MecORT enjoys prime view in Cape Town

Not even the notorious Western Cape wind could have stopped the radar and electronic warfare team that went to Cape Town to conduct research measurement trials using the MecORT mobile radar laboratory on Signal Hill recently.

The team of 10, led by Dr Paul Herselman and Willie Nel from CSIR Defence, Peace, Safety and Security, spent two weeks conducting research on detection, tracking and automatic recognition of different types of boats. This research forms part of the Awarenet radar strategic research programme.

The objective of the trial, says Herselman, was to record real-life data of a wide range of vessels, from small rubberducks to big cargo ships, and it was done using the MecORT laboratory. "We chose the site [Signal Hill] because of its wide horizontal coverage of the sea and steep incidence angles, which are representative of the geometries expected for the envisaged Awarenet concept demonstrator and final system," he says, adding that they also had a view of Robben Island, which is one of the problematic areas where significant abalone poaching activities take place.

He says that over the two weeks they spent in Cape Town, they recorded data of seven instrumented small boats fitted with a global positioning system and an inertial navigational unit. These boats ranged in size and structure from a 4,2 m pencilduck to a two-masted 16 m yacht. In addition to the instrumented boats, they recorded data of boats that were entering and leaving the nearby Cape Town harbour.

"During this trial, we also made specific long dwell-time recordings of the sea surface over a wide range of environmental conditions at different angles," he says. In addressing a need to improve the small boat detection capabilities of current and future maritime search radars, sector scan measurements were made over various areas of interest, e.g. the litoral around Robben Island.

Herselman mentions it was the first time that his team calibrated the MecORT laboratory using a sphere suspended below a helicopter above the sea. This, he says, allows them to quantify how big the ship appears to the radar, which is crucial in determining the detectability of the specific type of ship under different sea conditions.

"The team is still processing the data. Preliminary analysis of the data suggests that the trial was a success," says Herselman. Under certain conditions the radar was able to detect and track the 4,2 m pencilduck boat in the littoral at a range of up to 20 km. With advanced signal processing it should be possible to detect this boat at further ranges under a wider range of conditions. The capabilities of the MecORT laboratory allowed
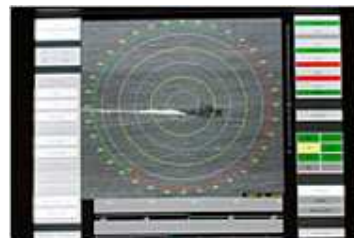
the researchers to characterise the radar reflectivity of the open sea at ranges of up to 60 km for the first time. A large amount of ship motion data has been recorded for different vessels. This will enable the researchers to determine the time periods during which they will be able to generate a focused, high-resolution synthetic radar image of the vessel, which will yield the best probability of automatic recognition.

The next trial for AwareNet will be conducted in the next 18 months. At this deployment it is envisaged that the detection, tracking and automatic recognition algorithms currently being developed will be implemented and evaluated in real-time.

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- The South African National Parks Board, specifically the Table Mountain National Park
- The National Sea Rescue Institute, specifically stations three, eight and 18
- The South African Weather Service
- Reutech Radar Systems
- The Trans Atlantic Boat Association
- The South African Navy.

Related information: Small Boat Detection research at the CSIR