



CODAR OCEAN SENSORS

HF Radar Calibration with Automatic Identification System

Mountain View, CA

High frequency (HF) radar systems produce ocean current data by measuring the speed and direction of ocean currents in near real time. The data, collected by over 300 HF radars worldwide, is used in a variety of ways, including: aiding oil spill response by using current information to predict the flow and location of contaminants, improving search and rescue missions by narrowing the search area, and providing key information used in a range of oceanographic research. Data quality is critical in providing the most accurate HF radar data to its users, so effective radar system calibration is critical to ensure high quality data.

Prior to 2011, CODAR, who designs, manufactures, and supports over 90 percent of the national HF radar network systems in the United States, was conducting system calibration through the use of transponders placed on small vessels. The vessels would travel in an arc around the receiving radar antenna to calibrate the antenna response from all angles. While effective, this method was limited by the cost and availability of vessels to carry the transponders, time for the calibration process, and weather and ocean conditions. Momentum for alternative methods for HF radar system calibration began building as system operators and technicians started discussing the potential for more efficient and cost-effective calibration methods. Simultaneously, oceanographic researchers at the University of California Santa Barbara (UCSB) became eager to obtain the Automatic Identification System (AIS) they saw being used for vessel location onshore in their work.

Web

<http://www.codar.com>



Photo: Codar Ocean Sensors

PROJECT

CODAR won an SBIR award to develop alternative HF radar calibration methods. With support from UCSB, the team showed that by associating AIS vessel identifications (which provide ship positions) with vessel radar echoes in HF radar data, it is possible to reproduce the antenna pattern that was previously measured by transponders aboard ships. In their Phase II award, CODAR and UCSB operationalized their calibration methods. UCSB investigated methods that could filter the incoming AIS and vessel echo

BENEFITS CODAR developed software that could match AIS data with radar signals and spectra. The resulting software product automates HF radar calibration for systems and allows for more continuous system calibration, which improves the accuracy of more accurate vectors. The automated antenna pattern calibrations have made it easier for local system operators to keep up to date with calibration of the HF radar. This has resulted in more accurate ocean current data which aids the downstream applications that have implications for ocean ecosystems, such as:

- Monitoring harmful algae blooms.
- Conducting ecosystem assessments.
- Assisting in fisheries management.
- Reducing the quantity and severity of oil spill contaminants in the ocean that affect water quality, the lives of marine wildlife, and ocean habitat, such as spawning grounds for marine organisms.

The SBIR award provided CODAR the opportunity to develop a beneficial community product that would not have otherwise been possible due to company resource constraints and the risk associated with the product development. The project led to a software prototype that laid the foundation for a marketable product that continues to be refined and sold by the company. The results of the Phase II SBIR award also positioned CODAR for a Phase III grant that, ultimately, allowed the software to be disseminated and used by operators; expanding the product's customer base.

The SBIR project provided several internal benefits to CODAR that have translated into economic impacts, including:

- Offering additional services in the form of analysis of the data generated by the software.
- Hiring additional staff to conduct the data analysis, as well as, software developers to continue updating the software initiated under the SBIR award.
- Helping CODAR remain competitive in their niche market, which includes both domestic and international customers.

NOAA SUPPORT

CODAR's principal investigator, Chad Whelan, described the SBIR award program as a "great fit" for the project to develop alternative HF radar calibration methods. The CODAR- UCSB team was able to improve something for the community due to the financial resources made available through the SBIR award program. The NOAA technical lead at the Integrated Ocean Observing System Office brought an in-depth understanding of the relevant information to project discussions; providing feedback and prompting project considerations.

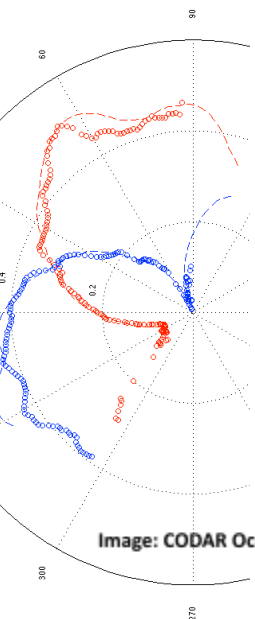


Image: CODAR Ocean Sensors