POS534 cruise to Goldeneye, North Sea (1.05.-29.05.2019)

3rd weekly report

During the last week, before disembarking part of our science crew in Aberdeen on the 22nd of May, we were active in investigating the water column at the CO_2-release site. The video-CTD with the attached water pump enabled us continuous monitoring of dissolved gas concentrations by using the onboard membrane inlet mass spectrometry and CO_2 sensors. Additional in situ pH and CO_2-sensor data and discrete water samples from the Niskin bottles (Fig. 1) were collected for nutrient analyses and calibration data. The video-recording always presented the seafloor "on stage" and we could follow the increased gas bubble flow (Fig. 2), which is controlled by our colleagues onboard RRS James Cook.

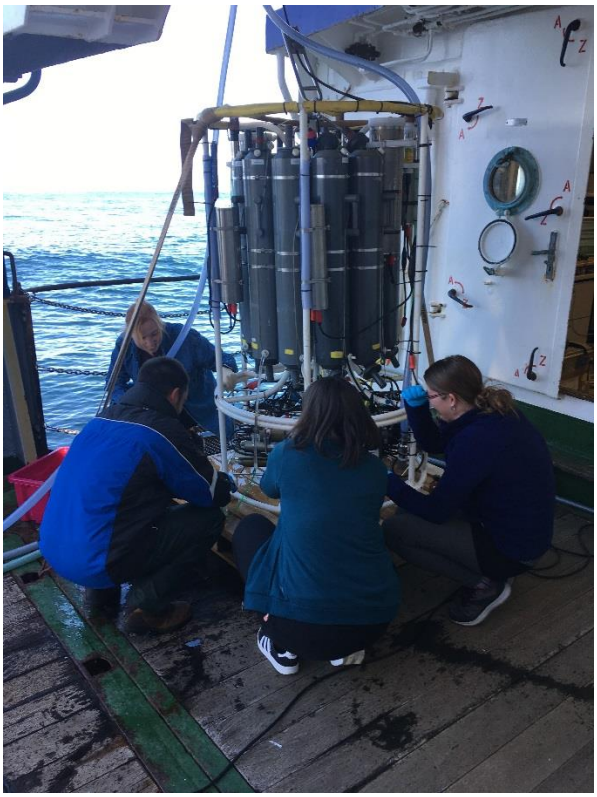

Fig. 1: The multipurpose Video-CTD is back on deck. Our scientific team is subsampling Niskin water bottles for various chemical water analyses onboard and in laboratories at GEOMAR (courtesy of P. Linke).

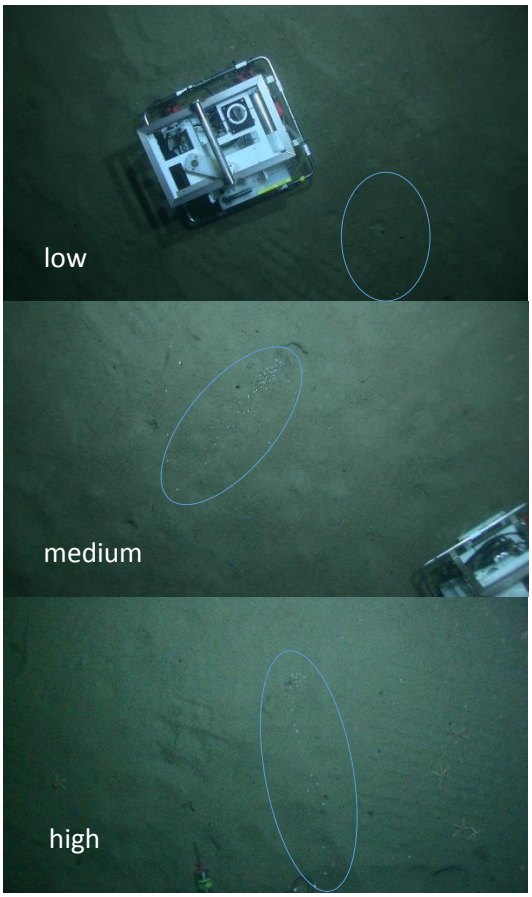

Fig. 2: CO_2-rich gas bubbles are emanating at different release rates from the seafloor at Goldeneye, where in situ instrumentation has been placed by ROV ISIS from board RSS JAMES COOK (Video-CTD; GEOMAR).

During week three, we did also monitor the hydroacoustic and chemical footprint of numerous decommissioned oil and gas wells in the British North Sea. A hydroacoustic water column characterization of each site, which recorded gas bubble flares emanating from the seafloor was followed by a video observation of selected sites by using our video-sled (Fig. 3). Chemical parameters were measured with different sensors attached to the sled and most of the data recorded in situ (i.e. dissolved gas concentrations like N_2, O_2, Ar, CO_2, CH_4) are available online by

fiber optic cable connection in the onboard control room (Fig. 4). Additionally, we recorded hydroacoustic images with the video-sled, looking down and straight forward into the water column by using the Kongsberg WBAT/EchoSounder system in a kind of gas flare hunting approach. We did expect a smooth seafloor at the inspected sites as most of the wells had been abandoned in the 70th and 80th, after drill pipes had been cemented and cut below the sediment surface. However, one can still spot the upper end of the pipe, broken-up plates made of concrete, iron ropes and other remnants (Fig. 5).

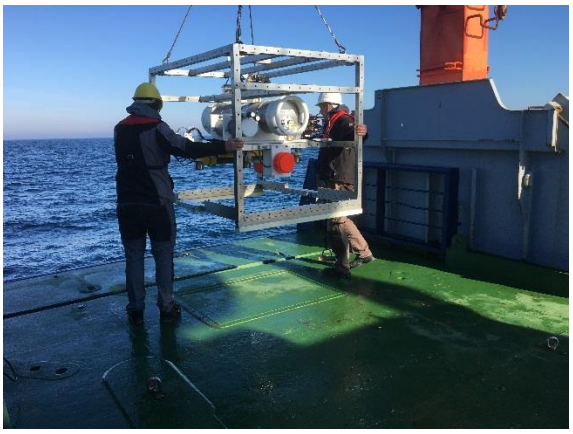

Fig. 3: The video-sled equipped with in situ mass spectrometer, gas and pH sensors, and ES70/120kHz echosounder (courtesy of P. Linke).

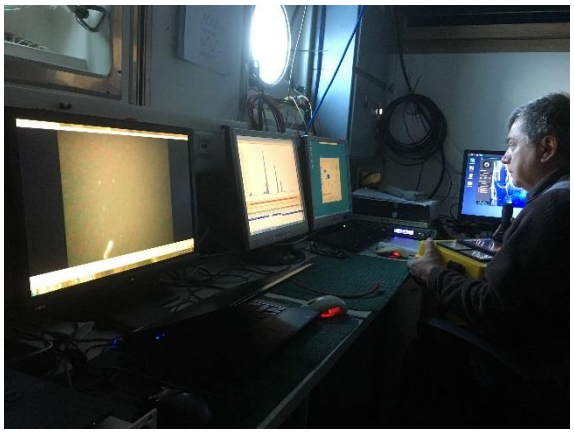

Fig. 4: Control room for video-sled and in situ mass spectrometer operation (courtesy of P. Linke).

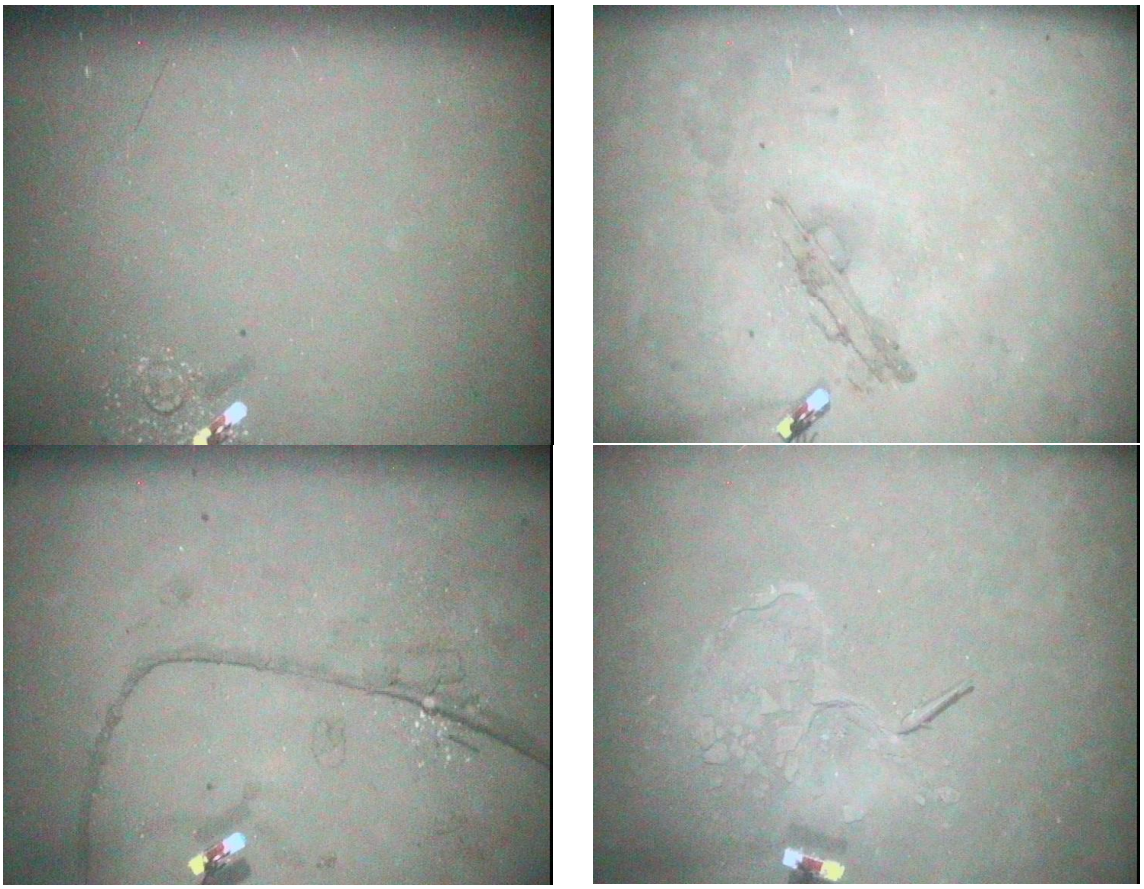

Fig. 5: View on decommissioned well areas at the North Sea floor (Video-sled; GEOMAR).

Today (21st of May) all of us help in rearranging our equipment in the onboard laboratories as most of the water column work has been finished. Laboratories have to be prepared for colleagues from Kiel, who will enter FS Poseidon tomorrow afternoon in Aberdeen. Finally, the second leg can start on Thursday with recovery of our SHIELD lander and a short but intensive sediment coring campaign after the CO_2 release experiment has been stopped by our colleagues onboard RSS JAMES COOK.

Greetings from onboard RV POSEIDON on behalf of all scientific crew members,

Dr. Mark Schmidt (PI)

p.s. follow our blogs for latest news:

http://www.oceanblogs.org/pos534/

https://stemmccs.blog/