Potential of technology Innovation for monitoring broad scale coastal impacts and change: remote ground based observations & autonomous sensor systems

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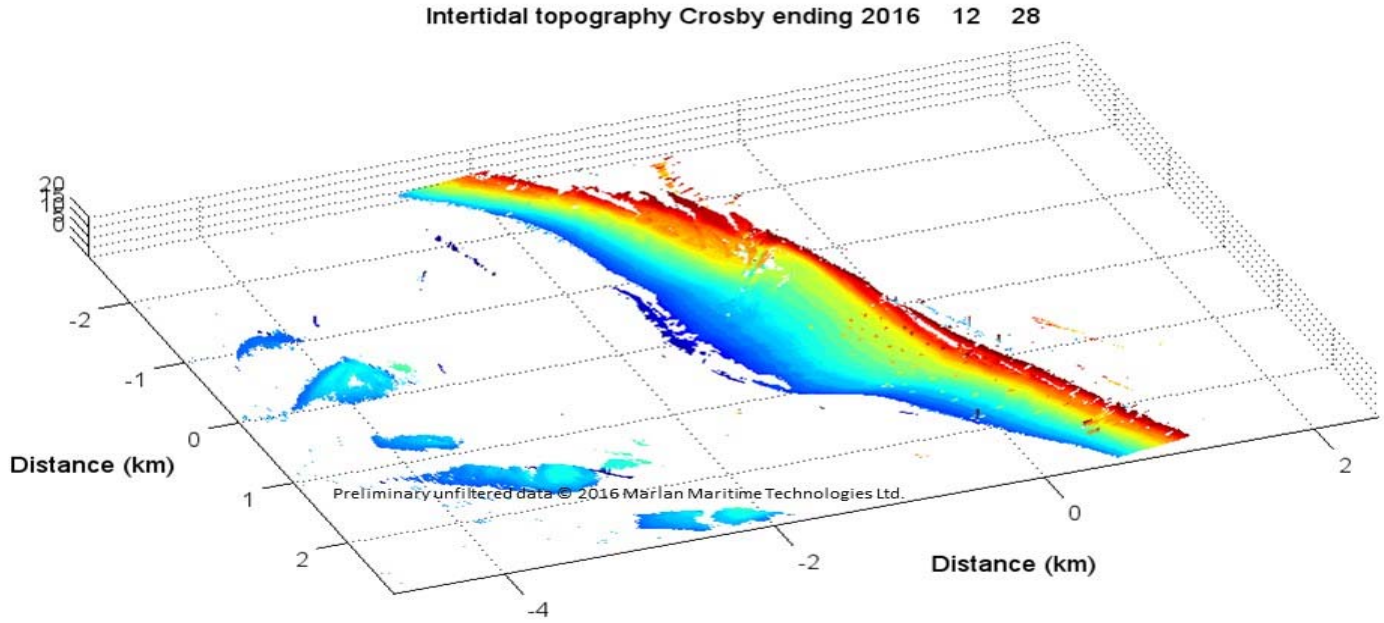
Emerging options for monitoring

- Ground based remote sensing (Radar, Video, GPS)
  - Intertidal and sub-tidal bathymetry using waterline and wave inversion
  - Currents using wave inversion
  - Bird tracking
- Unmanned Surface Vehicles (USVs)
  - Survey operations
  - Deployment of small systems
  - Data recovery

Ground based remote sensing

Temporal waterline mapping – pixel level intertidal mapping (InnovateUK KTP with Dr Cai Bird, NOC & Marlan Martime Ltd)



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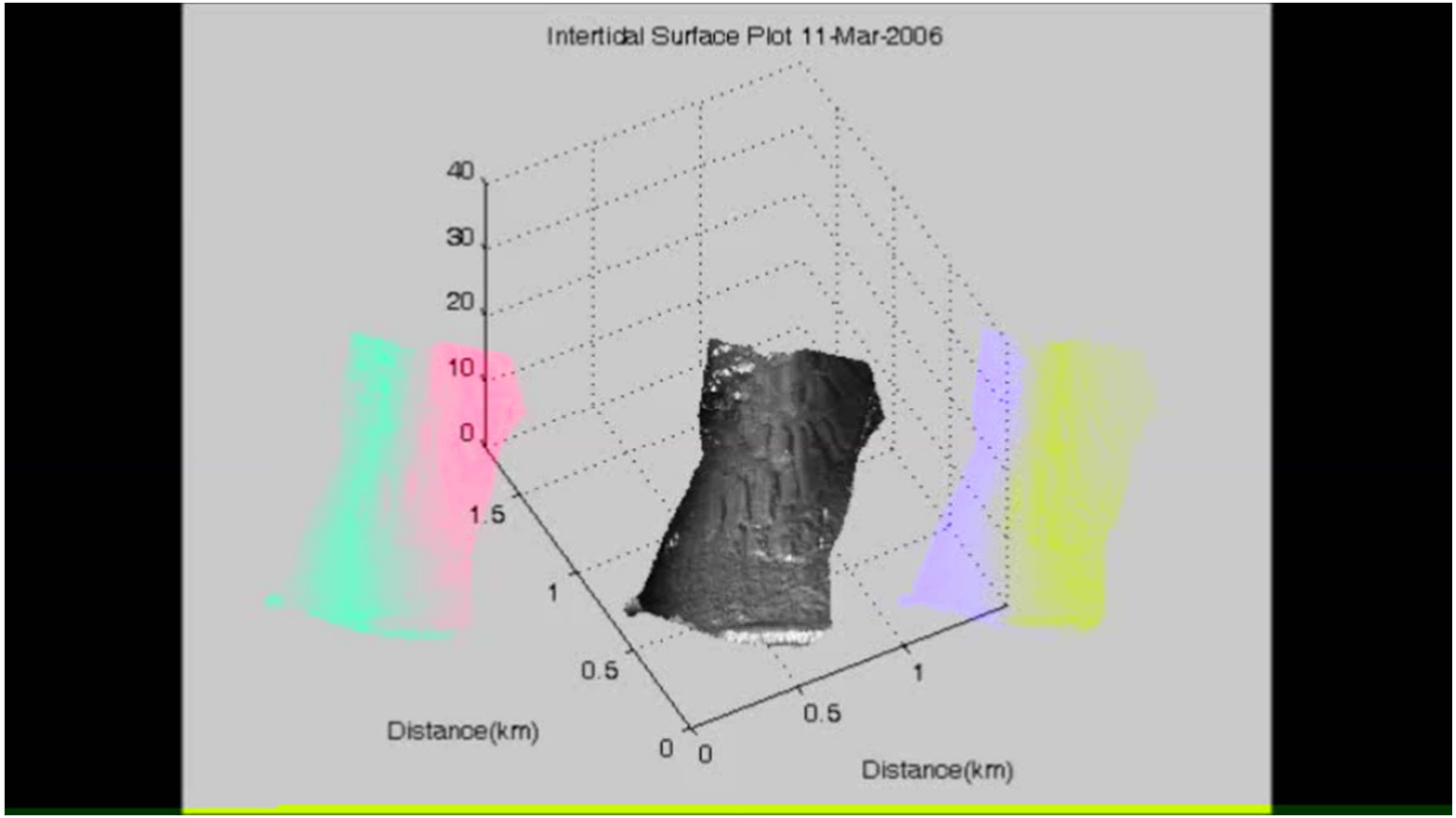
Ground based remote sensing

Temporal waterline mapping – pixel level intertidal mapping



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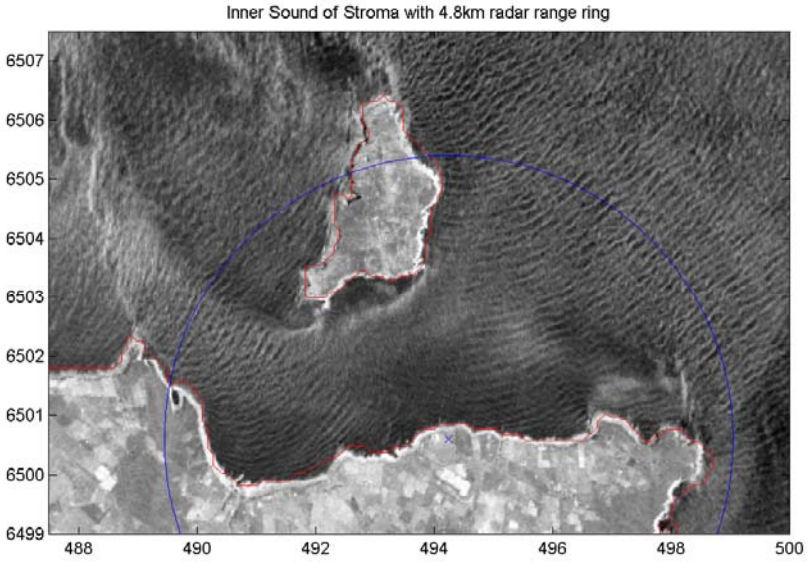
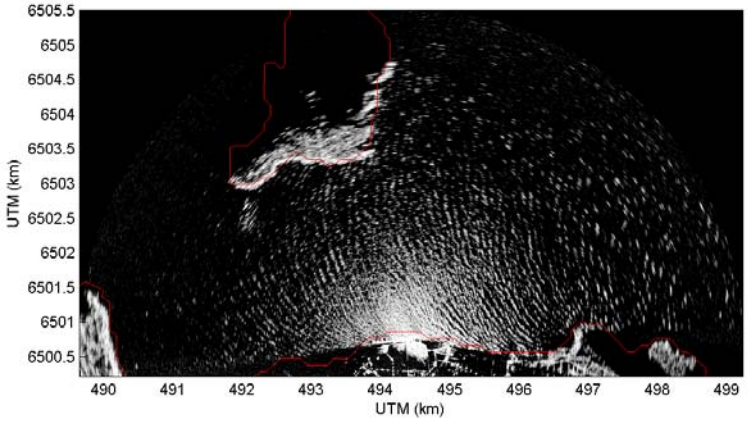
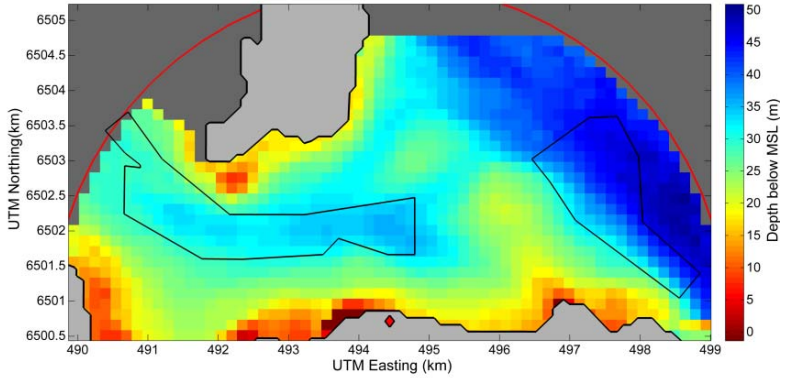
Ground based remote sensing

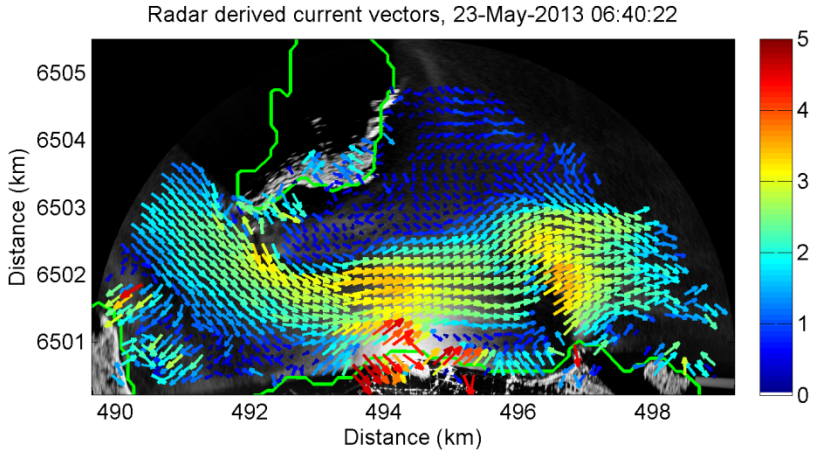
Wave Inversion for depth & currents



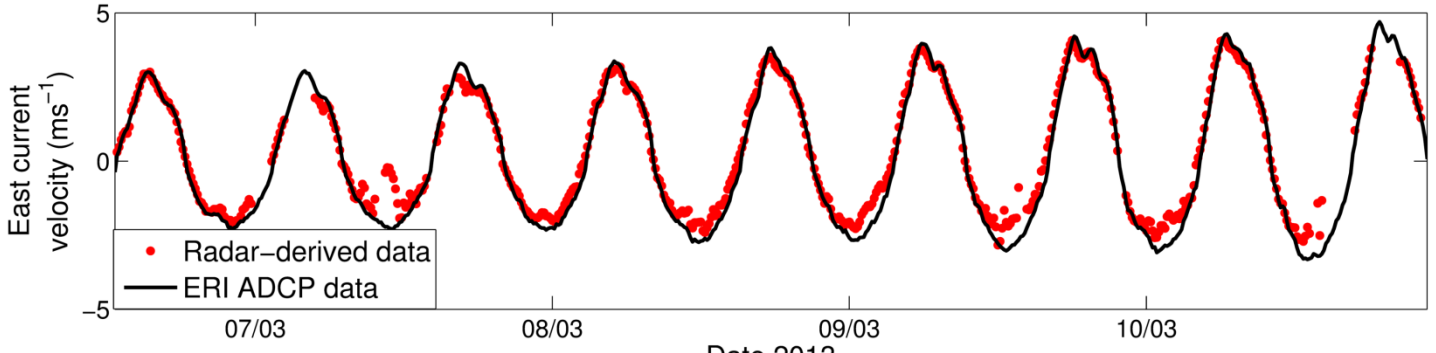


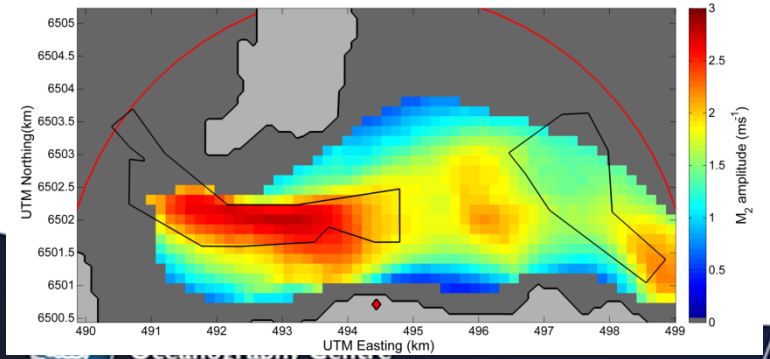


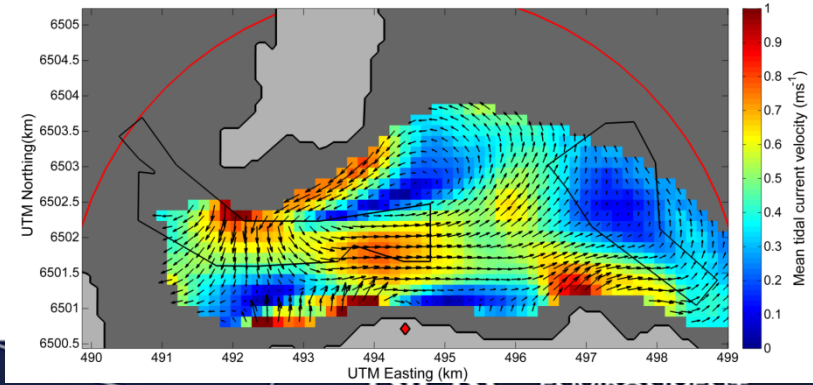
Currents in the Inner Sound of Stroma



- 3 months of intermittent current results allows tidal analysis of results:

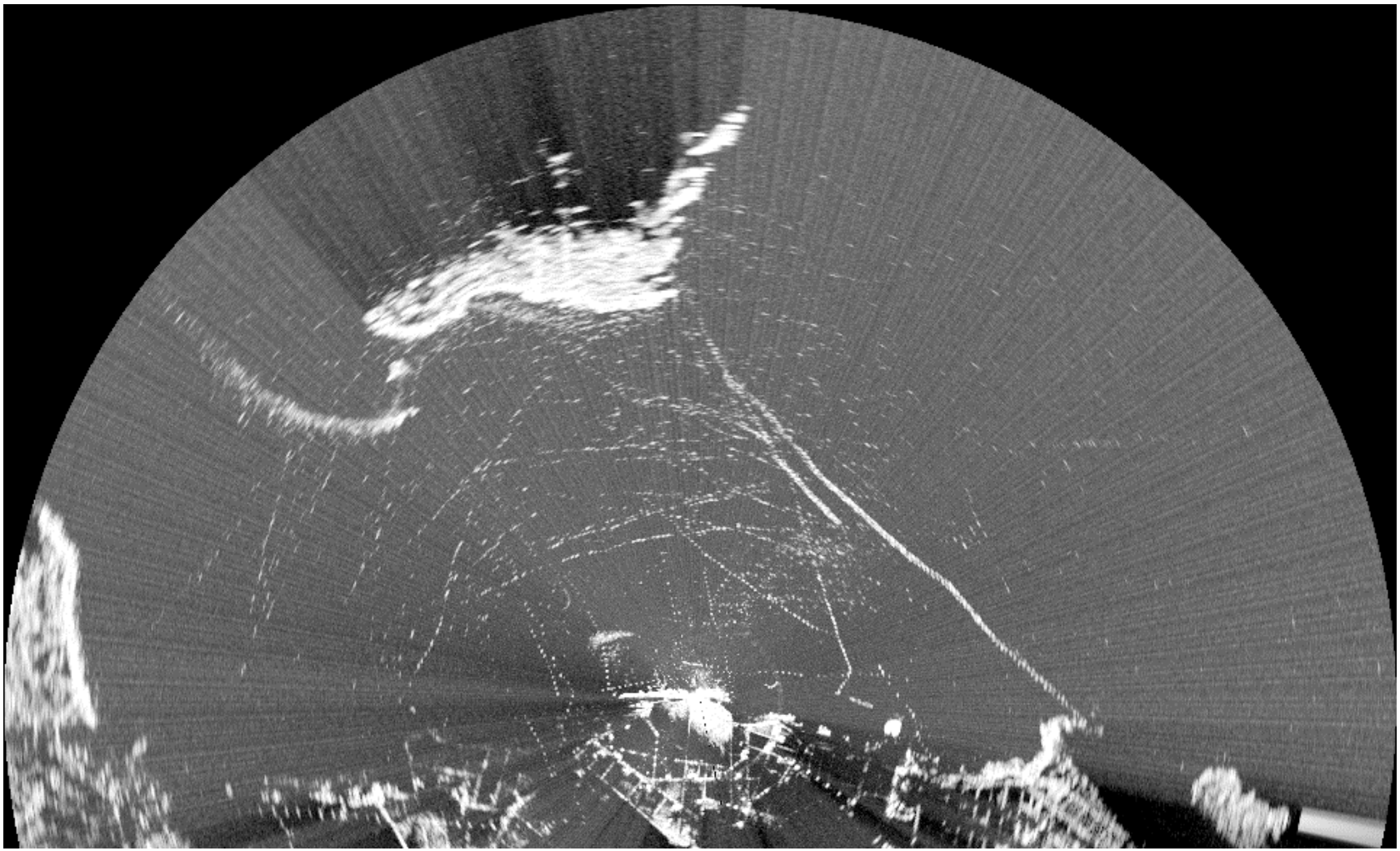






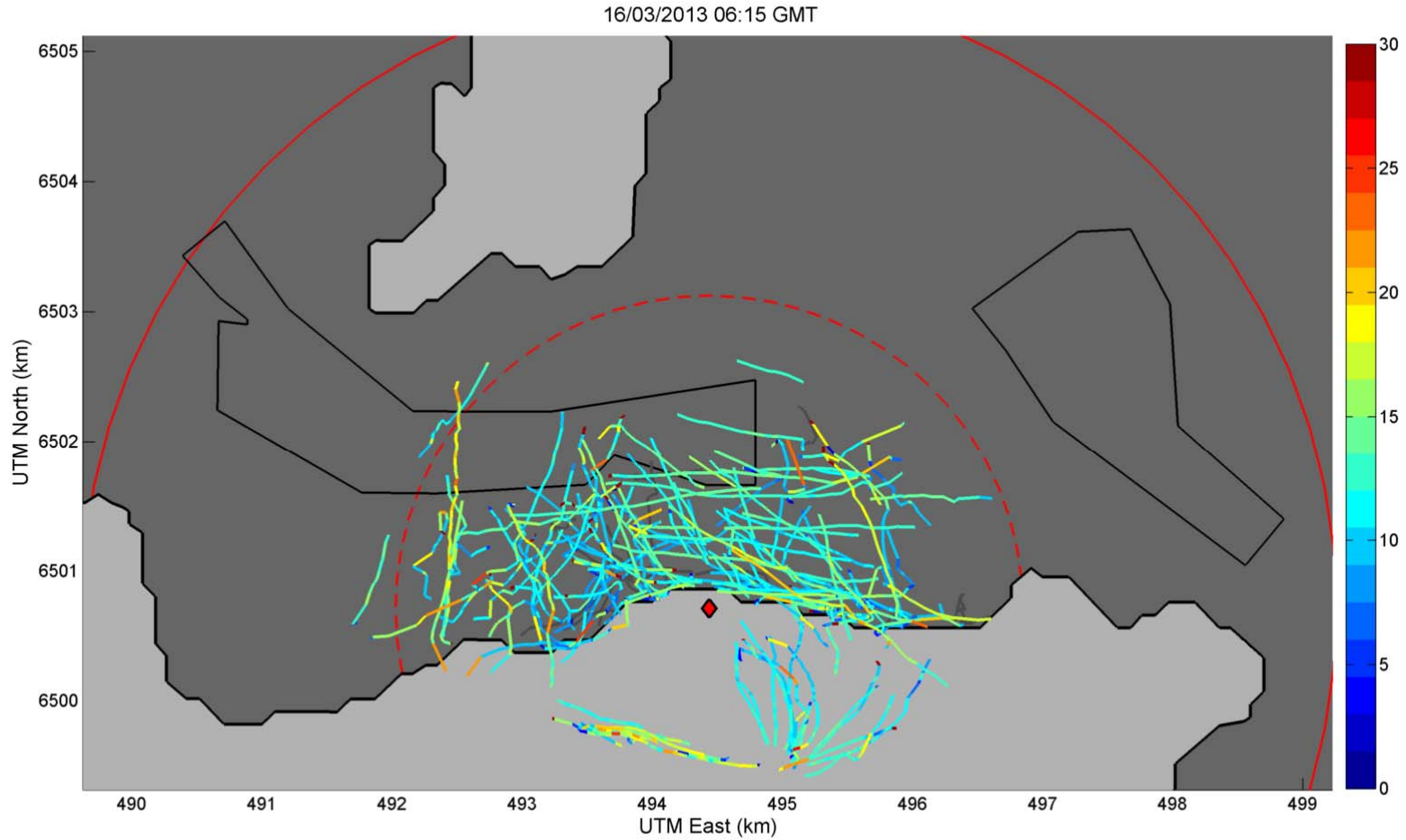
Raw 5-minute maximum images

- bird tracks visible



Bird Tracking – GANNETT

Dr David McCann



FLOWBEC Frame – deploying at EMEC

Now at Meygen site – InnovateUK KTP with Aberdeen University

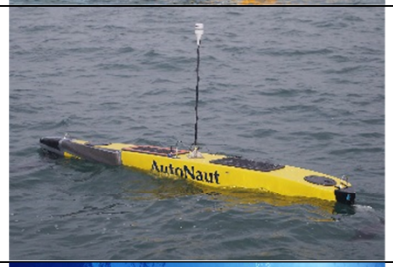
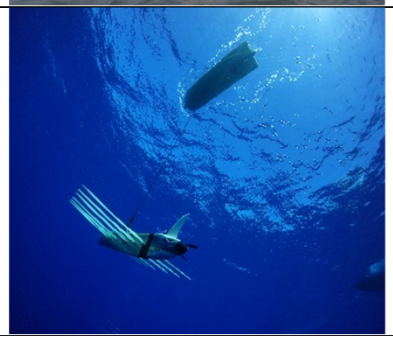
Photos: Beth Scott, U.Aberdeen

Autonomous Systems at NOC

A range of physical & chemical sensors are being integrated with these systems including new ‘lab-on-chip’ and microfluidic sensors.

Unmanned surface vehicles in particular may be ideal for monitoring of water quality within sheltered tidal lagoons.

Unmanned Surface Vehicles

Example platform		Renewable energy systems
ASV C-Enduro		Solar PV, wind turbine and diesel -electric generator. ~ 30 days endurance Speed < 4 knots (dual propellers)
MOST Autonaut USV		Wave-propelled or wave/electric hybrid motive unit. Solar PV and optional Hydrogen fuel cell for payload. Speed 2 –4 knots (dependent on wave conditions)
Liquid Robotics Wave Glider		Wave-propelled motive unit. Solar PV cells for payload ~ 12 month endurance Speed < 2 knots (dependent on wave conditions)

Summary

- The large areas involved in Tidal lagoons and surrounding areas can be monitored using new and emerging technologies including ground and vessel based remote sensing and autonomous vehicles equipped with state of the art sensor packages.
- In situ measurements of fish and diving birds also progressing
- Do not underestimate the level of data analysis required to turn data into information!