

# TETHYS ENGINEERING BLAST



**20 December 2019**

[Tethys Engineering](#) is an online knowledge base that facilitates the exchange and dissemination of information on the technical and engineering aspects of marine renewable energy. The bi-weekly *Tethys Engineering Blast* highlights new publications in the [Tethys Engineering Knowledge Base](#); relevant announcements, opportunities, and upcoming events; and news articles of international interest.

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## **Announcements**

### Call for Abstracts

The [European Geosciences Union \(EGU\) General Assembly 2020](#) will be held in Vienna, Austria on 3-8 May 2020. Please consider submitting an abstract to the session, [Marine Renewable Energy: Resource Characterisation, Interactions, and Impacts](#). The abstract submission deadline is 15 January 2020 at 13:00 CET.

### Funding Opportunities

The U.S. Department of Energy (DOE) has released a [Funding Opportunity Announcement](#) for the DOE Small Business Innovation Research and Small Business Technology Transfer programs. Letters of intent to apply are due 6 January 2020 and applications are due 24 February.

The European Commission has released a [Call for Proposals](#) for projects that can improve environmental monitoring of tidal and wave devices and support the development of ocean energy in Europe. The deadline is 15 January 2020.

The €13 million [OceanDEMO project](#) has announced the [2nd call for applications](#). The project aims to accelerate ocean energy's transition from single prototype to multi-device farms by providing access to world-leading test centers. Applications close 31 January 2020.

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## Upcoming Events

### Upcoming Conference

The inaugural [Pan American Marine Energy Conference \(PAMEC\)](#) will be held in San Jose, Costa Rica on 26-28 January 2020. Registration fees increase 1 January 2020.

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## New Documents on *Tethys Engineering*

### [Numerical design study of multipoint mooring systems for the floating wave energy converter in deep water with a sloping bottom](#) – Huang et al. 2019

The use of a floating wave energy converter (WEC) in the deep water zones around islands is increasing, but conventional mooring configurations often do not provide suitable station keeping options. This paper focuses on the assessment of a suitable mooring design for floating WECs in deep water locations, with a sloping seabed. The mooring study considers a 50-year return period to assess the survival rate for three mooring designs i) catenary mooring systems, ii) synthetic cable (polyester) taut mooring system, and iii) suspended anchoring point mooring system.

### [Finite Element Vortex Method for Hydrodynamic Analysis of Vertical Axis Cycloidal Tidal Turbine](#) – Jiang et al. 2019

A finite vortex method was developed based on the Kutta condition of pressure difference at the trailing edge of an airfoil aiming at the analysis and prediction of hydrodynamic load and wake field of cycloidal vertical axis tidal turbine. The empirical value of the trailing edge pressure difference parameter was obtained by comparing with the experimental value of static lift coefficient of NACA0015 airfoil. The instantaneous and average loads of fixed pitch turbine and cycloidal turbine with different eccentricity are compared.

### [Effect of fouling on performance of pressure retarded osmosis \(PRO\) and forward osmosis \(FO\)](#) – Nagy et al. 2018

A layered model is developed to describe mass transport through fouled membranes in pressure retarded osmosis (PRO) and forward osmosis (FO) processes. This resistance-in-series model accounts for salt and water transport through the active layer, support layer, external boundary layers, and the cake layer formed by foulants. The model is then evaluated to show how foulant accumulation affects FO system performance in both membrane orientations. The model is also used to elucidate the effect of fouling on power production in PRO.

### [North Sea Wave Database \(NSWD\) and the Need for Reliable Resource Data: A 38 Year Database for Metocean and Wave Energy Assessments](#) – Lavidas and Polinder 2019

The study presents a newly generated hindcast database of metocean conditions for the region of the North Sea by parametrising the newly introduced ST6 physics in a nearshore wave model. Exploring and assessing the intricacies in wave generation are vital to produce a reliable hindcast. The new parametrisations perform better, though they have a higher number of tuneable options. Results by the analysis show that in the North Sea, conditions are moderate to high, and the wave energy resource, which has been previously overlooked, is high and easily accessible due to the low distance from coasts.

### **[Testing of Hydrophobically Coated Composite Materials With Marine Renewable Energy Applications](#)** – Walls et al. 2019

Tidal turbine applications will place composite materials such as glass-fibre and carbon-fibre reinforced polymers under surprisingly high pressure due to the significant water depths they operate in (to depths of 50 m). It is possible that hydrophobic coatings could help protect the material while in service. Therefore, two commercially available coatings were applied to 5 variations of composites materials. Glass fibre epoxy (Ampreg), along with a glass fibre powdered epoxy, a glass fibre PEEK composite and a carbon fibre powdered epoxy composites were investigated.

### **[Construction of a Static Model for Power Generation of OTEC Plant Using Uehara Cycle Based on Experimental Data](#)** – Matsuda et al. 2018

This paper considers the construction of a static model for the power generation of an ocean thermal energy conversion (OTEC) plant using Uehara cycle. The model is constructed based on experimental data obtained from an actual experimental OTEC plant. In this paper, two kinds of static models are proposed. In both models, the relations among significant quantities are represented by polynomials. The usefulness and limitations of the proposed models are evaluated by simulation results.

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## **News & Press Releases**

### **[Ocean thermal energy conversion \(OTEC\) picks up momentum in Pacific](#)** – Radio New Zealand

A renewable energy system that uses deep ocean water to generate power is scheduled to move from 45 years of experimentation to seeing the world's two largest ocean thermal facilities installed in islands in the Pacific and Caribbean next year. The Kiribati and Caribbean developments herald a significant expansion of OTEC use after many decades of small, experimental plants in operation in various countries. Though still small by power plant standards, the new plants for the Pacific and Caribbean will be 10 to 30 times bigger than experimental plants, such as the facility in Okinawa, currently in operation.

### **[Global tidal energy leader gets go ahead for major Canadian project in Nova Scotia](#)** – Nova Innovation

Nova Innovation has landed its biggest project to date, expanding its operation in North America. Nova has received a permit to develop a 1.5MW tidal array in Petit Passage, in the Bay of Fundy area of Nova Scotia. A careful phased approach starting with a single turbine in 2020, then three phases of 0.5MW will eventually see 15 new tidal stream turbines installed by 2023 on the seabed to generate clean electricity from the natural ebb and flow of the tide – enough to power 600 homes.

### **Biome Wraps Up PowerCone Tidal Tech Trials – Marine Energy**

Toronto-based Biome Renewables has completed the testing of its PowerCone tidal technology in Strangford Loch, Northern Ireland in cooperation with Queens University Belfast and Cuan Marine Services. According to the company, the initial results are very promising. Reportedly, the PowerCone retrofit reduces peak loads by up to 10% while improving cut-in and power performance. This pilot project also represented the first use of 3D metal printing in the tidal industry.

### **Blue-GIFT Supports Nine Ocean Energy Companies to Trial and Validate Their Technologies – European Marine Energy Centre (EMEC)**

The first call for applications of the €2.5 million Blue-GIFT (Blue Growth and Innovation Fast Tracked) project led by EMEC, ended with a successful outcome for nine companies. Funded by Interreg Atlantic Area, the Blue-GIFT project is a coordinated ocean energy technology demonstration programme, encouraging longer-term demonstration and technology de-risking across the Atlantic Area regions. The first call offered support package vouchers to ocean energy companies for access to test and demonstration sites for validation of their technologies in real sea environments.

### **Copernicus Marine Service releases global wave reanalysis product – Ocean Energy Europe**

Copernicus Marine Service announced a new December 2019 catalogue that includes a wide range of updates including the release of a global wave reanalysis product with data back to 1993. This can be used for a wide range of Blue applications from siting renewable wave energy farms to identifying areas where ship structures and hulls endure the worst wear to improve their designed. The Copernicus Marine wave reanalysis provides 3-hourly updates on more than 20 integrated parameters including ones for wind-sea interactions and first and secondary swell wave systems.