



## MASTS Annual Science Meeting Workshop, 2<sup>nd</sup> November 2018 Conducting fieldwork in tidal stream sites

On the 2<sup>nd</sup> November 2018, 32 academics, technicians, technologists and marine renewable energy developers attended the Technology and Innovation Centre in Glasgow to discuss the challenges faced conducting fieldwork in energetic tidal stream sites. The workshop was part-funded by the Interreg Atlantic Area, ERDF-funded project MONITOR and came about through a collaboration between Marine Scotland Science and the SEACAMS2 project, and hosted at the MASTS annual science meeting.

### Keynote overview:

Rory O'Hara Murray (Marine Scotland Science) began the day with a short presentation on the motivations behind the workshop: interest in tidal stream development; wide range of measurements and fieldwork practices; challenges of working in these environments; equipment loss and failures and the need to come together as a community to develop best practices.

There were six keynote presentations given at intervals throughout the day, which set the scene for the breakout sessions chaired by Beth Scott (Aberdeen University), Brian Sellar (Edinburgh University), Arne Vögler (UHI):

- Michael Togneri (Monitor, Swansea University) – *Performing marine operations in strong current areas effectively – a case study*
- Jason McIlvenny (Environmental Research Institute, UHI) - *Mooring experiences in the Pentland Firth*
- Benjamin Williamson (University of Highlands and Islands) - *FLOWBEC and environmental monitoring*
- Fraser Johnson (SIMEC Atlantis Energy) - *Practical experience and learning of environmental monitoring in and around a tidal array*
- Andy Shanks (EMEC) - *The use of ROVs in strongly tidal sites: Planning bite-size operations*
- Brian Sellar (Edinburgh University) - *Acquisition of combined wave-current-turbulent flow data from energetic tidal sites as part of large Industrial-Academic projects: sensor configurations, data analysis and lessons-learned.*

## Outcomes of the discussions:

	Successes	Limitations	Alternatives?
<b>Releases</b>			
Acoustic	Few	Noisy environments linked to high turbulence levels; If used in regions of high volumes of sediment transport there is a potential for the device to become buried.	Cable ties + ROVs; divers; <i>type of acoustic release with a better frequency for turbulent environments</i>
Hydraulic	Yes		
<b>ADCP</b>			
Gimbles	Few	Issues with turbulence creating noise and data issues when gimbled.	Nortek – AHRS sensors for post processing; Edinburgh University development of a ‘smart gimble’; Consensus was that better results come from not using a gimble due to issues with turbulence
<b>Deployment / Recovery</b>			
Cameras	Mixed	High turbidity and low light environments; Extra complexity during deployment (more winches);	Use of a Bullseye to check positioning of device; Differential GPS on the line during deployment
ROVs	Yes	Limited operation window (< 3knts)	
Surface Buoy	Mixed	Risk of fouling MRED; Shipping risk;	ROV; Diver
Diver	Yes	H&S implications	
<b>Vessels</b>			
DP	Mixed	Cost;	Thrusters and winches better if they are close to the water.
Multicat	Mixed	Health and safety concerns;	Thrusters and winches better if they are close to the water.
<b>Connectors</b>			
Dry-mate	Mixed	In-efficient; Neap tides required	
Wet-mate	Yes	High Cost	<i>Wet-mateable</i> connectors at a lower cost

## Best Practices

	Options and Considerations
<b>Deployment and Recovery</b>	
Seabed data	Multibeam
	Octopus Echo Scope (<20m water depth)
	Drop camera
ROV	Big shackles
Positioning	USBL (2x)
	Drop camera (bull's eye)
	Data cable
Releases	Hydraulic release
Vessels	DP
	Multicat
	Experienced Crew / Local Knowledge
Recovery	ROV
	Divers
	Surface Buoy (if no MRED in proximity)
<b>Hydrodynamic Data collection</b>	
ADCP	4-beam (more post-processing)
	5-beam
ADV	

Areas where we need to improve:

- A standard method of measuring turbulence needs to be addressed and defined.
- Better communication with manufacturers - Nortek offer student placements.
- Post-processing of data – consideration of industry standards, need to be accessible by all and everyone working in this area should be aware of industry standards.
- Better meta-data on post-processing (MEDIN)
- Learn from offshore wind, develop transfer functions – Met certified project is developing new standards.
- Power curve methodology is strange and unrealistic to achieve and not specific enough – swept area calculations, horizontal and vertical shear need to be considered but vary in space and time.
- IECC standard - Call for sector to view the standards as live documentation

## Cost reduction

- Multi-use of vessels to save money
- Multiple sensors on moorings – high levels of upfront cost but better in the long run
- Combined biological and physical data collection – early stage design required

## Review Paper

An outcome of the workshop is a review paper, which is intended to be a document detailing ‘Best-known Practices’ for operating in tidal stream sites with a particular focus on the deployment and retrieval of seabed frames.

The paper will focus on the main themes of the workshop:

- Global review of tidal stream sites and operations – led by Alice Goward Brown (Bangor University), Sophie Ward (Bangor University) and Rory O’Hara Murray (Marine Scotland Science)
- Equipment - led by Brian Sellar (Edinburgh University) and Benjamin Williamson (ERI, University of Highlands and Islands)
- Mooring design and Vessel selection - led by Andy Shanks (EMEC) and Fraser Johnson (SIMEC Atlantis Energy)
- Future outlook - led by Michael Togneri (Swansea University) and Arne Vogler (University of Highlands and Islands)

## Final Remarks

The workshop organisers, Rory O’Hara Murray, Alice Goward Brown and Sophie Ward would like to thank everyone who attended and presented at the workshop and our chairs Beth Scott, Brian Sellar and Arne Vögler for playing a key role in driving discussion and leading the breakout sessions.