

winter 2009/10

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eri looks to a renewable future

Despite the recent unsettled political and economic climate there is a detectable air of opportunity and excitement in the North of Scotland.

The Highlands & Islands, with its extensive and diverse coastline and seas exposed to strong winds and tidal currents, has some of the world's best natural resources for marine renewable energy. In recent years the region as a whole, and the dynamic waters of the Pentland Firth in particular, have become a global focal point for the emergent marine energy sector. This presents us in the region with unrivalled opportunities to develop these natural resources, grow new strands of economic activity and play a key role in the energy markets and 'green economy' of Scotland, the UK and Europe in the coming years.



Our marine environments are of outstanding environmental, social and economic value. But they are complex, changeable and often poorly understood and many challenges exist if we are to harness the potential of marine energy in a sustainable manner. That is, a manner which maintains the delicate balance between the contemporary human need and preserving natural resources and ecosystems on which we, and future generations, depend.

At the UHI North Highland College's Environmental Research Institute we are committed to addressing these issues and to advancing our understanding of the sustainable use of our natural resources through research excellence and innovative scientific leadership. It is therefore timely and exciting that, together with our partners within the UHI Millennium Institute and across the region, we have been able to secure two major programmes which will help address these and many other pressing issues.

These projects, '**Marine Renewable Energy and the Environment (MaREE)**' and the '**Centre for Energy and the Environment (CfEE)**' represent £7 million of investment from Highlands and Islands Enterprise, the Scottish Funding Council and the European Regional Development Fund. These are transformational projects for the North of Scotland and clearly reflect a shared vision and common purpose amongst the funding partners.



MaREE will create thirteen new positions at the Environmental Research Institute and five more at the Scottish Association for Marine Science in Oban. The new teams will address the resources and risks, environmental impact issues of sustainability relating to marine energy and will work extensively with partners throughout Scotland and world-wide.

The CfEE will be established on Thurso Campus of North Highland College to house this new activity together with other areas of our growing environmental sciences portfolio. The Centre will make a key contribution to the development of a 21st Century campus providing a dynamic academic environment which promotes a culture of aspiration and excellence in interdisciplinary research, learning and knowledge exchange.

Scotland's Chief Scientific Advisor visits ERI

'The ERI is a striking example of excellent leadership and committed staff coming together to deliver internationally competitive environmental research in the North of Scotland and I was enormously impressed by all that I saw during my visit to the Institute.

As well as other applications, the expertise and facilities at ERI will be invaluable in supporting the harnessing of sustainable energy from the abundant wave and tidal resource of the Pentland Firth. The Scottish Government Saltire Prize (www.saltireprize.com) will accelerate development of the technologies required to do this and announcement of the Prize has already attracted over 130 expressions of interest from around 30 countries worldwide.

ERI is ideally placed to provide crucial expertise, knowledge and analysis to support potential competitors so that the full benefit of developing sustainable energy can be realized for Scotland.'

Professor Anne Glover CBE, Chief Scientific Advisor for Scotland



UHI Postgraduate Conference comes to Thurso

The ERI was privileged to host the 2009 UHI Postgraduate Research Student Conference. Due to the geographical widespread nature of UHI, a main aim of this conference is to bring together research students from across UHI to discuss their work and exchange advice about conducting a PhD.

Around 35 research students from between Edinburgh in the south and Shetland in the north made the trip to Thurso to take part.

Students in their 2nd and 3rd years gave presentations at our main venue in Caithness Horizons, with talks ranging from social issues with 'Barriers for developing social enterprises in the Highlands and Islands' to health sciences with 'Red Wine, Berries and Heart Disease: The Myth and The Magic'.

The event began with a warm welcome from ERI's Director, Prof. Stuart Gibb to all the participants, before the remainder of the afternoon was taken up with student presentations which were of a very high calibre. Not be outdone by their colleagues, the 1st year students each presented a poster of their work in an evening poster and drinks reception held in the ERI.

Delegates spent their first morning in Caithness walking (and in some cases running!) around Dunnet Forest where they took part in a treasure hunt. Teams explored the many tracks and paths to locate clues that would help decipher a coded phrase. This burst of fresh air was greatly appreciated by all and refreshed minds for an afternoon of presentations. The day was finished off with the conference dinner and a céilidh.

The final day started with a seminar from Scott Connor (Lews Castle) on how to effectively use the online resource made available to students by UHI and concluded with guest speaker, Louise Smith giving a lecture on 'Marine Energy – our place in its future'.

The final task was for Dr Neil Chisholm to present the awards for best poster and oral presentations to Astrid Harendza (ERI) and Jonathan Mackenzie (Highland Theological College) respectively.



Robbie Mutton, Co-organiser

eri out and about...

Surface Ocean - Lower Atmosphere Study



Dr. David Woolf and Dr. Lonneke Goddijn-Murphy joined 300 other international scientists in November at the latest SOLAS Open Science Conference in Barcelona and presented their recent work on processes in the upper ocean and on transfer mechanisms across the sea surface.

SOLAS, the Surface Ocean - Lower Atmosphere Study, is an international project investigating the interactions between the atmosphere and ocean, focusing on biogeochemical exchanges that affect atmospheric composition, marine productivity and climate.

The project aims to develop understanding of the

ocean's role in climate, e.g. to accurately estimate how much of the carbon dioxide released by human activity has been absorbed by the oceans. Also, many gases or particles emitted from the oceans affect heat transfer in the atmosphere and thus climate.

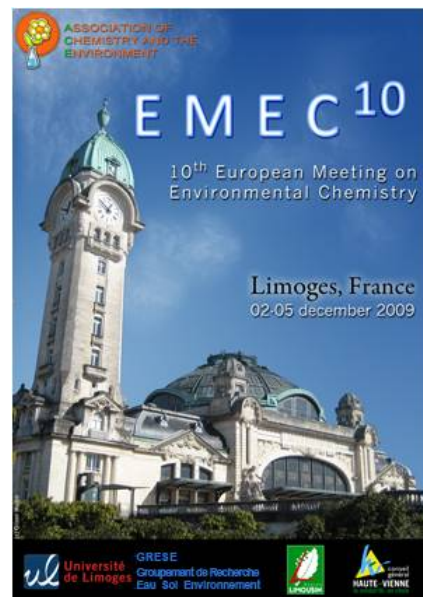
David, an expert in bubble mediated gas transfer, presented work on 'Developing mechanistic models of air-sea exchange' which showed how a standard model of air-sea gas exchange can be improved by a better description of the role of bubbles in gas exchange across the sea surface. Meanwhile, Lonneke presented research explaining how whitecaps affect air-sea gas exchange of carbon dioxide, and how whitecaps can be measured on a global scale.

During the meeting both David and Lonneke took part in several round table discussions on hot topics such as new joint European Space Agency activities, and the controversial subject of ocean fertilisation as a solution to increasing atmospheric carbon dioxide.

European Meeting on Environmental Chemistry

Dr Angela Squier and visiting research student Daniela Macová from the Czech Republic jetted off to Limoges, France before Christmas to attend the 10th European Meeting on Environmental Chemistry, EMEC10. EMEC is the annual scientific meeting of the Association of Chemistry and the Environment and covers a wide breadth of issues, encompassing the chemistry of the natural environment, anthropogenic influences on the environment and the development and application of analytical techniques with environmental relevance.

A recurring theme at this year's meeting was the fate of human pharmaceuticals in the natural environment addressing the detection, monitoring, removal and toxicological impacts of pharmaceutical compounds and it was within this field that Dr Squier gave her presentation, 'Pharmaceuticals in the natural environment analysed by liquid chromatography-tandem mass spectrometry'. Daniela, who is on placement from the Brno Institute of Technology, presented a poster entitled 'Environmental Degradation of Polyurethane Foams'.



International Centre for Mathematical Sciences

On 4-5th November 2009, a problem scoping workshop on marine and tidal energy was held at the prestigious International Centre for Mathematical Sciences (ICMS) at the James Clerk Maxwell House in Edinburgh. The workshop was jointly organised by Dr. Eric Grist of the ERI and other specialists in the field of marine renewable energy development. Over the two days the workshop brought together researchers and exponents in the areas of mathematics, engineering and ecology with industry and policy makers.

Amongst the invited speakers were Professor Jonathan Side of the International Centre for Island Technology,

Orkney, and Sondre Jacobsen of pioneering Norwegian marine engineering company, Pelagic Power Limited. Throughout the workshop there were several opportunities for participants to explore how multi-disciplinary mathematical approaches might be used to enhance understanding of tidal energy extraction. In particular, there was a strong focus on identifying any potential effects of hydrokinetic devices on physical processes upon which marine organisms depend.

The meeting provided an unrivalled opportunity for leading experts to examine factors likely to be crucial in minimizing ecological impacts of future marine energy developments around the coasts of Scotland.

SuperGen Plus gets underway

The ERI is delighted to welcome its newest additions to the team. After a highly competitive recruitment drive three candidates were selected to undertake PhD Research positions at ERI as part of the SuperGen Plus project. A further three were recruited by our project partner, the Scottish Association for Marine Science.

Jacqueline Black from Latheron in Caithness, has commenced her project entitled 'Strategies for Marine Energy'. Her work will investigate local, economically viable approaches to maximise the use of marine energy.

A recent graduate from the University of Edinburgh, Matthew Easton will undertake research on 'An Integrated Modelling Framework for EIA of Large-Scale Arrays'. In this he will construct a blueprint for environmental impact assess-

ment based on the application of specialised modeling software in the Caithness / Orkney region.

Finally, Astrid Harendza joins us from Germany to study 'Ecological impacts associated with renewable energy devices in extreme marine environments'.

All three students got off to a flying start and have already participated in the 2009 UHI Postgraduate Conference and the SuperGen Marine Annual Assembly which both took place in November. Astrid's poster presentation won first prize at the Postgraduate Conference while Matt's poster took first prize and Jacqui's second prize at the SuperGen Assembly. We wish them every success with their programmes of research.!



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