fraunhofer IGD

- ❖ Contros Systems & Solutions GmbH, Wischhofstr. 2 , 24148 Kiel, Germany
  
- ❖ Fraunhofer-Institut Für graphische Datenverarbeitung , Joachim-Jungius-Straße 1118059 Rostock, Germany
  
- ❖ GEOMAR Helmholtz Centre for Ocean Research Kiel, Wischhofstr. 1-3 , 24148 Kiel, Germany
  
- ❖ LEONI Special Cables GmbH, Eschstr. 1, 26169 Friesoythe, Germany
  
- ❖ Oktopus GmbH, Wischhofstr. 1 , 24148 Kiel, Germany

#### IV. Station list and gear abbreviations

##### Station List ALKOR-459: 03.07. - 09. 07. 2015

Station	Gear	No.	Date	Time	Coordinates		Depth
AL459-No.			2015	(UTC)	Lat. °N	Long. °E	(m)
561	CTD/RO	1	04.07.	06:15	58°49.133′	011°04.197′	92
562	SLM #3 (deployment)	1	04.07.	08:40	58°49.133′	011°04.214′	102
563	SLM #3 (recovery)	2	04.07.	9:00	58°49.210′	011°04.205′	100
564	SLM #3 (deployment)	3	04.07.	10:41	58°49.138′	011°04.211′	97
565	FBM	1	04.07.	14:04	58°49.104′	011°04.163′	92
566	SPI	1	05.07.	06:08	58°49.121′	011°04.209′	104
567	Data float	1	05.07.	08:28	58°49.389′	011°04.397′	120
568	FBM	2	05.07.	12:55	58°49.110′	011°04.165′	94
569	CTD/RO	2	05.07.	15:14	58°49.146′	011°04.206′	101
570	CTD/RO	3	05.07.	15:30	58°49.143′	011°04.214′	102
571	SLM #3 (recovery)	4	05.07.	16:00	58°49.158′	011°04.250′	100
572	Data float	2	07.07.	06:30	54°31.254′	010°02.943′	26
573	SPI	2	07.07.	10:15	54°31.273′	010°03.002′	26
574	FBM	3	07.07.	13:36	54°31.272′	010°03.000′	26
575	CTD/RO	4	08.07.	06:10	54°31.274′	010°02.980′	26
576	CTD/RO	5	08.07.	06:28	54°31.263′	010°02.965′	26
577	CTD/RO	6	08.07.	06:56	54°31.272′	010°02.976′	26
578	CTD/RO	7	08.07.	07:44	54°31.275′	010°02.943′	26
579	FBM	4	08.07.	11:38	54°31.193′	010°03.084′	26

##### Gear Abbreviations:

CTD/RO	Video-CTD/Rosette water sampler
SLM	Satellite Lander
FBM	FlexMoT Base Module
SPI	Sensor Profiling Instrument