Bernabe Gomez Perez, PhD

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Postdoctoral Scholar
Civil and Environmental Engineering
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Research Interests

Coastal flooding and erosion. Applications of data science, artificial intelligence and numerical modeling in coastal hazards. Mitigation strategies for coastal protection, including Nature-based solutions. Tsunami warning systems. Ocean acoustics. Dynamics of Infragravity waves. Harbor wave agitation. Impacts of climate change and sea-level rise on coastal environments.

Research Experience

Civil and Environmental Engineering. UCLA (USA). Postdoctoral scholar. 2022 - Present

Lead interdisciplinary research that combines data science, numerical modeling, and artificial intelligence to understand and forecast coastal hazards. Analyse the role of wetlands in flood mitigation and sea level rise and climate change adaptation. Investigate wave agitation in harbors and develop forecasting systems. Evaluate the effectiveness of submerged breakwaters for coastal protection and stabilization. Analyse the pollution transport patterns in Santa Monica Bay. Plan, design, and lead field campaigns to collect topo-bathymetric data alongside measurements of flow velocity, water levels, salinity, and temperature.

Mathematics department. Cardiff University (UK). PhD student. 2017 - 2022

Develop a suite of complementary tools to enhance current Tsunami Warning Systems by integrating analytical solutions of differential equations, data science, numerical modeling and artificial intelligence. Advance ocean acoustic monitoring by analyzing hydroacoustic signals and applying machine learning and deep learning techniques to accurately estimate source characteristics from acoustic recordings. Investigate historical tsunami events by the application and validation of numerical models simulating tsunami generation and propagation.

IHCantabria. University of Cantabria (Spain). MSc Student. 2016 - 2017

Develop and validate a high-resolution a computational fluid dynamics (CFD) numerical model designed for simulating coastal runup across varying lagoon-reef system configurations. Investigate and adapt existing parameterizations to accurately quantify the potential coastal runup according to the specific characteristics of the reef-lagoon geometry.

LIPC Sisal. National Autonomous University of Mexico (Mexico). MSc Student. 2015 - 2016

Design, develop and execute a series of laboratory experiments in a wave flume simulator to investigate the impact of different reef geometries on coastal runup. Assist in the collection of bathymetric data and the deployment of Conductivity-Temperature-Depth (CTD) and Acoustic Doppler Current Profiler (ADCP) instruments.

Publications

Gomez B., Gallien T.W. & Diaz-Hernandez G. *Numerical modeling of Infragravity wave propagation and amplification in a small harbor in Southern California (2025).* Under review in journal of Coastal Engineering.

Gomez B., Portillo N., Giddings S., Whitcraft C. & Gallien T.W. *Impacts of mouth reconfiguration and climate change on a Southern California estuary (2025).* Under internal review.

Gomez B., Gallien T.W., Giddings S., Whitcraft C. & Boxiang T. *Evaporation impacts on residence times and salinity transport in a low-inflow estuary.* Estuaries and Coasts journal, Springer (2024).

Gomez B., Gallien T.W. & Giddings S. *Infragravity wave oscillation forecasting in a shallow estuary.* Journal of Marine Science and Engineering, MDPI (2024).

Gomez, B. & Kadri, U. *Numerical validation of an effective slender fault source solution for past tsunami scenarios.* Physics of Fluids 35.4 (2023).

Gomez, B. & Kadri, U. *Near real-time calculation of submarine fault properties using an inverse model of acoustic signals.* Appl. Ocean. Res.109, 102557 (2021).

Gomez, B. & Kadri, U. *Earthquake source characterization by machine learning algorithms applied to acoustic signals.* Scientific Reports 11.1 (2021).

Teaching and Mentoring

Earth and Space science mentor. Mentoring365. Mentor. 2024 - Present

Global mentoring platform for the Earth and space sciences community supported by the American Geosciences Union.

Mentor for PhD and MSc students. UCLA. Postdoctoral scholar. 2022 - Present

Provide guidance on research for Master's degree and PhD students. Hold individual regular meetings with PhD students to offer guidance and support. Lead a scientific reading group.

Teaching assistant. Cardiff University, Mathematics Department. PhD student. 2017 - 2022

MA1301, Classical Mechanics.	Fall 2018 and Fall 2019
MA2303, Vibrations and Waves.	Fall 2018
MA1005, Foundations of Mathematics.	Fall 2017
MA1008, Linear Algebra.	Spring 2017 and Spring 2018
MA1003, Computing for Mathematics (Python).	Spring 2019

Mentor for MSc and BSc students. Cardiff University. PhD student. 2017 - 2022

Provide guidance to undergraduate and master's degree students in their scientific work and job applications, assistance with coursework and hold office hours.

Centro de Estudios Estela, Spain. Tutor. 2011 - 2013

Private tutorials in physics and mathematics for high school students.

Attended Workshops and Training

Center for the Integration of Research, Teaching, and Learning (CIRTL). 2024 – Present

Associate level. Professional development certification in evidence-based teaching strategies and development of quantitative and qualitative research skills

Evidence-Based Undergraduate STEM Teaching course 2024

Postdoc Research Mentor training 2024

The College Classroom 2024

Mentoring365, AGU. Mentoring Training course; Inclusive Mentoring course. 2024

FUNWAVE-TVD workshop, Northeastern University, College of Engineering. 2023

Coastal hydrodynamic modeling (Delft3D-FM) by Deltares, online. 2022

Statistical simulation course, Mathematics Department, Loughborough University. 2019

InFoMM mathematical modelling camp, Mathematics Department, Oxford University. 2018

Machine learning theory and applications workshop (Professor Alexander Balinsky) Mathematics department, Cardiff University. 2018

COMSOL Multiphysics workshop, Mathematics department, Cardiff University 2017

Organized Seminars

CEE200 Graduate Seminar Series, UCLA. 2022

Co-organized seminar series on Civil and Environmental Engineering with Prof. Timu Gallien.

Applied Mathematics Seminar Series, Cardiff University. 2018

Co-organized seminar on Applied Mathematics with Dr. Usama Kadri.

Conference Presentations / Posters

Poster - Gomez B., Gallien T.W., Boxiang T., Giddings S. & Whitcraft C. *Evaporation impacts on residence time and salinity transport in a low-inflow estuary*. AGU24, American Geosciences Union. 2024.

Gomez B., Gallien T.W., Boxiang T., Giddings S. & Whitcraft C. *Validated hydrodynamic and transport modeling in a small shallow low in-flow estuary*. Coastal & Estuarine Research Federation (CERF), Portland, Oregon, 2023.

Gomez, B. & Kadri, U. *Numerical validation of tsunamigenic source retrieval by machine learning methods*. Underwater Acoustics Conference and Exhibition (UACE), online, 2021.

Gomez, B. & Kadri, U., *Machine learning applications to underwater earthquake characterization by acoustic radiation analysis*. Cardiff SIAM-IMA three-minute thesis competition, Cardiff University, 2019.

Poster - Gomez, B. & Kadri, U. *Infragravity acoustic waves generated by underwater earthquakes*. Oxford SIAM-IMA Student chapter conference, 2018.

Gomez, B. & Kadri, U. *Inverse problems for earthquake-induced acoustic radiation.* Welsh Mathematics Colloquium, 2018.

Gomez, B. & Kadri, U. *Underwater earthquake induced acoustic radiation analysis*. European Geosciences Union (EGU), Viena, Austria, 2017.

Poster - Gomez, B. & Kadri, U. *Inverse problems for earthquake-induced acoustic radiation.* SIAM chapter conference Southampton, 2017.

Invited Talks / Guest Lectures

Guest Lecture. *Introduction to Water Resources Engineering*. CEE 151 - Introduction to Water Resources Engineering. Instructor: Professor Isabella Arzeno Soltero. University of California, Los Angeles. Feb 2025.

Invited talk. *Costal hazards modelling and prediction*. Loyola University Maryland, Department of Mathematics and Statistics. January 2025.

Guest Lecture. *Numerical Models*. CEE 107 - Environmental Fluid Mechanics. Instructor: Professor Timu Gallien. University of California, Los Angeles. 25th November 2024.

Guest Lecture. *Introduction to Waves*. CEE 107 - Environmental Fluid Mechanics. Instructor: Professor Isabella Arzeno Soltero. University of California, Los Angeles. October 2024.

Research Seminar. *Navigating Coastal Challenges: Forecasting Hazards and Climate Change Impacts*. 2024 Fall CEE seminar series. 5th November 2024.

Research Seminar. *Data collection and numerical modelling*. CEE 298 - Seminar. University of California, Los Angeles. November 2023.

Research Seminar. *Numerical validation of past tsunami scenarios.* Cardiff University Applied Mathematics Seminar, 2021.

Research Seminar. *Development of a suite of complementary tools to current tsunami warning systems*. South China Sea Tsunami Workshop. Zhejiang University, Hangzhou, China. (SCSTW-2019).

Research Seminar. *Underwater earthquake induced acoustic radiation analysis*. South China Sea Tsunami Workshop, Department of Civil and Environmental Engineering, National University of Singapore (SCSTW-2018).

Research Seminar. *Integration of numerical models with artificial intelligence algorithms for tsunami wave forecasting*. Cardiff University applied mathematics seminar series, 2019.

Research Seminar. *Effects of reef geometry on coastal run-up.* LIPC Sisal, coastal engineering seminar, 2016.

Education

Ph.D. in Applied Mathematics 2017 - 2022
Cardiff University, United Kingdom
Advisor: Dr. Usama Kadri, Cardiff University, UK
Dissertation title: *Underwater earthquake characterization by acoustic radiation analysis*.

Master's degree in Coastal and Environmental Engineering 2014 - 2017
IHCantabria, University of Cantabria, Spain
Advisor: Dr. Alec Torres-Freyermuth, UNAM, Mexico
Dr. Mauricio Gonzalez, IH Cantabria, Spain
Master's thesis title: *Coastal runup in varying reef-lagoon system geometries*.

Bachelor's degree in Civil Engineering 2009 - 2013
University of Cantabria, Spain

Professional experience

Postdoctoral scholar, Civil and Environmental Engineering 2022 - Present
University of California Los Angeles, USA
Advisor: Prof. Timu Gallien, University of California Los Angeles
Prof. Sarah Giddings, Scripps Institution of Oceanography

Civil Engineer. CONING, Spain. 2013 - 2014

Civil Engineering consulting.

Awards and Grants

Santa Monica Living Breakwater Analysis. Coauthored grant proposal submitted to The Bay Foundation. PI: Professor Timu Gallien (425,000 USD). 2024.

Article promoted as featured by the journal Physics of Fluids. Gomez, B. & Kadri, U. *Numerical validation of an effective slender fault source solution for past tsunami scenarios.* 2023.

Oxford SIAM-IMA Student chapter conference poster presentation 1st price. United Kingdom, 2018.

Engineering and Physical Sciences Research Council (EPRSC) graduate student scholarship. United Kingdom, 2017.

Consejo Nacional de Ciencia y Tecnologia (CONACYT) scholarship for international researchers. Mexico, 2015.

Instrumentation

Hydrodynamic and biogeochemical: Acoustic Doppler Current Profiler (ADCP), Acoustic Doppler Velocimeter (ADV), Conductivity-Temperature-Depth (CTD), GPS, pressure sensors, thermistors, capacitive level sensors and optical backscatter sensors.

Topobathymetric: 3D mapping by drone photogrammetry and SonTek HydroSurveyor bathymetry.

Featured Articles in Media

American Society of Civil Engineers (ASCE). "*Creating a tsunami warning system using artificial intelligence*".

Science Magazine (SCIENMAG). "*AI could help to refine tsunami warning systems*".

Association for the Advancement of Science, Eurekalert. "*Creating a tsunami warning system using artificial intelligence*".

Cardiff University news: Using artificial intelligence to create a tsunami early warning system.

Field Experience

Lead and participant at Santa Monica Beach bathymetry data collection, 2025.

Lead and participant at Santa Monica Breakwater hydrodynamic data collection, two ADCPs, two CTDs and RBR sensors mounted on SeaSpyders, 2024.

Lead and participant in Naval Weapons Station Seal Beach harbor resonance data collection (3 RBR pressure sensors), 2024.

Participant at Santa Monica Beach LiDAR topography data collection, 2024.

Lead and participant in Coastal Flood Lab (UCLA) El Nino recording campaign, configuration, and deployment of CTDs, dissolved oxygen gauges, ADV, ADCPs and pressure sensors in the Seal Beach Wildlife Refuge, 2023-2024.

Lead and participant in Hydro-surveyor bathymetry data collection at Seal Beach National Wildlife Refuge estuary and Sunset Beach, UCLA, 2023.

Participant in configuration and deployment of pressure sensor offshore Seal Beach in collaboration with Shark Lab, California State Long Beach, 2023.

Coastal Flood Lab (CFL) pressure sensors deployment and maintenance (RBR and Paros) and GPS measurements inside Seal Beach National Wildlife Refuge, 2022 and 2023.

Drone photogrammetry operations participant, Cardiff Beach, Encinitas, 2022, 2023 and 2024.

Terrestrial LiDAR beach topography collection participant, Zuma Beach, 2023.

Deployment of instruments for El Nino recording. Design of experiments, configuration of sensors and participation in their deployment (ADCP, ADV, CTD, Thermistors, dissolved Oxygen, pressure and optical backscatter sensor), 2023.

Southern California Marine Institute MOTC boat course, UCLA 2022.

ADCP and CTD deployment participant in the Gulf of Mexico, Sisal, 2016.

Service

Panel reviewer for student applications, RISING Tides program (CERF, 2025).

Community Science Fellow (AGU, 2025).

Member of the American Geosciences Union (AGU, 2023 - Present).

Member of the Coastal and Estuarine Research Federation (CERF, 2022 - Present).

Founder of **bluecoastresearch.org**, platform created to share ocean science resources and knowledge (2024 - Present)

Nearshore Processes Student Presentation at AGU24 reviewer (2024)

La Ballona Elementary School, science outreach to elementary school students (2024).

Coastal & Estuarine Research Federation biennial conference Student presentation assessment (2023).

Reviewer for *Applied Ocean Research* (2022 - Present), *Physics of Fluids* (2023 - Present) and *Journal Of Marine Science and Engineering* (2024 - Present).

Mathematics tutorials for high school students with financial problems, Mathematics department, Cardiff University (2017 – 2019).

Mathematics support service. Cardiff University (2017 – 2019). Drop-in service for students or faculty looking for help with mathematics.

Member of the European Geosciences Union (EGU, 2018 - 2020).

Laboratory Experience

Design and construction of a scaled model representing a reef-lagoon system within a wave flume simulator. Installation and calibration of capacitive level sensors and configuration of the wavemaker. LIPC, Sisal, 2016.

Languages

English, proficient.

Spanish, native.

French, intermediate.

German, beginner/intermediate. A2 institute Goethe certificate.

Software and Programming

ArcGIS and ARCmap PRO, QGIS, LaTeX, MATLAB, Python, C#, Mathematica, Bash, Maple, Microsoft Office, Nortek software, Sea-Bird software, RTK Surveying, Ocean Contour, COMSOL, SWAN, FUNWAVE, XBeach, Delft3D.

References

1 - Professor Timu Gallien

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2 - Professor Sarah Giddings

Scripps Institution of Oceanography, University of California San Diego, USA.

sgiddings@ucsd.edu

3 - Dr. Usama Kadri

Mathematics Department, Cardiff University, United Kingdom.

kadriu@cardiff.ac.uk

4 - Professor Christine Whitcraft

Department of Biological Sciences, California State University, Long Beach. USA.

Christine.Whitcraft@csulb.edu

5 - Dr. Alec Torres-Freyermuth

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