Report of Common Activities

WECANET COST Action

Working Group 1

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 **A. Grm**

1. **Joint Publications**

A list of joint publications was created considering the following rules:

* Only Journal Research Papers were considered. Conference papers and book chapters were discarded.
* The manuscripts were published over the period 2019-2022.
* At least, one researcher from two different institutions belonging to WECANET Cost Action was in the list of Authors
* At least one of those researchers from belonged to WG1.

The period 2015-2018 was considered for comparison purposes.

Only researchers included in the WECANET list at October 2, 2022 were considered.

|  |  |  |  |
| --- | --- | --- | --- |
| **INSTITUTION** | **INSTITUTION** | **2019****2020** | **2015****2018** |
| University of Vigo, Spain | Universiteit Gent, Belgium | 8 | 2 |
| University of Vigo, Spain | Università degli Studi di Salerno | 6 | 1 |
| University of Vigo, Spain | Uni. "Dunărea de Jos" Galați, Romania | 3 | 0 |
| University of Vigo, Spain | Uni Politècnica de Catalunya, Spain | 15 | 8 |
| University of Vigo, Spain | Universidade de Lisboa, Portugal | 2 | 0 |
| University of Vigo, Spain | University of Manchester, UK | 4 | 1 |
| University of Vigo, Spain | Università degli Studi di Firenze, Italy | 3 | 0 |
| University of Vigo, Spain | Universidade de Aveiro, Portugal | 8 | 1 |
| Universiteit Gent, Belgium | Università degli Studi di Firenze, Italy | 5 | 0 |
| Universiteit Gent, Belgium | Uni. Politècnica de Catalunya, Spain | 7 | 3 |
| Universiteit Gent, Belgium | University of Manchester, UK | 1 | 0 |
| Universiteit Gent, Belgium | Universidade de Porto, Portugal | 1 | 0 |
| Universiteit Gent, Belgium | University of Manchester, UK | 1 | 0 |
| Universiteit Gent, Belgium | SINTEF Ocean, North Jutland, Denmark | 0 | 1 |
| Universiteit Gent, Belgium | [Queen's University Belfast](https://www.scopus.com/affil/profile.uri?id=60029738&origin=AuthorResultsList) | 1 | 0 |
| Universiteit Gent, Belgium | Izmir Yüksek Teknoloji Enstitüsü, Turkey  | 2 | 2 |
| Uni. Politècnica de Catalunya, Spain | Università degli Studi di Firenze, Italy | 5 | 0 |
| Uni Politècnica de Catalunya, Spain | Università degli Studi di Salerno | 3 | 1 |
| [Queen's University Belfast](https://www.scopus.com/affil/profile.uri?id=60029738&origin=AuthorResultsList) | TU Delft, Netherlands | 1 | 0 |
| [Queen's University Belfast](https://www.scopus.com/affil/profile.uri?id=60029738&origin=AuthorResultsList) | SINTEF Ocean, North Jutland, Denmark  | 1 | 0 |
| Aalborg University, Denmark | SINTEF Ocean, North Jutland, Denmark | 1 | 8 |
| Aristotle Uni,of Thessaloniki, Greece | National TU of Athens, Greece | 6 | 0 |
| Politecnico di Torino, Italy  | Maynooth University, Ireland | 22 | 15 |
| Politecnico di Torino, Italy | Universidade de Lisboa, Portugal | 4 | 0 |
| Politecnico di Torino, Italy  | BME, Budapest, Hungary | 8 | 0 |
| Politecnico di Torino, Italy  | TU Braunschweig, Germany  | 7 | 0 |
| Maynooth University, Ireland | BME, Budapest, Hungary | 14 | 7 |
| Maynooth University, Ireland | TU Braunschweig, Germany  | 17 | 2 |
| BME, Budapest, Hungary | TU Braunschweig, Germany  | 12 | 4 |
| Uni. "Dunărea de Jos" Galați, Romania | Universidade de Lisboa, Portugal | 2 | 5 |
| Uni."Dunărea de Jos" Galați, Romania | Universidade de Aveiro, Portugal | 3 | 0 |
| TU Delft, Netherlands | Aristotle Uni. of Thessaloniki, Greece | 1 | 0 |
| TU Delft, Netherlands | National TU of Athens, Athens, Greece | 1 | 0 |

**Table 1.** Number of common publications among different institutions involved in WG1 of WECANET COST Action.

Table 1 shows the strongest collaborations for those groups that had already collaborated in the past. In most cases, collaboration has been reinforced as can be observed for different research networks as Vigo-Gent-Barcelona-Florence-Salerno or Torino-Budapest- Braunschweig- Maynooth. In general, these networks tend to connect institutions from different countries rather than institutions from the same country, with geographical proximity not being a key factor. No central hubs were identified as the collaboration follows a multi-node configuration rather than a centralized network.

The map depicted in Figure 1 shows the publication links among the different members. Only institutions with at least one common publication over the period 2019-2022 were considered. Dashed lines connect the institutions with common publications. The size of the dot corresponding to a certain institution is proportional to the number of institutions with common publications with that institution.

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**Figure 1:** Map showing the collaboration among institutions in terms of common publications. A threshold of only a common publication over the period 2019-2022 was imposed.

A higher threshold was imposed (at least five common publications) in order to shed light on the intensity of the common research

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**Figure 2:** Map showing the collaboration among institutions in terms of common publications. A threshold of at least five common publications over the period 2019-2022 was imposed.

1. **Short Term Scientific Missions (STSMs)**

As stated in WECANET website, Short Term Scientific Missions (STSM) are aimed at supporting individual mobility and at strengthening the existing networks and fostering collaborations by allowing scientists to visit an institution or laboratory in another Participating COST Country, or in approved COST Near Neighbour Countries (NNC) Institutions or in approved International Partners Countries (IPC) institutions. A STSM should specifically contribute to the scientific objectives of the COST Action, while at the same time allowing applicants to learn new techniques or gain access to specific instruments and/or methods not available in their own institutions. STSM applicants must be engaged in an official research programme as a PhD Student or postdoctoral fellow or can be employed by, or affiliated to, an Institution or legal entity which has within its remit a clear association with performing research. The institutions / organisations where applicants pursue their main strand of research are considered as Home institutions, being the Host institution the institution / organisation that will host the applicant.

The first step to assess both the coverage and the extent of the STSMs was to elaborate a full list including all the STSM sorted by call. Those STSMs associated with Working Group 1 activities were selected for further analysis, being a STSM considered to be associated with WG1 if two conditions are fulfilled:

* either the applicant (home institution) or the tutor (host institution) is listed in the WG1.
* the subject of the research to be carried out during the STSM is linked to the activities of WG1.

Overall, the WG1 is involved in more around 45% of the STSMs as shown in Table 2

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Call** |  | **WG1** | **Total** | **Percentage** |
| 1 |  | 4 | 7 | 57 |
| 2 |  | 2 | 6 | 33 |
| 3 |  | 3 | 5 | 60 |
| 4 |  | 2 | 6 | 33 |
| 5 |  | 5 | 16 | 31 |
| 6 |  | 1 | 5 | 20 |
| 7 |  | 4 | 9 | 44 |
| 8 |  | 9 | 11 | 82 |
| **Total** |  | **30** | **65** | **46** |

**Table 2**. Percentage of participation of WG1 in the different STSM calls.

A full list of STSMs sorted by call can be observed in Tables 3-10. The provided information includes the name of the applicant, the title of the application and the host and home institutions. Those applications marked in blue correspond to the applications that fulfilled the criteria described above.

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Title of the application** | **Host institution** | **Home institution** |
| Mr Nicolas Quartier | A DualSPHysics model coupled to MoorDyn and Project Chrono for numerical simulations of wave energy converters with mooring lines and power take-off system. | University of Vigo, Spain | Ghent University, Belgium |
| Ms Tatiana Potapenko | Experimental modelling, testing and comparison of a linear generator PTO system of a wave energy converter | University of Edinburgh, Scotland, UK, | Uppsala University, Sweden |
| Mr Timothy Vervaet | A DualSPHysics-OceanWave3D numerical wave basin to provide feedforward on the design of a wave energy converter array experimental set-up | University of Vigo, Spain | Ghent University, Belgium |
| Ms Brenda Rojas | WG3 Technology of WECs and WEC arrays | Uppsala University, Sweden | Uni. Carlos III de Madrid, Spain |
| Dr Hisham Elsafti | Accurate and Efficient Numerical Modelling of Point Absorber WECswith OpenFOAM |  Aalborg University, Denmark | TU Braunschweig, Germany |
| Dr William Finnegan | Experimental investigation of WECs for the validation of highperformance numerical models |  Universidade do Porto, Portugal |  National University of Ireland, Galway, Ireland  |
| Prof Milen Baltov | Review of the decision making process and the economic factors behind the marine energy and wave energy projects. Marking the bridges towards the Blue growth drivers and possible donors and investors support to them | Ghent University, Belgium | Burgas Free University, Bulgaria |

**Table 3.** List of STSMs corresponding to the first call.

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Title of the application** | **Host institution** | **Home institution** |
| Mr Hugo Diaz Martinez | Wecanet (Wave farm) | TU Delft, Netherlands | University of Lisbon, Portugal |
| Ms. Georgia Sismani | CFD analysis of flap-type WECs  | Ghent University, Belgium | Aristotle Uni Thessaloniki, Greece |
| Dr Jens Peter Kofoed | Development and editing of the annual assembly report, annual report and Action book; extension of the website with an exclusive user area | Ghent University, Belgium | Aalborg University, Denmark |
| Mr Jian Tan | Size Optimisation of Wave Energy Converters  | Aalborg University Denmark  | TU Delft, The Netherlands  |
| Dr Dogan Kisacik | Laboratory-Scale Modelling of WECs and development of the: WECANet-LABIMA Open Access Data Base for Numerical Models Benchmarking | Università degli Studi di Firenze, Italy | ​Institute of Marine Sciences and Technology, Turkey |
| Dr. Florin Onea | Technical assessment of the Black Sea wave power | Dunarea de Jos Uni. Galati, Romania | Burgas Free University, Bulgaria |

**Table 4**. List of STSMs corresponding to the second call.

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Title of the application** | **Host institution** | **Home institution** |
| Mr Nicolas Quartier | Advanced wave energy converter model in DualSPHysics, with accurate boundary conditions, variable power take-off force and mooring lines. | University of Vigo, Spain | Ghent University, Belgium |
| Mr Joe El Rahi | Development of a fluid-structure interaction system within DualSPHysics for flexible oscillating structures with applications to wave energy converters (WEC) | University of Vigo, Spain | Ghent University, Belgium |
| Mr Jian Tan | The affecting factors on the PTO rating optimization of WECs: numerical modelling, the representation of wave climates and the relative computational errors | École Centrale de Nantes, France | Delft University of Technology (Delft, Netherlands) |
| Dr Fernando Jaramillo Lopez | Development of a PTO for an E-Motion WEC and experimental testing for dynamic modelling | University of Porto, Portugal | Maynooth University, Ireland |
| Ms Eirini Katsidoniotaki | Experimental wave tank tests of a point-absorber WEC in extreme wave conditions | Aalborg University, Denmark | Uppsala University, Sweden |

**Table 5.** List of STSMs corresponding to the third call.

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Title of the application** | **Host institution** | **Home institution** |
| Mr Matej Žnidarec | Integration of WECs model into energy management system of RES-rich microgrids | Uppsala University, Sweden | Faculty of Electrical Engineering, Computer Science and Information Technology Osijek, Croatia |
| Dr Gianmaria Giannini | Power-Take-Off Systems Scaling Recommendations and Guidelines | Uppsala University, Sweden | University of Porto, Portugal |
| Dr Berguzar Ozbahceci | Large Scale Experiments for LABIMA-WEC and OWC Prototype Development | Forschungszentrum Küste, Germany | Izmir Institute of Technology, Turkey |
| Mr Nicolas Quartier | Advanced wave energy converter model in DualSPHysics, with accurate boundary conditions, variable power take-off force and mooring lines. | University of Vigo, Spain | Ghent University, Belgium |
| Mr Joe El Rahi | Development of a fluid-structure interaction system within DualSPHysics for flexible oscillating structures with applications to wave energy converters (WEC) | University of Vigo, Spain | Ghent University, Belgium |
| Mr Daniel Clemente | Control and Forecasting Strategies for a Wave Energy Converter based on the Roll Oscillations of Multipurpose Offshore Floating Platforms | Maynooth University, Ireland | ​Faculty of Engineering of the University of Porto, Portugal |

**Table 6.** List of STSMs corresponding to the fourth call.

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Title of the application** | **Host institution** | **Home institution** |
| Mr Panagiotis Vasarmidis | Extension of internal wave generation method in a non-hydrostatic model targeting the accurate modeling of wave-WEC interactions and far field effects. | TU Delft, Netherlands | Ghent University, Belgium |
| Mr Bono De Witte | Experimental testing of the WECfarm Wave Energy Converter | Aalborg University, Denmark | Ghent University, Belgium, |
| Mr Hendrik Claerbout | Experimental testing of the WECfarm Wave Energy Converter | Aalborg University, Denmark | Ghent University, Belgium |
| Mr Iván Martínez-Estévez | Coupling between DualSPHysics and the Finite Element Module of Project Chrono: multiphysics modelling of waves-WEC interaction | Ghent University, Belgium | University of Vigo, Spain |
| Mr Daniel Clemente | Hydrodynamic analysis of the E-Motions wave energy converter | University of Plymouth, UK | University of Porto, Portugal |
| Mr Rafail Ioannou | Round Robin Testing Programme | Ghent University, Belgium | Aristotle Uni. of Thessaloniki, Greece |
| Dr Gael Verao Fernandez | Advanced soil-cable interactions in Moody coupled with Chrono and DualSPHysics. | Aalborg University, Denmark, | Ghent University, Belgium |
| Mr Matteo Innocenti | WECANet Round Robin Test Program | Ghent University, Belgium | University of Florence, Italy |
| Dr Gianmaria Giannini | Analysis of offshore wave energy converters’ subsystems for improving reliability and efficiency | NTNU, Norway | University of Porto, Portugal |
| Mr Nikolaos Mantadakis | Round Robin Testing Programme | Ghent University, Belgium | Aristotle Uni. of Thessaloniki, Greece. |
| Mr Louis De Beule | Experimental testing of WEC control strategies for the WECfarm project | Aalborg University, Denmark | Ghent University, Belgium |
| Mr Tomás Cabral | Round Robin Testing Programme - LABIMA | University of Florence, Italy | University do Porto, Portugal |
| Dr Stuart Walker | Breakwater Integrated Rip-current Turbine Investigation  | University of Florence, Italy | University of Exeter, UK |
| Mr Bonaventura Tagliafierro | A Non-Linear Relationship for Simulating Power Take-off (PTO) Systems in DualSPHysics | University of Vigo, Spain | University of Salerno, Italy |
| Prof Liliana Rusu | Evaluation of the future wave power with numerical models  | University de Lisbon, Portugal | Dunarea de Jos Uni. Galati, Romania |
| Dr Dogan Kisacik | Round Robin Testing Programme | Ghent University, Belgium | ​Institute of Marine Sciences and Technology, Turkey |

**Table 7.** List of STSMs corresponding to the fith call.

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Title of the application** | **Host institution** | **Home institution** |
| Dr Theodoros Maniatis | European Green ports | Ghent University, Belgiun | Ship Procurement S.A, Greece |
| Dr Gülizar Özyurt Tarakcıoğlu | Post-processing of WEC experimental and field data for decision support system flowchart of WEC-Existing Breakwater Integration | Ghent University, Belgiun | Middle East Technical University, Turkey |
| Nikon Vidjajev | Digital-physical convergence of wave energy conversion | TU Delft, The Netherlands | Tallinna Tehnikaülikool, Estonia |
| Dr Vicky Stratigaki | Green Ports - Greece | Ship Procurement S.A, Athens, Greece | Ghent University, Belgium |
| Mr Omer Khalid | Impacts and economics of wave energy and how they affect decision- and policy-making | TU Delft, The Netherlands | University College Cork, Ireland |
| Ms Stavroula Gkleka | European Green ports | Ghent University, Belgium | Ship Procurement S.A, Greece |

**Table 8.** List of STSMs corresponding to the sixth call.

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Title of the application** | **Host institution** | **Home institution** |
| Mr. Bonaventura Tagliafierro | Maximum hydrodynamics loads on point-absorber wave energy converters induced by extreme conditions using focused wave models | EPhysLab, Universidade de Vigo, Spain | University of Salerno, Italy |
| Mr. Dogan Kisacik | Testing Scaled model of an Overtopping Device | Florence University, Italy | Izmir Institute of Technology, Turkey |
| Mr. Edoardo Pasta | Exploiting the power of sparse metocean datasets: gap filling techniques to model wave source changes in time and space. | Aalborg University, Denmark | Politecnico di Torino, Italy |
| Prof. Liliana Rusu | Evaluation of the climate change impact on wave power | University of Lisbon, Portugal | Dunarea de Jos Uni. Galati, Romania |
| Mr. Nicolas Faedo | Experimental data-based modelling and assessment of energy-maximising control technology for WEC array systems | Aalborg University, Denmark | Politecnico di Torino, Italy |
| Nikon Vidjajev | Wave energy converter pre- installation expertise | Uppsala University, Sweden | Tallinna Tehnikaülikool, Estonia |
| Nisa Bahadıroğlu | Testing Scaled model of an Overtopping Device | Florence University, Italy | Izmir Institute of Technology, Turkey |
| Vaibhav Raghavan | Extension of the open-source solver HAMS to multi-bodies with generalised degrees of freedom | Aristotle University of Thessaloniki, Greece | TU Delft, Netherlands |
| Prof. Vicky Stratigaki | Numerical and experimental generation of port data for green port applications | Ship Procurement S.A, Greece | Ghent University, Belgium |

**Table 9.** List of STSMs corresponding to the seventh call.

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Title of the application** | **Host institution** | **Home institution** |
| Mr. Americo Ribeiro  | Wave energy resource and device suitability during the winter season on the Galician coast (Spain) under climate change scenarios | University of Vigo, Spain | University of Aveiro, Portugal |
| Mr. Beatrice Battisti  | Numerical modelling of the far-field effects of a PeWEC farm | Ghent University, Belgium | Politecnico di Torino, Italy |
| Mr. Chen Zeng | Numerical modelling of the far-field effects of a PeWEC farm | University of Maynooth, Ireland | Ubiversity of Lisbon, Portugal |
| Mr. Matt Folley | Development of wave-tank models of wave energy converters suitable for array modelling | Aalborg University, Denmark | Queen's University Belfast, UK |
| Ajab Gul MAJIDI  | Technical assessment and the impact of climate change on the wave energy resources of the Atlantic coast of the Iberian Peninsula | Bursa Uludağ University, Turkey | University of Porto, Portugal |
| Ms. Giulia Cervelli  | Implementation of nearshore wave propagation techniques and comparison between numerical models and physically based equations. | TU Delft, the Netherlands | Politecnico di Torino, Italy |
| Mr. Gianmaria Giannini | Application of Smoothed Particles Hydrodynamics models for offshore wave energy converters | University of Vigo, Spain | University of Porto, Portugal |
| Mr. Salvatore Capasso  | Simulation of moored wave buoy in waves and current by SPH | Universitat Politècnica de Catalunya, Spain | Università degli Studi di Salerno, Italy |
| Mr. Daniel Clemente | Advanced optimization algorithms towards the optimization of the E-Motions wave energy converter | The University of Edinburgh, UK | University of Porto, Portugal |
| Mr. Tomás Cabral  | Development of a tool to estimate the power production of a hybrid WEC | SINTEF, Norway | University of Porto, Portugal |
| Mr. Maria F.L.P.R. Sarmento  | Validation of a numerical model by a physical model | SINTEF, Norway | University of Porto, Portugal |

**Table 10.** List of STSMs corresponding to the eight call.

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|  |  |  |
| --- | --- | --- |
| **Institution** | **Host(#)** | **Home(#)** |
| University of Vigo, Spain | 10 | 1 |
| Ghent University, Belgium | 3 | 10 |
| Università degli Studi di Salerno, Italy | 0 | 3 |
| Durarea de Jos, Univ of Galati, Romania | 1 | 2 |
| Universitat Politècnica de Catalunya, Spain | 1 | 0 |
| University of Lisbon, Portugal | 2 | 1 |
| University of Aveiro, Portugal | 0 | 1 |
| Universidade do Porto, Portugal | 2 | 3 |
| Queen's University Belfast, UK | 0 | 1 |
| TU Delft, the Netherlands | 2 | 1 |
| Aalborg University, Denmark | 3 | 0 |
| Aristotle University of Thessaloniki, Greece | 1 | 1 |
| Ship Procurement S.A, Athens, Greece | 2 | 0 |
| Politecnico di Torino, Italy | 0 | 2 |
| Maynooth University, Ireland | 1 | 1 |
| TU Braunschweig, Germany | 0 | 1 |
| National University of Ireland, Galway, Ireland | 0 | 1 |
| Burgas Free University, Bulgaria | 0 | 1 |
| Bursa Uludağ University, Turkey | 1 | 0 |
| SINTEF, Norway | 1 | 0 |

**Table 11.** Number of times that every institution has participated as home or host institution in the STSMs associated with WG1.



**Figure 3:** Map showing the collaboration among institutions in terms of the STSMs. The solid line marks the home institution and the dashed line the host institution. The size of the red dots is proportional to the activity as host institution.



**Figure 4:** Map showing the collaboration among institutions in terms of the STSMs. The soilid line marks the home institution and the dashed line the home institution. The size of the red dots is proportional to the activity as home institution.

1. **Special Issues**

The special issue "Numerical and Experimental Modelling of Wave Field Variations around Arrays of Wave Energy Converters" was published in WATER over the period 2019-2021, being the main topics:

* marine renewable energy
* wave energy converter arrays
* array wave tank experiments
* numerical modelling of WEC farm wake effects
* arrays of moored floating structures, numerical coupling methodologies
* co-located wave and wind energy farms
* WEC arrays combined with other marine facilities (e.g., breakwaters, offshore platforms, offshore wind turbines)
* WEC farm near and far field effects
* WEC array environmental impact assessment
* WEC array interactions

The special issue is a collaborative effort within the framework of WECANET, including members of the different Working Groups, with special emphasis on WG1. The special issue compiles eleven research papers (a full list can be seen in Appendix I) and was edited by P. Troch and V. Stratigaki (U. Ghent), M. Folley (Queen's University Belfast**)** and E Loukogeorgaki (Aristotle University of Thessaloniki).

|  |  |
| --- | --- |
| **Paper** | **Institutions involved** |
| Verao-Fernandez et al. | Ghent University, Belgium |
| Quartier et al. | Ghent University, BelgiumUniversity of Vigo, Spain |
| Šljivac et al. | University of Osijek, Croatia |
| Stansby and Carpintero Moreno  | University of Manchester, UK Ghent University, Belgium |
| Kisacik et al. | Dokuz Eylül University, TurkeyGhent University, BelgiumUniversità degli Studi di Firenze, ItalyUniversity of Vigo, SpainUniversity of Lisbon, PortugalUniversity of Manchester, UK |
| Loukogeorgaki et al. | Aristotle University of Thessaloniki, GreeceNational TU of Athens, Greece |
| Onea and Rusu  | Dunarea de Jos University of Galati, Romania |
| Stratigaki et al. | Ghent University, Belgium |
| Balitsky et al.  | Ghent University, Belgium |
| Verao-Fernandez et al. | Ghent University, Belgium |
| Vasarmidis et al. | Ghent University, BelgiumFlanders Hydraulics Research, BelgiumTU Delft, The Netherlands |

 The following table summarizes the different Institutions involved in every research paper

**Table 12.** Institutions that participated in the Special Issue.

The Wecanet institutions involved in the Special Issue are represented in Figure 5

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**Figure 5:** Map showing the institutions that participated in the Special Issue. Blue dots mark the institution of the editors and red dots the institution of the authors.

The special issue "Offshore Renewables for a Transition to a Low Carbon Society" was published in Journal of Marine Science and Engineering over the period 2022-2023, being the main topics:

* ocean energy
* climate change
* evaluation of the resources
* environmental modeling
* floating wind
* fix offshore wind turbines
* wave energy
* tide energy
* floating solar panels
* thermal and salinity gradients energy
* collocations and hybrid approaches
* economic assessments
* expected LCOE dynamics
* challenges in ocean energy extraction

The special issue is a collaborative effort within the framework of WECANET, including members of the different Working Groups, with special emphasis on WG1. The special issue compiles ten research papers (a full list can be seen in Appendix II) and was edited by L. Russu (University of Galati) and V. Stratigaki (U. Ghent). The following table only the different Institutions involved in every research paper that belong to WECANET.

|  |  |
| --- | --- |
| **Paper** | **Institutions involved** |
| Manolache et al. | University of Galati , Romania |
| Vervaet et al. | Ghent University, BelgiumAalborg University, Denmark |
| Vervaet et al. | Ghent University, Belgium |
| Stansby and Carpintero Moreno  | University of Manchester, UK Ghent University, Belgium |
| Arguilé- Perez et al. | University of Vigo, SpainUniversity of Aveiro, PortugalUniversity of Galati , Romania |
| Vagiona et al. | Aristotle University of Thessaloniki, GreeceNational TU of Athens, Greece |
| Chirosca et al.,  | University of Galati, Romania |
| Onea et al. | University of Galati, Romania |

**Table 13.** Institutions belonging to WECANET that participated in the Special Issue.

The Wecanet institutions involved in the Special Issue are represented in Figure 6

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**Figure 6:** Map showing the institutions that participated in the Special Issue. Blue dots mark the institution of the editors and red dots the institution of the authors.

1. **Training Schools and workshops**

Training school Varna.Training school on wave energy in Varna (Bulgaria) on 18-22 March 2019

Training school Ourense. Training school on Numerical modelling of WECs using SPH models in Ourense (Spain) on 22-23 January 2020

Training School Belfast.Training School on spectral-domain modelling on 10-11 March 2020 in Belfast, Northern Ireland.

Training School Florence. Training School on wave-structure interaction on 12-16 July 2021 in Florence, Italy.

**5. Collaboration with Working Group II**

Round Robin campaign of experimental tests Researchers from WG1 belonging to University of Vigo (Spain), Ghent University (Belgium) and Universitat Politècnica de Catalunya (Spain) have collaborated with researchers from WG2 in the design of the Round Robin campaign of experimental tests. They have mainly transmitted the requirements of modellers, especially focused on validation and calibration of numerical models. A brief summary of the proposed test is shown in Appendix III.

APPENDIX I.

List of papers published in the special Issue of the journal WATER.

Gael Verao Fernandez, Vasiliki Stratigaki, Nicolas Quartier and Peter Troch

Influence of Power Take-Off Modelling on the Far-Field Effects of Wave Energy Converter Farms

Water 2021, 13(4), 429; <https://doi.org/10.3390/w13040429>

Nicolas Quartier,Pablo Ropero-Giralda,José M. Domínguez,Vasiliki Stratigaki andPeter Troch

Influence of the Drag Force on the Average Absorbed Power of Heaving Wave Energy Converters Using Smoothed Particle Hydrodynamics

Water 2021, 13(3), 384; <https://doi.org/10.3390/w13030384>

Damir Šljivac,Irina Temiz,Branka Nakomčić-Smaragdakis and Matej Žnidarec

Integration of Wave Power Farms into Power Systems of the Adriatic Islands: Technical Possibilities and Cross-Cutting Aspects

Water 2021, 13(1), 13; <https://doi.org/10.3390/w13010013>

Peter Stansby and Efrain Carpintero Moreno

Study of Snap Loads for Idealized Mooring Configurations with a Buoy, Inextensible and Elastic Cable Combinations for the Multi-Float M4 Wave Energy Converter

Water 2020, 12(10), 2818; <https://doi.org/10.3390/w12102818>

Dogan Kisacik, Vasiliki Stratigaki, Minghao Wu, Lorenzo Cappietti, Irene Simonetti, Peter Troch, Alejandro Crespo,Corrado Altomare,José Domínguez, Matthew Hall, Moncho Gómez-Gesteira, Ricardo Birjukovs Canelas and Peter Stansby

Efficiency and Survivability of a Floating Oscillating Water Column Wave Energy Converter Moored to the Seabed: An Overview of the EsflOWC MaRINET2 Database

Water 2020, 12(4), 992; <https://doi.org/10.3390/w12040992>

Eva Loukogeorgaki, Ifigeneia Boufidi and Ioannis K. Chatjigeorgiou

Performance of an Array of Oblate Spheroidal Heaving Wave Energy Converters in Front of a Wall

Water 2020, 12(1), 188; <https://doi.org/10.3390/w12010188>

Florin Onea and Eugen Rusu

The Expected Shoreline Effect of a Marine Energy Farm Operating Close to Sardinia Island

Water 2019, 11(11), 2303; <https://doi.org/10.3390/w11112303>

Vasiliki Stratigaki

WECANet: The First Open Pan-European Network for Marine Renewable Energy with a Focus on Wave Energy-COST Action CA17105

Water 2019, 11(6), 1249; <https://doi.org/10.3390/w11061249>

Philip Balitsky, Nicolas Quartier, Vasiliki Stratigaki, Gael Verao Fernandez, Panagiotis Vasarmidis and Peter Troch

Analysing the Near-Field Effects and the Power Production of Near-Shore WEC Array Using a New Wave-to-Wire Model

Water 2019, 11(6), 1137; <https://doi.org/10.3390/w11061137>

Gael Verao Fernandez, Vasiliki Stratigaki, Panagiotis Vasarmidis, Philip Balitsky and Peter Troch

Wake Effect Assessment in Long- and Short-Crested Seas of Heaving-Point Absorber and Oscillating Wave Surge WEC Arrays

Water 2019, 11(6), 1126; <https://doi.org/10.3390/w11061126>

Panagiotis Vasarmidis, Vasiliki Stratigaki, Tomohiro Suzuki, Marcel Zijlema and Peter Troch

Internal Wave Generation in a Non-Hydrostatic Wave Model

Water 2019, 11(5), 986; <https://doi.org/10.3390/w11050986>

APPENDIX II.

List of papers published in the special Issue of the journal Journal of Marine Science and Engineering.

Tianyu Song, Ze Li, Honghao Zheng, Chujin Liang and Zhanhong Wan

Optimization on Hydrodynamic Performance for First Level Energy-Capturing Enhancement of a Floating Wave Energy Converter System with Flapping-Panel-Slope

J. Mar. Sci. Eng. 2023, 11(2), 345; <https://doi.org/10.3390/jmse11020345>

Alexandra Ionelia Manolache, Gabriel Andrei and Liliana Rusu

An Evaluation of the Efficiency of the Floating Solar Panels in the Western Black Sea and the Razim-Sinoe Lagunar System

J. Mar. Sci. Eng. 2023, 11(1), 203; <https://doi.org/10.3390/jmse11010203>

Timothy Vervaet, Vasiliki Stratigaki, Francesco Ferri, Louis De Beule, Hendrik Claerbout, Bono De Witte, Marc Vantorre and Peter Troch

Experimental Modelling of an Isolated WECfarm Real-Time Controllable Heaving Point Absorber Wave Energy Converter

J. Mar. Sci. Eng. 2022, 10(10), 1480; <https://doi.org/10.3390/jmse10101480>

Timothy Vervaet, Vasiliki Stratigaki, Brecht De Backer, Kurt Stockman, Marc Vantorre and Peter Troch

Experimental Modelling of Point-Absorber Wave Energy Converter Arrays: A Comprehensive Review, Identification of Research Gaps and Design of the WECfarm Setup

J. Mar. Sci. Eng. 2022, 10(8), 1062; <https://doi.org/10.3390/jmse10081062>

Bo Zhang, Haixu Zhang, Sheng Yang, Shiyu Chen, Xiaoshan Bai and Awais Khan

Predictive Control for a Wave-Energy Converter Array Based on an Interconnected Model

J. Mar. Sci. Eng. 2022, 10(8), 1033; <https://doi.org/10.3390/jmse10081033>

Beatriz Arguilé-Pérez, Américo Soares Ribeiro, Xurxo Costoya, Maite deCastro, Pablo Carracedo, João Miguel Dias, Liliana Rusu and Moncho Gómez-Gesteira

Harnessing of Different WECs to Harvest Wave Energy along the Galician Coast (NW Spain)

J. Mar. Sci. Eng. 2022, 10(6), 719; <https://doi.org/10.3390/jmse10060719>

Dimitra G. Vagiona,George Tzekakis,Eva Loukogeorgaki andNikolaos Karanikolas

Site Selection of Offshore Solar Farm Deployment in the Aegean Sea, Greece

J. Mar. Sci. Eng. 2022, 10(2), 224; <https://doi.org/10.3390/jmse10020224>

Ana-Maria Chirosca and Liliana Rusu

Characteristics of the Wind and Wave Climate along the European Seas Focusing on the Main Maritime Routes

J. Mar. Sci. Eng. 2022, 10(1), 75; <https://doi.org/10.3390/jmse10010075>

Gerard Lorenz D. Maandal, Mili-Ann M. Tamayao-Kieke and Louis Angelo M. Danao Techno-Economic Assessment of Offshore Wind Energy in the Philippines

J. Mar. Sci. Eng. 2021, 9(7), 758; <https://doi.org/10.3390/jmse9070758>

Florin Onea, Eugen Rusu and Liliana Rusu

Assessment of the Offshore Wind Energy Potential in the Romanian Exclusive Economic Zone.

J. Mar. Sci. Eng. 2021, 9(5), 531; <https://doi.org/10.3390/jmse9050531>

**APPENDIX III.**

 **1/3 Preliminary tests:**

INITIAL DECAY TESTS (only floating):

Decay tests: heave decay and pitch decay

INITIAL WAVE PROPAGATION TESTS (fixed and floating):

Wave propagation WITHOUT WEC aiming:

To measure the surface elevation at WEC position (this is important in CFD not only for regular waves but also for focused waves so that we should check first with the code that the target waves are reaching the device).

To apply a correction to the generation transfer function of the wavemaker at each facilities in order to get the target wave conditions (calibration phase)

TESTS TO DETERMINE INERTIA MATRIX OF FLOATING OWC (Mechanical Laboratory)

**2/3 Inputs for numerical modelling:**

BUOY (fixed and floating):

Geometry model: .STL is preferred

Total mass Moment of inertia in X, Y, Z direction

Density of the device as homogenous (otherwise this can be obtained using geo and mass)

Initial draft: helps to validate the initial situation at equilibrium

MOORINGS (only floating WEC):

Positions of the fairleads and anchor points

Stiffness of the mooring lines

Length of each line diameter or equivalent volume of lines

Friction coefficient (in case of seabed friction)

Initial tension will also validate the mooring solver

WAVE CONDITIONS (fixed and floating):

Wave parameters (H,T,d) and focused waves (xf, tf)

Time series of wavemaker displacement (not the DEMAND, the real one).

PTO Orifice diameter of the OWC

Relationship between airflow and air pressure inside the OWC chamber (this can however also be deduced from the output measurements of the airflow and the air pressure.

**3/3 Measurements for numerical validation:**

Sampling frequency of each measurement device must be clearly specified.

Raw and filtered data must be provided.

If treated (i.e. post-processed), information on how data have been treated (e.g. filtering techniques applied, etc) must be provided.

MEASUREMENTS (fixed and floating):

Surface elevation at different locations (if possible groups of 5 WG to determine reflection coefficient)

Water level inside the OWC

Pressure inside the air chamber

Air velocity through the orifices

MEASUREMENTS (only floating):

Tensions in the moorings

Motions of the buoy (heave, surge, sway, roll, pitch, yaw)