CURRÍCULUM VÍTAE NORMALIZADO

Sonia Ponce de Leon Alvarez

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GOBIERNO DE ESPAÑA
MINISTERIO DE CIENCIA E INNOVACIÓN

FECYT FUNDACIÓN ESPAÑOLA PARA LA CIENCIA Y LA TECNOLOGÍA

Summary of CV

This section describes briefly a summary of your career in science, academic and research; the main scientific and technological achievements and goals in your line of research in the medium -and long- term. It also includes other important aspects or peculiarities.

Dr. Sonia Ponce de León is an international recognized expert on ocean waves. She is presently a scientist at CENTEC, Instituto Superior Tecnico, University of Lisbon. Her research interests are rogue waves and extreme sea states based on wave modeling and satellite altimetry data.

She graduated with a Degree in Oceanographic Engineering in 1986 at the Institute of Hydrometeorology of Odessa (Russia). Later, she was awarded the MSc degree in Physical Oceanography (1995) at CICESE (Mexico). In 2008, she completed her PhD in Naval Engineering degree in 2008 at the University of Lisbon, Portugal.

She published 28 papers in peer reviewed high impact factor journals with an accumulated impact factor of 11 and with 440 citations.

She started researching on extreme sea states and rogue waves in 2012 at the University of Lisbon (CENTEC). Her work focused on North Atlantic extratropical severe storms under which rogue waves are known to occur. She found that the probability of rogue wave occurrence in such storms, as measured by the Benjamin-Feir index was higher in the storm's lower right quadrant (Ponce de Leon & Guedes Soares, 2014).

In 2014, she was awarded with a PostDoctoral grant level-II in the frame of the European Research Council project "MULTIWAVE rogue waves" of Prof. Dias. She spent 2 years (2014-2016) in the University College Dublin (UCD), Ireland to study the relationship between the BFI and rogue wave generation.

During her stay at UCD she started an ongoing collaboration with Prof. Osborne, the foremost expert in nonlinear ocean waves. Their work involves studying the effect of the shape of the spectral peak on the generation of rogue waves and extreme sea states. They used the Inverse Scattering Transform (Osborne et al. 2019) together with spectral wave models to model the evolution of the wave spectrum and compute the number of rogue wave packets present in the region of the spectrum maximum. They showed that the standard method of computing nonlinear interactions in spectral wave models does not represent the true magnitude of spectral peak enhancement (Ponce de Leon et al. 2018; Osborne and Ponce de Leon 2017).

She collaborated in competitive European research projects (MULTIWAVE). She has participated in national projects such as PREDICE, the Operational wave forecast systems for the Catalan MetOffice, SOCIB and the America's CUP of Valencia. She was principal investigator of two PRACE projects.

She was Chairman and Topic Organizer of the 37th International Conference on Ocean, Offshore and Arctic Engineering, in 2018, from the American Society of Mechanical Engineers where more than 1400 abstracts were accepted. In 2020 she was Chairman for RENEW and MARTECH conferences, Lisbon, Portugal.

She participates as a reviewer of several scientific journals of high impact factor (Journal of Geophysical Research, Ocean Modeling, Ocean Dynamics, Continental Shelf Research, Applied Energy and others). She also was reviewer of International Projects.

Dr. Sonia Ponce de León was awarded with grants from Spanish Ministry of Education and Science (MINECO), and from the European Space Agency (ESA). She also supervised postgraduates students in Ireland, Portugal and Brazil. She was Associate Professor at NTNU Alesund (Norway), Visiting Lecturer at FURG (Brazil) and at Technical University of Catalunya (Spain).

In 2019 she was qualified as a Contracted Professor Doctor by the ANECA.

General quality indicators of scientific research

This section describes briefly the main quality indicators of scientific production (periods of research activity, experience in supervising doctoral theses, total citations, articles in journals of the first quartile, H index...). It also includes other important aspects or peculiarities.

Dr. Sonia Ponce de León has a total number of citations of 622 (SCOPUS), with 225 citations in the last 5 years, giving 44.2 citations per year in the last 5 years (SCOPUS). She has 15 papers published in Q1 journals (Scimago journal rankings) of the 28 papers she has published, and 4 papers published in Q2 journals. Her h-index is 14 (SCOPUS). Presently she is Visiting Scientist at the European Space Agency (ESA-ESRIN) where she is developing research on extreme waves and renewable energy from ocean and from space.

She presented and published, her work in more than 30 international conferences and workshops in the last 5 years, including the WISE (Waves in Shallow Water Environments) and the International Workshop on Wave Hindcasting and Forecasting workshops, the OMAE conference, the IUTAM (International Union of Theoretical and Applied Mechanics), Symposium Wind Waves, UK. Also she attended the 25YPRA (25 Years of Progress in Radar Altimetry) conference of the European Space Agency (ESA) and the Atlantic from Space Workshop (ESA), hosted by the National Oceanography Laboratory (NOC), South Hampton, United Kingdom. She attended the Coastal Altimetry Workshop CAW12, hosted by ESA-ESRIN, Frascati, Rome in February 2020.

In addition, she was reviewer for the following high impact journals and conferences: Journal of Geophysical Research, Remote Sensing, Ocean Modeling, Continental Shelf Research, Ocean Engineering, Applied Energy, Estuarine, Coastal and Shelf Science, Applied Ocean Research, Ocean Dynamics, Journal of Zhejiang University-SCIENCE A, Journal of Coastal Research, ASME-The American Society of Mechanical Engineers, OMAE-International Conference on Ocean, Offshore & Arctic Engineering, ISOPE-International Society of Offshore and Polar Engineers.

Sonia Ponce de Leon Alvarez

Surname(s): **Ponce de Leon Alvarez**
Name: **Sonia**
ORCID: **0000-0002-3332-9908**
Contact aut. region/reg.: **Lisboa**

Current professional situation

Employing entity: European Space Agency **Type of entity:** State agency
Department: EO Science, Applications and Climate Department, ESRIN
Professional category: Investigador Visitante
Start date: 10/05/2022
Type of contract: Investigador Invitado
Performed tasks: Investigacion sobre olas extremas y energias renovables del oceano en zonas costeras mediante datos de satélites. I am developing research on extreme waves and renewable ocean energies using satellite altimetry data in coastal zones

Employing entity: University of Lisbon, Portugal **Type of entity:** University
Department: Instituto Superior Tecnico, University of Lisbon
Professional category: Assistant Researcher
Start date: 01/12/2019
Type of contract: Temporary employment contract **Dedication regime:** Full time
Primary (UNESCO code): 251000 - Oceanography
Secondary (UNESCO code): 251007 - Physical oceanography
Tertiary (UNESCO code): 251007 - Physical oceanography
Performed tasks: I have been developing my research on rogue waves and extreme events by applying third generation wave models. I am studying the influence of currents on the modulational instability and consequently on the formation of oceanic rogue waves. The attention is focused on the Portuguese-Spanish coasts where strong currents are usually observed. We will determine the influence of currents on the modulational instability and the resultant effect on rogue wave generation. This research is being developing in an straight collaboration with an expert on rogue waves and extreme events (Professor Alfred Osborne).To determine the influence of an opposite current on waves we will add to the modulational parameter (Osborne 2010) this influence through the wave steepness. This research is published in different international conferences and journals.
Identify key words: Oceanography

Previous positions and activities

	Employing entity	Professional category	Start date
1	University College Dublin, Ireland	postdoctoral researcher	01/09/2014
2	University of Lisbon, Portugal	postdoctoral researcher	01/01/2012
3	Instituto Mediterráneo d Estudios Avanzados, Spain	posdoctoral researcher	01/06/2009

	Employing entity	Professional category	Start date
4	University College Alesund (NTNU), Norway	Associate Professor	01/08/2008
5	TECNOCEAN S.L.	Research Scientist	01/06/2006
6	Technical University of Catalonya (UPC), LIM-CIIRC	Sr.Engineer	01/06/1998
7	Federal University of Rio Grande	Visiting Lecturer in Physical Oceanography	01/06/1995

1 **Employing entity:** University College Dublin, Ireland
Professional category: postdoctoral researcher
Start-End date: 01/09/2014 - 01/10/2016 **Duration:** 2 years - 1 month

2 **Employing entity:** University of Lisbon, Portugal **Type of entity:** University
Professional category: postdoctoral researcher
Start-End date: 01/01/2012 - 31/08/2014 **Duration:** 1 year - 8 months

3 **Employing entity:** Instituto Mediterráneo d Estudios Avanzados, Spain
Professional category: posdoctoral researcher
Start-End date: 01/06/2009 - 01/06/2012 **Duration:** 3 years

4 **Employing entity:** University College Alesund (NTNU), Norway **Type of entity:** University
Professional category: Associate Professor
Start-End date: 01/08/2008 - 01/05/2009 **Duration:** 9 months - 270 days

5 **Employing entity:** TECNOCEAN S.L.
Professional category: Research Scientist
Start-End date: 01/06/2006 - 31/12/2007 **Duration:** 1 year - 6 months

6 **Employing entity:** Technical University of Catalonya (UPC), LIM-CIIRC **Type of entity:** University
Professional category: Sr.Engineer
Start-End date: 01/06/1998 - 01/06/2002 **Duration:** 4 years

7 **Employing entity:** Federal University of Rio Grande **Type of entity:** University
Professional category: Visiting Lecturer in Physical Oceanography
Start-End date: 01/06/1995 - 01/03/1998 **Duration:** 2 years - 3 months

Education

University education

1st and 2nd cycle studies and pre-Bologna degrees

1 **University degree:** ANECA
Name of qualification: Profesor Contratado Doctor
Degree awarding entity: Profesor Contratado Doctor **Type of entity:** Foundation
Date of qualification: 04/01/2019

2 **University degree:** Master of Science
Name of qualification: Master of Science in Physical Oceanography
Degree awarding entity: CICESE (Center for Scientific Research and Higher Education), Ensenada, Baja California, México
http://www.cicese.edu.mx/
Type of entity: R&D Centre
Date of qualification: 31/10/1994

3 **University degree:** Master of Science
Name of qualification: Master of Science in Geography
Degree awarding entity: Odessa State Environmental University, Institute of Hydrometeorology (OGMI)
Type of entity: University
Date of qualification: 23/06/1986

4 **University degree:** bachelor's degree
Name of qualification: Oceanologist Engineer
City degree awarding entity: Odessa, Russia
Degree awarding entity: Odessa State Environmental University, Institute of Hydrometeorology (OGMI), http://odeku.edu.ua/language/ru/ob-universitete/?lang=ru
Date of qualification: 23/06/1986
Foreign qualification: Oceanologist Engineer

Doctorates

Doctorate programme: PhD in Naval Engineering
Degree awarding entity: Technical University of Lisbon
City degree awarding entity: Lisbon, Portugal
Date of degree: 07/07/2008
European doctorate: Yes
Thesis title: Sheltering effect of islands in wave model predictions
Thesis director: Carlos Guedes Soares
Recognition of quality: Yes
Date of award: 07/07/2008
Standardised degree: Yes
Date of standardisation: 28/01/2010

Language skills

Language	Listening skills	Reading skills	Spoken interaction	Speaking skills	Writing skills
Portuguese	C1	C1	C1	C1	C1
Russian	C1	C1	C1	C1	C1
English	C2	C2	C2	C2	C2
Spanish	C2	C2	C2	C2	C2

Teaching experience

General teaching experience

1 **Type of teaching:** Official teaching
Name of the course: Marine Hydrodynamics 1
Type of programme: Engineering **Type of teaching:** In person theory
Type of subject: Obligatory
University degree: Bachelor degree in Ship Design
Frequency of the activity: 1
Start date: 01/01/2009 **End date:** 01/04/2009
Type of hours/ ECTS credits: Hours
Entity: NTNU- University of Science and Technology, Alesund, NORWAY
City of entity: Alesund, Norway
City funding entity: Norway
Subject language: English

2 **Name of the course:** Waves and Tides
University degree: Oceanographer
Start date: 15/09/1995 **End date:** 15/11/1996
Entity: FURG-University of Rio Grande, Brazil **Type of entity:** University
Faculty, institute or centre: Institute of Oceanography

3 **Name of the course:** Waves and Tides
University degree: Oceanographer
Start date: 01/01/1996 **End date:** 01/03/1996
Entity: FURG-Federal University of Rio Grande, Brazil **Type of entity:** University
Faculty, institute or centre: Institute of Oceanology

4 **Name of the course:** Physics I
University degree: Oceanographer
Start date: 01/09/1995 **End date:** 01/12/1995
Entity: Federal University of Rio Grande(FURG), Brazil

5 **Name of the course:** Physics part 2
University degree: Oceanographer
Start date: 15/09/1995 **End date:** 15/11/1995
Entity: FURG-Federal University of Rio Grande **Type of entity:** University

Faculty, institute or centre: Institute of Oceanology

Experience supervising doctoral thesis and/or final year projects

1 **Project title:** Influence of islands in the wave field inferred from SAR imagery, wave buoys and WAM model
Type of project: Master of Science
Co-director of thesis: Nelson Violante Carvalho; Sonia Ponce de Leon Alvarez
Entity: Master of Science, COPPE Faculty, UFRJ-Federal University of Rio de Janeiro, Brazil **Type of entity:** University
City of entity: Rio de Janeiro, Brazil
Student: Jamila Fernanda Jumeniuk
Identify key words: Earth sciences; Engineering
Date of reading: 30/09/2015
Date of award: 30/09/2015

2 **Project title:** Extreme events in deep and shallow waters around Ireland
Type of project: Research Projects (final degree project)
Co-director of thesis: Sonia Ponce de Leon Alvarez
Entity: University College Dublin (UCD) **Type of entity:** University
City of entity: Dublin, Southern and Eastern, Ireland
Student: Christopher Higgins
Identify key words: Earth sciences
Date of reading: 24/06/2015

3 **Project title:** Extreme waves in the North Sea
Type of project: Research Projects (final degree project)
Co-director of thesis: Sonia Ponce de Leon Alvarez
Entity: University College Dublin (UCD) **Type of entity:** University
City of entity: Dublin, Southern and Eastern, Ireland
Student: Patrick Doohan
Obtained qualification: Higher Diploma in Mathematical Sciences
Identify key words: Mathematics
Date of reading: 24/06/2015
Quality recognition: Yes **Date of award:** 24/06/2015

Scientific and technological experience

Research and development groups/teams

1 **Name of the group:** CENTEC-Centre for Marine Technology and Ocean Engineering
Aims of the group: Research and Development of extreme waves
Name of principal investigator: Sonia Ponce de Leon **Number of members in the group:** 5
Type of collaboration: Co-authorship of international collaboration
City of group: Lisbon, Lisboa, Portugal
Affiliation entity: University of Lisbon, Portugal **Type of entity:** University Department
Number of directed thesis: 0 **Number of directed postdoc:** 1
Relevant results: Investigate the influence of currents on the modulational instability and the formation of rogue waves.
Others: The expected results of the project will be an increased understanding of the realistic weather conditions under which rogue waves occur and a characterization of the wave spectrum that produces the mechanisms that cause rogue waves.
Identify key words: Oceanography
Start date: 01/12/2016 **Duration:** 1 year - 1 month

2 **Name of the group:** UCD Earth Institute
Aims of the group: Research on rogue waves
Name of principal investigator: Frederic Dias **Number of members in the group:** 30
Type of collaboration: Co-authorship of publications
City of group: Dublin, Ireland
Affiliation entity: University College Dublin, Ireland **Type of entity:** University
Relevant results: http://www.ercmultiwave.eu
Identify key words: Oceanography; Engineering
Start date: 01/09/2014 **Duration:** 2 years - 1 month

3 **Name of the group:** TMOOS-Marine Technologies, Operational Oceanography and Sustainability
Aims of the group: Research and Development of an operational wave forecast
Name of principal investigator: Joaquin Tintore Subirana **Number of members in the group:** 10
Type of collaboration: Co-authorship of publications
City of group: Esporles, Spain
Affiliation entity: Instituto Mediterráneo d Estudios Avanzados **Type of entity:** State agency
Relevant results: I have implemented and validates the operational wave forecast system of SOCIB-IMEDEA
Others: During my postdoctoral position at Mediterranean Institute for Advanced Studies, I have worked with the team researching the influence of the marine breezes on the wave field around Mallorca Island, the assessment of different wind fields for the implementation of an operational wave forecast and the study of wave energy resources around the Balearic Islands.
Identify key words: Earth sciences
Start date: 01/06/2009 **Duration:** 3 years

4 **Name of the group:** TECNOCEAN S.L.
Aims of the group: Implementation of the operational wave forecast for the America's CUP, of Valencia
Name of principal investigator: Francisco Rivero **Number of members in the group:** 10

Type of collaboration: Co-authorship of projects and their development
City of group: Barcelona, Spain
Affiliation entity: TECNOCEAN S.L. **Type of entity:** Technological Centre
Identify key words: Oceanography
Start date: 01/06/2006 **Duration:** 1 year - 6 months

Scientific or technological activities

R&D projects funded through competitive calls of public or private entities

1 **Name of the project:** Extreme waves in coastal zones
Entity where project took place: European Space Agency **Type of entity:** Agencia
City of entity: Frascati (Roma), Lazio, Italy
Name principal investigator (PI, Co-PI....): Sonia Ponce de Leon Alvarez
Nº of researchers: 2
Start-End date: 10/05/2022 - 31/12/2022

2 **Name of the project:** Modelling Extreme sea states in the Atlantic Ocean using a spectral wave model
Identify key words: Oceanography
Identify key words: Oceanography
Type of project: Research and development, including transfer **Geographical area:** European Union
Degree of contribution: Coordinator of total project, network or consortium
Entity where project took place: ST-Instituto Superior Tecnico, Universidad de Lisboa, CENTEC **Type of entity:** University Department
City of entity: Lisbon, Lisboa, Portugal
Name principal investigator (PI, Co-PI....): Sonia Ponce de Leon Alvarez; Alfred Osborne; Joao Paulo Horta Bettencourt
Nº of researchers: 3 **Nª people/year:** 3
Type of participation: Principal investigator
Name of the programme: PRACE(Partnership for Advanced Computing in Europe)
Code according to the funding entity: 2010PA4539
Start-End date: 01/08/2018 - 10/12/2018 **Duration:** 5 months
Participating entity/entities: CENTEC(University of Lisbon) Portugal, LEGOS(CNRS)France, Nonlinear Research S.L., United States of America
Relevant results: Relevant results have been obtained during this project regarding the importance of the study of the impact of the climate change on the extreme waves in Europe.
Dedication regime: Full time

3 **Name of the project:** Characterization of extreme sea states using exact calculation of four wave nonlinear interactions (PRACE (Partnership for Advanced Computing in Europe)
Identify key words: Earth sciences
Identify key words: Information technology and adata processing
Type of project: Research and development, including transfer **Geographical area:** European Union
Degree of contribution: Coordinator of total project, network or consortium
Entity where project took place: IST-Instituto Superior Tecnico, Universidad de Lisboa, CENTEC **Type of entity:** University Department
City of entity: Lisboa, Lisboa, Portugal

Name principal investigator (PI, Co-PI....): Sonia Ponce de Leon Alvarez
Nº of researchers: 2 **Nª people/year:** 2
Type of participation: Principal investigator
Name of the programme: PRACE (Partnership for Advanced Computing in Europe)
Code according to the funding entity: Proposal nº2010PAA3530
Start-End date: 19/12/2016 - 19/03/2017 **Duration:** 4 months - 124 days
Total amount: 0 € **Sub-project amount:** 0 €
Percentage as grant: 0 **Percentage as credit:** 0
Mixed percentage: 0
Relevant results: This project aimed at understanding the scalability properties of the WAVEWATCH-III model when using WRT algorithm for exact computation of four resonant nonlinear interactions in realistic oceanographic applications. The results obtained showed that the wave model is highly scalable among others results which are the basis of the present proposal.
Dedication regime: Full time
Applicant's contribution: My role as Principal Investigator was the coordination of the activities planned in the frame of this proposal. This project aimed at improving the current knowledge of the generation of rogue waves.The objective of the project is to characterize in detail the spectral wave characteristics during extreme sea states in Portugal using a 3GS wave model using the exact Boltzmann integral instead of DIA because only with the exact computation of the NL4 terms, can we incorporate the physics of the modulational instability into the evolution of the wave spectrum and the associated rogue waves (Ponce de León et al., 2017). To this end we use of the exact WRT method (Resio and Perrie, 1991; Van Vledder, 2006; Rogers and VanVledder 2013) for the computation of the four-wave nonlinear source term. The research is under development up to now as can be seen from the published papers and from the participation in the international congresses described in my CV.

4 **Name of the project:** MULTIWAVE
Entity where project took place: University College Dublin **Type of entity:** University Research Institute
City of entity: Dublin, Southern and Eastern, Ireland
Nº of researchers: 30
Start-End date: 01/08/2012 - 31/08/2016
Total amount: 1.000.000 €

5 **Name of the project:** HIPOCAS
Identify key words: Oceanography
Type of project: Research and development, including transfer **Geographical area:** European Union
Degree of contribution: Researcher
Entity where project took place: University of Lisbon, CENTEC **Type of entity:** University Department
City of entity: Lisbon, Lisboa, Portugal
Nº of researchers: 20
Type of participation: PhD student
Name of the programme: HIPOCAS
Start-End date: 01/01/2001 - 01/01/2004 **Duration:** 4 years - 48 months
Total amount: 200.000 €
Dedication regime: Part time

Results

Technological results derived from specialized and transfer activities, not included in previous sections

1 **Description:** Operational wave forecast system SOCIB
Primary (UNESCO code): 251000 - Oceanography
Secondary (UNESCO code): 251000 - Oceanography
Tertiary (UNESCO code): 339900 - Other Technological specialities
Name of the principal Investigator (PI): Joaquin Tintore Subirana
Name of the Co-principal investigator (Co-PI): Alejandro Orfila Foster
Degree of contribution: Researcher
New techniques or equipment: Yes
Spin-off R&D companies: No
Results for improvement of products: Yes
Expert technologist: Yes
Collaboration agreements: Yes
Geographical area: National
Collaborating entity or bodies:
CENTRO DE ACUSTICA APLICADA Y EVALUACION NO DESTRUCTIVA — **Type of entity:** Associations and Groups

Puertos del Estado, IMEDEA-CSIC-SOCIB
City collaborating entity: Madrid, Balearic Islands, Spain

Start date: 01/06/2009 — **Duration:** 3 years
Relevant results: I have implemented the operational wave forecast system of SOCIB at the beginning of its creation. I have validated, maintained and calibrated this system.
Identify key words: Computer system

2 **Description:** Sistema Operacional de METEOCAT, Barcelona, Spain
Primary (UNESCO code): 250000 - Earth and space sciences
Secondary (UNESCO code): 251000 - Oceanography
Tertiary (UNESCO code): 251000 - Oceanography
Name of the principal Investigator (PI): Agustin Sanchez-Arcilla Conejo
Name of the Co-principal investigator (Co-PI): Sonia Ponce de Leon Alvarez
Degree of contribution: Researcher
New techniques or equipment: Yes
Spin-off R&D companies: No
Results for improvement of products: No
Standardisation, calibration: No
Expert technologist: Yes
Collaboration agreements: Yes
Geographical area: National
Collaborating entity or bodies:
METEOCAT-LIM-UPC — **Type of entity:** State agency
City collaborating entity: Barcelona, Catalonia, Spain

Target entity or bodies:
Meteorological Service of Catalonia (SMC) — **Type of entity:** State agency

City receiving entity: Barcelona, Catalonia, Spain

Start date: 01/06/1998 **Duration:** 4 years
Relevant results: Implementation of the Catalan operational wave forecast http://www.meteo.cat/prediccio/models/swan
Identify key words: Engineering

Scientific and technological activities

Scientific production

Publications, scientific and technical documents

1 Alfred Osborne; Donald Resio; A Costa; Sonia Ponce de Leon Alvarez; Elisabetta Chirivi. Highly nonlinear w ind w av es in currituck sound: dense breather turbulence in random ocean w av es. Ocean Dynamics. 1 - 1, pp. 1 - 33. Berlin(Germany): Springer Nature, 19/12/2018. Available on-line at: <https://link.springer.com/article/10.1007/s10236-018-1232-y>. ISSN 1616-7228

Type of production: Scientific paper **Format:** Journal
Position of signature: 4 **Degree of contribution:** Author or co-author of article in journal with external admissions assessment committee
Total no. authors: 5 **Corresponding author:** No
Relevant publication: Yes

2 Alfred Osborne; Sonia Ponce de Leon Alvarez. Properties of rogue waves and the shape of the ocean wave power spectrum. ASME proceedings of the 36th OMAE2017. V03AT02A013 - Paper No. OMAE2017-6, pp. 1 - 12. ISBN: 978-0-7918-5765-6, 01/09/2017. Available on-line at: <http://proceedings.asmedigitalcollection.asme.org/proceeding.aspx?articleid=2655398>. ISBN 978-0-7918-5765-6

Type of production: Scientific paper **Format:** Journal
Position of signature: 2 **Degree of contribution:** Author or co-author of article in journal with external admissions assessment committee
Total no. authors: 2 **Corresponding author:** No
Relevant results: We discuss a method for the determination of the shape of the ocean wave power spectrum that is based on the physics of the modulational instability for the nonlinear Schrödinger and the Zakharov equations. We find that the form of the spectrum includes an enhanced spectral peak and modulational channels that extend to both high and low frequency. Furthermore, this fundamental shape of the spectrum is found to also be contained in the kinetic equation commonly used for wind-wave models provided that the full Boltzmann four-wave interactions are included. We discuss a number of numerical simulations that demonstrate the modulational form of the power spectrum. We furthermore discuss how the enhanced spectral peak governs the formation of rogue wave packets. We provide ways to compute the properties of the rogue waves directly from the nonlinear spectrum of analyzed time series data or from wave forecasts and hindcasts.
Relevant publication: Yes

3 Sonia Ponce de Leon; Joao Paulo Bettencourt; Frederic Dias. Comparison of hindcasted extreme waves with a Doppler radar measurements in the North Sea. Ocean Dynamics. 67 - 1, pp. 103 - 115. ELSEVIER, 23/12/2016. Available on-line at: <https://link.springer.com/content/pdf/10.1007%2Fs10236-016-1014-3.pdf>.

Type of production: Scientific paper **Format:** Journal
Position of signature: 1 **Degree of contribution:** Author or co-author of article in journal with external admissions assessment committee
Total no. authors: 3 **Corresponding author:** Yes

Relevant results: This contribution deals with the severe sea state that often take place in the North Sea. We compared simulations performed with the WAVEWATCH-III model in different high resolution grids against a Doppler radar data for specific extreme waves. In particular, we disscussed how integral parameters such as the significant wave height (H) is not the best way to study the extreme waves, and focused our discussions on the shape of the frequency-direction spectrum that plays an major role in the occurrence of the extreme waves.
Relevant publication: Yes

4 Francesco Fedele; Joseph Brennan; Sonia Ponce de Leon; Jonh Dudley; Frederic Dias. Real world ocean rogue waves explained without the modulational instability.Scientific Reports (Nature). 6 - 27715, 21/06/2016. Available on-line at: <http://www.nature.com/articles/srep27715>.

Type of production: Scientific paper
Format: Journal
Position of signature: 3
Degree of contribution: Author or co-author of article in journal with external admissions assessment committee
Total no. authors: 5
Corresponding author: No
Relevant results: Based on measurements and numerical simulations of the three most known rogue waves: Draupner, Andrea and Killar waves, we analyzed the generation mechanisms for rogue waves. It was concluded that rogue waves are likely to be rare occurrences of weakly nonlinear random seas.
Relevant publication: Yes

5 Sonia Ponce de Leon; Joao Paulo Bettencourt; Frederic Dias. Evolution of the extreme wave region in the North Atlantic using a 23 year hindcast. ASME 2015 34th International Conference on Ocean, Offshore and Arctic Engineering. Structures Safety an - 3, pp. 1 - 7. (United States of America): ASME-The American Society of Mechanical Engineering, 01/09/2015. Available on-line at: <http://proceedings.asmedigitalcollection.asme.org/proceeding.aspx?articleid=2465566>. ISBN 978-0-7918-5649-9

Type of production: Scientific paper
Format: Journal
Position of signature: 1
Degree of contribution: Author or co-author of article in journal with external admissions assessment committee
Total no. authors: 4
Corresponding author: Yes
Relevant results: This contribution deals with the calculation of return periods for storms that generate extreme waves. The return periods were calculated with the Equivalent Triangular Storm model that, unlike other methods, does not assume a priori any probability distribution for the Hs peaks. In this work, the ETS model was applied for the first time to a whole ocean basin, using hindcasted wind wave data. My role was the computation of the return periods of sea storms where Hs exceeds extreme values by using 23 year hindcast by adopting the Equivalent Triangular Storm.
Relevant publication: Yes

6 S. Ponce de León; Carlos Guedes Soares. Extreme wave parameters under North Atlantic extratropical cyclones. Ocean Modeling. 81, pp. 78 - 88. ELSEVIER, 22/07/2014. Available on-line at: <https://www.sciencedirect.com/science/article/pii/S146350031400095X>.

Type of production: Scientific paper
Format: Journal
Position of signature: 1
Degree of contribution: Author or co-author of article in journal with external admissions assessment committee
Total no. authors: 2
Corresponding author: Yes
Relevant results: The above contribution deals with the identification and the study of abnormal rogue waves by examining case studies of realistic weather patterns such as North Atlantic extratropical storms under which they are known to occur. By using WAM high resolution simulations, the spatial-temporal distribution of extreme wave parameters was examined. The distribution in time and space of the rogue wave parameters around the eye of one of the major North Atlantic extratropical cyclones was assessed.
Relevant publication: Yes

7 S. Ponce de León; A. Orfila; L. Gómez-Pujol; L. Renault; G. Vizoso; J. Tintoré. Assessment of wind models around the Balearic Islands for operational wave forecast. Applied Ocean Research. 34, pp. 1 - 9. ELSEVIER, 01/01/2012. Available on-line at: <https://www.sciencedirect.com/science/article/pii/S0141118711000770>.

Type of production: Scientific paper
Format: Journal
Position of signature: 1
Degree of contribution: Author or co-author of article in journal with external admissions assessment committee
Total no. authors: 5
Corresponding author: Yes
Relevant results: This contribution deals with the assessment of atmospheric models in providing the forcing for the operational wave forecast of SOCIB (Balearic Islands Coastal Observing System). A wave hindcast in the Western Mediterranean Sea is carried out in order to assess the performance of three atmospheric models in providing the forcing for a third generation wave model. The wind models have been used as forcing fields for the generation of waves and the resulting significant wave height time history compared with four buoys around the Balearic Islands. Two different wave-model grid resolutions are used to get the wave field in the entire Mediterranean and around the Balearic Islands. The present application was performed for three months: November 2008 and for July and August 2009. Results indicate that all data sources provide good forcing for operational wave forecast at large scales (wind forecast with grid resolution of 30 and 25 km). Near the coast or at the lee of islands, resolving small scale topographical features result in a better forecast of wave fields. However, for the area studied, the atmospheric model that better represents summer and winter conditions is hourly WRF at 1.5 km resolution.
Relevant publication: Yes

8 S. Ponce de León; J.H. Bettencourt; N. Kjerstad. Simulation of irregular waves in an offshore wind farm with a spectral wave model. Continental Shelf Research. 31 - 15, pp. 1541 - 1557. ELSEVIER, 01/10/2011. Available on-line at: <http://www.scopus.com/inward/record.url?eid=2-s2.0-80052416528&partnerID=MN8TOARS>.
Type of production: Scientific paper
Format: Journal
Position of signature: 1
Degree of contribution: Author or co-author of article in journal with external admissions assessment committee
Total no. authors: 3
Corresponding author: Yes
Relevant results: This contribution deals with the effect of a single windmill monopile in the local incoming wave field in a wind farm using realistic wave spectra.The effects of the windmill monopile on the wave field were found to be dependent on the directional distribution of the incoming wave spectrum and also on the wave diffraction and reflection. The hindcast study showed that the group of windmill monopiles may contribute to the reduction of the wave energy inside the offshore wind farm and that once the waves enter into the offshore wind farm they experience modifications due to the presence of the windmill monopiles, which cause a blocking of the wave energy propagation resulting in an altered distribution of the Hs field.
Relevant publication: Yes

9 S. Ponce de León; C. Guedes Soares. The sheltering effect of the Balearic Islands in the hindcast wave field. Ocean Engineering. 37 - 7, pp. 603 - 610. ELSEVIER, 06/02/2010. Available on-line at: <https://www.sciencedirect.com/science/article/pii/S0029801810000193>.
Type of production: Scientific paper
Format: Journal
Position of signature: 1
Degree of contribution: Author or co-author of article in journal with external admissions assessment committee
Total no. authors: 2
Corresponding author: No
Relevant results: The sheltering effect of the Balearic Islands in the hindcast wave field was studied for typical Mediterranean wave situations of Llevant, Tramuntana and Mestral and for mild conditions such as the Garbí and Ponent winds. For this purpose, a third generation wave model was applied to the Mediterranean Sea and different patterns of the sheltered areas were found for the various representative situations depending on the wind variability and on the magnitude of the wind speed. From the analysis it was concluded that the sheltered zones created during storms generally persist for short periods of time of the order of 6 h, possibly reaching a maximum of 12 h.
Relevant publication: Yes

10 S. Ponce de León; C. Guedes Soares. Sensitivity of wave model predictions to wind fields in the Western Mediterranean sea. Coastal Engineering. 55 - 11, pp. 920 - 929. ELSEVIER, 2008. Available on-line at: <https://www.sciencedirect.com/science/article/pii/S0378383908000501>.
Type of production: Scientific paper
Format: Journal
Position of signature: 1

Degree of contribution: Author or co-author of article in journal with external admissions assessment committee

Total no. authors: 2 **Corresponding author:** No

Relevant results: The paper compares the wave hindcast in the Western Mediterranean sea using the reanalysis wind fields from HIPOCAS and ERA-40 from ECMWF for November 2001. The study has concentrated on the Mediterranean coast of Spain where there are known difficulties with the wind and wave modelling. Two winter storms have been compared. The main differences between the significant wave heights using the ERA-40 reanalysis (ECMWF) and HIPOCAS reanalysis winds were observed to increase when moving southwards in the geographical domain at the offshore locations. Systematic negative biases of Hs were obtained with the ERA-40 data at all the coastal locations analyzed, whereas positive biases are typical for the HIPOCAS reanalysis.

Relevant publication: Yes

11 S. Ponce de León; C. Guedes Soares. On the sheltering effect of islands in ocean wave models. Journal of Geophysical Research C: Oceans. 110 - 9, pp. 1 - 17. 2005. Available on-line at: <http://www.scopus.com/inward/record.url?eid=2-s2.0-27744510627&partnerID=MN8TOARS>.

Type of production: Scientific paper **Format:** Journal

Position of signature: 1 **Degree of contribution:** Author or co-author of article in journal with external admissions assessment committee

Total no. authors: 2 **Corresponding author:** No

Relevant results: The study was planned in order to find specific sea state conditions under which the sheltering effect of the Azores islands results strongest. The study if part of my PhD thesis work developed under direction of Prof. Guedes Soares at University of Lisbon.The sheltering effect of the islands was demonstrated by a reduction of the significant wave height in the region on the leeward side of Azores Archipelago when comparing the wave model results with the island resolved and unresolved.

Relevant publication: Yes

12 Sonia Ponce de Leon; F.J. Ocampo-Torres. Sensitivity of a wave model to wind variability. Journal of Geophysical Research C: Oceans. 103 - C2, pp. 3179 - 3201. American Geophysical Union, 1998. Available on-line at: <http://onlinelibrary.wiley.com/doi/10.1029/97JC02328/abstract>.

Type of production: Scientific paper **Format:** Journal

Position of signature: 1 **Degree of contribution:** Author or co-author of article in journal with external admissions assessment committee

Total no. authors: 2 **Corresponding author:** Yes

Relevant results: A third-generation wave model was applied to the Gulf of California (Mexico) to hindcast wave spectra and to assess model sensitivity to wind variability on the basis of three different numerical simulations: (1) when asynthetic wind field of varying randomness is adopted and when the forcing wind field considered has an input time stepof (2) 6 hours and (3) 5 min. In the first idealized simulation the wave field induced by a constant wind field is compared with the result when white noise was added to the originally constant forcing winds. Results from these numerical simulations demonstrate that wave energy increases with wind variability, even though the mean wind is kept constant. In the second and third simulations the forcing wind is averaged for periods of 6 hours and 5min,which representrelatively low and high time scale variability, respectively. This work was based on by Master of Science Thesis work developed at the excellence centre of CICESE (Centro de Investigación Científica y de Educación Superior de Ensenada).

Relevant publication: Yes

13 Sonia Ponce de Leon. Local analysis of wave fields produced from hindcasted rogue wave sea states. ASME 2015 34th International Conference on Ocean, Offshore and Arctic Engineering. V003T02A020 - 3, pp. 1 - 8. (United States of America): ASME-The American Society of Mechanical Engineering, Available on-line at: <http://proceedings.asmedigitalcollection.asme.org/proceeding.aspx?articleid=2465567>. ISBN 978-0-7918-5649-9

Type of production: Scientific paper **Format:** Journal

Position of signature: 3 **Degree of contribution:** Author or co-author of article in journal with external admissions assessment committee

Total no. authors: 5 **Corresponding author:** No

Relevant results: Local wave models based on first-principle fluid dynamics equations (such as the Higher Order Spectral Method) are able to represent wave fields in detail, but in general they are hard to interface with the full complexity of real-world sea conditions. This paper displays our efforts in coupling these two types of models in order to enhance our understanding of past extreme events and provide scope for rogue wave risk evaluation. In particular, high resolution numerical simulations of a wave field similar to the “Andrea” wave one are performed, allowing for accurate analysis of the event.
Relevant publication: Yes

14 Sonia Ponce de Leon; Carlos Guedes Soares. Distribution of average extreme wave parameters in the North Atlantic from numerical simulations.Ocean Engineering. 253, ELSEVIER, 16/06/2022.
Type of production: Scientific paper **Format:** Journal
Corresponding author: Yes

15 1; Ian Young; Sonia Ponce de Leon; Takuji Waseda; Alfred Osborne. Extreme Waves, Special Issue Editorial. Journal of Marine Science and Engineering. 697 - 10, MDPI, 29/04/2022.
Type of production: Scientific paper **Format:** Journal
Corresponding author: Yes

16 1; Carlos Guedes Soares; Sonia Ponce de Leon. Numerical Modelling of the Effects of the Gulf Stream on the Wave Characteristics. Journal of Marine Science and Engineering. 9 - 42, MDPI, 03/08/2021.
Type of production: Scientific paper **Format:** Journal
Corresponding author: Yes

17 Saleh; Jerome Benveniste; International Altimetry Team; Sonia Ponce de Leon. Altimetry for the future: Building on 25 years of progress Altimetry for the future: Building on 25 years of progress, Advances in Space Research 68, 319-363, Special Issue entitled "25 Years of Progress in Altimetry”Altimetry for the future: Building on 25 years of progress, Advances in Space Research 68, 319-363, Special Issue entitled "25 Years of Progress in Altimetry”Altimetry for the future: Building on 25 years of progress, Advances in Space Research 68, 319-363, Special Issue entitled "25 Years of Progress in Altimetry”Altimetry for the future: Building on 25 years of progress, Advances in Space Research 68, 319-363, Special Issue entitled "25 Years of Progress in Altimetry”Altimetry for the future: Building on 25 years of progress, Advances in Space Research 68, 319-363, Special Issue entitled "25 Years of Progress in Altimetry”Altimetry for the future: Building on 25 years of progress, Advances in Space Research 68, 319-363, Special Issue entitled "25 Years of Progress in Altimetry”Altimetry for the future: Building on 25 years of progress, Advances in Space Research 68, 319-363, Special Issue entitled "25 Years of Progress in Altimetry”Altimetry for the future: Building on 25 years of progress, Advances in Space Research 68, 319-363, Special Issue entitled "25 Years of Progress in Altimetry. Advances in Space Research 68, 319-363, Special Issue entitled "25 Years of Progress in Altimetry”. 68, pp. 319 - 363. ELSEVIER, 01/06/2021.
Type of production: Scientific paper **Format:** Journal
Corresponding author: No

18 Sonia Ponce de Leon; Carlos Guedes Soares. Extreme Waves in the Agulhas Current Region Inferred from SAR Wave Spectra and the SWAN Model. Journal of Marine Science Engineering. 9 - 153, MDPI, 28/05/2021.
Type of production: Scientific paper **Format:** Journal
Corresponding author: Yes

19 Ponce de Leon; Joao Bettencourt. Composite analysis of North Atlantic extra-tropical cyclone waves from satellite altimetry observations. Advances in Space Research. 68, pp. 762 - 772. ELSEVIER, 06/05/2021.
Type of production: Scientific paper **Format:** Journal
Corresponding author: Yes

20 Sonia Ponce de Leon; Alfred Osborne. Role of Nonlinear Four-Wave Interactions Source Term on the Spectral Shape. Journal of Marine Science and Engineering. 8, pp. 1 - 16. MDPI, 03/04/2020.
Type of production: Scientific paper **Format:** Journal
Corresponding author: Yes

21 Sonia Ponce de Leon; Joao Bettencourt. Composite analysis of North Atlantic extra-tropical cyclone waves from satellite altimetry observations. Advances in Space Research. https://doi.org/10.1016/j.asr.2019.07.021. 1 - 1, pp. 1 - 30. ELSEVIER, 16/07/2019.

Type of production: Scientific paper **Format:** Journal
Corresponding author: Yes

22 Adem Akpinar; Sonia Ponce de Leon. An assessment of the wind re-analyses in the modelling of an extreme sea state in the Black Sea.Dynamics of Atmospheres and Oceans. 73, pp. 61 - 75. ELSEVIER, 01/03/2016. Available on-line at: <https://www.sciencedirect.com/science/article/pii/S0377026515300129>.

Type of production: Scientific paper **Format:** Journal
Position of signature: 2 **Degree of contribution:** Author or co-author of article in journal with external admissions assessment committee
Total no. authors: 2 **Corresponding author:** No
Relevant results: This study aims at an assessment of wind re-analyses for modelling storms in the Black Sea. A wind-wave modelling system (Simulating WAve Nearshore, SWAN) is applied to the Black Sea basin and calibrated with buoy data for three recent re-analysis wind sources,namely the European Centre for Medium-Range Weather Forecasts Reanalysis-Interim(ERA-Interim), Climate Forecast System Reanalysis (CFSR), and Modern Era Retrospective Analysis for Research and Applications (MERRA) during an extreme wave condition that occurred in the north eastern part of the Black Sea. The SWAN model simulations are carried out for default and tuning settings for deep water source terms, especially whitecapping.Performances of the best model configurations based on calibration with buoy data are discussed using data from the JASON2, TOPEX-Poseidon, ENVISAT and GFO satellites. TheSWAN model calibration shows that the best configuration is obtained with Janssen andKomen formulations with whitecapping coefficient (Cds) equal to 1.8e?5 for wave generation by wind and whitecapping dissipation using ERA-Interim. . Numerical results, thus show that the accuracy of awave forecast will depend on the quality of the wind field and the ability of the SWAN mode lto simulate the waves under extreme wind conditions in fetch limited wave conditions.

23 Sonia Ponce de Leon; Alejandro Orfila; Gonzalo Simarro. Wave energy in the Balearic Sea. Evolution from a 29 years spectral wave hindcast.Renewable Energy. 85, pp. 1192 - 1200. ELSEVIER, 01/02/2016. Available on-line at: <http://dx.doi.org/10.1016/j.renene.2015.07.076>.

Type of production: Scientific paper **Format:** Journal
Position of signature: 1 **Degree of contribution:** Author or co-author of article in journal with external admissions assessment committee
Total no. authors: 3 **Corresponding author:** No
Relevant results: This contribution deals with the wave climate variability in the Mediterranean by performing a wave simulation for a 29 year period. This work allowed to assess the potential for extracting wave energy around the Balearic Islands. The study uses the database created by the first author (S. Ponce de Leon) which was constructed using a third generation wave model and the reanalysis wind fields from ECMWF.

24 Sonia Ponce de Leon; Carlos Guedes Soares. Hindcast of the Hercules winter storm in the North Atlantic. Natural Hazards. 78 - 3, pp. 1883 - 1897. Springer, 22/05/2015. Available on-line at: <https://link.springer.com/article/10.1007/s11069-015-1806-7>. ISSN 0921-030X

Type of production: Scientific paper **Format:** Journal
Position of signature: 1 **Degree of contribution:** Author or co-author of article in journal with external admissions assessment committee
Total no. authors: 2 **Corresponding author:** No
Relevant results: This contribution deals with a characterization severe sea state of a peculiar winter season in which a number of consecutive storms took place severely beating the west of Europe. The study determined the Benjamin–Feir index. It is shown that close to the Iberian Peninsula there was a high probability of occurrence of abnormal waves generated in this storm.

25 Sonia Ponce de Leon; Carlos Guedes Soares. Hindcast of Extreme Sea States in North Atlantic Extratropical Storms. Ocean Dynamics. 65 - 2, pp. 241 - 254. Springer, 02/01/2015.

Type of production: Scientific paper
Format: Journal
Position of signature: 1
Degree of contribution: Author or co-author of article in journal with external admissions assessment committee
Total no. authors: 2
Corresponding author: No

Relevant results: This study examines the variability of freak wave parameters around the eye of northern hemisphere extratropical cyclones. The hindcast (from the WAM model) results were validated against the wave buoys and satellite altimetry data showing a good correlation. The variability of different wave parameters was assessed by applying the empirical orthogonal functions (EOF) technique on the hindcast data. From the EOF analysis, it can be concluded that the first empirical orthogonal function accounts for greater share of variability of significant wave height, peak period, directional spreading and Benjamin-Feir index. The share of variance in the first mode varies for cyclone and variable: for the 2nd storm and Hs variance (1st mode) contains 96 % of variance while for the 3rd storm and BFI V1accounts only for 26 % of variance.The variability of freak wave's parameters was inspected for extratropical cyclones.

26 Liliana Rusu; Sonia Ponce de Leon; Carlos Guedes Soares. Numerical modelling of the North Atlantic storms affecting the West Iberian coast.Proceedings of MARTECH 2014: 2nd International Conference on Maritime Technology and Engineering.pp. 1365 - 1370. Leiden(Holland): CRC Press/Balkema, Taylor & Francis Group, London, 30/09/2014. ISBN 9781138027275

Type of production: Scientific paper
Format: Journal
Corresponding author: No

27 J. F. Humeniuk; S. P. de Leon; N. Violante-Carvalho; L. M. de Carvalho; C. G. Soares. Sheltering effect of islands on the Pacific swell. Proceedings of IMAM 2013, 15th International Congress of the International Maritime Association of the Mediterranean. pp. 973 - 978. CRC Press/Balkema, Taylor&Francis Group, 2014. ISBN 978-1-138-00162-6

Type of production: Scientific paper
Format: Book
Position of signature: 2
Degree of contribution: Author or co-author of article in journal with external admissions assessment committee
Total no. authors: 5
Corresponding author: Yes

Relevant results: The sheltering effect of coastal islands on the Pacific Ocean swell is studied in the present work. Wave spectra were retrieved from ERS-2 SAR (European Remote Sensing Satellite 2, Synthetic Aper-ture Radar) measurements in the shadow zone of the islands to investigate the swell evolution. Comparisons were made between the swell spectra retrieved in the sheltered and non-sheltered zones from SAR and wave buoys from the National Data Buoy Center moored nearby. Several SAR images were selected from the Euro-pean Space Agency (ESA) data base that satisfied a threshold minimum wind speed and particular wave prop-agation directions for the area. Information from a third generation wave model was used to compare the di-rectional wave spectra with the remote sensing data employed.This contribution is part of the Master of Science Thesis Work of my student Jamila Jumeniuk who was during 6 months working under my direction at CENTEC, Instituto Superior Tecnico, University of Lisbon.

28 S. Ponce de León; Alejandro Orfila. Numerical study of the marine breeze around Mallorca Island. Applied Ocean Research. 40, pp. 26 - 34. ELSEVIER, 08/01/2013. Available on-line at: <http://www.sciencedirect.com/science/article/pii/S014111871200096X?via%3Dihub>.

Type of production: Scientific paper
Format: Journal
Position of signature: 1
Degree of contribution: Author or co-author of article in journal with external admissions assessment committee
Total no. authors: 2
Corresponding author: Yes

Relevant results: This contribution deals with the characterization of marine breezes around the Majorca Island. This phenomenon modifies the wave field. The study was planned in order to show that around islands breezes need to be accounted for in the forcing. A study of marine breezes and their impact on the wave field around Mallorca Island was carried out by numerical simulations with the spectral wave model SWAN and three different wind fields: WRF – Weather Research and Forecasting model, HIRLAM – High Resolution Limited Area model and ECMWF – European Center for Medium-range Weather Forecasts. The main characteristics of the modelled

breeze circulation and its effects on the wave field are analyzed. The modified wave field under breeze conditions and the correlations with their variability and daily short life time period are studied and discussed by analyzing the spectral balance. The results show that the accuracy of a wave forecast will depend on the quality of the wind field and its ability to simulate the sea breeze induced waves. The study period covers the summers of 2009 and 2010. In addition, to assess the performance of SWAN forced with two different winds the numerically obtained significant wave heights (Hs) are collocated against the ENVISAT-ESA's Environmental Satellite measurements (GLOBWAVE data) of Hs around the Mallorca Island.

29 S. Ponce De León; C. Guedes Soares. Distribution of winter wave spectral peaks in the seas around Norway. Ocean Engineering. 50, pp. 63 - 71. ELSEVIER, 15/08/2012. Available on-line at: <https://www.sciencedirect.com/science/article/pii/S0029801812001667>.

Type of production: Scientific paper
Format: Journal
Position of signature: 1
Degree of contribution: Author or co-author of article in journal with external admissions assessment committee
Total no. authors: 2
Corresponding author: Yes

Relevant results: This contribution deals with the analysis of wave spectra obtained by the WAM model in order to characterize typical spectra. A hindcast study is made of a severe winter period in the seas around Norway. The European Center for Medium-range Weather Forecasts (ECMWF) reanalysis wind data are used as forcing of a third generation wave model. A spectral characterization is given for the Norwegian Sea and Barents Sea long fetch regions and for the limited fetch area of the North Sea. The study was carried out by applying the WAM model to the North Atlantic region. The WAM model produced six hourly spectra and a total of 247 spectra were analyzed for two relatively nearby locations in the North Sea, two at the Norwegian continental shelf and two locations in the Barents Sea. Multi-peaked hindcast wave spectra were typically obtained for the North Sea, whereas in the Norwegian Sea one peaked spectra are the most common. The Barents Sea also presented a similar occurrence of the bimodal spectra as in the North Sea.

30 A. Sanchez-Arcilla; M. Espino; R. Bolaños; J. Gomez; G. Jorda; Sonia Ponce de Leon; A. Sairouni. Wave and current forecasting along the Spanish Catalan coast. Elsevier Oceanography Series. 69 - C, pp. 379 - 385. ELSEVIER, 2003. Available on-line at: <https://www.sciencedirect.com/science/article/pii/S0422989403800636>.

Type of production: Scientific paper
Format: Journal
Position of signature: 6
Degree of contribution: Author or co-author of article in journal with external admissions assessment committee
Total no. authors: 7
Corresponding author: No

Relevant results: Wave and current predictions along the Spanish Catalan coast (NW Mediterranean) are considered in this paper. Wave predictions are obtained using the WAM 4.0 code while current predictions come from the POM model. Their validation with a network of buoys and the quality and improvement of predictions are also briefly considered. https://doi.org/10.1016/S0422-9894(03)80063-6

Works submitted to national or international conferences

1 **Title of the work:** Assessment of combined wind and wave energy in European Coastal waters using satellite altimetry data. Living Planet Symposium, 23-27 May 2022, Bonn, Germany.
Name of the conference: Living Planet Symposium 2022
Corresponding author: Yes
City of event: Bonn, Köln, Germany
Date of event: 23/05/2022
End date: 27/05/2022
Organising entity: European Space Agency
City organizing entity: Frascati (Roma), Lazio, Italy
Sonia Ponce de Leon; Joao Bettencourt; John Ringwood. "Proceedings of Living Planet Symposium 2022".

2 **Title of the work:** Comparison of wave spectra in the Agulhas current system using spectral wave models and SAR. CFOSAT 2nd International Science Team Meeting, 15-18 March 2021. Organizers: CNES, CNRS, LORA, METEOFRANCE, IFREMER, LOPS
Name of the conference: CFOSAT 2nd International Science Team Meeting
Corresponding author: Yes
City of event: Paris, France
Date of event: 15/03/2021
End date: 18/03/2021
Organising entity: CNES
City organizing entity: Toulouse, Midi-Pyrénées, France
Sonia Ponce de Leon. "Comparison of wave spectra in the Agulhas current system using spectral wave models and SAR".

3 **Title of the work:** Wave-current interactions in the Agulhas Current.
Name of the conference: 12th Coastal Altimetry Workshop (CAW12)
Corresponding author: Yes
City of event: Frascati, Roma, Italy
Date of event: 04/02/2020
End date: 07/02/2020
Organising entity: European Space Agency **Type of entity:** State agency
City organizing entity: Frascati, Italy
Sonia Ponce de Leon; Carlos Guedes Soares; Jonnhy Johannessen. "CAW12th Final Report, ESA Publication".

4 **Title of the work:** North Atlantic Extratropical cyclones extreme waves from satellite altimetry observations
Name of the conference: Atlantic from Space Workshop
Corresponding author: Yes
City of event: Southampton, Hampshire and Isle of Wight, United Kingdom
Date of event: 23/01/2019
End date: 25/01/2019
Organising entity: European Space Agency (ESA) **Type of entity:** R&D Centre
City organizing entity: Paris, Île de France, France
Sonia Ponce de Leon; Joao Bettencourt. "https://www.dropbox.com/sh/z57c4vhlf65qjha/AABgcl2daWmxsj-_bOEeWkqYa?dl=0&preview=17.15+Sonia+Ponce+de+León.pdf".

5 **Title of the work:** Assessment of severe waves with satellite altimetry data and Doppler radar observations in the North Sea
Name of the conference: 25Year of Progress in radar altimetry symposium
Corresponding author: Yes
City of event: Ponta Delgada, Região Autónoma dos Açores, Portugal
Date of event: 24/09/2018
End date: 29/09/2018
Organising entity: European Space Agency (ESA) **Type of entity:** State agency
City organizing entity: Paris, Île de France, France
Sonia Ponce de Leon; Joao Bettencourt; Frederic Dias. "Assessment of severe waves with satellite altimetry data and Doppler radar observations in the North Sea.".

6 **Title of the work:** On the importance of the exact nonlinear interactions in the spectral characterization of rogue waves
Name of the conference: 37th International Conference on Ocean, Offshore and Arctic Engineering, OMAE2018
Corresponding author: Yes

City of event: Madrid, Community of Madrid, Spain
Date of event: 17/06/2018
End date: 22/06/2018
Organising entity: ASME-The American Society of Mechanical Engineers **Type of entity:** Foundation
City organizing entity: New York, United States of America
Sonia Ponce de Leon; Alfred Osborne; Carlos Guedes Soares. "On the importance of the exact nonlinear interactions in the spectral characterization of rogue waves".

7 **Title of the work:** Performance of WAVEWATCH-III and SWAN models in the North Sea
Name of the conference: 37th International Conference on Ocean, Offshore and Arctic Engineering, OMAE2018
Corresponding author: Yes
City of event: Madrid, Community of Madrid, Spain
Date of event: 17/06/2018
End date: 22/06/2018
Organising entity: ASME-The American Society of Mechanical Engineers **Type of entity:** Foundation
City organizing entity: New York, United States of America
Sonia Ponce de Leon; Joao Paulo Bettencourt; Christopher Higgins; Patrick Doohan; Gerbrant Van Vledder; Carlos Guedes Soares. "Performance of WAVEWATCH-III and SWAN models in the North Sea".

8 **Title of the work:** Highly Nonlinear Extreme Waves in Currituck Sound: Interpretation in Terms of Highly Dense Breather Turbulence in a Random Wave
Name of the conference: 15th International Workshop on Wave Hindcasting and Forecasting and 6th Storm Surges and Coastal Hazards Symposium, Storm Surges and Coastal Hazards
Type of event: Conference
Corresponding author: No
City of event: Liverpool, Merseyside, United Kingdom
Date of event: 10/09/2017
End date: 15/09/2017
Organising entity: NOC-National Oceanography Centre **Type of entity:** R&D Centre
City organizing entity: Liverpool, United Kingdom
Type of contribution: Scientific paper
Alfred Osborne; Andrea Costa; Sonia Ponce de Leon. "Highly Nonlinear Extreme Waves in Currituck Sound: Interpretation in Terms of Highly Dense Breather Turbulence in a Random Wave".

9 **Title of the work:** Spectral characterization of rogue seas using high resolution nonlinear interactions in Portugal
Name of the conference: 15th International Workshop on Wave Hindcasting and Forecasting and 6th Storm Surges and Coastal Hazards Symposium, Storm Surges and Coastal Hazards
Corresponding author: Yes
City of event: Liverpool, Merseyside, United Kingdom
Date of event: 10/09/2017
End date: 15/09/2017
Organising entity: NOC-National Oceanography Centre **Type of entity:** Innovation and Technology Centres
City organizing entity: Liverpool, Merseyside, United Kingdom
Sonia Ponce de Leon. "Spectral characterization of rogue seas using high resolution nonlinear interactions in Portugal". Available on-line at: <http://www.waveworkshop.org/15thWaves/index.htm>.

10 **Title of the work:** Real world ocean rogue waves explained without the modulational instability
Name of the conference: Symposium Wind Waves
Corresponding author: No
City of event: London, Inner London, United Kingdom
Date of event: 04/09/2017
End date: 08/09/2017
Organising entity: International Union of Theoretical and Applied Mechanics (IUTAM) **Type of entity:** Foundation
City organizing entity: London, Inner London, United Kingdom
Francesco Fedele; Joseph Brennan; Sonia Ponce de Leon; Jonh Dudley. "Real world ocean rogue waves explained without the modulational instability".

11 **Title of the work:** Properties of rogue waves and the shape of the ocean wave power spectrum
Name of the conference: 36th OMAE2017 (International Conference on Ocean, Offshore & Arctic Engineering)
Type of event: Conference **Geographical area:** Non EU International
Type of participation: Participatory - oral communication **Reasons for participation:** Review before acceptance
Corresponding author: Yes
City of event: Trondheim, Norway
Date of event: 25/06/2017
End date: 30/06/2017
Organising entity: ASME-American Society of Mechanical Engineers **Type of entity:** Foundation
City organizing entity: New York, United States of America
Publication in conference proceedings: Yes
Type of contribution: Scientific paper
Alfred Osborne; Sonia Ponce de Leon. "Properties of rogue waves and the shape of the ocean wave power spectrum". En: ASME proceedings. V03AT02A013 - 3, pp. 1 - 12. (United States of America): ASME-The American Society of Mechanical Engineers, 01/09/2017. Available on-line at: <http://proceedings.asmedigitalcollection.asme.org/proceeding.aspx?articleid=2655398>. ISBN 978-0-7918-5765-6

12 **Title of the work:** Real world ocean rogue waves explained without the modulational instability
Name of the conference: European Geosciences Union (EGU) General Assembly 2016
Corresponding author: No
City of event: Viena, Austria
Date of event: 17/04/2016
End date: 22/04/2016
Organising entity: European Geosciences Union **Type of entity:** Foundation
City organizing entity: Vienna, Austria
Francesco Fedele; Joseph Brennan; Sonia Ponce de Leon; Jonh Dudley; Frederic Dias; Frederic Dias. "Real world ocean rogue waves explained without the modulational instability".

13 **Title of the work:** Modelling wave spectra in the North Sea: Influence of the nonlinear interactions computation
Name of the conference: Brazilian Symposium on Ocean Waves
Corresponding author: Yes
City of event: Rio de Janeiro, Brazil
Date of event: 14/03/2016
End date: 16/04/2016
Type of entity: University

Organising entity: COPPE, Federal University of Rio de Janeiro
City organizing entity: Rio de Janeiro, Brazil
Sonia Ponce de Leon; Frederic Dias. "Modelling wave spectra in the North Sea: Influence of the nonlinear interactions computation".

14 **Title of the work:** Comparison of hindcasted extreme waves with a Doppler radar measurements in the North Sea
Name of the conference: 14th International Workshop on Wave Hindcasting and Forecasting and the 5th Coastal Hazards Symposium
Corresponding author: Yes
City of event: Key West, Florida, United States of America
Date of event: 08/11/2015
End date: 13/11/2015
Organising entity: JCOMM, Environment Canada and the US Army Corps of Engineers
City organizing entity: United States of America
Sonia Ponce de Leon; Joao Paulo Bettencourt; Frederic Dias. "Comparison of hindcasted extreme waves with a Doppler radar measurements in the North Sea".

15 **Title of the work:** Evolution of the extreme wave region in the North Atlantic using a 23 year hindcast.
Name of the conference: 34th International Conference on Ocean, Offshore and Arctic Engineering OMAE 2015
Corresponding author: Yes
City of event: St. Jonhs, Canada
Date of event: 31/05/2015
End date: 05/06/2015
Organising entity: ASME-The American Society of Mechanical Engineers **Type of entity:** Foundation
City organizing entity: St. Jonhs, Canada
Sonia Ponce de Leon; Joao Paulo Bettencourt; Joseph Brennan; Frederic Dias. "Evolution of the extreme wave region in the North Atlantic using a 23 year hindcast.".

16 **Title of the work:** Local analysis of wave fields produced from hindcasted rogue wave sea states.
Name of the conference: 34th International Conference on Ocean, Offshore and Arctic Engineering OMAE 2015
Corresponding author: No
City of event: St. Jonhs, Canada
Date of event: 31/05/2015
End date: 05/06/2015
Organising entity: ASME-The American Society of Mechanical Engineers **Type of entity:** Foundation
City organizing entity: St. Johns, Canada
Frederic Dias; Joseph Brennan; Sonia Ponce de Leon; Colm Clancy; Jonh Dudley. "Local analysis of wave fields produced from hindcasted rogue wave sea states".

17 **Title of the work:** Extreme wave parameters under North Atlantic extratropical cyclones
Name of the conference: WISE Meeting (Waves in Shallow water Environment)
Corresponding author: Yes
City of event: Reading, United Kingdom
Date of event: 08/06/2014
End date: 12/06/2014
Organising entity: ECMWF-European Centre for Medium-Range Weather Forecasts

City organizing entity: Reading, United Kingdom
Sonia Ponce de Leon; Carlos Guedes Soares. "Extreme wave parameters under North Atlantic extratropical cyclones".

18 **Title of the work:** Comparison of extreme storms in the North Atlantic and Mediterranean
Name of the conference: 3rd IAHR Europe Congress
Corresponding author: Yes
City of event: Porto, Centro (P), Portugal
Date of event: 14/04/2014
End date: 16/04/2014
Organising entity: FEUP-University of Porto **Type of entity:** University
City organizing entity: Porto, Portugal
Sonia Ponce de Leon; Jesus Gomez; Agustin Sanchez-Arcilla Conejo; Carlos Guedes Soares. "Comparison of extreme storms in the North Atlantic and Mediterranean".

19 **Title of the work:** Sheltering effect of islands on the Pacific swell
Name of the conference: IMAM-International Maritime Association of the Mediterranean
Corresponding author: Yes
City of event: A Coruna, Galicia, Spain
Date of event: 14/10/2013
End date: 17/10/2013
Organising entity: Barrie Foundation and University of A Coruna **Type of entity:** Foundation
City organizing entity: A Coruna, Galicia, Spain
Jamila Jumeniuk; Sonia Ponce de Leon; Nelson Violante Carvalho; L.M. De Carvalho; Carlos Guedes Soares. "Sheltering effect of islands on the Pacific swell".

20 **Title of the work:** The Effect of Islands on the Wind Wave Spectrum observed in SAR Images
Name of the conference: Living Planet Symposium,
Corresponding author: No
City of event: Edinburg, United Kingdom
Date of event: 09/09/2013
End date: 13/09/2013
Organising entity: European Space Agency (ESA) **Type of entity:** State agency
City organizing entity: Paris, Île de France, France
Jamila Humeniuk; Nelson Violante-Carvalho; Sonia Ponce de Leon; Carlos Guedes Soares. "The Effect of Islands on the Wind Wave Spectrum observed in SAR Images".

21 **Title of the work:** Extreme swell in North Atlantic winter storms based on WAM model and satellite altimetry
Name of the conference: GLOBWAVE Meeting
Corresponding author: Yes
City of event: Lisbon, Lisboa, Portugal
Date of event: 07/11/2012
End date: 11/11/2012
Organising entity: European Space Agency (ESA) **Type of entity:** State agency
City organizing entity: Paris, Île de France, France
Sonia Ponce de Leon; Carlos Guedes Soares. "Extreme swell in North Atlantic winter storms based on WAM model and satellite altimetry". Available on-line at: <http://globwave.ifremer.fr/download/65_de_leon_Sonia_GLOBWAVE_LISBON2012.pdf>.

22 **Title of the work:** Characterization of the Mediterranean SWH variability over the last 23 years.
Name of the conference: WISE Meeting
Corresponding author: Yes
City of event: Barcelona, Catalonia, Spain
Date of event: 16/04/2012
End date: 20/10/2012
Organising entity: Universitat Politècnica de Catalunya **Type of entity:** University
City organizing entity: Barcelona, Catalonia, Spain
Sonia Ponce de Leon; Alejandro Orfila; Guillermo Visozo; Joaquin Tintore. "Characterization of the Mediterranean SWH variability over the last 23 years".

23 **Title of the work:** Ponce de León S., Bettencourt J.H., Jonh Ringwood, 2022 Assessment of combined wind and wave energy in European Coastal waters using satellite altimetry data.
Name of the conference: D2.09.1 Sustainable Natural Resources and Energy, Living Planet Symposium 2022
Corresponding author: Yes
City of event: Bonn, Germany
Organising entity: European Space Agency
City organizing entity: Roma, Lazio, Italy
Sonia Ponce de Leon; Joao Horta Bettencourt; John Ringwood.

R&D management and participation in scientific committees

Scientific, technical and/or assessment committees

1 **Committee title:** Advisor of the European Space Agency
Affiliation entity: European Union
City affiliation entity: Frascati (Roma), Lazio, Italy
Start-End date: 13/06/2022 - 13/06/2025

2 **Committee title:** FONDECYT Regular 2017 grant competition
Geographical area: asesor
Primary (UNESCO code): 251000 - Oceanography
Secondary (UNESCO code): 251007 - Physical oceanography
Tertiary (UNESCO code): 251007 - Physical oceanography
City: Santiago de Chile, Chile
Affiliation entity: Chilean National, Science and Technology Commission (CONICYT - Chile)
City affiliation entity: Santiago de Chile, Chile
Start-End date: 05/11/2016 - 05/12/2016

3 **Committee title:** Member of the Scientific Committee of the Doctoral thesis: Improving wave forecasting in variable wind conditions. M. Alomar Dominguez
Geographical area: National
Primary (UNESCO code): 251000 - Oceanography
Secondary (UNESCO code): 251007 - Physical oceanography
Tertiary (UNESCO code): 251000 - Oceanography
City: Barcelona, Catalonia, Spain
Affiliation entity: Universitat Politècnica de Catalunya **Type of entity:** University

City affiliation entity: Barcelona, Catalonia, Spain
End date: 03/12/2012

4 **Committee title:** Member of the Academic Thesis : "Morphological changes of the Cassino beach, Rio Grande"
Geographical area: Non EU International
Primary (UNESCO code): 250600 - Geology
Secondary (UNESCO code): 250600 - Geology
Tertiary (UNESCO code): 250000 - Earth and space sciences
City: Rio Grande, Brazil
Affiliation entity: Federal University of Rio Grande (FURG) **Type of entity:** University
City affiliation entity: Rio Grande, Brazil
Start-End date: 15/05/1995 - 14/05/1996

Organization of R&D activities

1 **Title of the activity:** Guest Editor of the Special Issue on Extreme Waves
Type of activity: Scientific Publisher **Geographical area:** Internacional
Convening entity: Journal of Marine Science and Engineering
City convening entity: Basel, Switzerland
Start-End date: 20/05/2020 - 20/05/2021 **Duration:** 1 year - 12 months

2 **Title of the activity:** Chairman
Geographical area: European Union
Convening entity: 5th MARTECH2020 (International Conference on Maritime Technology and Engineering)
City convening entity: Lisbon, Lisboa, Portugal
Start-End date: 16/11/2020 - 19/11/2020 **Duration:** 2020 years - 4 days

3 **Title of the activity:** Chairman
Geographical area: European Union
Convening entity: 4th International Conference on Renewable Energies Offshore RENEW2020 **Type of entity:** University Research Institute
City convening entity: Lisbon, Lisboa, Portugal
Start-End date: 12/11/2020 - 15/11/2020 **Duration:** 2020 years - 5 days

4 **Title of the activity:** Session organizer of the 37th International Ocean Offshore and Arctic Engineering
Type of activity: Session organizer **Geographical area:** Non EU International
City of event: Madrid, Community of Madrid, Spain
Convening entity: ASME-The American Society of Mechanical Engineers **Type of entity:** Foundation
City convening entity: New York, United States of America
Type of participation: Organiser
Nº assistants: 60
Start-End date: 01/02/2018 - 22/06/2018 **Duration:** 11 months

R&D management

Name of the activity: Topic Organizer of the 37th International Ocean Offshore and Arctic Engineering
Type of management: Management of organised events
Performed tasks: 6
City of entity: Madrid, United States of America
Entity: ASME-The American Society of Mechanical Engineers **Type of entity:** University
Start date: 14/07/2017 **Duration:** 12 months
Access system: Designated by the corresponding party without competition
Specific tasks: During a year I was the topic organizer in the OMAE conference by receiving the papers submitted and looking for the adequate reviewers of them. Finally the accepted paper were assigned to the adequate session by me.
Identify key words: Mechanical aeronautics and naval engineering

Other achievements

Stays in public or private R&D centres

1 **Entity:** University College Dublin **Type of entity:** University
Faculty, institute or centre: School of Mathematics and Statistics
City of entity: Dublin, Border, Midland and Western, Ireland
Primary (UNESCO code): 251000 - Oceanography
Secondary (UNESCO code): 120900 - Statistics
Tertiary (UNESCO code): 250000 - Earth and space sciences
Start-End date: 01/09/2014 - 01/10/2016 **Duration:** 2 years - 1 month
Funding entity: European Union **Type of entity:** State agency
City funding entity: Brusels, Belgium
Name of programme: Euroepean Research Council Advanced Grant
Goals of the stay: Contracted
Provable tasks: 2
Acquired skills developed: During my stage at UCD, I have improved my knowledge on extreme waves and rogue waves investigating the role of the modulational instability in the generation of rogue waves.
Relevant results: I computed the wave spectrum for three rogue waves, to investigate the role of the modulational instability in the generation of rogue waves and in Fedele et al (2016), it was proposed that these particular rogue waves did not show signs of modulational instability.

2 **Entity:** European Space Agency (ESA-ESRIN), Largo Galileo Galilei 1
Faculty, institute or centre: EO Science, Applications and Climate Department
City of entity: Frascati (Roma), Lazio, Italy
Start date: 10/05/2022 **Duration:** 8 months
Goals of the stay: Guest

Obtained grants and scholarships

1 **Name of the grant:** ESA travel grant CAW12
Aims: Agencia Espacial Europea
Awarding entity: European Space Agency **Type of entity:** State agency
Conferral date: 12/12/2019 **Duration:** 5 days
End date: 07/02/2020
Entity where activity was carried out: 12th Coastal Altimetry Workshop (CAW12), Frascati, Roma
Faculty, institute or centre: European Space Agency

2 **Name of the grant:** ESA Grant 25 Years of Progress in Radar Altimetry Symposium
Aims: This grant is intended for attending the training sessions of ESA
Awarding entity: European Space Agency (ESA) **Type of entity:** This grant is intended to attend the 25 Years of Progress in Radar Altimetry Symposium and the training sessions
Conferral date: 12/06/2018 **Duration:** 4 months
End date: 29/09/2017
Entity where activity was carried out: 25YPRA organisation
Faculty, institute or centre: Azores Islands

3 **Name of the grant:** FCT fellowship (SFRH/BPD/84358/2012)
City awarding entity: Lisbon, Lisboa, Portugal
Identify key words: Earth sciences
Aims: Post-doctoral
Awarding entity: Portuguese Science and Technology Agency (FCT) **Type of entity:** State agency
Amount of the grant: 32.480 €
Conferral date: 01/01/2013 **Duration:** 20 months
End date: 01/09/2014
Entity where activity was carried out: University of Lisbon

4 **Name of the grant:** Juan de la Cierva
City awarding entity: Madrid, Community of Madrid, Spain
Identify key words: Earth sciences
Aims: Post-doctoral
Awarding entity: MINISTERIO DE EDUCACION Y CIENCIA
Conferral date: 01/06/2009 **Duration:** 3 years
End date: 01/06/2012
Entity where activity was carried out: Instituto Mediterráneo d Estudios Avanzados
Faculty, institute or centre: Marine Technologies, Operational Oceanography and Sustainability

5 **Name of the grant:** Torres-Quevedo
City awarding entity: Madrid, Community of Madrid, Spain
Identify key words: Information technology and adata processing
Aims: Pre-doctoral
Awarding entity: MINISTERIO DE EDUCACION Y CIENCIA
Conferral date: 01/01/2007 **Duration:** 1 year
End date: 31/12/2007
Entity where activity was carried out: TECNOCEAN INGENIERÍA, S.L.

Faculty, institute or centre: centro