# **Kyungmin Park**

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#### **RESEARCH INTERESTS**

Coastal Ocean Modeling, Coastal Flooding, Marine Renewable Energy, Climate Change, Earth System Modeling, Numerical Models, Data Analysis, Coastal Oceanography

#### **APPOINTMENTS**

Postdoctoral Research Associate	Seattle, Washington
Pacific Northwest National Laboratory	2023 - present
Visiting Scientist	Gloucester Point, Virginia
Virginia Institute of Marine Science	2022-2023
Graduate Research/Teaching Assistant	Atlanta, Georgia
Georgia Institute of Technology	2018-2022
Research Intern	Lecce, Italy
Euro-Mediterranean Center on Climate Change	2019
Research Intern	Daejeon, Korea
Korea Research Institute of Ship and Ocean Engineering	2014

#### **EDUCATION**

Georgia Institute of Technology	Atlanta, Georgia
Ph.D. in Ocean Science and Engineering	2022
• Overall GPA: 4.0 / 4.0 (100 / 100)	
Pusan National University	Busan, Korea
M.S. in Naval Architecture and Ocean Engineering	2017
• Overall GPA: 4.5 / 4.5 (100 / 100)	
Tongmyong University	Busan, Korea
B.Eng. in Naval Architecture and Ocean Engineering	2015
• Overall GPA: 4.24 / 4.5 (97.9 / 100)	

#### HONORS AND AWARDS

Allianz Climate Risk Research Award, Allianz, 2021 [link]
President's Award for Excellent Academic Record and Extracurricular Activity, Tongmyong University, 2015
Excellence Paper Award in Busan Future Scientist, Federation of Busan Science and Technology, 2014
Winner in Solar Boat Race, Human and Solar Powered Vessel Festival, 2014
Best Hull Form Design Award, Korea Research Institute of Ship and Ocean Engineering, 2014
Scholarship for Top Student, Tongmyong University, 2013
Excellence Award in the Creative Design Competition, Pusan National University, 2013 Silver Medal in the Capstone Design, Southeast Industry-University Cooperation, 2013 Excellence Award in Leisure Boat and Marina Design Competition, Chosun University, 2013 Creativity Design Award in National Yacht Model Design and Performance Competition, Gyeongnam Changwon-Science & Technology Promotion Agency, 2013 2nd Place in Solar Boat Race, Human and Solar Powered Vessel Festival (HSPVF), 2013 Scholarship, Korea Student Aid Foundation, 2012

## **RESEARCH EXPERIENCE**

- **1.** Pacific Northwest National Laboratory (Department of Energy) Seattle, Washington **Postdoctoral Research Associate** Jan. 2023-Present
  - Developed and deployed numerical models to characterize resources from Ocean Thermal Energy Conversion and ocean currents.
  - Developed marine energy converter to simulate the impacts of energy extraction on ocean conditions (https://github.com/schism-dev/schism/tree/veg-mec).
  - Supported the development of an Earth system modeling framework for the NOAA Unified Forecasting System (UFS) project, assisting testers by providing ideal meshes, model configurations, and pre- and post-processing scripts (https://github.com/wzhengui/pylibs).
  - Evaluated hydrodynamic-hydrological-wave coupled models within the UFS framework.

# 2. Virginia Institute of Marine Science

Gloucester Point, Virginia Jan. 2022-Jan. 2023

# **Visiting Scientist**

- Developed a hydrodynamic (SCHISM)-hydrological (NWM)-wave (WWM3) coupled model on HPC Linux systems for compound flood simulations, which covers the entire U.S. east coast and Gulf of Mexico.
- Utilized GIS/DEM data to generate unstructured grids and to visualize coastal vulnerability index.
- Created Python and MATLAB scripts for surface forcing/boundary conditions (interpolated from global-scale models and observations) and post-processing (visualization, data analysis).

# 3. Di Lorenzo Research Group, Georgia Institute of Technology **Graduate Research Assistant**

- Led a NOAA UFS project to evaluate the performance of the SCHISM coastal ocean model and assess its applications for marine navigation.
- Investigated multiple drivers of extreme water levels through numerical models and observations.
- Leveraged collaborations with diverse institutes to analyze coastal sea levels using interdisciplinary knowledge and skills.
- Engaged with coastal stakeholders (e.g., the City of Savannah and Chatham Emergency Management Agency in Georgia) for coastal protection and management plans.
- Won Allianz Climate Risk Research Award.

## 4. Euro-Mediterranean Center on Climate Change **Research Intern**

Lecce, Italy May 2019-July. 2019

Atlanta, Georgia

Aug. 2018-Dec. 2022

- Developed a city-scale (~10m) hydrodynamic model (SHYFEM) for a 3-day forecast system on the Georgia coast (<u>https://savannah.cmcc.it</u>).
- Conducted comparative analyses against available observations such as high-density water level sensors, buoys, tide gauges, CTDs and satellites to evaluate and validate model outputs.
- Calibrated model configurations (e.g., initial/boundary conditions, bathymetry, parameters) for enhanced accuracy.

<ul> <li>5. Global Core Research Center for Ship and Offshore Plants Researcher</li> <li>Developed Eulerian (OpenFOAM)-Lagrangian (LIGGGHTS) coupled model particle mixture flow.</li> </ul>	Busan, Korea Mar. 2017-Mar. 2018 l to analyze a liquid-gas-	
6. Computational Thermo-Fluids Laboratory, Pusan National University	Busan, Korea	
Graduate Research Assistant	Jan. 2015-Feb. 2017	
<ul> <li>Analyzed turbulent channel flows for different Reynolds numbers using the Simulation.</li> </ul>	Direct Numerical	
<ul> <li>Investigated flow characteristics around cylinders such as separated shear layers, vortex shedding and bluff body wakes using the Large Eddy Simulation.</li> </ul>		
<ul> <li>Led an industrial project (POSCO company) to optimize internal blast furnad molten iron mixture flows in porous media.</li> </ul>	ce flow, simulating air-	
7. Korea Research Institute of Ship and Ocean Engineering	Daejeon, Korea	
Research Intern	Sept. 2014-Dec. 2014	
<ul> <li>Evaluated hydrodynamic performance of ships and propellers using Comput (CFD), towing tanks and circulating water channel experiments.</li> </ul>	ational Fluid Dynamics	
8. Design and Building Solar Boat Group, Tongmyong University	Busan, Korea	
Leader	Jan. 2013-Aug. 2014	
- Lad a tagen of 10 - manch and in designing and building a solar nervous d hast	from concept to	

- Led a team of 10+ members in designing and building a solar-powered boat from concept to production.
- Optimized hull form design for energy efficiency using CFD and field testing.
- Won 14 awards in 8 competitions.

## **TEACHING AND MENTORING EXPERIENCE**

Teaching	
1. Introduction to Oceanography (EAS 4300), Georgia Institute of Technology	Atlanta, Georgia
Graduate Teaching Assistant	Jan. 2020-May 2020
Mentoring	
1. Spenser Wipperfurth, Georgia Institute of Technology	Atlanta, Georgia
PhD student	2022-2023

#### JOURNAL PUBLICATIONS

Google Scholar [link]. Impact Factor (IF) data sourced from JCR.

In preparation / submitted

- <u>K. Park</u>, Y. Zhang, E. Lorenzo, G. Seroka, A. Fujisaki, S. Peeri, S. Moghimi, J. Kelley (2024). "Evaluation of a 3d Unstructured Grid Model for the New York-New Jersey Harbor Under Different Forcing Sources", *Ocean Modelling (IF: 3.1; top 20 % in Oceanography)*, Under review (1<sup>st</sup> revision).
- <u>K. Park</u>, Z. Yang, A. Copping, F. Rollano (2024). "<u>A High-Resolution Modeling Study on the Influence of Thermal Gradient Variability on Ocean Thermal Energy Conversion Resources</u>", *Renewable Energy (IF: 9.0; top 14 % in Energy & Fuels)*, Under review (1<sup>st</sup> revision).
- <u>K. Park</u> Z. Yang, K. Haas, M. Muglia (2024). "<u>Characterization of Gulf Stream Energy Resources:</u> <u>A 30-year High-resolution Simulation Study</u>", *Renewable Energy (IF: 9.0; top 14 % in Energy & Fuels)*, Under review (1<sup>st</sup> revision).

Published

- L. Cui, F. Ye, Y. Zhang, H. Yu, Z. Wang, S. Moghimi, G. Seroka, J. Riley, S. Pe'eri, S. Mani, E. Myers, <u>K. Park</u>, L. Tang, Z. Yang, Y. Wang (2024). "<u>Total water level prediction at continental scale: coastal ocean</u>", *Ocean Modelling (IF: 3.1; top 20 % in Oceanography)*, 192, p.102451
- Y. Zhang, J. Anderson, <u>K. Park</u>, C. Wu, S. Wipperfurth, E. Anderson, S. Pe'eri, D. Beletsky, D. Titze, E. Lorenzo, S. Moghimi, G. Seroka, E. Myers, A. Fujisaki-Manome, J. Kelley (2024).
   "<u>Debunking common myths in coastal circulation modeling</u>", *Ocean Modelling (IF: 3.1; top 20 % in Oceanography)*, 190, p.102401.
- K. Park, E. Lorenzo, Y. Zhang, H. Wang, T. Ezer, F. Ye (2024). "Delayed coastal inundations caused by ocean dynamics post-Hurricane Matthew", *npj Climate and Atmospheric Science (IF:* 8.5; top 4.5 % in Meteorology & Atmospheric Science), Vol.7(1), p.5.
- Y. Son, E. Lorenzo, <u>K. Park</u>, S. Wipperfurth, J. Luo (2023). "<u>Data assimilation of hyper-local water</u> <u>level sensors for real-time monitoring of coastal inundation</u>", *Coastal Engineering (IF: 4.2; top 15.9 % in Engineering, Civil)*, Vol.186, pp. 104398.
- 8. K. Park, I. Federico, E. Lorenzo, T. Ezer, K. Cobb, N. Pinardi, G. Coppini (2022). "The contribution of hurricane remote ocean forcing to storm surge along the Southeastern U.S. coast.", *Coastal Engineering (IF: 4.2; top 15.9 % in Engineering, Civil)*, Vol.173, pp.104098.
- K. Park, M. Kim, H. Yoon (2019). "Effects of the Size and Friction Coefficient of Particles on a Liquid-Gas-Particle Mixture Flow in Dam Break." *AIP Advances (IF: 1.4; top 77.1 % in Physics, Applied)*, Vol.9, No.1, pp. 015208.
- K. Park, H. Yoon, M. Kim. (2018). "CFD-DEM based Numerical Simulation of Liquid-Gas-Particle Mixture Flow in Dam Break." *Communications in Nonlinear Science and Numerical Simulation (IF: 3.4; top 3.6 % in Mathematics, Applied)*, Vol.59, pp.105-121.

## **CONFERENCE PRESENTATIONS (Asterisk: speaker)**

- 1. **K. Park\***, Z. Yang, A. Copping (2024). "Numerical model-based Ocean Thermal Energy Conversion (OTEC) resource characterization", AGU Fall Meeting 2024
- 2. F. Ticona\*, **K. Park**, Z. Yang, A. Copping (2024). "Resource characterization in support of an OTEC multi-use platform", Ocean Sciences Meeting 2024
- 3. **K. Park\***, Z. Yang, K. Haas (2024). "Characterization of the Gulf Stream using a 3D Unstructuredgrid Model for Marine Energy Assessment", Ocean Sciences Meeting 2024
- 4. Y. Zhang, **K. Park**, S. Wipperfurth, G. Seroka, A. Fujisaki, S. Pe'eri (2024). "Rigorous and defensible in silico simulation for New York Harbor", 104th AMS Annual Meeting
- K. Park\*, et al. (2023). "Numerical Modeling of Large-scale Ocean Circulation for Better Understanding of Coastal Dynamics and Energy Fluxes", Coastal & Estuarine Research Federation 2023
- L. Cui\*, F. Ye, J. Zhang, Z. Wang, S. Moghimi, G. Skrocka, J. Riley, S. Mani, E. Myers, K. Park (2023) "Total Water Elevation Prediction at the Continental Scale", Coastal & Estuarine Research Federation 2023
- B. Maldonado\*, H. Wang, K. Park, A. George, Z. Wang, J. Zhang, F. Ye, L. Cui (2023) "Coastal water anomaly, Gulf Stream deceleration, and cross-shelf mixing in South Atlantic Bight post-Hurricane Matthew", Coastal & Estuarine Research Federation 2023
- 8. Y. Son\*, E. Lorenzo, **K. Park** (2022). "Empirical Dynamical Modeling and Prediction of Coastal Water Levels: Combining Hyper-local Sensor Networks with Spatial Information from Numerical Dynamical Models", AGU Fall Meeting 2022
- K. Park\*, E. Lorenzo, K. Cobb, I. Federico, G. Coppini, T. Ezer, N. Pinardi (2022). "Timing and regional dynamics of extreme water level drivers in the U.S. southeast coast" Ocean Sciences Meeting 2022
- K. Cobb\*, R. Clark, N. Deffley, R. Mathews, E. Lorenzo, L. Polepeddi, A. Chavan, T. Cone, J. Koval, A. Robel, A. Hyde, J. Ramirez, I. Tien, K. Park, M. McSorley, D. Shabaka, M. McClain (2022). "Research to Action Frameworks for Equitable Coastal Resilience: A Case Study from Savannah, Georgia" 102nd American Meteorological Society Annual Meeting
- 11. K. Park\*, E. Lorenzo, K. Cobb, R. Clark, I. Federico, N. Pinardi, G. Coppini, N. Deffley, R. Mathews, C. Piecuch, T. Ezer (2020). "Drivers of Coastal Flooding along South-Atlantic Bight during Hurricanes Dorian and Matthew." Ocean Sciences Meeting 2020
- 12. **K. Park\*** and H. Yoon (2016). "Study on Characteristics of Dam Break Flow containing Particles using DEM-CFD Method." Proceeding of The Korean Society of Mechanical Engineers 2016
- 13. J. Jung\*, **K. Park**, et al. (2015). "Large Eddy Simulation of Gravity Current Flow Past Circular Cylinder." Proceeding of The Korean Association of Ocean Science and Technology Societies 2015
- 14. D. Park, K. Park\*, et al. (2014). "Design of One-man Solar Boat (Kwife & Captain)." Proceeding of The Society of Naval Architects of Korea 2014

# **PROFESSIONAL ACTIVITIES**

Journal Reviewer: Renewable Energy (3), Journal of Hydrology (1), Journal of Geophysical Research: Oceans (1), Natural Hazards (1)

Grant Reviewer: PNNL TEAMER (1)

#### **INVITED TALKS AND SEMINARS**

- 1. K. Park (2025), "The Gulf Stream's Role in Coastal Flooding and Marine Energy." *NOAA Pacific Marine Environmental Laboratory Symposiums Series*
- 2. K. Park (2025), "High-resolution Modeling on Coastal Flooding and Marine Renewable Energy on the U.S. East Coast." *Department of Civil & Environmental Engineering, Old Dominion University*
- 3. K. Park (2024), "The Gulf Stream's Role in Climate Action: Coastal Flooding and Marine Energy." Coastal Ocean Fluid Dynamics Laboratory Talk, Woods Hole Oceanographic Institution
- 4. K. Park (2023), "Impacts and Dynamics of Hurricane-induced Ocean Adjustments along the U.S. Southeast Coast." *NOAA Coastal Ocean Modeling Science Seminar*
- 5. K. Park (2022), "Coupled Model Development for Advanced Forecasting and Analysis of Extreme Water Levels." *NOAA Unifying Innovations in Forecasting Capabilities Workshop 2022*
- 6. K. Park (2022), "New framework for the coastal hazard assessment." *Coastal Equity and Resilience Hub 2022 (with stakeholders on the Georgia coast)*
- 7. K. Park (2022), "Timing and regional dynamics of extreme water level drivers in the U.S. southeast coast." *Interdisciplinary Marine Science Seminar, Virginia Institute of Marine Science*
- 8. K. Park (2021), "Coastal flooding forecast using the coupled model." *College of Sciences Advisory Board Meeting, Georgia Institute of Technology*

# **TECHNICAL SKILLS**

Programming and data analysis	FORTRAN, MPI, Python, MATLAB, C++
Numerical models	SCHISM, SHYFEM, ROMS, WRF-Hydro, WWM3, WW3
	OpenFOAM, Fluent, STAR-CCM+
Geographic information	ArcGIS, QGIS, SMS, OpenStreetMap, Google Earth Pro
Computer-aided design	Rhino, CATIA, Auto-CAD