



Newsletter 3

April 2019



6 NOVEMBER 2019: DISCLOSE SYMPOSIUM IN UTRECHT

DISCLOSE is an acronym for Distribution, StruCture and functioning of LOw-resilience benthic communities and habitats of the Dutch North SEa; a four-year research project wrapping up in March 2020. DISCLOSE aims to map the habitats of the Dutch North Sea using a combination of techniques. The project – a collaboration between the Delft University of Technology, the Royal Netherlands Institute for Sea Research (NIOZ), the University of Groningen, and the North Sea Foundation – is funded by the Gieskes-Strijbis Fonds.



In this newsletter:

- The first five DISCLOSE papers
- Identifying fisheries hotspots
- Reaction of fisheries to fisheries hotspots study
- Where do benthic organisms live near sand waves?



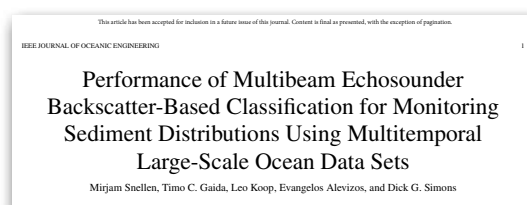
New: Five DISCLOSE papers

The DISCLOSE researchers have started writing. After years of collecting data, discussing, analysing and writing, the first scientific papers have been published. At this point, five have been published by journals, with more to follow. In this newsletter, the researchers explain their published papers.



'Together with the researchers of DISCLOSE, we recorded benthic organisms over two sand waves. We observed more organisms in the troughs of the sand waves than on the crests. On page 6, I elaborate on these results.'

Johan Damveld (University of Twente)



'Our paper on the seabed of the Dutch North Sea was published in early 2018 in IEEE Journal of Oceanic Engineering. Here we describe a methodology to combine multiple multibeam echosounder datasets of Rijkswaterstaat.'

Leo Koop (Delft University of Technology)



'March 2019, this paper was published by the journal Geosciences. The seabed of the North Sea is not uniformly flat. Large sand dunes, like the Brown Bank, exist as well as sand waves with wavelengths of 100 to 300 meters. These sand waves are overlaid with smaller megaripples. We have succeeded in mapping sediment types along megaripples using multibeam echosounder data. We found coarser sediments in the troughs, finer sediments on the slopes and again coarser sediments on the crests. In this article, we combine the three DISCLOSE methods: video footage, sediment samples and acoustics.'

Leo Koop (Delft University of Technology)



'In collaboration with Wageningen Marine Research, we revealed the relationship between fisheries hotspots and seascapes. Our paper was published in the journal PLOS ONE. See pages 3 and 4 for an explanation.'

Karin van der Reijden (University of Groningen)



'Our unexpected discovery of the Sabellaria spinulosa (Ross worm) reefs in the intensively fished Brown Bank area has been described in this paper, published by the Journal of Sea Research.'

Karin van der Reijden (University of Groningen)



Fisheries hotspots versus seascapes



Fishermen know exactly where to fish. For sole, plaice and Norway lobster they return to the same seascapes. That's the conclusion of University of Groningen and Wageningen Marine Research in the scientific journal PLOS ONE. The paper received quite a lot of media attention. Leading researcher Karin van der Reijden from the University of Groningen explains.

Why this interest in fisheries hotspots?

"Within DISCLOSE, we see bottom disturbing fisheries as the largest human impact on the seabed of the North Sea. Other human activities, like sand extraction and offshore wind farms, also have an impact the seabed, but on a much smaller scale. To really determine impact, we first need to know where the fishermen fish, and in which environments. Our research question was: "can we explain fisheries hotspots with the prevailing seascape, or do fishermen create fishing grounds by 'ploughing' the seabed?" The first turned out to be the case.

How did you define the hotspots?

"We combined datasets. The European 'Vessel Monitor System' registers the location of all fishing vessels by satellite every two hours. Fishermen report their daily catches and gears used in logbooks. For this study, I used datasets from 2008-2015 off Dutch fisheries. The English,

Germans, Danish, Norwegians and Belgians fish in the North Sea as well. That's why I focused on fisheries which are dominated by the Netherlands. Hotspots were defined as those 1 km box, which belonged, in at least seven of the eight years, to the top 1% most intensively fished boxes within a fishery."



Karin van der Reijden (University of Groningen):

'The hotspots of the three studied fisheries – sole, plaice, and Norway lobster, are situated at different locations within the North Sea.'

What did you conclude?

"Fishing impact is clearly divided unequally over the North Sea bottom. The hotspots of the three studied fisheries – sole, plaice, Norway lobster- are situated at different locations within the North Sea (see map and frames page 4), which makes sense. Sole, plaice, and Norway lobster each require different environmental conditions."

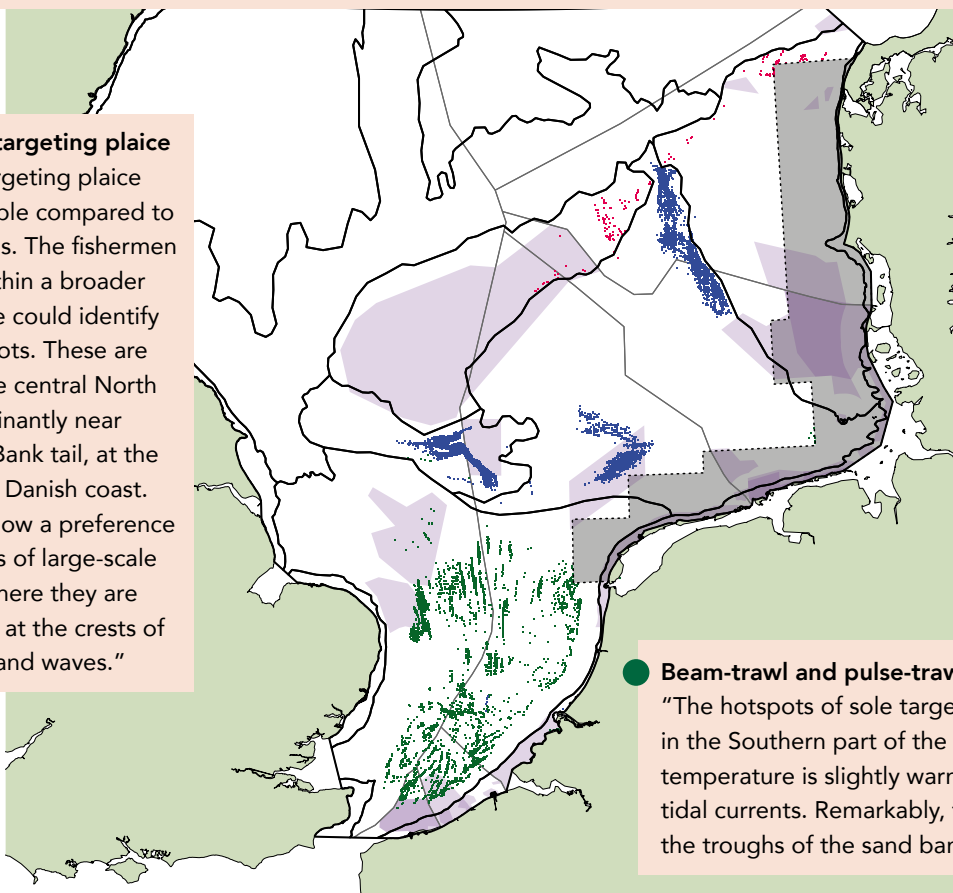


● Otter trawl targeting Norway lobster

"The otter trawl with 80mm mesh size mainly targets Norway lobster in the North Sea. They also catch demersal fish species, like plaice, dab, and turbot. With this fishing technique, the nets are held open by large otter boards, which are placed on either side of the net. The hotspots are concentrated at three locations within the central part of the North Sea. All three locations turned out to be the deeper parts of the North Sea, with relative calm conditions and few currents. These locations are relatively muddy."

● Beam trawl targeting plaice

"Fisheries targeting plaice are very flexible compared to other fisheries. The fishermen are active within a broader range, yet we could identify fishing hotspots. These are located in the central North Sea, predominantly near the Dogger Bank tail, at the height of the Danish coast. Fishermen show a preference for the slopes of large-scale structures, where they are mainly active at the crests of the smaller sand waves."



Click [here](#) for the interactive North Sea map

■ Natura 2000-area

● Beam-trawl and pulse-trawl targeting sole

"The hotspots of sole targeting fisheries are located in the Southern part of the North Sea. Here, the temperature is slightly warmer, and there are higher tidal currents. Remarkably, the fishermen only fish in the troughs of the sand banks."

What relation with seascapes was found?

"It is striking that all hotspots of a fishery are within a specific seascape. It means that the fisheries are concentrated within a limited number of seascapes. I determined these seascapes based on available datasets of environmental conditions such as temperature, depth, salinity, sediment type and water dynamics. Knowledge of the underwater life are not included here, since no suitable datasets are publicly available."

How valuable are these hotspot-seascapes?

"All hotspots are located within seascapes which are relatively uncommon in the North Sea. The total surface of intensively fished seascapes, like the troughs of sand banks, is not very extensive, and for this reason, potential conflicts of interest may arise. Species living within such a seascape could be put under pressure by the intense fishing activity. We expect that hotspot seascapes are important for underwater life. This is, among other things, based on the fact that part of the hotspots are positioned within Natura2000 areas."

The research received quite a lot of media attention. What did you think of the reporting?

"Our press release was widely received. Among others Trouw, NRC, RTV-Noord, Radio Focus and Reformatorisch Dagblad reported about our study. I don't agree with some of the headlines. ScienceGuide, for instance, stated: 'Natura 2000 areas not safe for Dutch fishermen', which was not our message. In this way, it sounds like the fishermen are illegally fishing in those areas, while that is not the case. Our message is that fishing activity in the North Sea is divided unequally over the different seascapes, and that this could negatively affect underwater life."



'Objective facts are essential for policy'

DISCLOSE seeks collaboration. In this section, external people with overlapping interests get to say their piece. How do they view the research? What are the opportunities and the pitfalls? In this episode: Pim Visser, director of the fisheries interest group VisNed.

The publication about fisheries hotspots and seascapes (see page 3 and 4) caused resentment among the fisheries. The analysis itself was not discussed, but rather the publicity surrounding it. Wageningen Marine Research and University of Groningen jointly published a press release. The fisheries were triggered by the word "prefer" in the headline. "Fishermen do not have a preference for a specific habitat, which was concluded by science. Fishermen solely focus on the catching of fish, not explicitly on fishing in protected areas", explains Visser. He wrote an opinion piece, titled 'Coloured facts obstruct the discussion about North Sea fisheries', which was published in the *Reformatisch Dagblad*.

Pim Visser (Visned):

'DISCLOSE will enable an informed discussion.'

More factual

Also, the emphasis of the overlap of fisheries hotspots and Natura 2000 areas in the media was not appreciated by the fisheries. "These messages sounded like the fishermen were illegally and secretly fishing in protected nature areas. It almost sounded like fishermen are poachers, which is unjustified. Fishermen there are fishing completely legally", says Visser. He detects a difference in tone between the two institutes involved, especially on social media. "According to us, messages by Wageningen Marine Research were more objective and factual, and less biased than those of University of Groningen. Some researchers are tempted to become nature conservationists. Whether that is the case within DISCLOSE, I can't judge that". Better engagement with stakeholders could have prevented the negative image, he states. "Within some research projects, like DiscardLess, there are regular meetings with stakeholders in the soundboard group."

Clear segregation

Visser argues for a clear segregation between science and advocacy, both for fisheries and nature conservation. "When fishermen collect



Pim Visser

and provide data, the question of whether or not these data can be trusted arises. That question is valid, so the data should be collected according to a validated and warranted protocol. But the same applies for nature conservationists. Within VisNed, we have recently employed a scientist. He operates outside of our advocacy and takes part in conversations with other researchers." Within DISCLOSE, researchers cooperate with the North Sea Foundation. "It is then essential that all parties involved stay with their own 'role', says Visser. "Scientists should leave the advocacy to advocates."

Objective facts

Objective facts are essential for good policy according to Visser. "Scientists should provide objective and verifiable facts, without value, to enable a weighted balance of interests by policy makers and politicians. For example, a balance between nature and food provision." He is positive about the ambition of DISCLOSE to map the North Sea nature. "DISCLOSE will enable an informed discussion."

Pulse fisheries

The decision-making in the pulse fisheries is his bugbear. "Science has been completely ignored in this decision making. Emotions dominated", he evaluates. The debacle does not undermine his faith in science. On the contrary. "The collaboration between fisheries and science has strongly improved over the last decennia, and we will continue this. The knowledge of fishermen about the North Sea is phenomenal. Fishermen can contribute in the collection of trustworthy data."



Life at sand wave bottoms

The researchers of DISCLOSE and SANDBOX shared a vessel by chance during a North Sea expedition. This cooperation resulted in a scientific publication. Johan Damveld, researcher at Twente University, elaborates about the distribution of benthic organisms at sand wave bottoms.

This collaboration was definitely opportunistic. "The DISCLOSE researchers joined our cruise. It was only when we were on board the RV Pelagia that we actually met". Damveld studies the seabed from the civil engineering aspect. He studies sand waves, which is the term for underwater 'hills'. He describes the North Sea seabed as a sloping landscape. "Sand waves have heights of several meters, wave lengths of a few hundred meters, and they migrate over the seabed. Within the SANDBOX project, I study the effects of benthic organisms on sand wave migration. Some organisms stabilise the seabed, while others destabilise it. Over a longer period, small organisms can cause considerable differences, which would be an important consideration for seabed infrastructure, such as the installation of offshore wind farms."

Crest and trough

It was on board that Damveld became enthusiastic about the NIOZ camera, which was recording the seabed. For the first time he saw sand waves and benthic organism in real life. "Really nice to observe these live", he says. Approximately twenty kilometres offshore of the coast of Texel, the researchers recorded two sand waves. They focused on the crests and troughs. "For each video still, we counted

the number of holes, as a proxy for the number of organisms living in the seabed, the so-called endobenthos. In addition, we counted the number of benthic organisms living on the seabed, the epibenthos. The method applied was very time effective. "Traditional sampling comprises sediment samples obtained with a Box Corer, which have to be processed and identified in the lab. The analysis of video footage is much faster."



Johan Damveld (University of Twente):

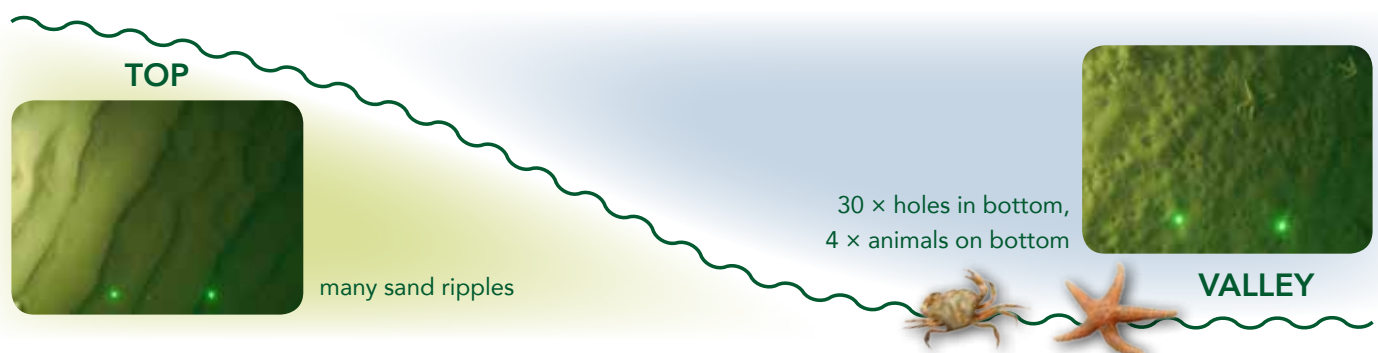
'More organisms live in sand wave troughs compared with sand wave crests.'

Thirty times more

The differences between crests and troughs are considerable. "Many more organisms live in the troughs compared with the crests, concludes Damveld. In numbers: they counted thirty times more holes in the sand wave troughs, potentially created by crustaceans, bivalves, polychaetes, and other organisms. They observed four times more star fish, hermit crabs and flatfish in the troughs. Troughs may provide shelter; currents are stronger at the crests", he explains the observations.

Different sand ripple pattern

Damveld observed another difference: the difference in sand ripple pattern. "Sand waves are superimposed by smaller sand ripples. In the troughs, we hardly observed such sand ripples, while there were plenty at the crests. These ripples roughen the seabed, resulting in higher resistance to the water flow. Our current computer simulation models are currently based on a homogeneous distribution of these ripples. That is incorrect, but without the camera footage we would not have noticed."





How vulnerable is a community?

Within DISCLOSE, three Ph. D. candidates are active. Together they are mapping the expanse of nature in the North Sea, each from their own perspective and with their own techniques. This column lets the researchers have their say. Third episode: Sarah O’Flynn.

When we talk with Sarah, she is stationed in the office of Leo Koop from TU Delft –another researcher within DISCLOSE. “Within DISCLOSE we have an integrated and multidisciplinary approach. Leo and I are currently collaborating on a scientific manuscript, in which we combine Leo’s acoustic data and my biological data from the Brown Bank area.” Of the three DISCLOSE researchers, O’Flynn studies the seabed from a taxonomic perspective. But her methodology goes beyond the species level. The behavior and life-strategies of the species are also important to her. ‘Trait-based analysis’, she calls the approach, in which trait represents species-specific characteristics. “Every species has specific characteristics, related to their life-history including their foraging method, where they life, how many offspring they produce, and so on.”

Sarah O’Flynn (NIOZ):

‘Some species groups recover quicker and better from disturbances than others.’

Determination of resilience

O’Flynn combines species presence with species’ traits, with which she can try to assess the resilience of benthic communities. Some communities can handle some disturbance, while others cannot. “Resilience is the ability to recover from a disturbance, like storms or demersal fisheries. Some species groups recover quicker and better than others. Long-lived species, for instance, produce few offspring and grow slowly. This causes them to be more susceptible to disturbances than fast growing species with many offspring.” The first group is mainly observed in the deeper parts of the North Sea, while the second group is more abundant in shallower parts. However, it is too early to draw conclusions.

Nice, but time-consuming

O’Flynn is halfway through. She has joined several North Sea expeditions for DISCLOSE. Her Box Corer has been lowered to the seabed over a hundred times, to take a sample from the seabed. The sieving yielded an immense number of benthic organisms, which are all identified to species level in the lab. Nice work, she states, but time consuming. “We have so many samples that we have hired additional laboratory technicians, otherwise I would have to spend all my time in the lab. Now it’s time to focus on data analysis and writing articles.”



Name:	Sarah O’Flynn
Age:	37 years
Employment:	Royal Netherlands Institute for Sea Research (NIOZ) in Yerseke
Research:	Determine resilience of benthic communities

Switch from business

O’Flynn is Irish. She originates from Cork, in the southern part of the country. There she obtained her bachelor ‘Environmental Sciences (Zoology)’. Subsequently she obtained her master ‘Marine and Lacustrine Sciences’ in Belgium. She was familiar with fieldwork at sea and the identification of benthic organisms. Before DISCLOSE she worked as environmental researcher at a commercial marine survey



continued page 7



company. "I worked on environmental reports and marine taxonomy", she explains. She likes the switch to fundamental research, mainly because of the freedom, the possibilities to explore, and the ambitions of DISCLOSE. "The Netherlands are behind in North Sea research. The distribution of benthic habitats and communities is not as well-known in the Dutch part of the North Sea, compared with other North Sea nations. Hopefully, we can contribute with DISCLOSE."

6 NOVEMBER 2019: DISCLOSE-SYMPOSIUM

DISCLOSE is organizing her first symposium on Wednesday November 6th. The symposium is free and is held in 'het Muntgebouw' in Utrecht. Welcome is from 09:30 with coffee and tea, after which the program will start at 10:00. Lunch is provided. The program will end with drinks at 17:00.

The day comprises four sessions of an hour each. During each session, a DISCLOSE researcher will give an overview of the relevant DISCLOSE results, after which an external speaker will delineate recent developments in the research field. Goal of the symposium is to present the first results of DISCLOSE and to give an perspective of monitoring and nature conservation in the North Sea.

The four sessions:

1. Acoustic imaging: Leo Koop + external speaker
2. Benthic biodiversity: Sarah O'Flynn + external speaker
3. Habitat disturbance: Karin van der Reijden + external speaker
4. Effective conservation: Christiaan van Sluis + external speaker

Register for the symposium at the website: <https://disclose-web.webhosting.rug.nl/disclose-symposium-2019>. For questions regarding the symposium, please contact Christiaan van Sluis from the North Sea Foundation (c.vansluis@noordzee.nl), or one of the DISCLOSE-researchers (k.j.van.der.reijden@rug.nl, sarah.oflynn@nioz.nl, l.koop@tudelft.nl).



Address het Muntgebouw: Leidseweg 90, 3531 BG Utrecht. It is a 10 min walk from Utrecht Central Station to the Muntgebouw. For directions with car or public transport: <https://www.muntgebouw-utrecht.nl>.

Colophon

Text: Addo van der Eijk

Design: Sense Visuele Communicatie

Photography: OCEANA/Juan Cuetos (p. 1 large photo), OCEANA/Carlos Minguell (photos in banner, p. 1 bottom, p. 2 top, p. 7, p. 8), Oscar Bos/Wageningen Marine Research (p. 3), Johan Damveld (p. 6), Wikipedia (p. 8).

Translation: Karin van der Reijden and Sarah O'Flynn

More information over the project

www.discloseproject.nl and from the project leader Dick Simons of TU Delft, e-mail: d.g.simons@tudelft.nl.



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