University of the Highlands and Islands
Oilthigh na Gàidhealtachd agus nan Eilean

MERIKA
Marine Energy Research Innovation and Knowledge Accelerator

Breakfast Showcase for Marine Energy

at University of the Highlands and Islands

Time: 08.30 – 09.30 (Breakfast available from 08:00)
Date: Wednesday 24 September
Location: Maclean Room, Bishop's Palace, Eden Court Theatre

Host: Professor Ian Bryden, Vice-Principal (Research), UHI

Speakers:
Professor Ben Wilson, Chair of Energy, UHI
Arne Vögler, Senior Research Engineer, UHI
Professor Stuart Gibb, Director Environmental Research Institute, UHI
Dr Raeanne Miller, Knowledge Exchange Fellow for Marine Renewable Energy, SAMS
Damian Collins, MERIKA Project Knowledge Exchange and Innovation Manager, UHI

The Marine Energy breakfast event will showcase UHI's marine energy expertise and research themes, and introduce UHI's newest EU-funded marine energy project, MERIKA.

All delegates of the Scottish Renewables Marine Conference 2014 are invited to attend.

w. merikafp7.eu e. merikafp7@uhi.ac.uk @merikafp7

University of the Highlands and Islands
Oilthigh na Gàidhealtachd agus nan Eilean

HIE
Highlands and Islands Enterprise

The MERIKA Project has received funding from the European Union Seventh Framework Programme (FP7/2007-2013) under grant agreement no 315925

University of the Highlands and Islands
Oilthigh na Gàidhealtachd agus nan Eilean

eri environmental research institute

University of the Highlands and Islands
Lews Castle College

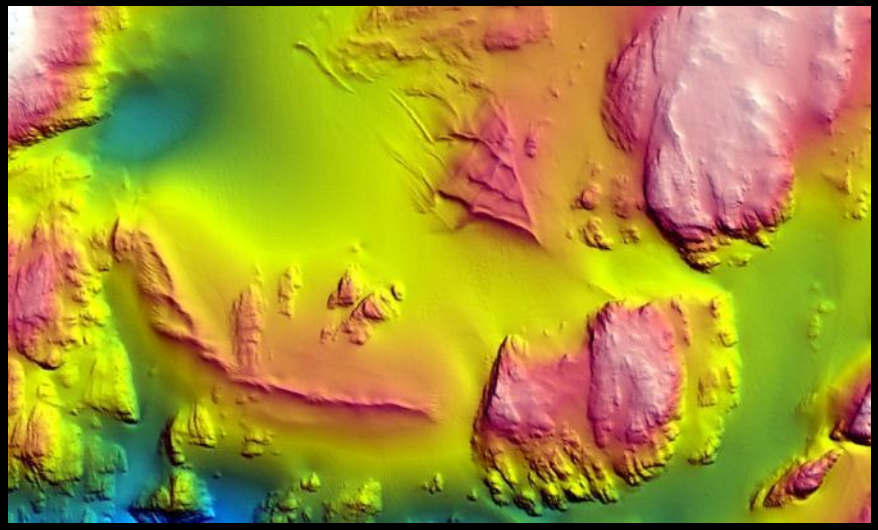
SCOTTISH ASSOCIATION for MARINE SCIENCE

University of the Highlands and Islands
Oilthigh na Gàidhealtachd agus nan Eilean

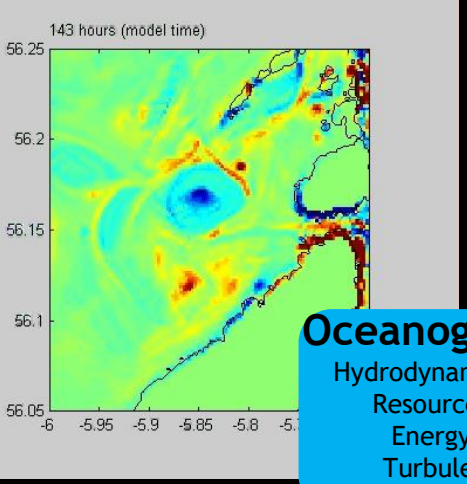
SCOTTISH ASSOCIATION for MARINE SCIENCE

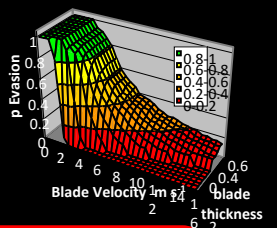
SAMS


QUEST UAV



Marine Renewables Team





Wildlife Displacement

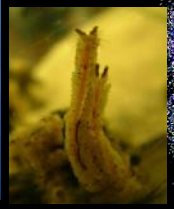
Interference with
habitat use & movements
Surveys, passive acoustics

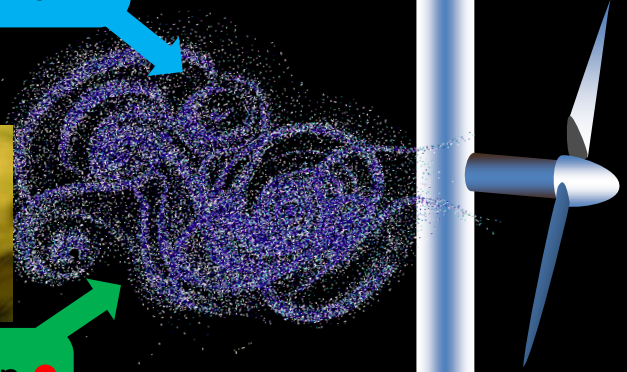
Collision Risks

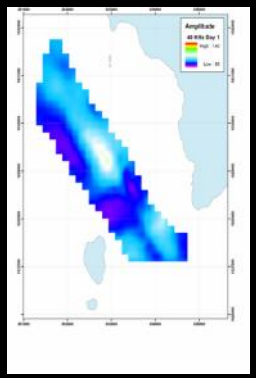
Mammals • Fish • Birds
Modelling Behaviour
Encounter Rate, Evasion

Oceanography

Hydrodynamic modelling
Resource mapping
Energy shadows
Turbulent mixing







Habitat Modification

Sediment Redistribution
Burying

Device acoustic Footprints

Device & background:
prediction, measurement
& mitigation

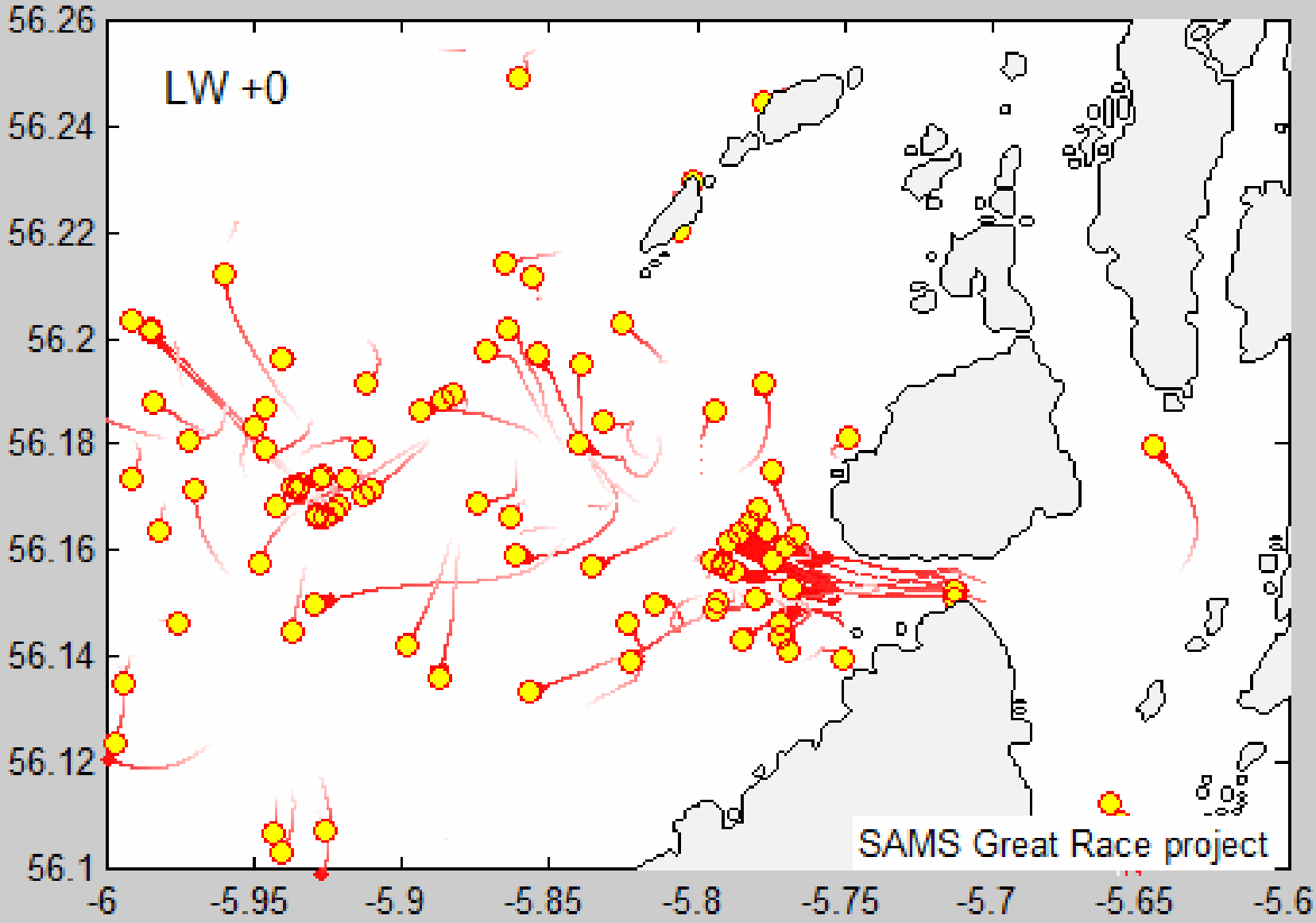
Artificial structures

Artificial Reefs
Colonisation
Invasive Species (staging posts)
Fisheries enhancement

User displacement

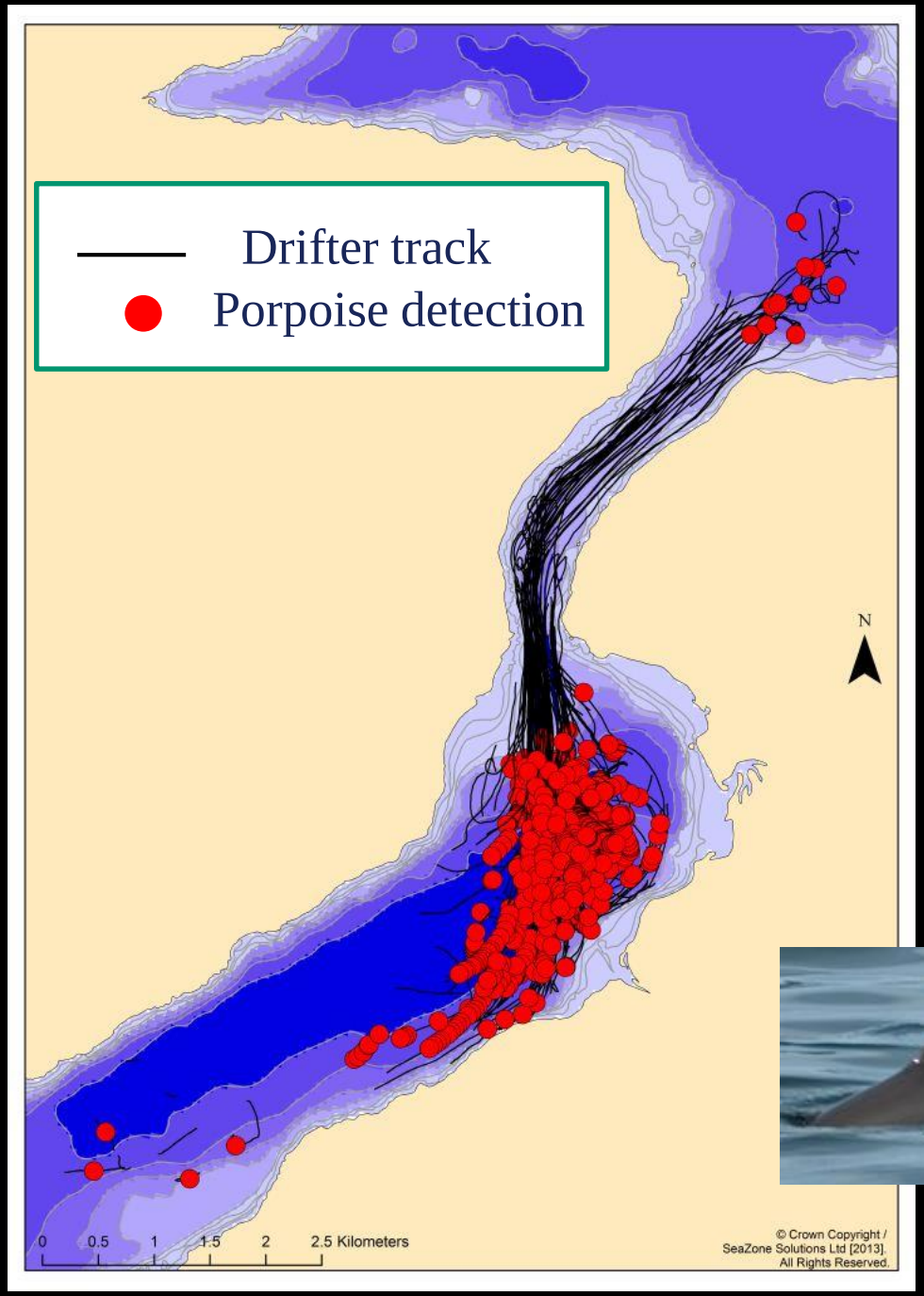
Marine Spatial Planning
Relocation of fisheries
Recreation

1: Drifters


©Andy Dale @ SAMS
LW +0
56.26
56.24
56.22
56.2
56.18
56.16
56.14
56.12
56.1
-6
-5.95
-5.9
-5.85
-5.8
-5.75
-5.7
-5.65
-5.6
SAMS Great Race project

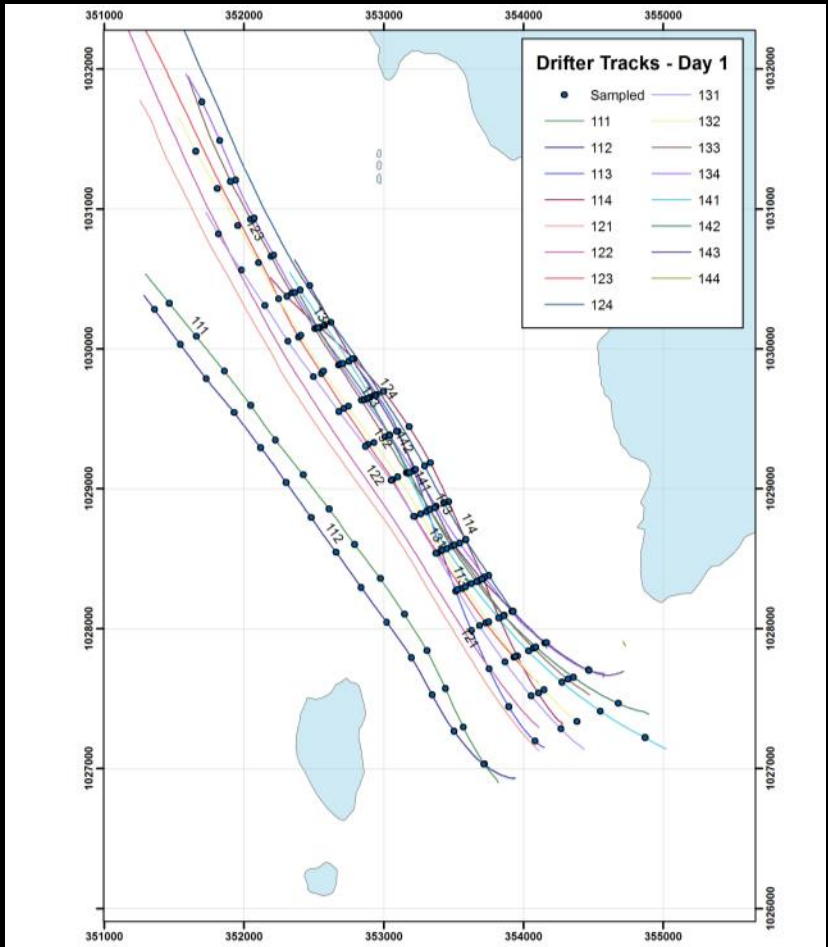
CetRens

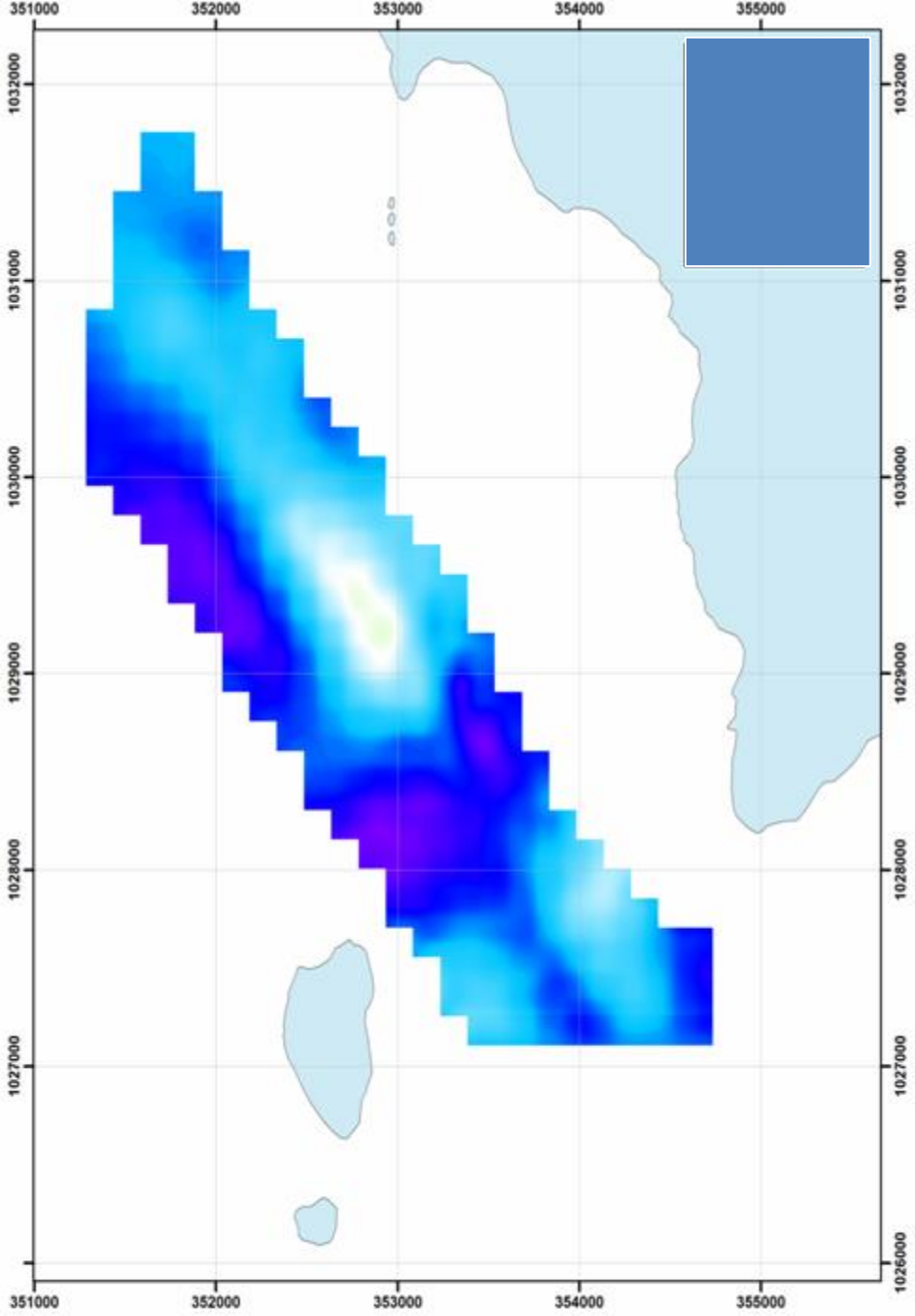
Cetaceans and Marine Renewables



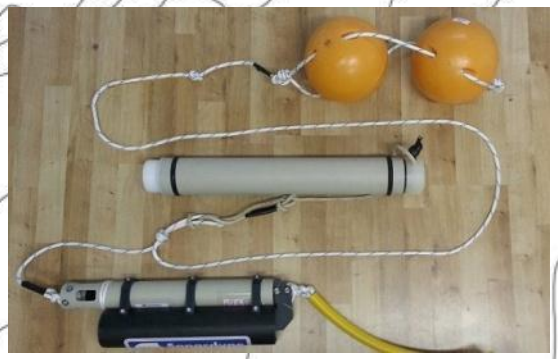
SCOTTISH ASSOCIATION for MARINE SCIENCE

EMEC ORKNEY
The European Marine Energy Centre Ltd





2: Underwater sound



Scarba sound source mooring

C-PODs per mooring

1

2

Potential C-POD detection radius

Distance from Scarba sound source

100 m

316 m

1000 m

3162 m

10000 m

4A

4B

3C

3D

2C

3B

2B

2D

1

2A

3A

4C

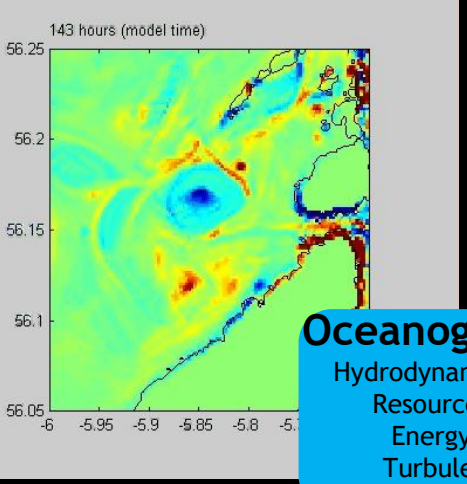
Lunga

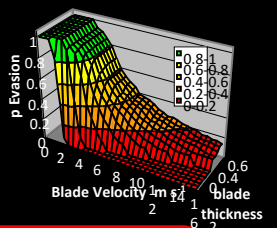
Scarba

N

0 0.5 1 2 3 4 5 Kilometers

3: Fouling and loading





Wildlife Displacement

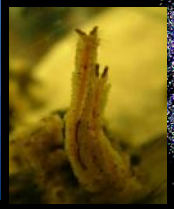
Interference with
habitat use & movements
Surveys, passive acoustics

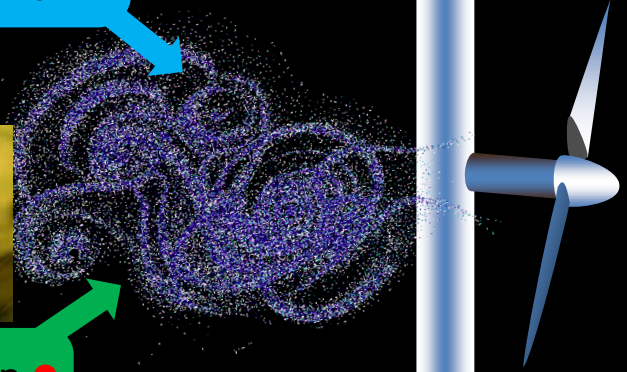
Collision Risks

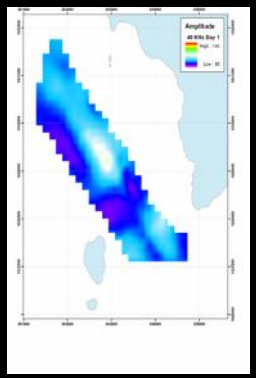
Mammals • Fish • Birds
Modelling Behaviour
Encounter Rate, Evasion

Oceanography

Hydrodynamic modelling
Resource mapping
Energy shadows
Turbulent mixing







Habitat Modification

Sediment Redistribution
Burying

Device acoustic Footprints

Device & background:
prediction, measurement
& mitigation

Artificial structures

Artificial Reefs
Colonisation
Invasive Species (staging posts)
Fisheries enhancement

User displacement

Marine Spatial Planning
Relocation of fisheries
Recreation

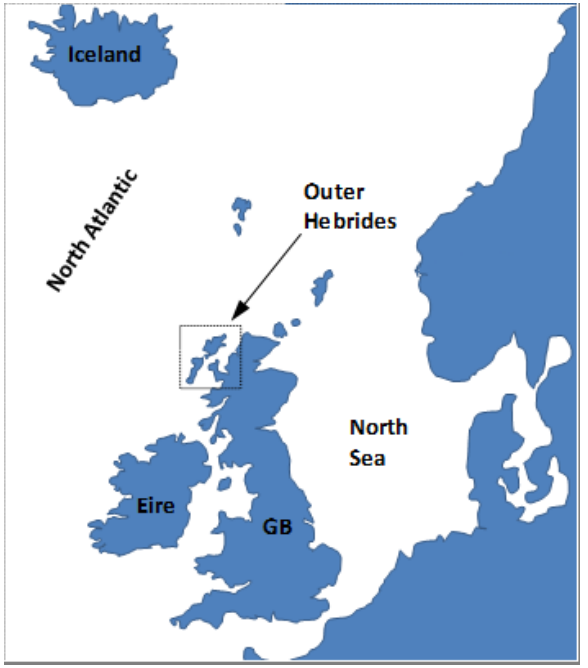
University of the Highlands and Islands
Oilthigh na Gàidhealtachd agus nan Eilean

eri environmental research institute

University of the Highlands and Islands
Lews Castle College

SCOTTISH ASSOCIATION for MARINE SCIENCE

University of the Highlands and Islands
Oilthigh na Gàidhealtachd agus nan Eilean



Arne Vögler, PI Marine Energy, Lews Castle College, Stornoway

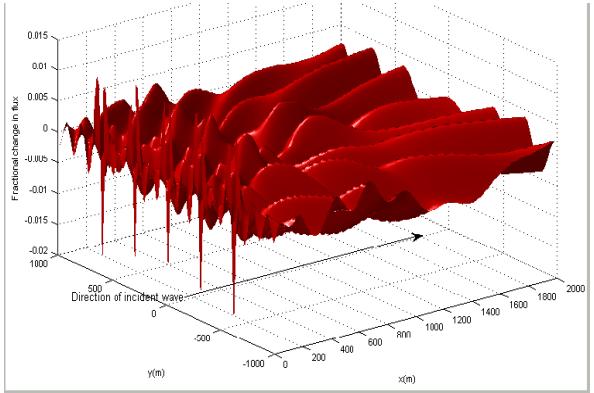
University of the Highlands and Islands
Lews Castle College
Oilthigh na Gàidhealtachd agus nan Eilean
Colaisde a' Chaisteil

Marine Engineering Portfolio

Diverse skills set in 7-strong research group:

- Hydrodynamicists
- Mathematicians
- Chartered Engineers
  - (Mechanical, Civils, Electronics)
- Computer Scientist
- Physicist

Healthy mixture of theoretical and practical expertise, together with industrial and academic backgrounds



Five scatterers at 300m separation, wavelength = 135m

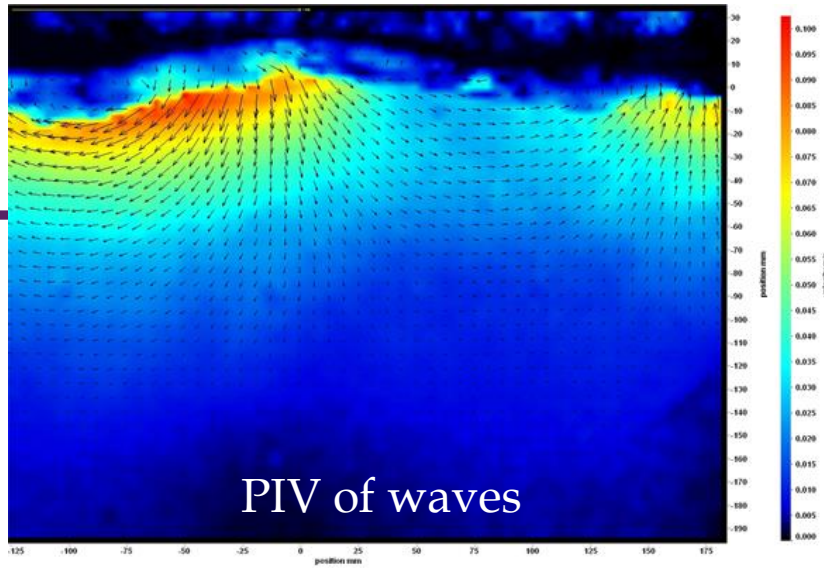
Marine Engineering Portfolio

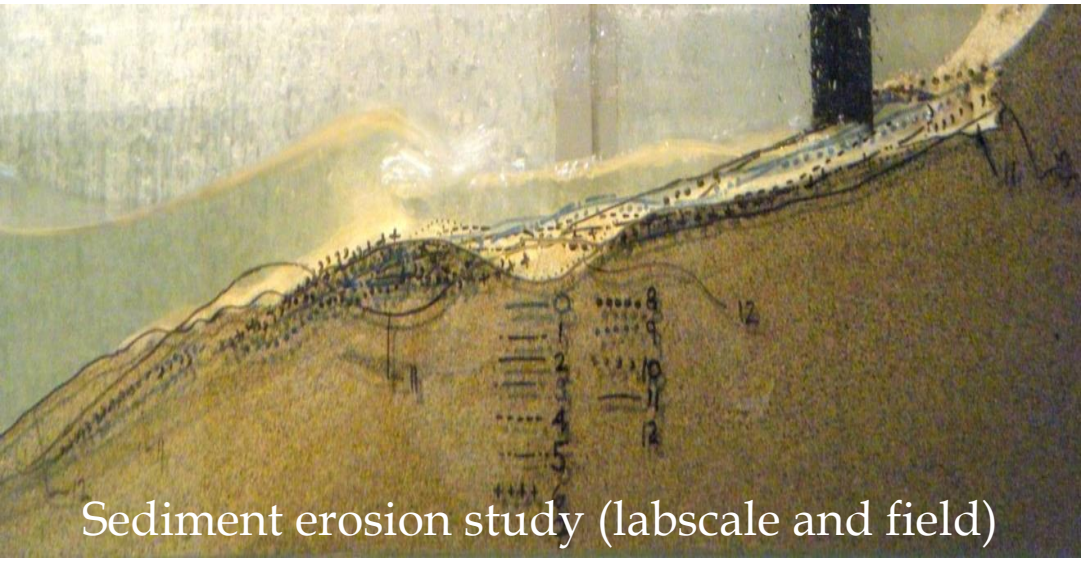
Research focus on the waters around the Outer Hebrides and wider Scotland

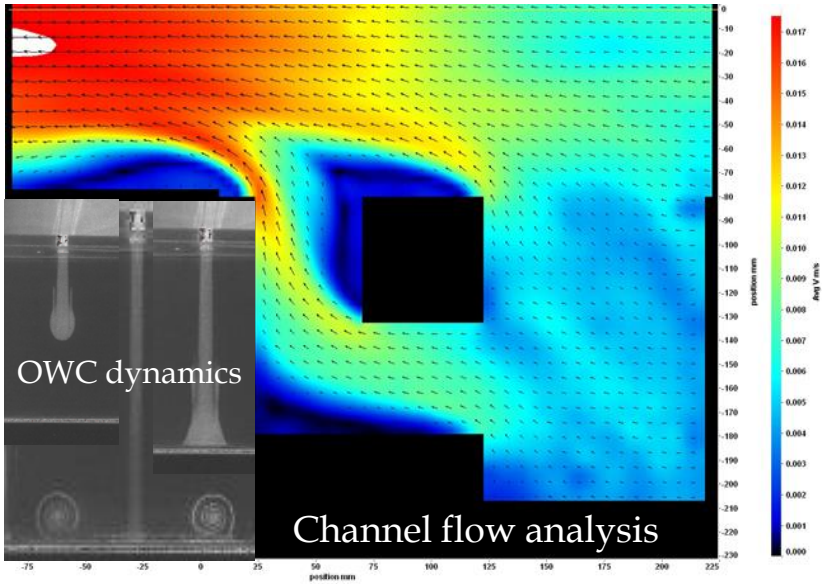
- Wave energy resource assessment
- Wave forecasting
- Coastal Processes
- Data acquisition skills
- Sensor Configuration and Deployment
- Electrical Grid Integration
- Local Energy Storage / Hydrogen solutions
- Wind - wave energy correlation
- Mapping environmental constraints and opportunities

Marine Portfolio

- Numerical analysis
- Physical modelling
- Field studies
- Local presence – short lead times



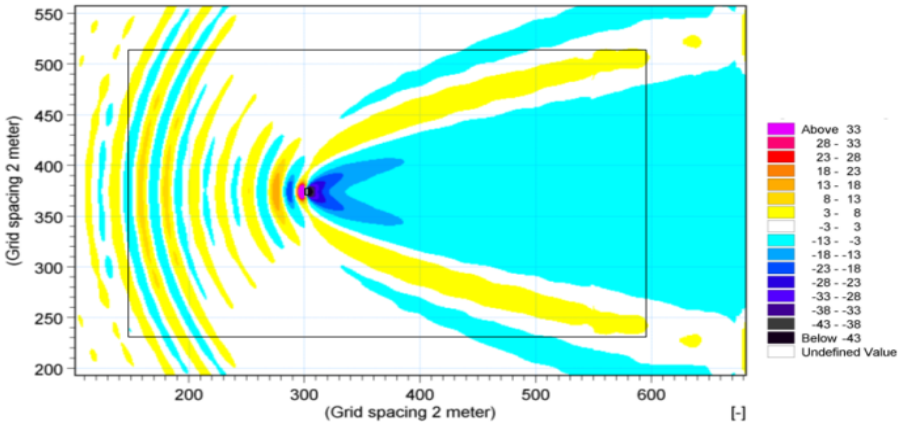


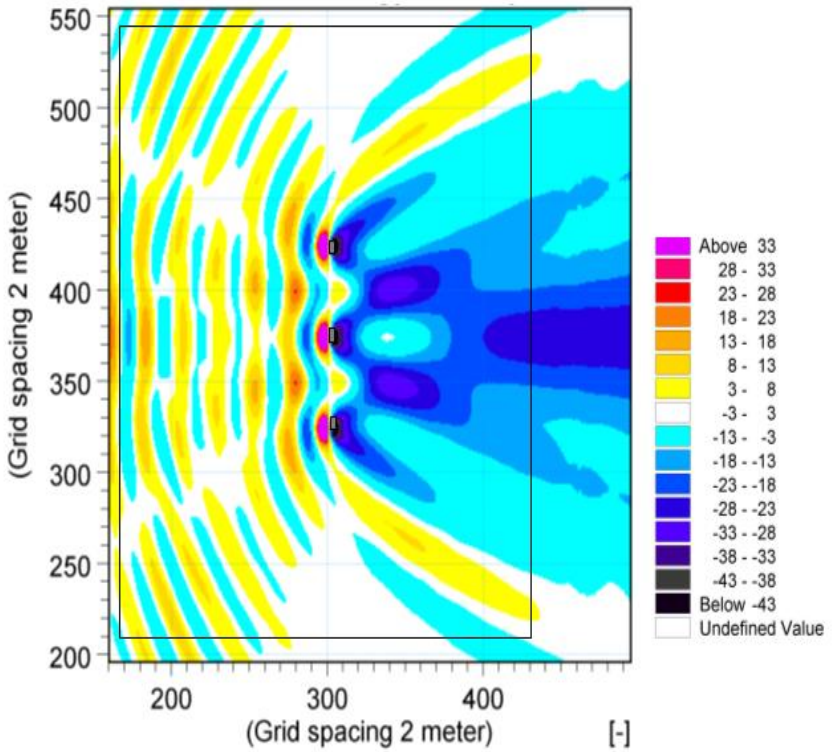


Marine Engineering Portfolio

Impact assessment of WEC array installations on physical processes

- Using Boussinesq and SW models
- Downstream wave field changes
- Coastal processes evaluation

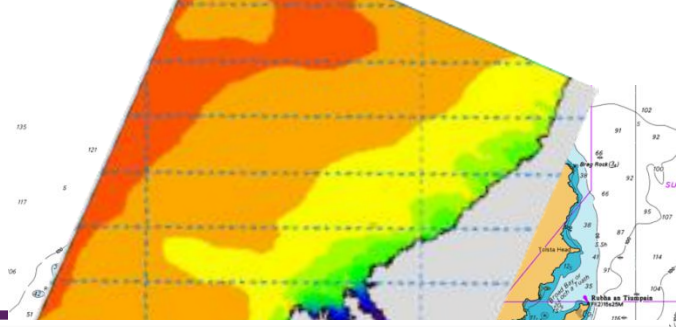


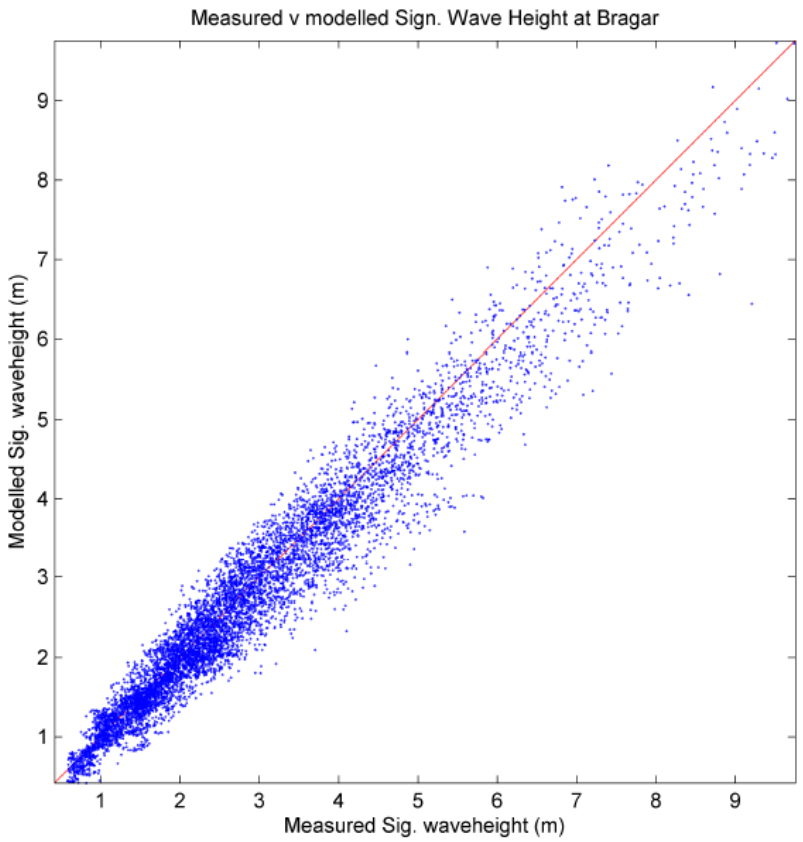


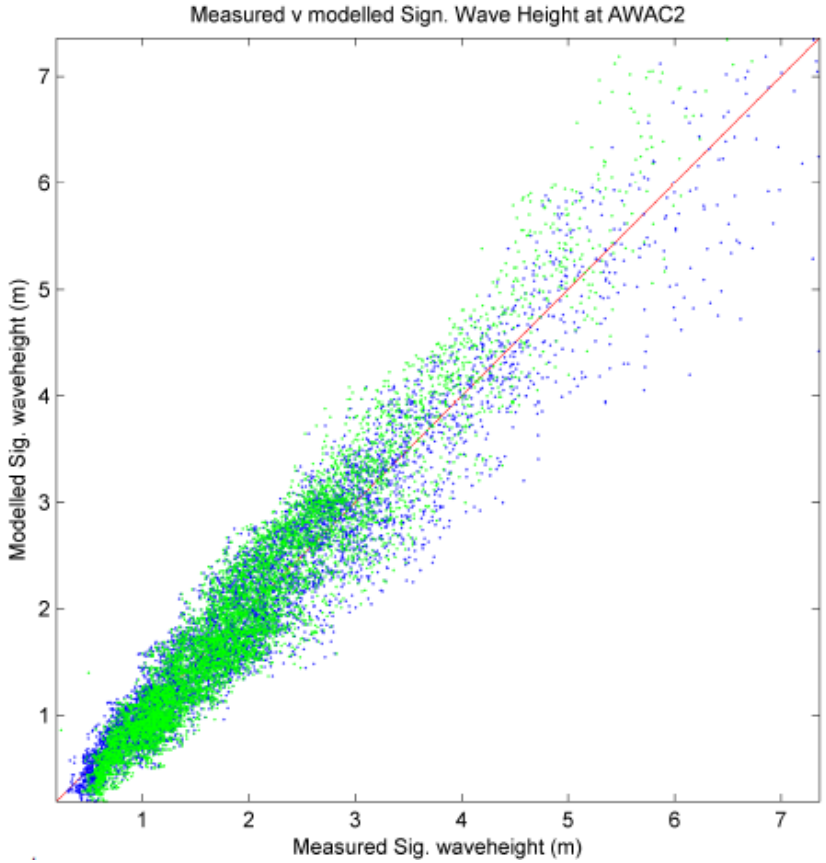
Percentage change in wave energy around single and multiple oscillating wave surge converters.

University of the Highlands and Islands
Lews Castle College
Oilthigh na Gàidhealtachd agus nan Eilean
Colaisde a' Chaisteil

Track Record



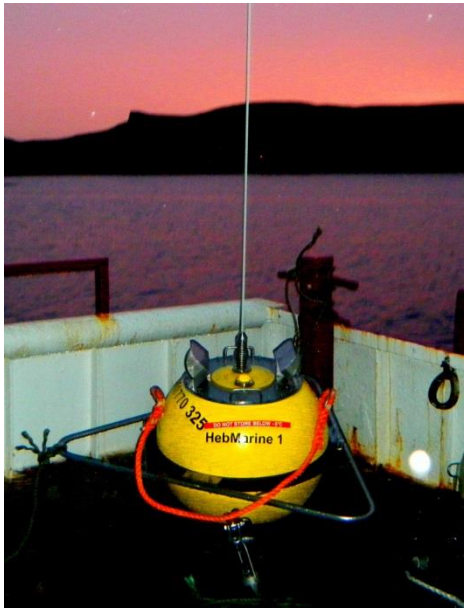


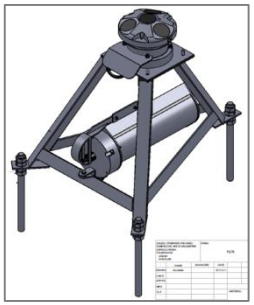


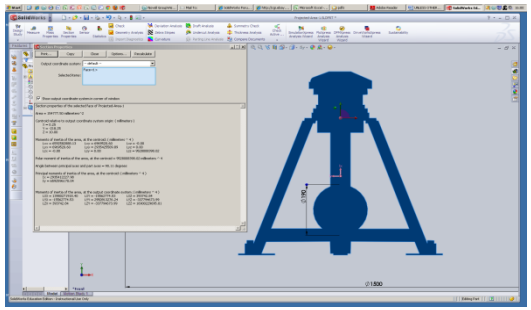
Future planning

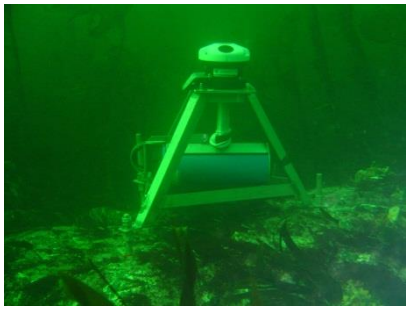
Building on previous successful measurement campaigns

- Combination of spatial area sensing with spot measurements at Butt of Lewis wave observatory (x-band radar | acoustic | buoys)
- Advancing of sensor technology and algorithms to optimise directional wave measurements and data interpretation









University of the Highlands and Islands
Oilthigh na Gàidhealtachd agus nan Eilean

Prof Stuart Gibb

Environmental Research Institute.

North Highland College

University of the Highlands and Islands

Environmental Research Institute

UHI – Scotland's newest and most distinctive University

A 21st century University in the Highlands & Islands

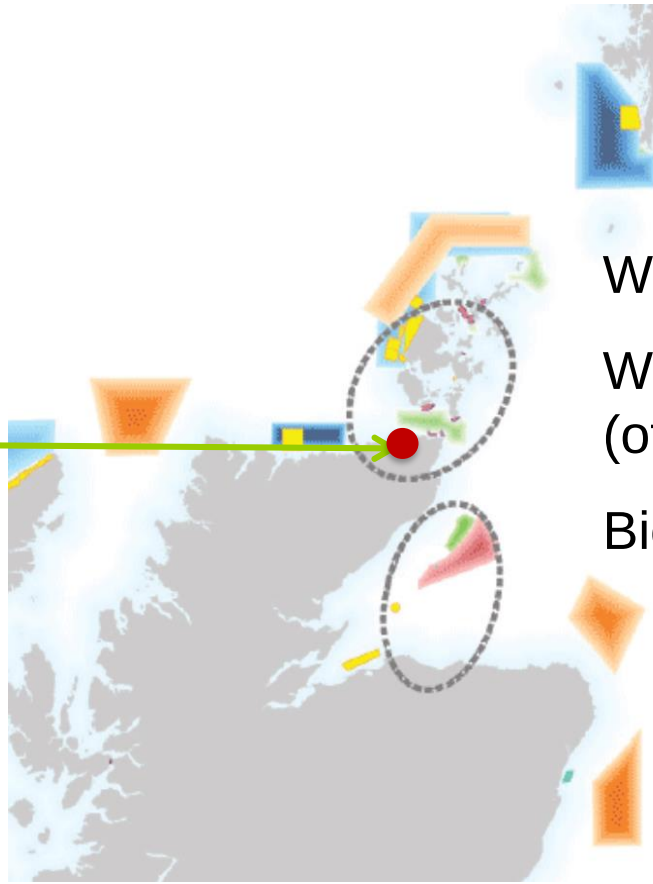
Vision

'To be internationally recognised for distinctive and innovative environmental science'

Unrivalled location

Centre for Energy & Environment

Castle Street, Thurso



Wave & tidal

Wind
(offshore + onshore)

Biomass

Scottish Government: NPF3

Renewable Energy & the Environment

Priorities

- Resources & risk
- Environmental & Ecological Interactions
- Sustainability – economics, management & communities

Activities

- Research (Applied + Knowledge Exchange)
- Enterprise (commercial and consultancy
- Learning and teaching
- Outreach (communication + dissemination)

Who we work with….

Clients

Collaborators & Partners

Stakeholders & partners

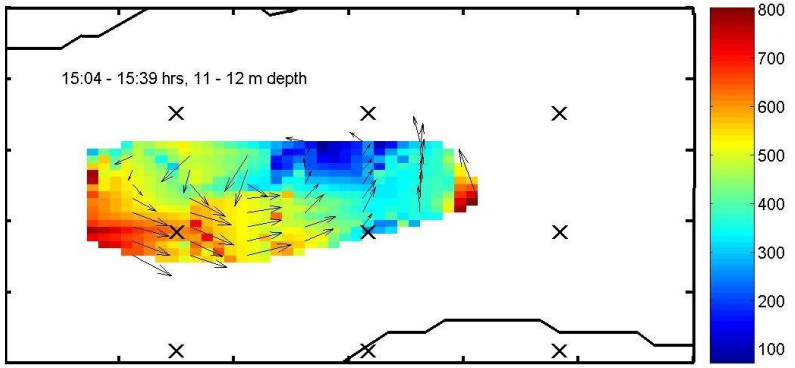
Funders

Resource & Risk

Assessing the energy resource

- spatial and temporal variability

- developer-relevant scales



Understanding risk

- Characterising unfavourable & destructive conditions

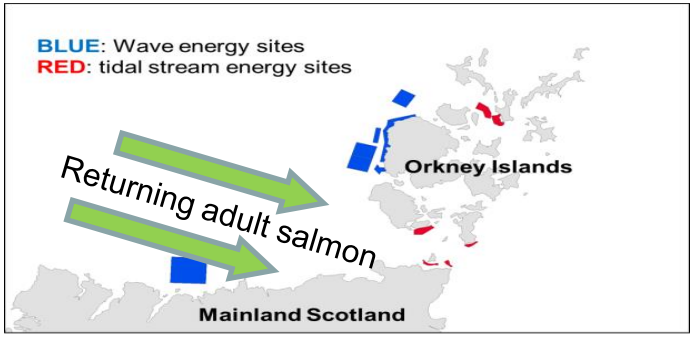
  - turbulence
  - sheared velocity profiles
  - eddies
  - large, steep waves
  - standing waves

Environmental & Ecological Interaction

Influence of by energy development ? (+ve / -ve)

Migratory fish

- Modelling, monitoring & tracking - abundance, residence patterns, behaviour



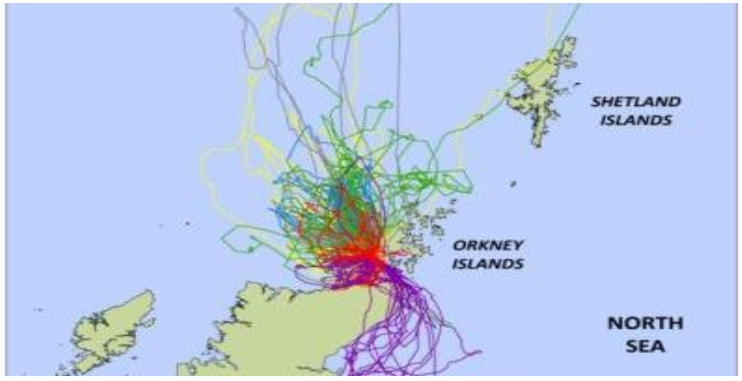
Pentland Salmon Initiative

- Platform: Academic, stakeholders, developers etc.
- Ethos: Collaborative, independent, multi-disciplinary
- Aim: Science to inform managers, stakeholders, planners etc.

Environmental & Ecological Interaction

Diving seabirds

- Tracking behavior and use of habitats e.g. black guillemots & great skuas



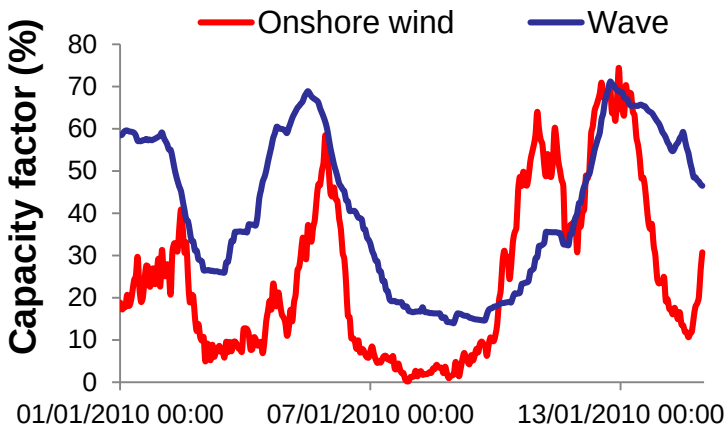
Peatlands (onshore wind)

- Habitat assessment & restoration Plans

Sustainability

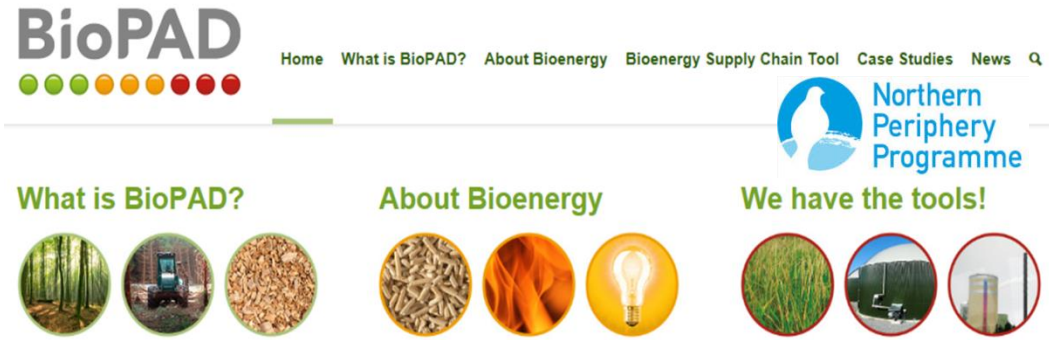
Aligning renewable supply & demand

- renewables = 100% electricity by 2020
- characterising intermittency + variability in renewable generation



Biomass

- informing development of the bio-energy supply chain
- wood, energy crops, wastes



University of the Highlands and Islands
Oilthigh na Gàidhealtachd agus nan Eilean

Knowledge Exchange for Wave and Tidal Energy

Dr. Raeanne Miller
Raeanne.Miller@sams.ac.uk

Knowledge Exchange

- industry tied to the natural environment
- environmental scientists & engineers – wealth of marine data, knowledge, & understanding
- NEED: translate existing knowledge & data and develop sector-specific expertise to proactively address industry challenges

Knowledge Exchange

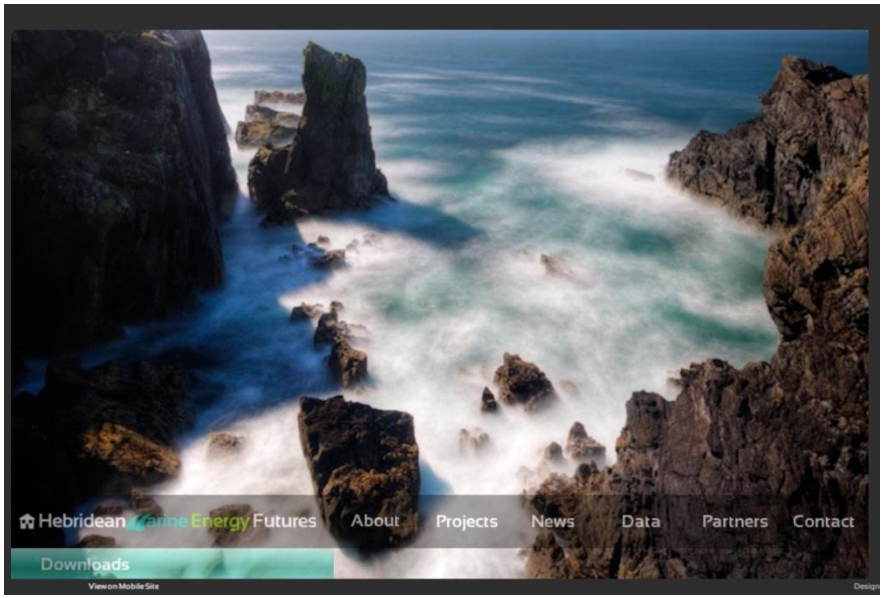
“*developing a common language for communication, collaboration, and information exchange between research, industry, and government bodies to support sustainable growth of the marine energy sector*”

Hebridean Marine Energy Futures

"Converting knowledge to wave power"

- 5 projects, 1 deliverable:

- Assessing/modelling wave resource
- Detailed physical characterisation of sites
- Assess grid infrastructure and power quality management questions
- Assessing environmental interactions of WECs
- Coordination of research and KE



To analyze and share high quality, detailed information with developers to enable them to identify potential sites appropriate for large-scale developments

Hebridean Marine Energy Futures

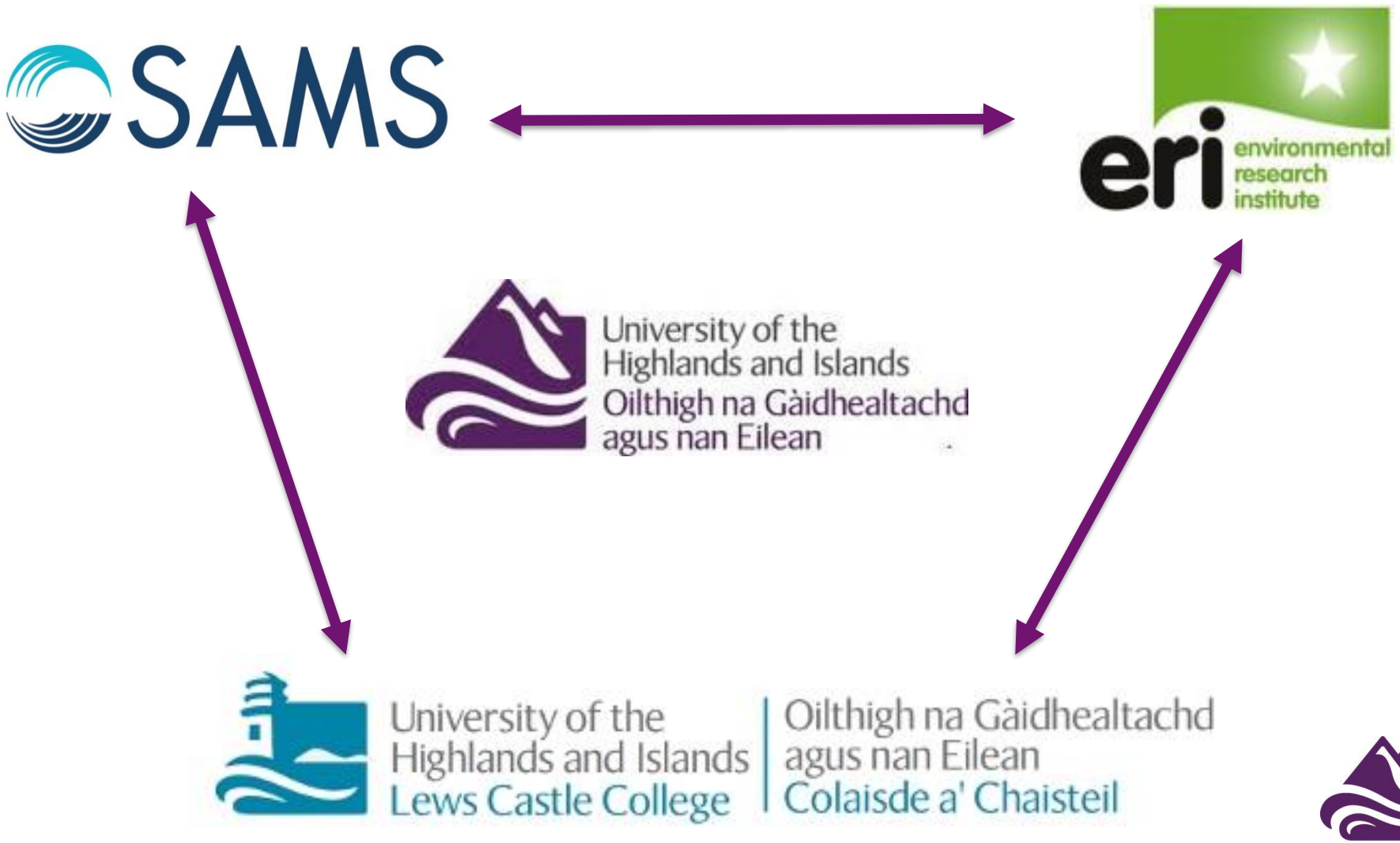
- Steep learning curve
- Collaboration: full commitment to continue working together from all partners
- High quality science: remarkable wave dataset

4 February 2013 Last updated at 15:04

Could big waves be big news for the Western Isles?

By Steven McKenzie
BBC Scotland Highlands and Islands reporter

Hebridean Marine Energy Futures



Who We Work With

pelamis wave power

openhydro a DCNS company

SCOTTISHPOWER RENEWABLES

CATAPULT Offshore Renewable Energy

AQUAMARINE POWER

MEYGEN THE TIDE OF CHANGE IN CAITHNESS

EMEC ORKNEY THE EUROPEAN MARINE ENERGY CENTRE LTD

Carnegie

WESTISLAY TIDAL

VOITH

sse

e·on

marinescotland

Scottish Natural Heritage All of nature for all of Scotland

NERC SCIENCE OF THE ENVIRONMENT

KE Moving Forward

- Proactively address upcoming industry challenges
- KE Opportunities & funding for industry-research collaborations are growing
  - ➢*often must be industry-led*

- Recent European investment: a research and innovation hub for marine energy

University of the Highlands and Islands
Oilthigh na Gàidhealtachd agus nan Eilean

Damian Collins

Project Knowledge Exchange and Innovation Manager

MERIKA
Marine Energy Research Innovation and Knowledge Accelerator

Some Facts…….

- An EU FP7 funded project
  - Regions of Potential Initiative, Capacity building programme
  - Single beneficiary
  - First UK institution to secure funding
- Builds up Marine Energy research and innovation capacity
- €3.95m over 3yrs to March 17

w. merikafp7.eu e. merikafp7@uhi.ac.uk @merikafp7

University of the Highlands and Islands
Oilthigh na Gàidhealtachd agus nan Eilean

HIE
Highlands and Islands Enterprise
Iomairt na Gàidhealtachd 's nan Eilean

The MERIKA Project has received funding from the European Union Seventh Framework Programme (FP7/2007-2013) under grant agreement no. 315925

MERIKA
Marine Energy Research Innovation and Knowledge Accelerator

Objective

to create a leading Marine Energy research and innovation hub that addresses science challenges for this emerging sector……..

MERIKA
Marine Energy Research Innovation and Knowledge Accelerator

New Capacity

- 12 new science resources to build and extend knowledge capacity
- Equipment Upgrade to strengthen physical infrastructure

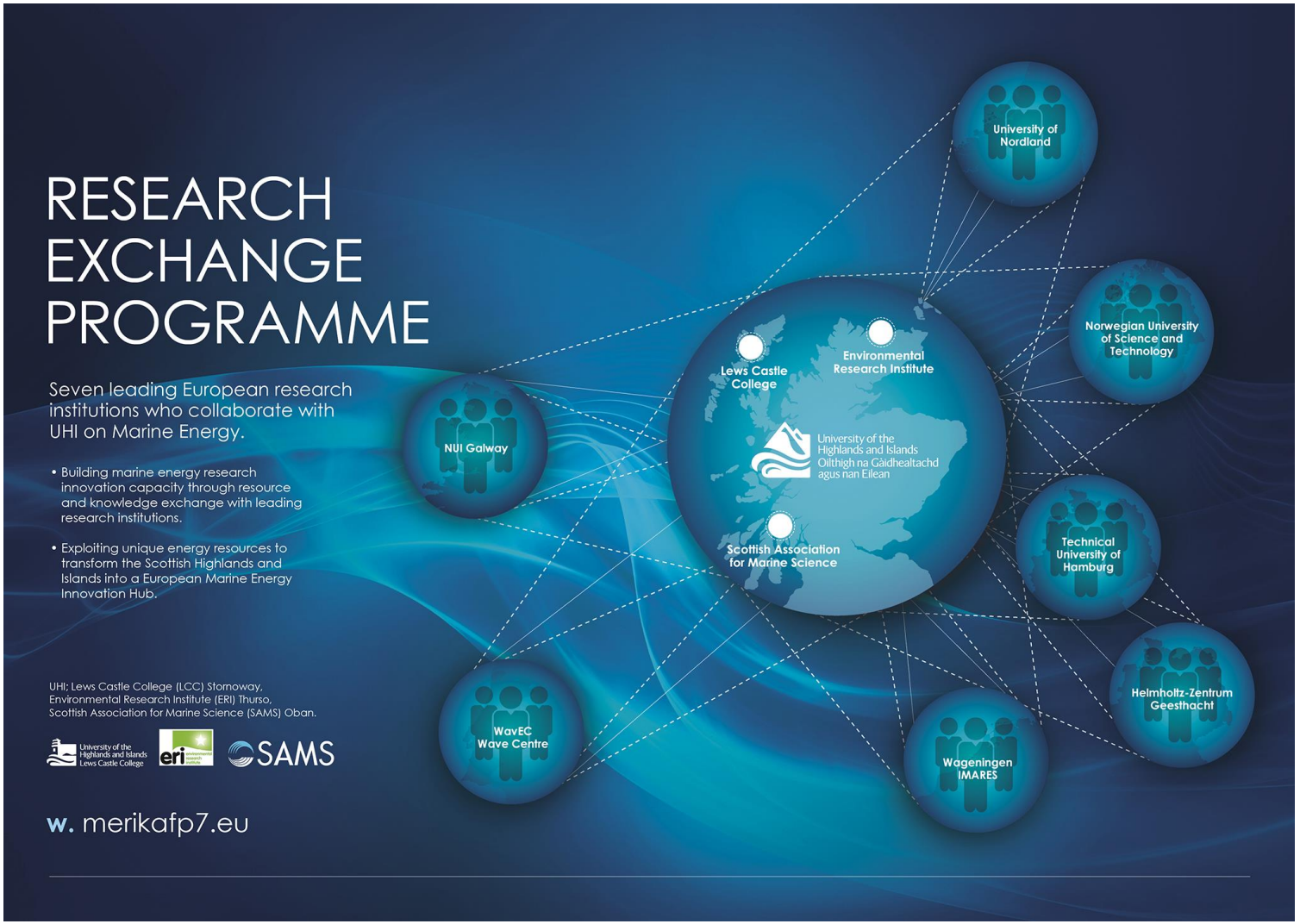
SAMS

eri environmental research institute

University of the Highlands and Islands
Lews Castle College
Oilthigh na Gàidhealtachd agus nan Eilean
Colaisde a' Chaisteil

MERIKA
Marine Energy Research Innovation and Knowledge Accelerator

New Capacity



MERIKA
Marine Energy Research Innovation and Knowledge Accelerator

New Capacity

"research where the resource is"

Resource Assessment

Resource Assessment and Risk:

- Tidal current
- Wave
- Offshore wind

Environment & Ecology

- Understanding the effects of marine renewable energy devices on the environment and ecology

Social Impact

- Understanding the social, economic and policy dimensions of marine renewable energy

MERIKA
Marine Energy Research Innovation and Knowledge Accelerator

Greater capability

- Coaching and Networking
  - Coaching and Training for UHI staff to engage with H2020
  - Networking with EU stakeholders, research organisations and industrial partners

- Business and Industrial Relations
  - Understanding technologies and innovation markets
  - Developing business engagement strategies
  - Implementing an effective innovation strategy

MERIKA
Marine Energy Research Innovation and Knowledge Accelerator

Breakfast Showcase for Marine Energy

at University of the Highlands and Islands

University of the Highlands and Islands
Oilthigh na Gàidhealtachd agus nan Eilean

Research where the resource is

Professor Ian Bryden
Ian.Bryden@uhi.ac.uk

Professor Ben Wilson
Ben.Wilson@sams.ac.uk

Arne Vögler
Arne.Vogler@uhi.ac.uk

Professor Stuart Gibb
Stuart.Gibb@uhi.ac.uk

Dr Raeanne Miller
Raeanne.Miller@sams.ac.uk

Damian Collins
Damian.Collins@uhi.ac.uk

www.uhi.ac.uk **www.merikafp7.eu**

MERIKA
Marine Energy Research Innovation and Knowledge Accelerator