Newsletter 1-2026

New WERA network in Indonesia

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Latest WERA project for Helzel Messtechnik GmbH

Already in 2025 the Indonesian agency BMKG placed an order for 20 WERA systems for the integration into their Maritime Meteorological Information System.

BMKG selected the highest performance systems which are currently available, some 16 channel WERA systems for dual frequency operation. These systems are equipped with an unique receive array, with an antenna spacing optimized in a way to get best beamforming performance at the lower and the higher frequency band. Two frequency band combinations are used, 9.33 & 16.15 MHz for long range applications and for medium ranges 16.15 & 26.275 MHz. For the transmit array the standard 4 element antenna system are used, but in this case both transmit arrays are merged into one rectangular array of 8 poles. The two frequencies can be used in alternating operation mode.

Top panel:

Receive array on Java at the Sunda strait

Left panel:

Dual band transmit array with 8 poles merged into one rectangular array

The first systems were delivered in October 2025 and installed in December. The last batch was delivered in June 2026 to be installed within the next months.

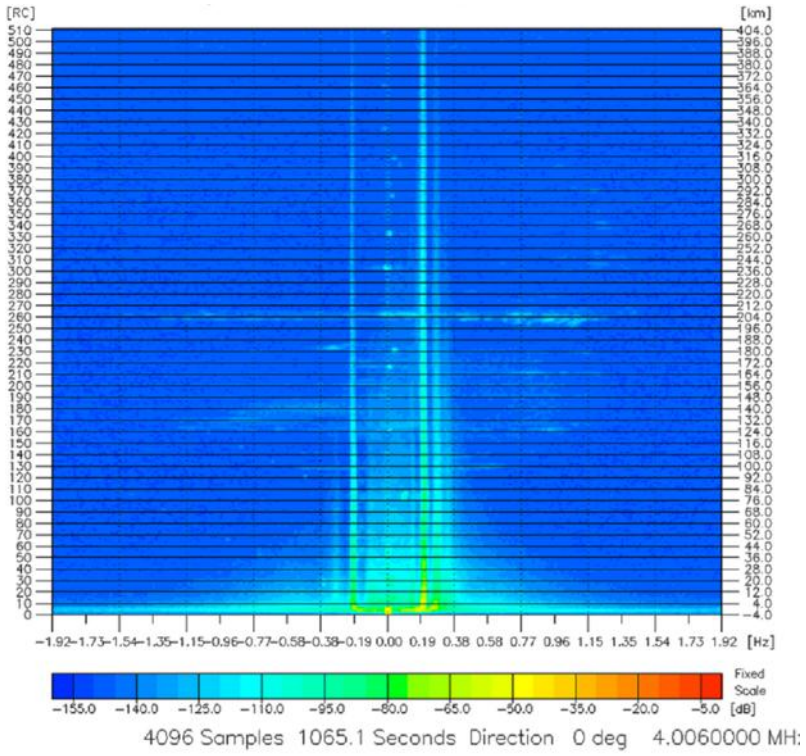
Leif Petersen, presenting the WERA systems for the factory acceptance tests

The first installation at the Sunda strait was supervised by our new team member Oliver Schematus and Thomas Helzel, (#5 & 6 from the right on the picture below). In this case, twenty land-based ocean radar systems have been ordered by Indonesia's meteorological agency BMKG. These systems are designed to improve marine weather forecasting and tsunami early warning capabilities. As a result, technology from Germany will play an important role in enhancing the safety of people and infrastructure in one of the world's most tsunami-prone regions.

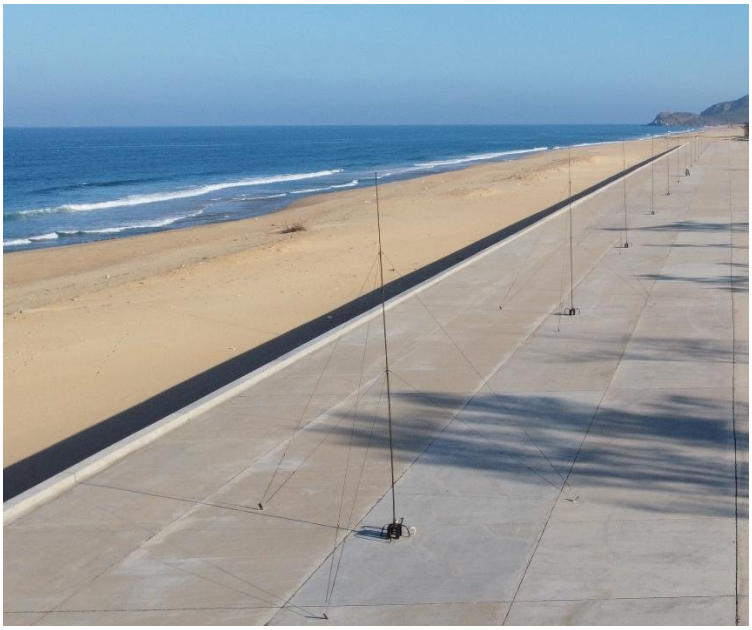
Installation team from Terrindo with local project leader **Carsten Gladen** (in the center front of the photo),

Sample from dual use applications (OTHR)

Details about the dual use OTHR systems are classified but anonymized plots and a photos can be shared. The achieved range for ship tracking was more than 200 nautical miles and Bragg lines reached out more than 400 km in some cases.



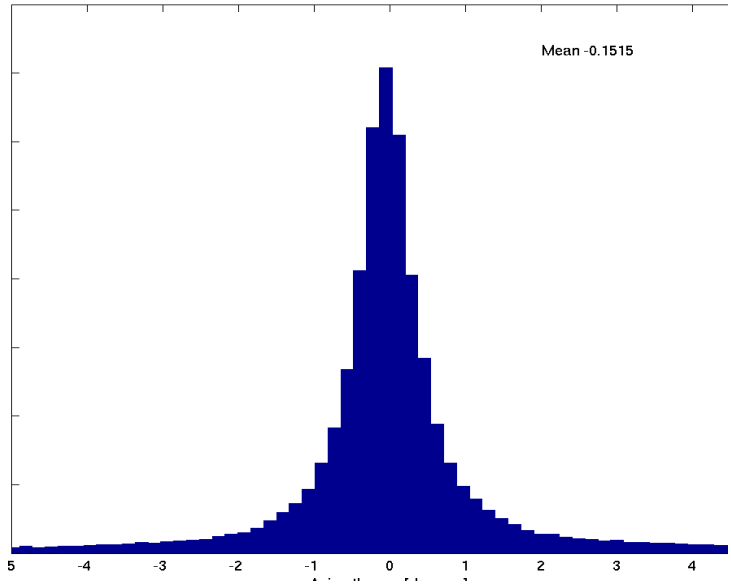
Range Doppler spectrum of an OTHR operated at 4 MHz, with an integration time of 1065 Seconds. The dots arround the center line are the targets. The vertical axis starts with a negative value of 4 km caused by the overal signal cable lengths and it need to be added to the range values.



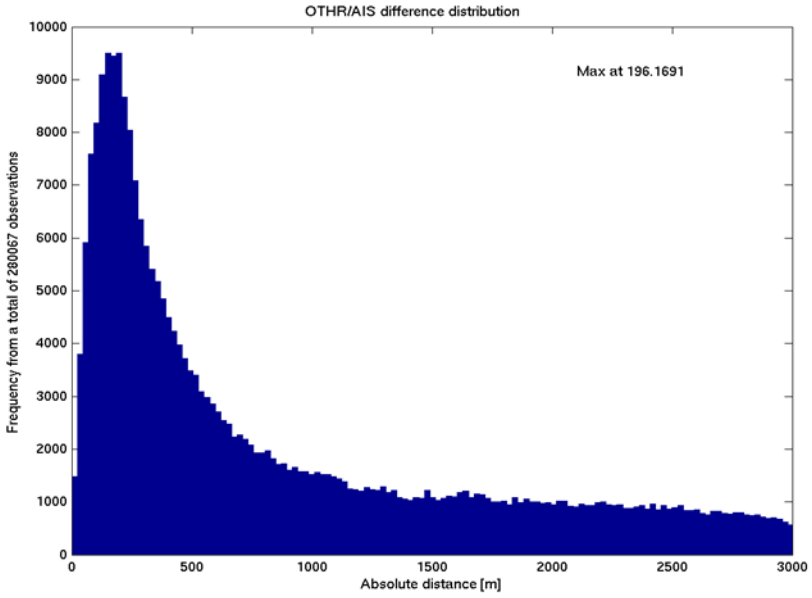
Receive antenna array of 560 m length with 9 m poles

Details about the dual use OTHR systems are classified but anonymized plots and a photos can be shared. The achieved range for ship tracking was more than 200 nautical miles and Bragg lines reached out more than 400 km in some cases.

From these OTHR systems we collected tracks and compared the monitored positions with locations reported by AIS. The impressive results are shown below.



Tracking accuracy in azimuth from a statistical analysis of >280.000 detects. Data aquired with an OTHR at 4 MHz for ranges of up to 200 NM



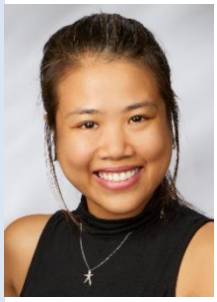
Tracking accuracy in absolute distance from a statistical analysis of >280.000 detects. Data aquired with an OTHR at 4 MHz for ranges of up to 200 NM

For the dual use applications it is important to know that it is possible (and in several cases already done) to integrate a second antenna system for a higher frequency into the low band receive array. This has the advantage that such a second radar installed together with the longest range OTHR would not require additional land area at the coast.

New Team Members

Our Team is growing and we are pleased to welcome our new colleagues Lihue, Huyen, Oliver, Henning, Oguzhan and Julia in our Helzel Team. A short introduction is enclosed to get to know our new team members with her extensive expertise.

Welcome to HELZEL Messtechnik – Dr. Huyen Tran



We are pleased to welcome **Dr. Huyen Tran** to HELZEL Messtechnik.

Dr. Tran holds a Ph.D. in Marine Science and Physical Oceanography from the University of the Littoral Opal Coast (ULCO), France. With more than ten years of professional experience in hydrology, meteorology, and oceanography, she has built an extensive international career spanning academia, government institutions, and industry in Vietnam, France, and Germany.

Throughout her career, Dr. Tran has contributed to numerous international and national projects in a variety of roles, including scientific research, technical training, project coordination, and project management. Her interdisciplinary expertise and strong scientific background make her a valuable addition to our team.

At HELZEL Messtechnik, Dr. Tran is responsible for coordinating projects and strengthening our network in the South Pacific region. She also supports our research activities in the fields of High Frequency Radar (HFR) applications and physical oceanography, helping to advance innovative solutions for coastal and ocean monitoring.

We warmly welcome Dr. Tran to HELZEL Messtechnik and wish her every success in her new role. We look forward to working with her and benefiting from her expertise.

Below, you will find an abstract of her doctoral thesis.
For further information, please feel free to contact her at: **tran@helzel.com**

Characterization of submesoscale dynamics in coastal regions of Vietnam using high-frequency radars and numerical modelling

Abstract

The coastal regions of Vietnam, part of the Vietnam East Sea, are socio-economically vital. However, they still lack a comprehensive understanding of their dynamics, which limits effective and sustainable coastal management. In this PhD work, coastal circulation at the submesoscale and tracer dispersion are investigated in two contrasting regions: a deep-water region along the Vietnam mid-southern coast (VMSC) and the shallow-water Red River (RR) plume region in the Gulf of Tonkin.

For the first time, datasets of high spatio-temporal resolution surface currents covering large domains (with widths of approximately 60-80 km from the shore) were obtained, enabling new insights into the submesoscale dynamics of the surface circulation in these regions. In the VMSC region, coastal dynamics during the monsoon transition (April-May, 2019) is controlled by winds and large-scale circulation resulting in a large variability in surface flow fields. Two wind-forcing optimization methods, Ensemble Perturbation

Smoother (EnPS) and wind-driven surface current correction (EkW), are introduced to improve the model simulation for the VMSC and resulted in a significant error reduction (~40% in v-component) compared to observations. The performance of both methods was limited under calm winds, as the coastal dynamics of the VMSC region is largely governed by ocean intrinsic variability and external large-scale circulations. Open boundary conditions together with wind forcing optimization, is therefore necessary to enhance the accuracy and the realism of model simulations.
In the RR plume region, coastal dynamics showed strong seasonal variability as observed by HF radars: in summer, prevailing southwesterly winds allowed the plume to extend more than 30 km offshore, whereas in winter, northeasterly winds confined it to approximately 10 km from the coast. Particle tracking approach was used to investigate the Lagrangian dispersion. The Richardson super-diffusive regime of dispersion dominated the plume area in both winter and summer, with higher spreading rates in summer attributable to high river discharge and submesoscale eddies. The thesis also provided the first analysis of coastal dynamics and dispersion under an extreme event, typhoon Yagi (September, 2024). Tracers were spread more than ten times faster as the flow rapidly adjusted to strong winds, while relative dispersion of particles in clusters exhibited a lower rate than under normal conditions, following a ballistic dispersion regime.

The effectiveness of HF radars for monitoring surface currents has been demonstrated in the VMSC and RR plume regions of Vietnam, two coastal systems with contrasting dynamics, thereby advancing understanding of coastal ocean circulation variability and submesoscale processes.

Key words: *surface circulation, high-frequency radars, model optimization, submesoscale dynamics, relative dispersion, river plume, Vietnam coasts*

Welcome to HELZEL Messtechnik – Francisco Lihue Ferro

We are pleased to welcome **Francisco Lihue Ferro** to the HELZEL Messtechnik team. Francisco is an oceanographer with an international academic background and a strong expertise in physical oceanography, marine environmental research, and environmental data analysis. He earned both his Bachelor's degree in Marine Sciences and his Master's degree in Oceanography from the University of Las Palmas de Gran Canaria, Spain.

During his academic career, Francisco specialized in the analysis of animal-borne telemetry data, satellite observations, and numerical models to investigate ocean currents, eddies, and climate-related marine processes. He has presented his research at international scientific conferences, including the European Geosciences Union (EGU), and actively contributes to science communication by making oceanographic topics accessible to a broader audience.

With his strong analytical skills and experience in MATLAB, R, Fortran, and advanced data visualization tools, Francisco brings valuable expertise to our team. His knowledge and enthusiasm will further strengthen HELZEL's capabilities in marine measurement technology and radar-based environmental monitoring.

We warmly welcome Lihue to HELZEL Messtechnik and wish him every success in his new role.

Welcome to HELZEL Messtechnik Oliver Schematus

Meet Oliver —Project Manager / Engineer of Helzel Messtechnik

Oliver is a Diploma Engineer with more than 25 years of experience in development, precision measurement technology, and specialized machinery engineering. He began his career at Helzel Messtechnik as a Development Engineer, contributing to the design and manufacture of the WERA system. He later specialised in industrial automation, PLC programming, electrical design, and system commissioning, including 1.5 years of on-site service support at Rohde & Schwarz. Most recently, Oliver served as a lead engineer in specialised machinery manufacturing, applying his expertise to complex production systems. He combines deep technical knowledge, automation expertise, and hands-on production experience. Oliver has joined our team as Project Engineer / Manager and is responsible for various high-frequency (HF) projects worldwide. We warmly welcome Oliver to Helzel Messtechnik GmbH and are delighted that he brings his experience to our company.

Welcome to HELZEL Messtechnik Henning Hamer / Oguzhan Vatanlar / Julia Altergott

Our production and manufacturing team is growing — we are very pleased to welcome Henning, Oguzhan and Julia to Helzel Messtechnik GmbH. Each brings technical expertise and relevant experience and is already actively contributing to current projects and technical work. The entire Helzel team is delighted to have them on board and will provide full support as they settle into their roles.