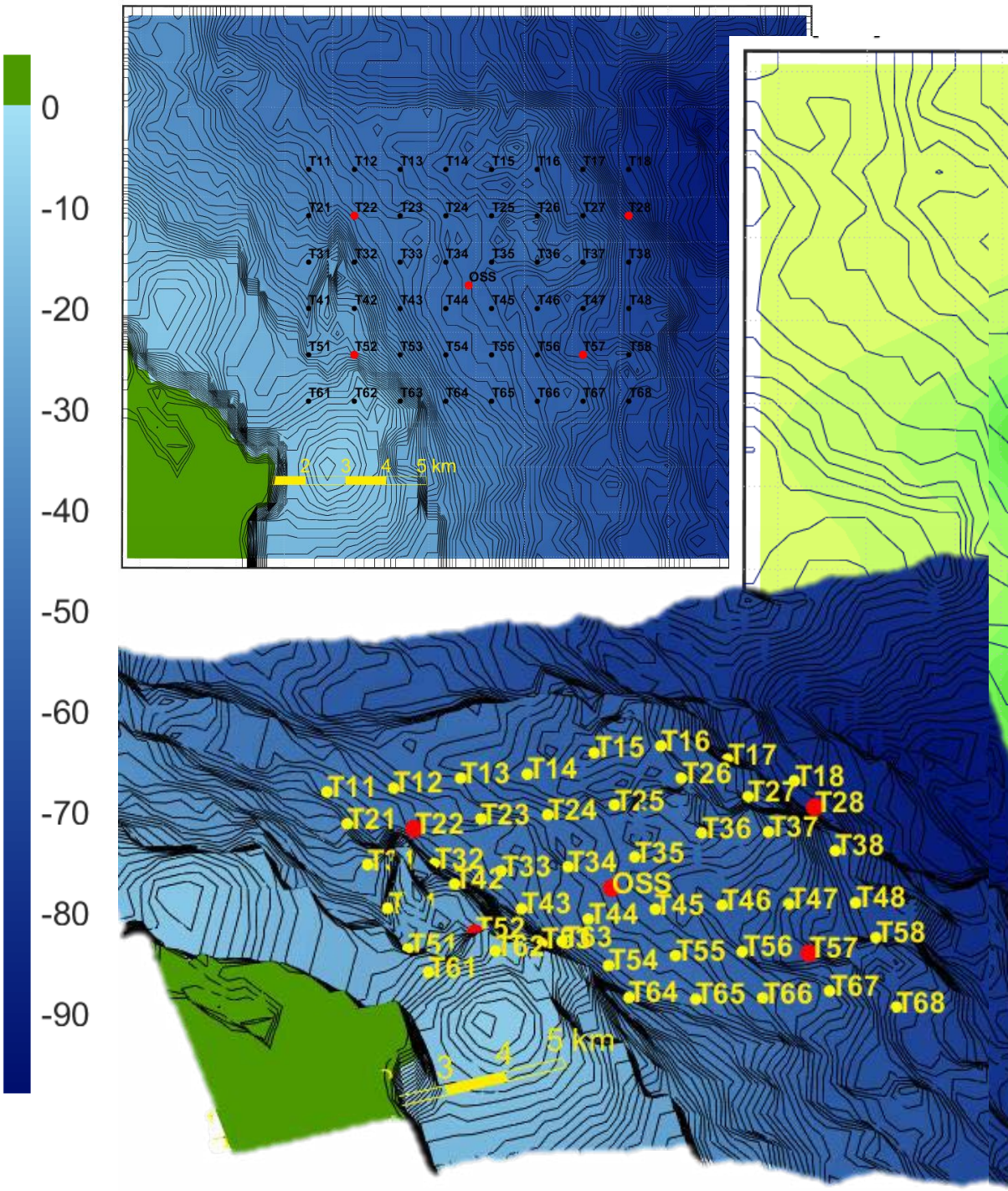
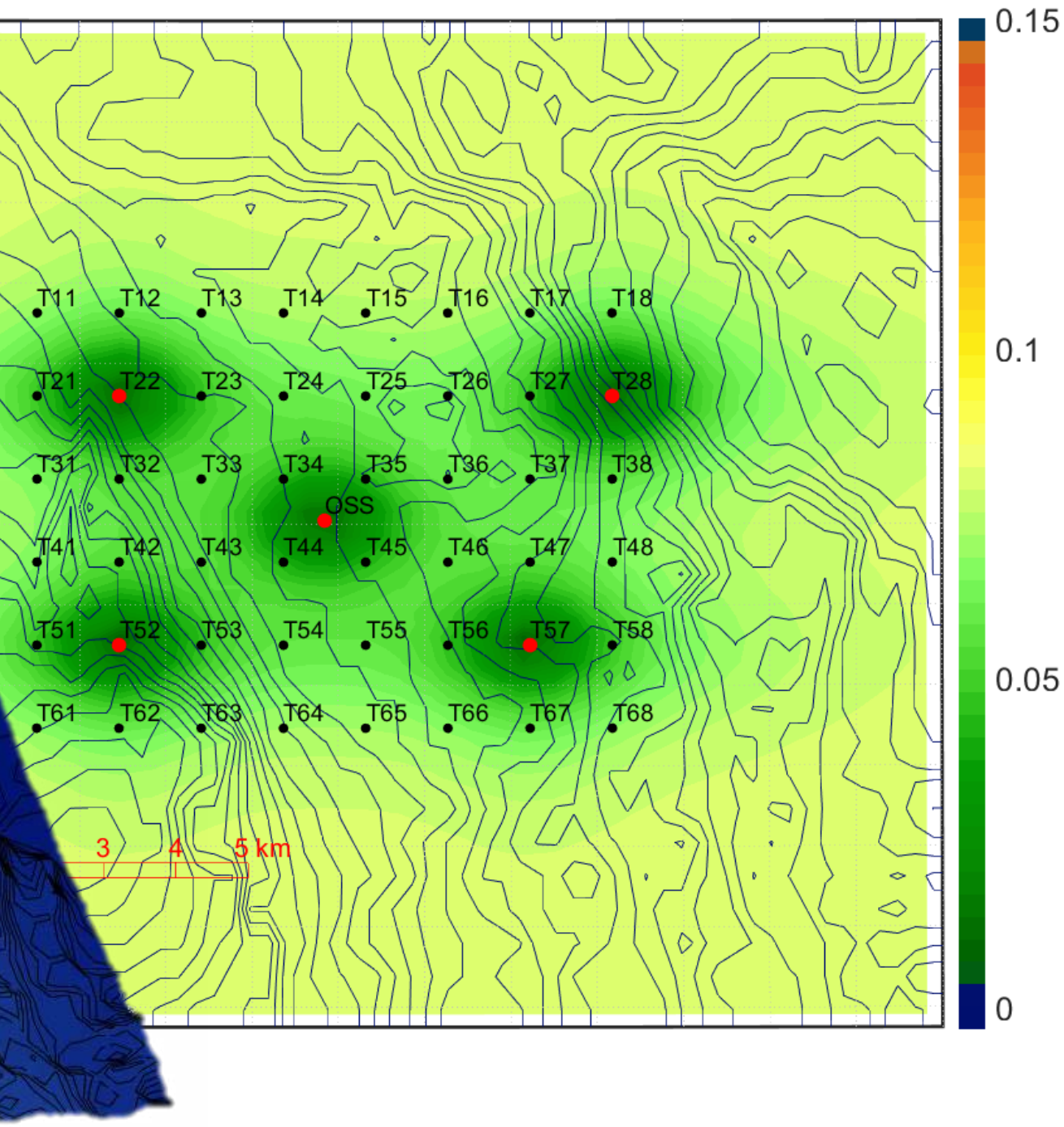


From knowledge transfer to crew transfer: saving millions in offshore wind



Miros is a technology company that specialises in measuring the ocean surface. With 35 years of experience engineering dry-mounted, radar-based sensors robust enough to weather the harsh and unpredictable conditions of the North Sea, the company develops innovative solutions for real-time, local environmental monitoring for the global offshore and maritime industry. By making essential data available to all relevant stakeholders, Miros continues to develop its long track record of enhancing the safety, performance, and efficiency of offshore operations, including those related to both floating and fixed offshore wind installations.

Erik Salo

In an effort to expand upon its legacy of development and innovation, 2019 saw Miros establish a knowledge transfer partnership (KTP) with Strathclyde University.

This collaborative programme, funded by InnovateUK, aims to embed academic expertise within the industrial landscape to accelerate R&D and improve competitiveness.

Strathclyde University, and particularly its EEE (Electronic and Electrical Engineering) department, is widely recognised for its offshore wind research. This competence, along with Miros' proven portfolio of Cloud-integrated wave sensors, seemed to be an excellent match, both academically and commercially.

As the partnership gathers steam, we decided it was high time to talk with our KTP Associate, Erik Salo, about his exciting work bringing new ideas to the forefront of the offshore wind industry. Maggie McMillan, our Sales Manager for Renewables conducted the interview.

Maggie McMillan: Hi Erik! Before we get into the nitty gritty, would you be so kind as to introduce yourself?

Erik Salo: Sure. I'm Erik Salo, an Estonian researcher and engineer living in Scotland – probably the best place in the world for wind energy research right now.

MM: Could you tell us a little about your background in offshore wind?

ES: Wind energy is where all of my passions and backgrounds meet: the environment, aerodynamics, electronics and heavy engineering, plus, more recently, computing and software too. I believe that in order to give us a chance of reaching our sustainability goals, we need to go big with all of the solutions that we have on the table. Offshore wind, with its incredible development in both size - we're already building 12 MW machines, and are scoping for 15 MW as we speak - and extent - many GW-scale sites are already being developed across the globe - is big in all the right ways.

My entry to the wind energy sector took place during my master studies at Strathclyde University. Over the past five years or so, I've been able to dive headlong into the industry, starting a whole new topic of research within my research group, which has led to a deeper focus on the operations and maintenance (O&M) and data side of things. While the specific topics and projects vary a bit for me, O&M and data have been central to them all, including the KTP with Miros.

MM: Can you please describe some of the work you've been doing with the KTP?

ES: Absolutely. Miros have a long history and well-established product portfolio based in oil and gas, but offshore wind has its own set of requirements, which continue to be established within the industry itself. Despite the ongoing nature of this process, it has become clear that real-time, local environmental monitoring should be front and centre in risk mitigation strategies, as RenewableUK made clear in their Offshore Wind and Marine Energy Health and Safety Guidelines, and this is something that Miros has unparalleled experience in. The challenges presented by offshore wind are new for both the company and the sector, and the aim of the KTP is to help both parties

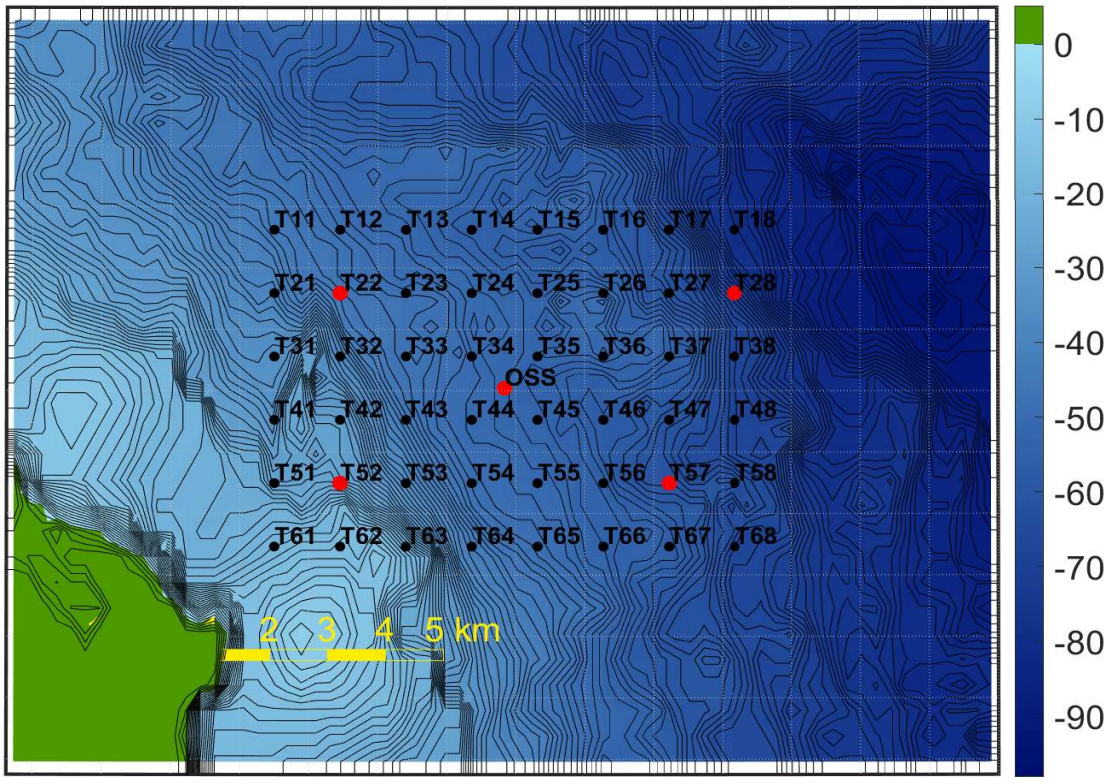


Figure 1. Site bathymetry: 1m countours

‘Wrong decisions have a cost in terms of injuries, safety risks, team morale, vessels and fuel, and personnel too. This cost can run into the thousands of pounds per day, as well as lost production in the many thousands of pounds per day, per turbine.’

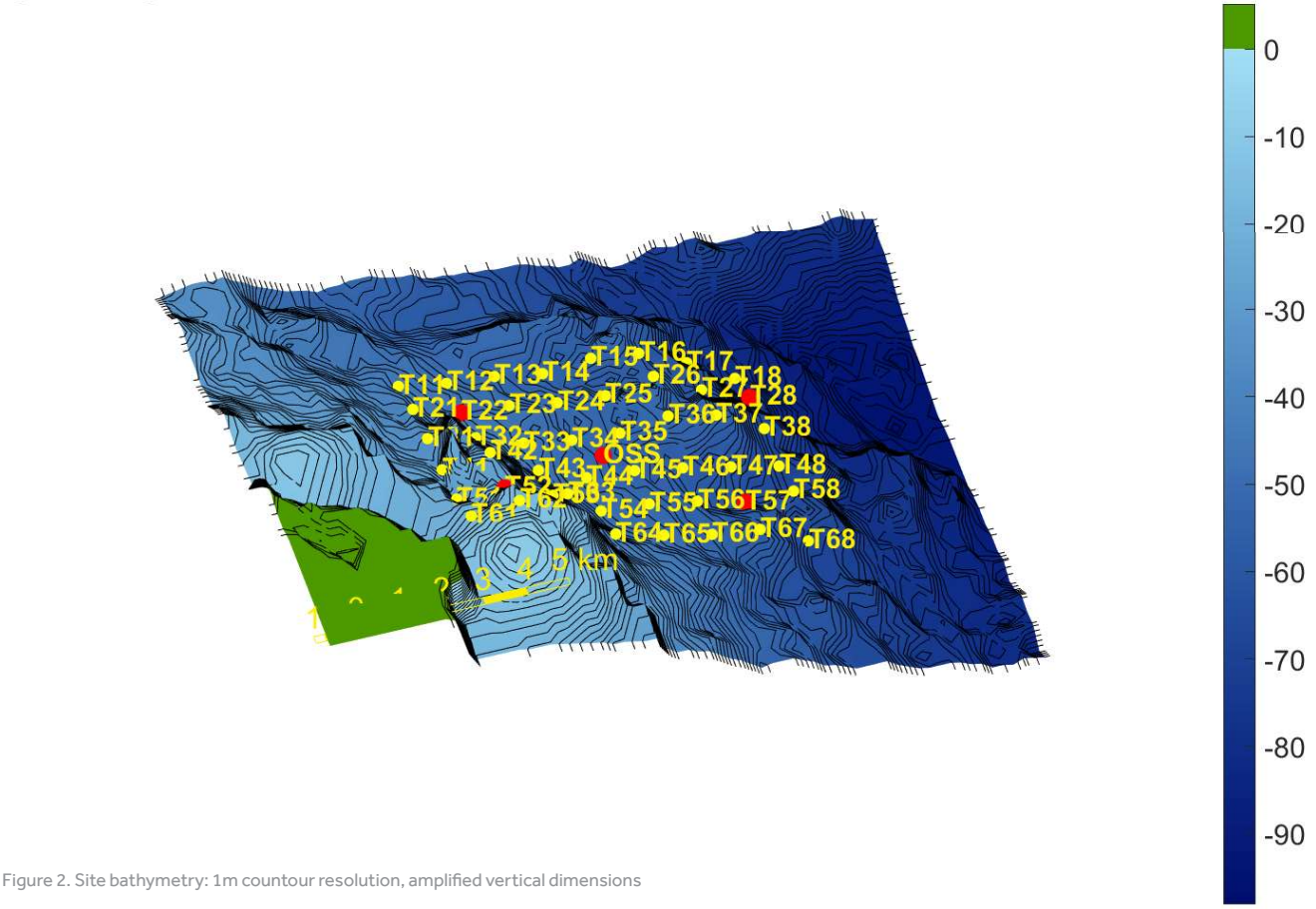


Figure 2. Site bathymetry: 1m countour resolution, amplified vertical dimensions

take the best possible path forward.

There are over a hundred turbines on a modern wind farm, each of which is an incredibly large and complex machine that requires maintenance visits up to a dozen times each year. This means that in the UK alone, technicians are required to take the step between a vessel and a turbine tens of thousands of times in a twelve-month period! The vessels used for maintenance activities have a limit for the sea state in which they can safely complete these transfers, and the main parameter to measure this is Hs (significant wave height), where the upper limit is usually between 1.25 to 3 metres. In reality, crew safety is also affected by other parameters like wind and current that affect the vessel’s movement, but Hs is a key measure.

Reactive maintenance is especially valuable when there is most consistent wind, as in the winter months, but this is also when the conditions are at their most hazardous. Many planned maintenance jobs are scheduled for when the outlook is clearer, but the unpredictability of the weather can be significant. Except for a window spanning from around May to September, there are often marginal weather periods – times when it is ‘sort of’ safe to transfer during the necessary access window (the time required to complete the job). Nevertheless, it’s not uncommon for work to be aborted due to unsafe conditions.

It is in these marginal conditions that crew safety and work completion depend most upon having accurate sea state insights. The marine controller needs to answer questions such as: ‘What is the probability of having 6 hours of good conditions this afternoon, so that we can complete the job?’ and decide whether to send a vessel out. The vessel master will look at the sea state on site and the day’s forecast and decide whether to transfer or not. Wrong decisions have a cost in terms of injuries, safety risks, team morale, vessels and fuel, and personnel too. This cost can run into the thousands of pounds per day, as well as lost production in the many thousands of pounds per day, per turbine.

The KTP between Miros and Strathclyde University aims to provide the best possible data to support these operations in real time and to minimise the associated risks. We are looking into optimising the number of sensors needed on any specific site, as well as where to place them, so that they provide the best full-field coverage with sea state data. We are working on not just getting accurate measurements across to the user, but also acknowledging that a sea area of hundreds of square miles can be a difficult thing to measure, and so we are helping the user to understand those inherent uncertainties and their effect on operations.

That means we are no longer just relying on a coarse forecast grid that was output by a model possibly half a day ago, but on a much higher-resolution and more up-to-date view of site conditions.

MM: How is this work likely to redefine the norms?

ES: Operations and maintenance in offshore wind is fairly complex and involves many

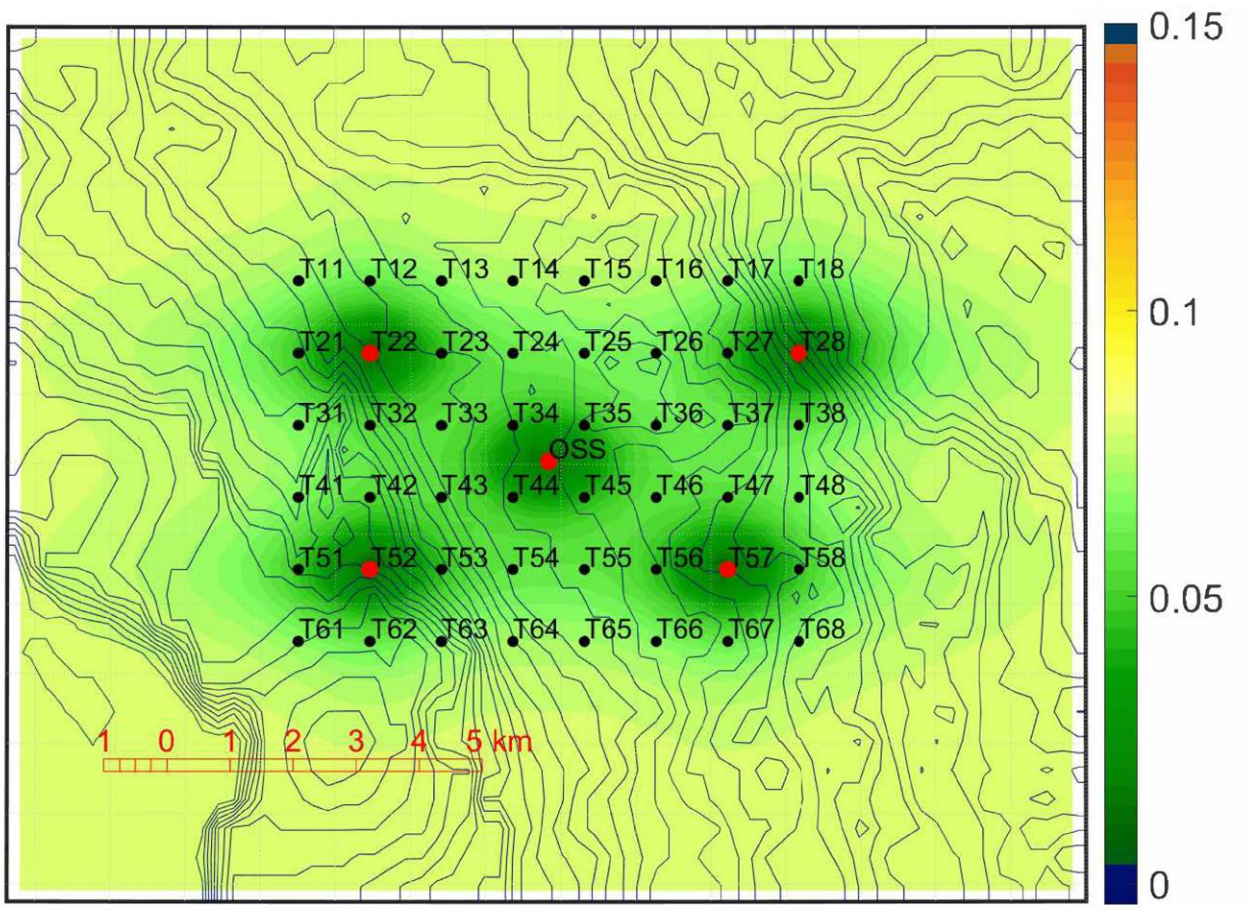


Figure 3. One of the case studies illustrating the importance of full-field coverage: the certainty of Hs measurement degrades as standard deviation increases with distance from sensors

partners and stakeholders. Each of those in turn has their own KPIs, data sources and other drivers. Operations are therefore siloed in many ways, and at present, a central key person, such as the marine coordinator, is required to make sense of it all and keep operations safe and efficient.

Our research on this KTP is looking to distribute some of that decision-making capability, to make operations smoother and more transparent across the supply chain. We are still following Miros' mission to make accurate real-time sea state data more accessible for users, but we're looking beyond the traditional approaches of displaying data to decision-makers. Instead, we're tailoring the analytical process of our platform for offshore wind stakeholders to deliver data that is most useful and actionable for an individual's specific role.

More people will be able to make decisions on common grounds, based on the same real-time data source. This way, we will remove some of the communication and planning barriers associated with the current practices. The result we are aiming for is more efficient operations, improvements in personnel safety and mental health, higher success rates in maintenance trips offshore and, as a result, higher yields of sustainable energy.

MM: What does all this mean for costs savings in O&M?

ES: The figure depends on individual sites, O&M strategies, and the extent of data-driven operations planning, etc., but a Strathclyde paper published in 2016 gave a range of results from £0.3 to £1.3M per year of potential savings depending on site. Since then, the £1M mark seems to be quite well established.

I should say that Miros are not the ones directly saving an operator that amount, we, with our data, unlock the possibility to do better planning and marine coordination and reach those savings. The way I see it, those activities are not really in our product scope, instead we integrate with how the site runs their own operations and make that more informed and more accurate.

MM: How soon will we see your work in action?

ES: Rather excitingly, the research is already being applied to real-world scenarios, so we hope to be able to share more of this story in the not too distant future. Even so, there are plenty of additional functionalities that could be developed in collaboration with Miros customers in the sector too. So, watch this space!

About Miros

Founded in Norway in 1984, Miros is a technology company that specialises in measuring the ocean surface. Our portfolio of sensors provides accurate, real-time data for weather-sensitive operations offshore, as well as offering input to asset integrity systems and coastal monitoring. Our radar-based solutions deliver real-time insights about local sea state and marine conditions, without the need for any equipment submerged in water. Additionally, the company's Cloud-integrated sensors allow for easy and secure access to essential data, anywhere, anytime, from any device, and with minimum effort.

Find out more at **www.miros-group.com**

View real-time data from live installations at **www.miros.app**