Summary Findings from the HF Radar Tool Launch Event

Introduction

This event took place on 16/10/18 at Tremough Innovation Centre, Penryn Campus.

The focus was to launch a new online resource available to businesses, hosted by the University of Plymouth and funded by the Marine-i project on behalf of Cornwall and the Isles of Scilly. This resource is primarily a web visualisation tool users can interact with to access data from the University's two HF radar stations located at Perranporth and Pendeen. Using this tool, users will have access to both historic and current data by simply defining the geographical area and date range of interest.

The concepts and ideas outlined here are a combination of perspectives that include input from the team at the University of Plymouth, Richard Greaves at VooMeRoon and Simon Collins and Jonathan Turner from NLAI. This summary divides ideas in to broad groups and themes. All content was generated during the workshop with input from the attending delegation.

The Day

A mix of private, public and research sector delegates were guided through a programme of presentations and discussions designed to raise awareness of HF Radar and similar sensing methods, to then stimulate thoughts around optimisation of existing industry activities via a presentation on how these methods are used more widely around the world. This led to ultimately exploring situational awareness and inspiration for new and innovative applications of the technology for growth of R D& I in the region.

Findings

Operational Planning / Vessel Optimisation

HR Radar data offers near real time ((NRT) circa 20mins – 30mins lag time) and therefore supports operational planning in the near term. As such, HR Radar data could be used to determine and inform:

- Whether launch conditions are suitable for certain maritime operations.
- End-to-end mission planning – opportunities to extend operating windows.
    - Potentially applicable to activities such as dredging operations.

- Route planning (NRT sea state data) – this could potentially be fed directly to a vessel's bridge to support route optimisation considering safety, comfort and fuel efficiency factors.
    - This method would inform navigational decision making and could be applied to autonomous and crewed vessels.
    - May result in reductions in fuel usage or calmer travelling conditions for passengers, or both.
- High resolution data to support offshore design and to inform siting/location decision making to optimise efficiency and through life maintenance considerations.
    - Applicable to offshore renewables as well as aquaculture and other marine spatial planning applications.

Ground truth(ing)

HF Radar provides a situational awareness data layer that brings a number of benefits to improve the understanding of a given sea space both in NRT and over an extended period. Benefits and potential applications include:

- HF Radar provides higher resolution data when compared against wave buoys as the data covers more points over a wider area.
- Surface measurements absent in ADCP data – combine ADCP and HF radar to get accurate current profile?
    - Need to interpolate/model lower water column from ADCP and coastal models.
- Intermediate data between in-situ instrumentation and earth observation data.
- Validation for insurance models.
- Extrapolated wind and wave data.
    - Could data from one site be extrapolated to another?

Tracking / Awareness

The HF Radar station on the north Cornwall coast's data capture frequency can be as often as every 5mins. Such high frequency data captures facilitate maritime situational awareness applications if it can be demonstrated that vessels of x size and at up to y range can be detected by HF Radar.

- Vessel traffic could be monitored and compared against other data sets such as AIS.
- The position of and trends in the movements of ocean fronts could be captured (useful as an indicator for locating fish).
    - If used to predict fish whereabouts, might be able to reduce time at sea for fishers, which improves their work conditions, welfare, safety, etc.
- Identifying areas of interest where casualties might best be located.
    - i.e. where sea states are particularly rough or where vessels can be seen to deviate from an expected course.
- Miscellaneous objects of appropriate size – we need to define both the size and range of objects that can be seen and whether different materials can be identified.

- These factors will initially be based on the capability of our existing HF Radar array?
- Could new installations be higher res?
- Objects might include, vessels, debris, harmful algal blooms (if they disturb the sea surface) oil, plastic debris, etc.

Development / Environmental Mitigation

The environmental data that is already captured (wind, current and wave) could be deployed to inform several activities such as:

- By combining current and habitat mapping HF Radar data could be used to inform plans for seeding of additional substrate.
  - E.g. oysters in estuaries/bays/windfarms/reefs.
- Supporting data for coastal engineering (artificial reefs/defense structures).
  - E.g. Dawlish railway.
- Wave/current resource data for Offshore Renewable Energy.

Forecasting / Hindcasting

The ability to capture regular data sets for the same area over extended periods allows for trends to be identified. These can then be used to:

- Develop more accurate models from more defined spatial data.
- Predict sediment transfer potentially useful for dredging and/or mineral extraction.
  - E.g. Tin deposits off St Agnes & Trevaunance Cove.
- Informing coastal monitoring.
- Marine litter/plastics/pollution movement.
  - Both where it will go and where it may have come from.
- Leisure planning, management and forecasting.
  - Including conflict resolution with other water users, e.g. mineral operators.

Conclusions

The link to commercial products and services is key and this is the driver to the development of the web tool and this launch event.

Delegates expressed an interest in increased access to data beyond the web tool in forms such as an API; allowing access to the full high resolution data captured by the arrays. The Marine-I funded Business Research Fellow post, based at the University of Plymouth is on hand to facilitate and support businesses in accessing the full data set; working to co-create new solutions and applications for R, D and I outcomes. In engaging with this fully-funded offer, there are factors that will be evaluated and planned for on a case by case basis, including access to data, processing considerations, sharing of the data, app development and commercial revenue models.

Next Steps

The Marine-i project partners offer their full support in engaging with the HF Radar Station facility and data. Representatives of these organisations are eager to continue discussions to explore ideas for demonstrations, tests and creative interrogation of the data to achieve commercial ambitions for industry.

To speak with the Marine-i team, including experts and our partners from NLAI and VooMerOon in the room, please contact us via:

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If you wish to contact the University of Plymouth directly, you can do so via:

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