

Special issue

Neill, Simon; Yang, Zhaoqing; Hashemi, M. Reza

Renewable Energy

DOI: 10.1016/j.renene.2017.07.054

Published: 01/12/2017

Peer reviewed version

Cyswllt i'r cyhoeddiad / Link to publication

Dyfyniad o'r fersiwn a gyhoeddwyd / Citation for published version (APA): Neill, S., Yang, Z., & Hashemi, M. R. (2017). Special issue: Wave and tidal resource characterization. *Renewable Energy*, *114*, 1-2. https://doi.org/10.1016/j.renene.2017.07.054

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Special Issue: Wave and tidal resource characterization

Simon P. Neill^{a,*}, Zhaoqing Yang^b, M. Reza Hashemi^c

^aSchool of Ocean Sciences, Bangor University, Marine Centre Wales, Menai Bridge, UK ^bPacific Northwest National Laboratory, 1100 Dexter Ave North, Suite 400, Seattle, WA 98109, USA

^cDepartment of Ocean Engineering and Graduate School of Oceanography, University of Rhode Island, Narragansett Bay Campus, Rhode Island, USA

The ocean represents a vast, and largely untapped, energy resource that could be exploited as a form of low carbon electricity generation. There has been much academic research, R&D, and commercial progress in marine renewable energy over the last decade. However, for the sector to flourish, and before electricity can be generated at significant scale, it is essential that the resource is fully, and accurately, characterized. This special issue comprises a range of articles relating to wave and tidal energy resource characterization in coastal waters throughout the world.

The special issue begins with a consideration of the wave and tidal resource of Scotland [1] – a nation that has been instrumental in the progress of the industry due to its energetic resource, and the foundation of the European Marine Energy Centre (EMEC) that has become a template for other test centres throughout the world. The next two articles consider countryscale wave and tidal resource assessments from two contrasting continents – the Uruguayan shelf seas [2] and, within the context of post-Fukushima,

Preprint submitted to Renewable Energy SI: wave & tidal

^{*}Corresponding author

Email address: s.p.neill@bangor.ac.uk (Simon P. Neill)

Japan [3].

It is interesting to note that the majority of accepted submissions (62%) examined waves, demonstrating the global interest and significance of this resource. These contributions include wave energy resource assessments that span the Middle East [4, 5], Australasia [6, 7], South America [8, 9], North America [10], and Europe [11, 12], considering issues such as model calibration [13], spatial/temporal variability [12], and wave/tide interaction [14].

A number of tidal stream resource assessments are included in the special issue, discussing the tidal resource of the Bosphorus [15], Puget Sound [16], the Massachusetts coast [17], Rathlin Sound in Northern Ireland [18], and the famous Pentland Firth [19]. These studies consider issues that include characterising the shape of the velocity profile at highly energetic sites [20], turbulence [21, 22], representing energy extraction in three-dimensional (3D) models [19, 23], the impact of waves on the tidal resource [24], and novel floating tidal devices [25]. It is notable that the majority of tidal resource assessments in the special issue that included a modelling component used 3D models as standard.

Finally, there was one contribution on tidal range power plants [26]. Although not a new concept (La Rance has been in operation since 1966), this technology has recently gained momentum, particularly in the UK, with the possible development of tidal lagoon power plants.

This special issue is comprised primarily from papers that were initially presented in the "Marine Renewable Energy: Resource Characterization, Environmental Impacts, and Societal Interactions" session at the 2016 AGU/ASLO/TOS Ocean Sciences Meeting in New Orleans, USA, 21-26 February 2016. However, due to the nature of the topic, many contributions that were not initially presented at this meeting are included in the special issue.

Acknowledgement

The guest editors wish to thank the contributors, the Renewable Energy editors, the Elsevier staff, and especially the reviewers of the manuscripts, all of whom have contributed to bringing the special issue to successful fruition.

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