RV Simon Stevin – Cruise report

Vlaams Instituut Voor De Zee

RV SIMON STEVIN, CRUISE NUMBER 19-840

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Geophysical survey: 03/12/2019 - 05/12/2019

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1. CRUISE DETAILS

1.	Cruise number	19-840
2.	Date/time	Oostende: 03/12/2019 at 09h00 Oostende: 05/12/2018 at 17h00
3.	Chief Scientist Participating institutes	Tine Missiaen Vlaams Instituut Voor De Zee
4.	Area of interest	Dover Strait, UK (British Continental Shelf) Between 51.01°N – 51.11°N and 1.37°E – 1.58°E (see Figure 1)

2. SCIENTIFIC TEAM

INSTITUTE	NAME	03/12 – 05/12
VLIZ	Tine MISSIAEN	x
VLIZ	Ruth PLETS	x
VLIZ	Michiel T'Jampens	x
VLIZ	Robin HOUTHOOFDT	x
	Total number of participants:	**4**

3. SCIENTIFIC OBJECTIVES

The goal of the 2019 campaign was to collect additional data from a series of enigmatic linear ridge-and-groove features (hundreds-of-metres long, 1-2 m high) on the seafloor of the Dover Strait. In February 2018 a first survey was carried out (see Fig. 1) to characterise the morphology and nature of the linear ridges and grooves, as well as their relationship with the formation of other erosional landforms carved in the Dover Strait. The results suggest that the grooves and ridges are carved into hard bedrock and revealed that these features are truncated by large-scale scours, which were interpreted as megaflood-eroded landforms. It is believed that the linear features were formed by fluvial erosion and high-magnitude flood erosion prior to the megaflood event. The 2018, however, the multibeam data showed quite some artefacts (related to poor weather, inaccurate acquisition settings and RTK problems) and interpretation of the data was therefore not always straightforward. Video footage was only obtained from 2 locations and grab sample from one location. Moreover, the quality of the 2018 video footage was rather low.

The objectives of the 2019 survey were to obtain (1) new high-res bathymetric and backscatter data from the 2018 survey area, especially from the deeper parts where data quality was not optimal and the westernmost edge of the survey area which was marked by artefact-like lineations; (2) new high-res multibeam data from the area to the NW where good data are currently still lacking; (3) high quality video footage and grab samples from different, well-targeted locations. This should allow to further corroborate the findings from the 2018 survey. In addition, the video images and grab samples should allow a better seafloor characterisation based on backscatter strength, the 2018 backscatter data often being rather ambiguous.

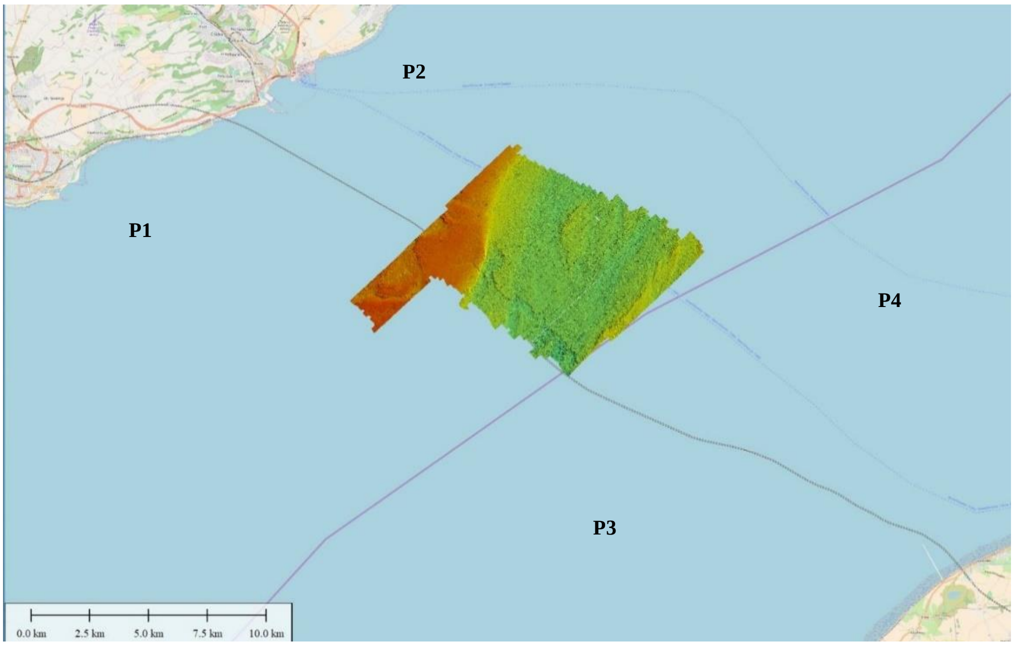

Figure 1: Bathymetric map of the survey area from February 2018.

4. DATA ACQUISITION

4.1. Multibeam data

The multibeam echosounder used during the 2019 cruise is the EM2040 permanently installed on RV Simon Stevin. Frequency was set at 300 kHz with a swath width of 70º on both port and starboard (using the normal sector mode), pinging roughly 6 times every second (using a short CW pulse type). Vessel speed was set between 6 and 7 knots. Prior to the multibeam measurements a CTD was taken and patch test was carried out in the survey area for optimal calibration (5 lines, vessel speed ranging between 4 and 8 knots).

Bathymetric swaths were collected in the direction of the navigation lane (WSW–ENE), keeping a 25-30% overlap between consecutive swaths (see Fig. 2 for overview of MBES coverage). Line spacing varied between 130 m and 220 m depending on the encountered water depth (between 30 and 60 m). Backscatter settings were carefully chosen to allow accurate post-survey corrections (see Fig. 3 for backscatter coverage).

Weather conditions throughout the survey were good (2-4 bft) with an overall calm sea. The quality of the obtained bathymetric and backscatter data was very good.

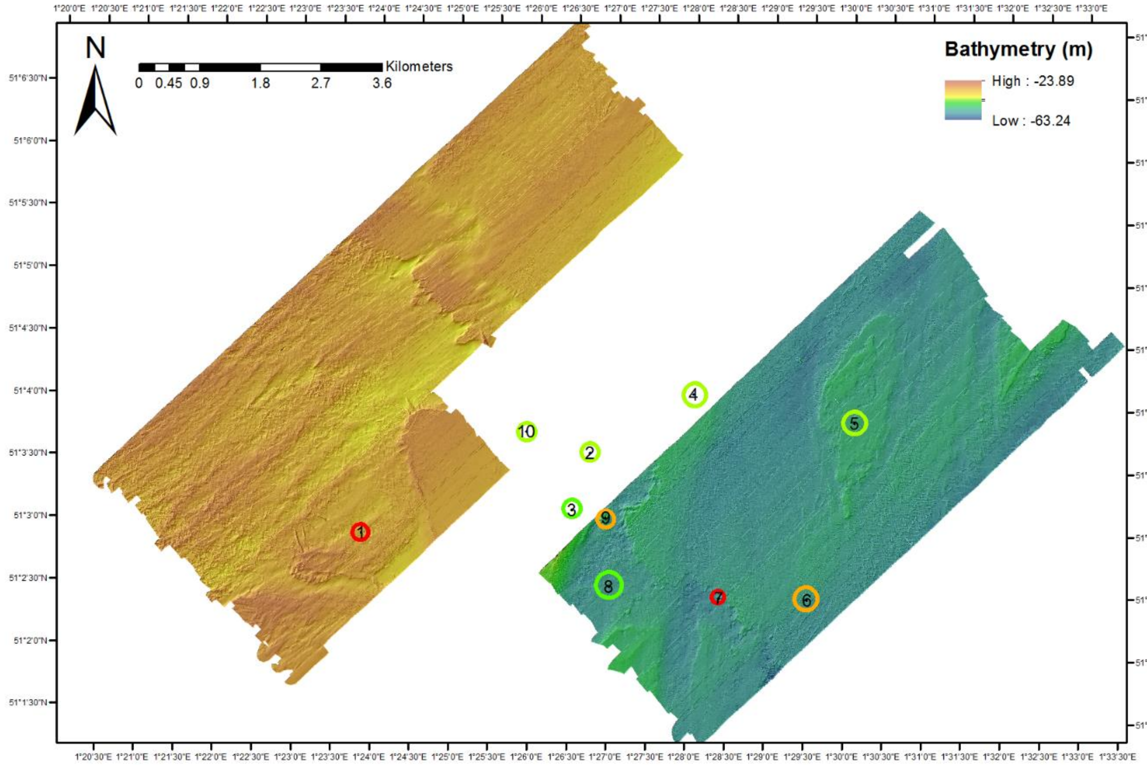

Figure 2: Preliminary bathymetric image of the 2019 survey (unprocessed data) with sample stations indicated.

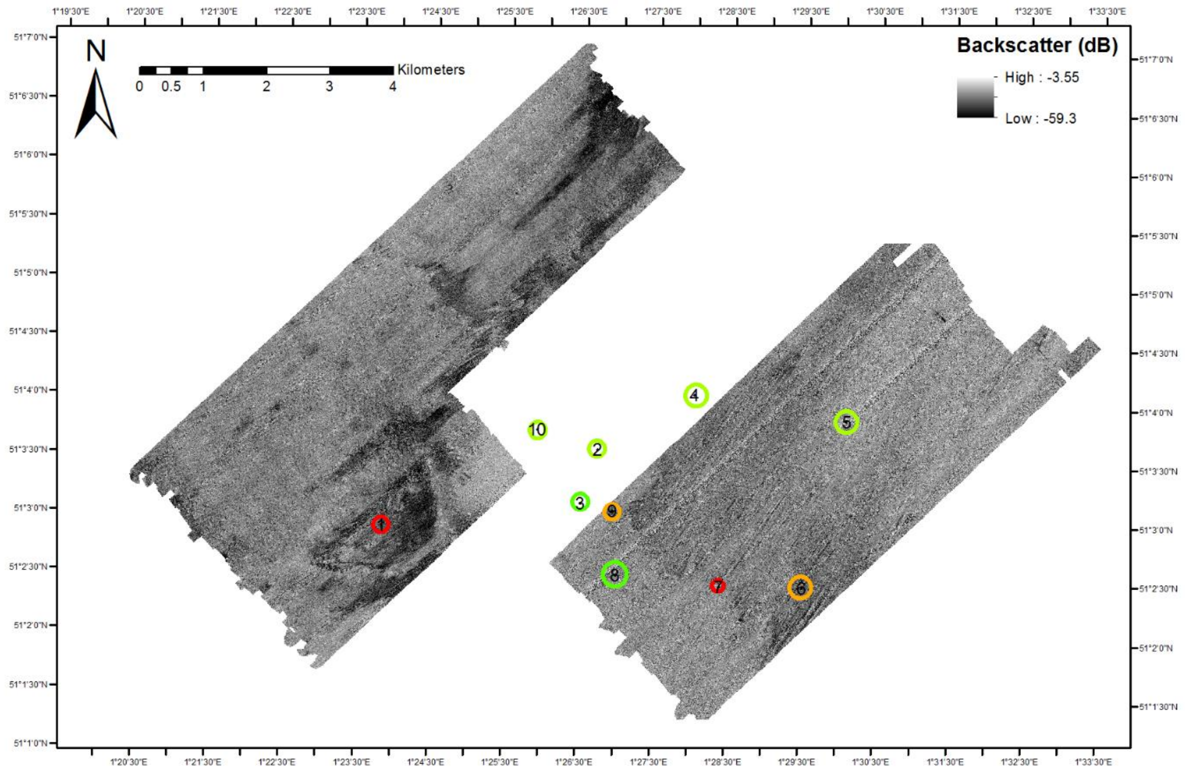

Figure 3: Preliminary backscatter image of the 2019 survey (preliminary processing to 1m resolution) with sample stations indicated.

4.2. Video footage and grab sampling

Video survey and grab sampling was carried out during slack tide, when current velocities were lowest. In total 10 different sites were sampled and filmed (Fig. 2 and 3; Table 1). The locations were primarily chosen for their different backscatter signals as seen on the 2018 data, and included some of the islands, palaeovalley tributaries to the Lobourg Channel, the scarp, longitudinal scours, large streamlined island, as well as linear sets inside and outside the Lobourg channel. A safety perimeter of at least 300 m was kept from all cable routes crossing the area. For the video footage a mini-ROV was mounted inside the VLIZ video frame (the ROV camera being of better quality than the video frame camera) (Figure 4). For the grab sampling the Hammond grab of VLIZ was used (Fig. 5).

Table 1. Sample locations and description; sample coordinates are the positions given to the ship and are not corrected for video/grab deployment offsets

Sample ID	Lat (^oN)	Long (^oE)	Approx depth (m)	Sample description
1	51.04857	1.397285	-32	Fine sand to silt, quite stiff; some cobbles with lots of worm casts
2	51.05984	1.445493	-32	Chalk cobbles, broken shells, coarse sand; lots of encrustations and some flint material
3	51.05219	1.441876	-36	Mostly pebbles and cobbles, heavily
4	51.06794	1.46717	-47	Grab mostly empty; some chalk pebbles with lots of encrustations, heavily bored
5	51.06446	1.501387	-48	Mostly pebbles and cobbles with some sand and broken shell
6	51.04078	1.492	-51	Pebbles, coarse sand and broken shell fragments
7	51.04077^o	1.473311	-53	Pebbles, coarse sand and broken shell fragments
8	51.0421	1.450063	-49	Sand with bored chalk cobbles
9	51.05122	1.449052	-46	Mix of sand, broken shell, pebbles and cobbles (heavily bored)
10	51.06255	1.431984	-29	Mostly empty grab, some pebbles and flint

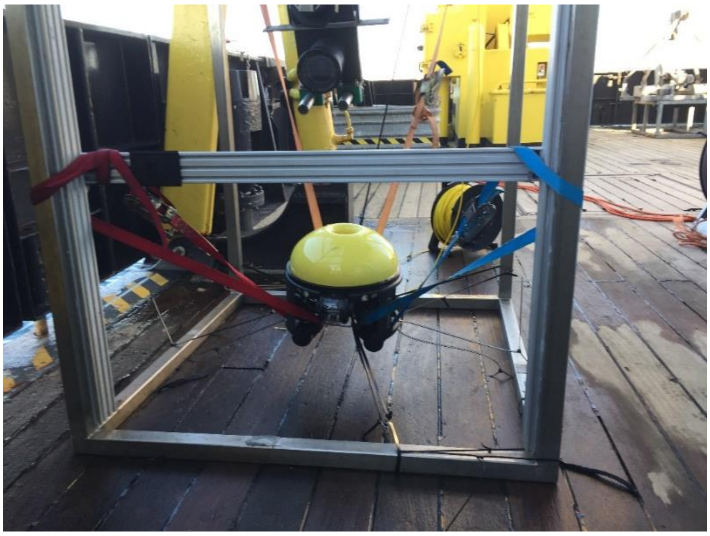

Figure 4. Mini-ROV mounted inside the VLIZ video frame.

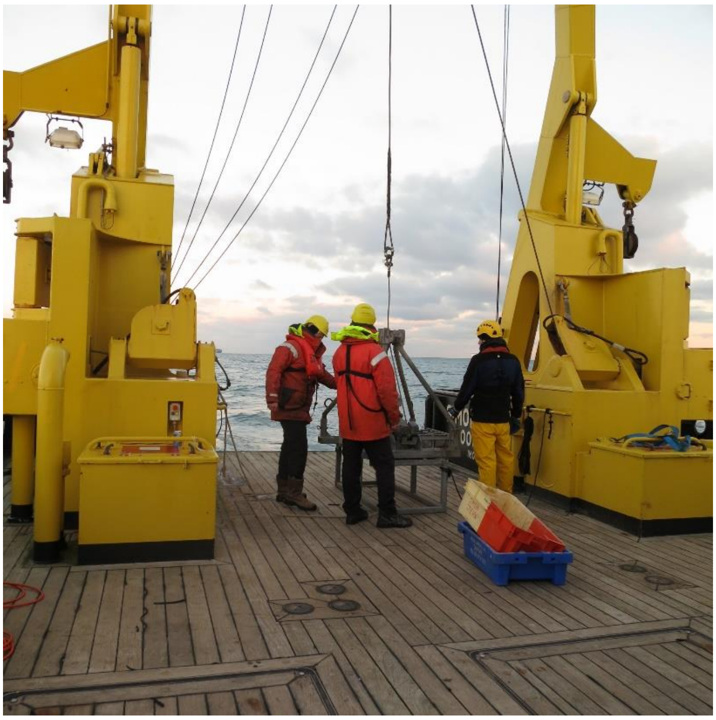

Figure 5. Deployment of the Hammond grab.

Overall quality of the video images was very good, notwithstanding the relatively high sediment content in the water. In most locations, the seafloor seemed to be formed of patches of sandy/gravelly sediments (locally rich in shell material) and numerous scattered rocks and pebbles (e.g. Fig. 6). The exact thickness of the sand/gravel bed was difficult to tell. In at least one location the images suggest a seafloor primarily formed of exposed white rock with only a very thin film of fine sediment on top (Fig. 7).

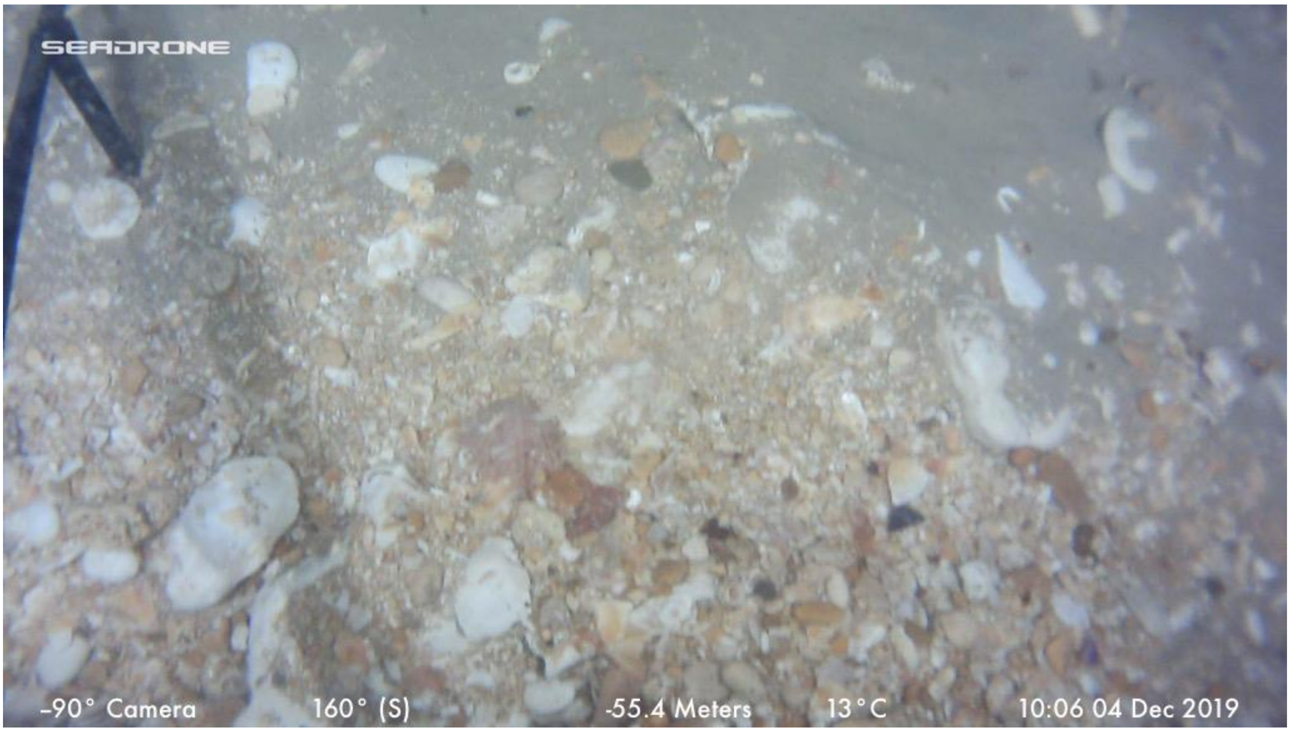

Figure 6: Example of video still image showing chalk cobbles in a sandy-shelly matrix (station 6).

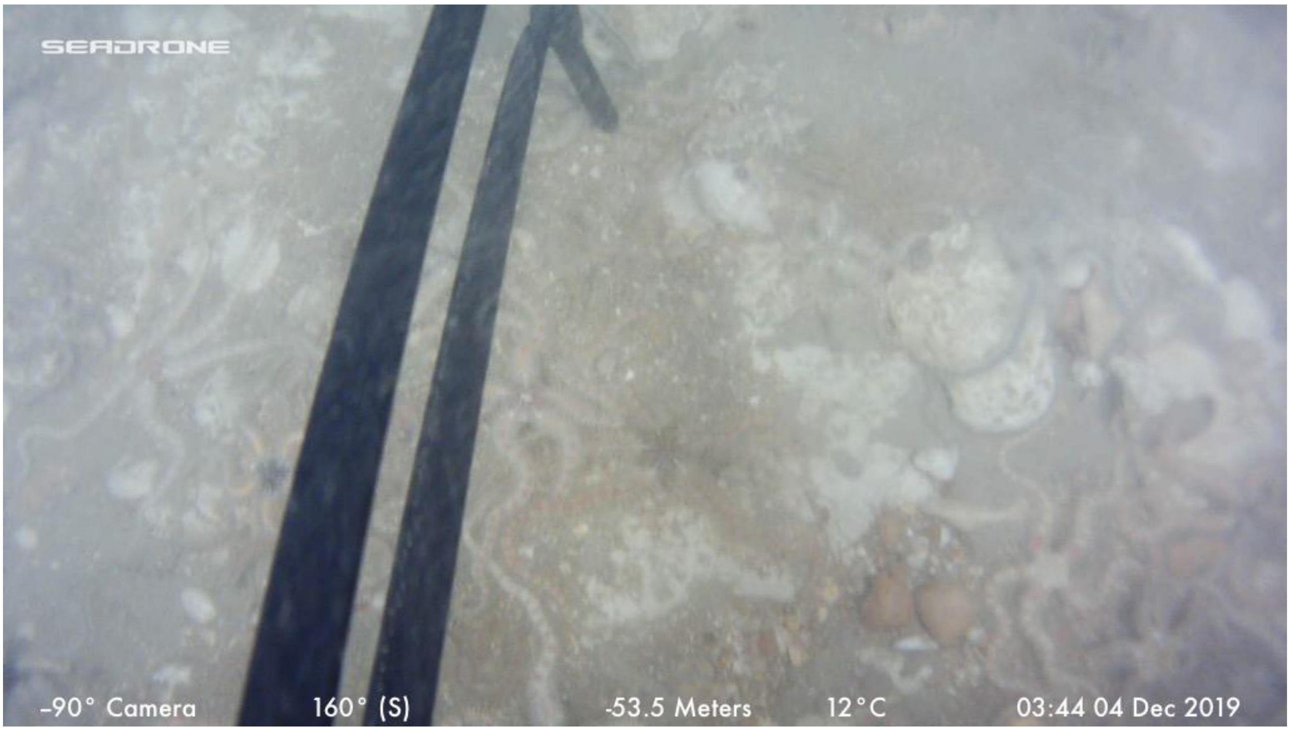

Figure 7: Example of sand and some chalk cobbles over a chalk seabed (station 4).

The grab sampling was very successful, bringing back different sediments (gravel, coarse sand, fine sand, broken shells), rocks and small pebbles from each location. Some of the rock samples appear to be scratched from the seafloor (Fig. 8a). Many rocks had centimetre-scale holes (Fig. 8b) and some contained clear flint inclusions (Fig. 8c).

Fig. 8: Example of some of the grabs (stations 5 (a), 9 (b) and 10 (c)), mainly containing encrusted chalk cobbles (evidence of biological boring) and flint (broken by the Hammond Grab) sometimes in a sandy/shelly matrix.

5. TRACK PLOT

http://www.vliz.be/vmdcdata/midas/report.php?cruise=1984

7. REMARKS

We would like to thank the Simon Stevin captain and crew for their efforts and cooperation. Their skilfulness on-board contributed greatly to the success of this campaign.

8. DATA STORAGE

Copies of multibeam data and video footages are stored at VLIZ on external hard-disks and servers. Sedimentary samples are stored at VLIZ; future analysis of the samples at UGent is foreseen.

For more information about these data, please contact:

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