

Conference Newsletter

September 2014

- OCEANS MTS/IEEE 2014 – St. John’s – Newfoundland - Canada
- ICHE 2014 – International Conference on Hydrosience and Engineering – Hamburg-Germany
- METSZ 2014 - Mega Earthquakes and Tsunamis in Subduction Zones, Rhodes Island – Greece
- MiTiN – 2nd International Symposium / SEA TECH WEEK 2014 - Brest – France
- Radar 2014 – Lille - France
- Meteorological Technology WORLD EXPO 2014 – Brussels - Belgium
- EuroGOOS 2014 / European HF Radar Meeting - Lisbon – Portugal

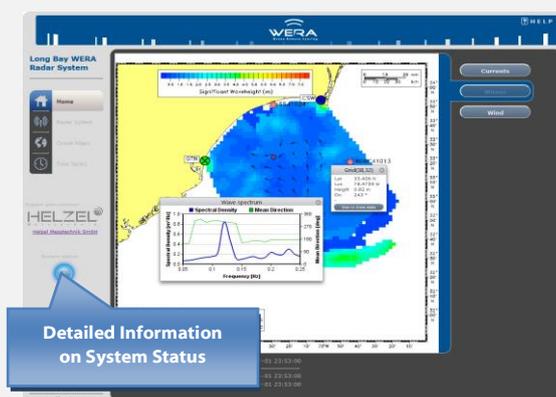
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WERA now registered trademark - WERA now registered trademark - WERA now registered trademark

There are some informative and interesting conferences ahead for the rest of 2014!

HF radar will be discussed in all its variety for diverse application fields. On the following pages, we have summarized paper abstracts which will be presented at these conferences. Moreover, we will be there or represented with a booth which offers you the opportunity for ongoing discussions during these events.

Don't miss to attend. We will be pleased to meet you there.



Always a wavelength ahead!



Session: Coastal Radar and Applications 1

Wednesday – September 17 – 3:30 to 5:15 PM
Salon F

Dr. Anna Dzvonkovskaya

Initial Surface Current Measurements on the West Florida Shelf Using WERA HF Ocean Radar with Multiple Input Multiple Output (MIMO) Synthetic Aperture

High-frequency (HF) radar systems located at the coast are well-known as a measurement tool for synoptic online mapping of ocean surface current fields. These radars use surface electromagnetic wave propagation coupled to the salty ocean surface and are capable of monitoring thousands of square kilometers of the ocean surface. For oceanographic applications, low transmit power HF radar beamforming systems have been developed for operation in the 3-30 MHz frequency band. . These systems require the use of a linear array of receive antenna elements whose inter-element spacing is dependent upon the operational frequency chosen. This paper presents a new approach of applying the Multiple Input Multiple Output (MIMO) technique with a synthesized antenna aperture to a compact HF ocean radar. The initial results show that the MIMO HF radar configuration with collocated receive antennas can be used for both oceanographic measurements and ship tracking applications. Initial MIMO results also reveal that positive results can be achieved from a reduced length receive array without reducing overall system performance. The comparison between standard and MIMO configurations has been focused on the estimation of surface current velocities and comparison with in-situ acoustic Doppler current profiler (ADCP) measurements

Prof. Malcolm Heron

Observations and Theory of a Shoaling Tsunami Wave

A WERA phased array HF radar was used in Chile to observe the disturbance of the 11 March 2011 tsunami which originated near Japan. In this pilot study, three sites on a transect across the shelf were analysed at water depths of 40, 160 and 880m. The maximum wave orbital velocities increased as the wave-group propagated into shallow water. The increase in maximum wave orbital velocities between 160 m depth and 40 m depth followed linear theory, but between 880 m and 160 m depths, the tsunami wave-group was non-linear and over half the amplitude was lost. The HF radar data indicate that non-linear processes are occurring at this location as the tsunami disturbance propagates from deep water onto the continental shelf.

Your contact persons:

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Dr. David Fissel
ASL Environmental Sciences

BOOTH 20

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<http://www.oceans14mtsieestjohns.org/>



Session T12: Remote Sensing and Field Monitoring

Thursday – October 2 – 13:20 to 15:00 PM
room M

Leif Petersen

New Data Management System for Coastal Radar WERA to Support Decision Making

The HF-Coastal Radar "WERA" is a shore based remote sensing system to monitor ocean surface currents, waves and wind direction. This very reliable long range (up to >200 km) monitoring system provides reliable data maps of the coastal zone with high spatial and temporal resolution. These data can be used for decision makers to optimize coastal zone management and planning and in case of emergencies it can be used to support hazard management.

The new data management system provides easy and fast access to all archived current, wave and wind data. The data are stored in an archive and can be accessed as time series plots for individual grid cells or as animated maps for the entire measured area. For each grid cell all data are marked with quality flags which can be used to exclude suspicious data from the analysis. Various output formats are available to compare the ocean radar data with data acquired from other sensors or numerical models.

In addition to use the measured data for planning and real-time monitoring, a special forecasting mode can be used to improve predictions of ocean currents and waves in case of risk management. Due to the outstanding accuracy of the radar the acquired data can be assimilated into numerical oceanographic models. In case of accidents in a distance of up to 200 km off the coast the real-time ocean surface current data can help Search and Rescue (SAR) operators. Presently, SAR tools are based on hydro-dynamical and atmospheric models to provide hindcast and forecast situations. Even if these oceanic numerical models are efficient to produce instantaneous maps of currents, the accuracy of derived Lagrangian trajectories is not sufficient for search and rescue purposes.

Results of various experiments with drifters to simulate a drifting persons or containers show the significant improvement of the drift simulation, when using real-time current data provided by radar systems instead of using results from numerical models only. This improved quality of the drift prediction can be very useful for various applications.

The same tool can be used for backtracking a monitored oil spill and estimate the origin to identify the polluter. Furthermore the improved numerical models can be used to provide more reliable metocean forecasts (sea states and currents) to be used by ferry operators. Data and experimental results from the French coast demonstrate the efficiency of these instruments.

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HELZEL Messtechnik GmbH
Foyer EG (ground floor)

<http://www.iche2014.baw.de/venue/index.html>

Significant Surface Current Velocity Changes Measured by the Ocean High-Frequency Radar after the Great 2011 Japan Tsunami

Dr. Anna Dزونkovskaya

The ocean high-frequency (HF) radar, which is based on electromagnetic wave propagation along the salty and good conducting ocean surface, provides a unique capability for continuously monitoring large areas of ocean. This type of radar is usually operated at a radio frequency between 3 and 30 MHz to provide a grid coverage of ocean surface that could extend more than 250 km off the coast. These large ranges are of high interest for many interesting applications such as research in oceanography, vessel detection and tracking, search and rescue, transport and distribution of pollutants, etc. These radar systems recently became an operational tool for coastal monitoring worldwide.

The HF radar system WERA (**Wave RADar**) was originally designed at the University of Hamburg; nowadays it is completely manufactured by the Helzel Messtechnik company in Germany. The WERA system is operated as a low-power ocean radar providing simultaneous measurements and mapping of surface current velocity and direction, wind parameters, ocean wave height and directional spectrum. The WERA system is based on a modular design that can be easily installed at the coast and adapted to the requirements of an actual application.

One of the WERA systems was in operation on March 11, 2011, when the Great 2011 Japan tsunami waves hit the Chilean coast after 22 hours of propagation time throughout the Pacific Ocean. The radar was located near Rumena, Chile, and supplied ocean surface monitoring in that region. The radar measurements were recording during several hours while tsunami wave train was arriving at the coast. Bragg-resonant backscattering by ocean waves with a half of the electromagnetic radar wavelength allows measuring the ocean surface current velocity using space-time processing. The ocean surface current field changes due to a tsunami event were evaluated using the measured HF radar backscatter spectra. The unique chance to observe a natural tsunami event by means of WERA radar showed that such radars are capable to measure tsunami surface current velocity with a resolution of a few cm/s. Significant deviations in ocean current measurements were observed by the radar system at distances up to 40 km off the coast. It was also observed that as soon as the tsunami waves were moving into shallower water, the surface velocity was increasing. To identify a tsunami induced signature in a measured current field, a moving-average filtering technique to remove regional surface currents was used. After applying this technique the unique tsunami wave train was clearly seen in radar measurements. Furthermore, it was compared with water level measurements by the tide gauge located 50 km to the south from the radar site. The tsunami wave periodicity was estimated for measurement data. It showed agreement estimating two tsunami wave periods of 14 min and 32 min for both tide gauge and radar measurements.

Installed along the coastal regions at tsunami risk the ocean HF radars can contribute to tsunami early warning systems. If these radar systems would have been already installed at the coast, it is just an additional software package to enable real-time support for tsunami detection and its monitoring.

<http://www.gein.noa.gr/metsz/>

Your contact person:

Dr. Anna Dزونkovskaya
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2ND INTERNATIONAL SYMPOSIUM

«INNOVATION & COOPERATION FOR BLUE GROWTH»

OCTOBER, 12TH – 16TH, 2014 – BREST, FRANCE

www.mitin-network.org

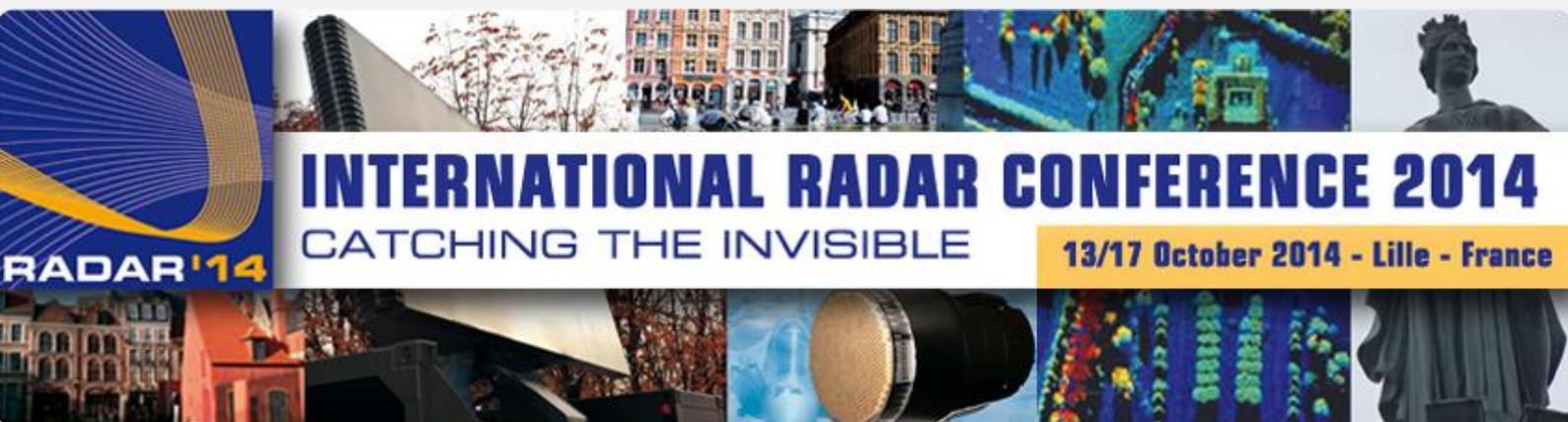
Nicolas Thomas / Roberto Gomez / Gunnar Tietze

Data Interface and Viewing for Ocean Radar Systems in Coastal Zone Risk Management

Presentation includes the topics: Tsunami Detection - Forecasting of dangerous currents and waves
Drift Prediction of oil slick for environmental protection - Drift Prediction of persons for search and rescue

<http://www.mitin-network.org/>

<http://www.seatechweek.com/index.php/en/>

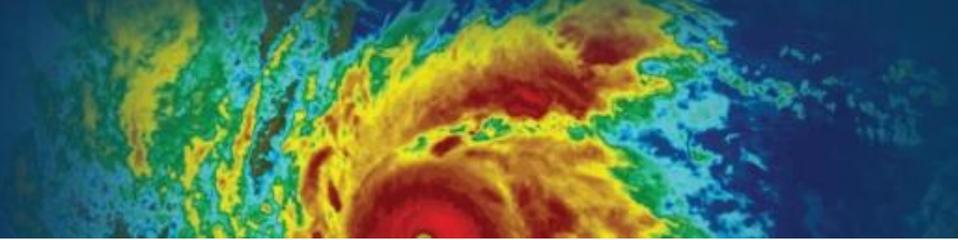


Dr. Anna Dzvonkovskaya

Fast-Moving Target Observation Using High-Frequency Surface Wave Radar

The high-frequency (HF) surface wave radar system located at the coast is well-known as a tool for synoptic on-line mapping of sea surface current fields and the spatial distribution of the sea waves. Especially for oceanographic applications, low power HF radar systems have been developed, which use surface wave propagation along the salty sea surface. Such HF radar system brings area surveillance far beyond the conventional microwave radar coverage. Additional options for oceanographic radar applications can be vessel and aircraft monitoring above sea surface. This paper describes a new attempt in signal processing approach for detection of fastmoving targets in the radar observations based on a constant false-alarm-rate algorithm. The target locations detected by the HF radar are passed to a tracking filter using range and azimuth information to track the locations of fast-moving targets. A special short coherent integration time mode has been applied for processing real radar measurements. The tracking procedure is performed for fast-moving target observation using two monostatic HF radar systems located at the coast.

<http://www.radar2014.org/>



Breakout Session
Meteorology Developments
Used in Marine Application
Wednesday – October 22 – 15:30 to 16:00 PM

Michal Weis / Thomas Helzel

Coastal Radar WERA to Support Met Ocean Forecasting for Coastal Zones

The HF-Coastal Radar “WERA” is a shore based remote sensing system to monitor ocean surface currents, waves and wind direction. This very reliable long range (up to >200 km) monitoring system provides reliable data maps of the coastal zone with high spatial and temporal resolution. These data are used for decision makers to optimize coastal zone management and planning and in case of emergencies it can be used to support hazard management.

In addition to use just the real-time monitoring, a special forecasting mode can be activated providing predictions of ocean currents and waves for the next hours.

Due to the outstanding accuracy of the radar the acquired data can be assimilated into numerical oceanographic models. This technique provides reliable forecasting of ocean currents and waves for coastal zones for more than 36 hours. The data output format can be adapted to user specific requirements. The standard GRIB output is used as input for the IBL Visual Weather Interface.

The same tool can be used for backtracking a monitored oil spill and estimate the origin to identify the polluter. Furthermore the improved numerical models can be used to provide more reliable metocean forecasts (sea states and currents) to be used by ferry operators. Data and experimental results from the French coast demonstrate the efficiency of these instruments.

Results of various experiments with drifters to simulate a drifting persons or containers show the significant improvement of the drift prediction, when using real-time current data provided by radar systems instead of using results from numerical models only. This improved quality of the drift prediction can be very useful for various applications.

These systems are already used by several Meteorological Institutes and Hydrographic services, some samples are shown.

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together with
IBL Software Engineering



<http://www.meteorologicaltechnologyworldexpo.com/index.php>

7th EuroGOOS conference

OPERATIONAL OCEANOGRAPHY FOR SUSTAINABLE BLUE GROWTH

Lisbon, 28-30 October 2014

+ more detail

Celebrating 20 years of EuroGOOS

Céline Quentin

High Frequency Surface Wave Radar in the French Mediterranean Ocean Observing System on Environment (MOOSE)

A Mediterranean Ocean Observing System on Environment (MOOSE) has been set up as an interactive, distributed and integrated observatory system of the North West Mediterranean Sea in order to detect and identify long-term environmental anomalies. The surface circulation in this region is characterized by a large-scale flow (Northern Current N-C) and by a broad range of other scales of variability induced by meteorological and tidal forcing. In this framework, the Mediterranean Institute of Oceanography (former L.S.E.E.T.) is operating High Frequency Surface Wave Radar (HFSWR). The ability of HFSWR is to provide synoptic observation as sea surface current map with high temporal resolution and over long distances, which can be used to study the spatial variability of the NC and Eddy dynamics. One site is already operational nearby Toulon for more than three years and is monitored in near real-time by WERA (Helzel Messtechnik). Its specificities array type antenna system in non-linear configuration and bistatic operation mode have required new development in the hardware, and in the processing (adaptation for the bistatism with direction finding method). These data were used during the TOSCA Med-project (Tracking Oil Spills & Coastal Awareness network). The second site will extend the radar observation and was just set up this year around Nice with two SeaSonde (Codar). We present here an overview of the HFSWR network, the surface current mapping facility offered by the system, and recent observation results and applications. MOOSE data management is entrusted by CORIOLIS and will use the MyOcean data distribution infrastructure.

Your contact person on site:

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European HF Radar meeting
Monday 27th October 2014
Lisbon

<http://eurogoos.eu/events/hf-radar-pre-event-eurogoos-conference/>