

# Jiyong Lee

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## Professional Experience

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### Oak Ridge National Lab

Research scientist in Water Resource Science and Engineering Group

USA

Aug 2024 - Present

### Utrecht University

Postdoctoral researcher in the Institute for Marine and Atmospheric Research Utrecht (IMAU)

the Netherlands

Sep 2022 - Aug 2024

## Education

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### University of Minnesota

Ph.D. Civil, Environmental, and Geo-Engineering

MN, USA

Jan 2019 - Aug 2022

*Thesis: Scale-dependent dynamics of migrating bedforms and sediment transport in fluvial channels*

### Hanyang University

M.S. Civil and Environmental Engineering

Seoul, South Korea

Mar 2016 - Feb 2018

*Thesis: Flume experiments for studying the effects of the tip speed ratio on the flow patterns in the wake of a horizontal-axis hydrokinetic turbine*

### Hanyang University

B.S. Civil and Environmental Engineering

Seoul, South Korea

Mar 2010 - Feb 2016

## Publications

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### 1st author: 8 & coauthor: 6

14. **Lee, Jiyong**, Bouke Biemond, Daan van Keulen, Ymkje Huismans, Rene van Westen, Huib de Swart, Henk A. Dijkstra, and Wouter Kranenburg. "Global increases of salt intrusion in estuaries under future environmental conditions." *Nature Communications* (under 1st revision).
13. Tseng, Chien-Yung, **Jiyong Lee**, Michele Guala, and Mirko Musa. "Experimental Tests of Lateral Bedload Transport Induced by a Yawed Submerged Vane Array in Open-Channel Flows." *Journal of Hydraulic Engineering* (2024), <https://ascelibrary.org/doi/10.1061/JHEND8.HYENG-14076>.
12. **Lee, Jiyong**, Bouke Biemond, Huib de Swart, and Henk A. Dijkstra. "Increasing risks of extreme salt intrusion events across European estuaries in a warming climate." *Communications Earth and Environment* (2024), <https://doi.org/10.1038/s43247-024-01225-w>.
11. Henk A. Dijkstra, Biemond, Bouke, **Jiyong Lee**, and Huib de Swart. "Explaining the statistical properties of salt intrusion in estuaries using a stochastic dynamical modelling approach." *Water Resources Research* (2023): e2023WR034454, <https://doi.org/10.1029/2023WR034454>.
10. **Lee, Jiyong**, Arvind Singh, and Michele Guala. "On the scaling and growth limit of fluvial dunes.", *Journal of Geophysical Research: Earth Surface* (2023): e2022JF006955, <https://doi.org/10.1029/2022JF006955>.
9. Kang, Seokkoo, **Jiyong Lee**, Youngkyu Kim, and Ali Khosronejad. "Experimental and numerical study on the flow characteristics around spur dikes at different length-to-depth ratios." *Advances in Water Resources* (2023): 104428, <https://doi.org/10.1016/j.advwatres.2023.104428>.
8. **Lee, Jiyong**, Jeff Marr, and Michele Guala. "On sediment mass flux directionality induced by yawed permeable vanes under near-critical mobility conditions." *Journal of Hydraulic Engineering* 148, no. 10 (2022): 04022019, [https://doi.org/10.1061/\(ASCE\)HY.1943-7900.0002006](https://doi.org/10.1061/(ASCE)HY.1943-7900.0002006).

7. **Lee, Jiyong**, Arvind Singh, and Michele Guala. "Reconstructing sediment transport by migrating bedforms in the physical and spectral domains." *Water Resources Research* (2022): e2022WR031934, <https://doi.org/10.1029/2022WR031934>.
6. Kang, Seokkoo, Youngkyu Kim, **Jiyong Lee**, Ali Khosronejad, and Xiaolei Yang. "Wake interactions of two horizontal axis tidal turbines in tandem." *Ocean Engineering* 254 (2022): 111331, <https://doi.org/10.1016/j.oceaneng.2022.111331>.
5. Gao, Jinjin, Han Liu, **Jiyong Lee**, Yuan Zheng, Michele Guala, and Lian Shen. "Large-eddy simulation and Co-Design strategy for a drag-type vertical axis hydrokinetic turbine in open channel flows." *Renewable Energy* (2022), <https://doi.org/10.1016/j.renene.2021.09.119>.
4. **Lee, Jiyong**, Mirko Musa, and Michele Guala. "Scale-dependent bedform migration and deformation in the physical and spectral domains." *Journal of Geophysical Research: Earth Surface* 126, no. 5 (2021): e2020JF005811, <https://doi.org/10.1029/2020JF005811>.
3. **Lee, Jiyong**, Youngkyu Kim, Ali Khosronejad, and Seokkoo Kang. "Experimental study of the wake characteristics of an axial flow hydrokinetic turbine at different tip speed ratios." *Ocean Engineering* 196 (2020): 106777, <https://doi.org/10.1016/j.oceaneng.2019.106777>.
2. **Lee, Jiyong**, Mirko Musa, Chris Feist, Jinjin Gao, Lian Shen, and Michele Guala. "Wake characteristics and power performance of a drag-driven in-bank vertical axis hydrokinetic turbine." *Energies* 12, no. 19 (2019): 3611, <https://doi.org/10.3390/en12193611>.
1. Jeon, Jeongsok, **Jiyong Lee**, and Seokkoo Kang. "Experimental investigation of three-dimensional flow structure and turbulent flow mechanisms around a nonsubmerged spur dike with a low length to depth ratio." *Water Resources Research* 54, no. 5 (2018): 3530-3556, <https://doi.org/10.1029/2017WR021582>.

## Research Projects

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| 2024-2026   | <b>Reservoir sedimentation modeling framework and data analysis (Task-lead: \$240k)</b> , DOE, USA  |
| 2024-       | <b>Testing &amp; Expertise for Marine Energy (TEAMER) - ORNL support (PI: \$100k)</b> , DOE, USA  |
| 2022-2024   | <b>SALTISolution</b> , NWO, the Netherlands   |
| 2020-2022   | <b>A novel sediment passage module design in support of standard modular hydropower</b> , DOE, USA  |
| 2019-2021   | <b>Development of a drag-driven in-bank vertical axis hydrokinetic turbine design</b> , IonE at University of Minnesota, USA                                |
| 2019 - 2020 | <b>Geophysical flow control</b> , NSF, USA  |
| 2018        | <b>Study on 3D flow structures around a rectangular spur dike with different length-to-depth ratio</b> , NRF, South Korea                                   |
| 2017 - 2018 | <b>Experimental and computational investigation of 3D flow structures in the wake of a bank-attached in-stream structure</b> , KAIA, South Korea            |
| 2015 - 2018 | <b>On the 3D flow characteristics and the optimal efficiency of hydrokinetic turbine arrays</b> , NRF, South Korea  |
| 2015 - 2016 | <b>Development of design methods for in-stream structures in natural meandering channels using the supercomputer-based 3D CFD model</b> , KAIA, South Korea |

## Presentations

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- Lee, Jiyong (invited)**. "Sustainable river and coastal management in a changing climate: from sediment to salinization." *Jan 2023, Oklahoma State University, USA*.
- Lee, Jiyong**, Bouke Biemond, Rene van Westen, Daan van Keulen, Wouter Kranenburg, Ymkje Huisman, Huib de Swart, and Henk A. Dijkstra. "Global assessment of dominant future forcing for salt intrusion under a changing climate." *Dec 2023, AGU, USA*.
- Lee, Jiyong (invited)**. "Increasing risks of salt intrusion in estuaries in a warming climate." *Nov 2023, BBOS, the Netherlands (host: Dr. Abdel Nnafie)*.
- Lee, Jiyong (invited)**. "Increasing risks of salt intrusion in estuaries in a warming climate." *Oct 2023, Oak Ridge National Lab (ORNL), USA*.
- Lee, Jiyong**. "Stochastic properties and statistics of salt intrusion in estuaries in a warming climate." *Apr 2023, EGU, Austria*.

- Lee, Jiyong.** "Scale-dependent dynamics of migrating bedforms and sediment transport in fluvial channels." *Oct 2022, BBOS, the Netherlands (host: prof. Gerben Ruessink).*
- Lee, Jiyong (invited).** "Scale-dependent bedform transport and growth limits of dunes in sand bedded rivers." *Apr 2022, Yonsei University, South Korea (host: prof. Wonsuck Kim).*
- Lee, Jiyong and Michele Guala.** "A spectral bedload transport model resolving scale-dependent bedform morphology and kinematics." *AGU Fall Meeting 2021.*
- Lee, Jiyong (invited).** "Scale-dependent bedform kinematics, morphology, and bedload transport in fluvial channels." *Oct 2021, University of Pennsylvania, USA (host: prof. Douglas Jerolmack).*
- Lee, Jiyong, Mirko Musa, and Michele Guala.** "Kinematics and sediment transport of migrating multi-scale bedforms." *AGU Fall Meeting 2020.*
- Lee, Jiyong and Michele Guala.** "Scour, Deposit and Mass Flux Directionality Induced by a Vertical Yawed Permeable Wall." *APS DFD 2020.*
- Lee, Jiyong, Mirko Musa, and Michele Guala.** "Quantification of bedform characteristics using Particle Image Velocimetry technique and bedform tracking method." *AGU Fall Meeting 2019.*

## Awards and Fellowships

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- 2022 **Early Career Spotlight (nominated award)**, AGU EPSP
- 2021 **Graduate Student Fund Travel Award**, Saint Anthony Falls Laboratory
- 2021 **3 minute thesis contest in Civil, Environmental, and Geo-Engineering (first prize)**, University of Minnesota
- 2021 **SAFL Graduate Fellowship**, Saint Anthony Falls Laboratory
- 2021 **Roger E.A. Arndt Fellowship**, Saint Anthony Falls Laboratory
- 2019 **Civil, Environmental, and Geo-Engineering Fellowship**, University of Minnesota
- 2019 **Frank and Julie Tsai Travel Award**, Saint Anthony Falls Laboratory

## Teaching Experience

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- Mar 2023 **Graduate level sediment transport**, Guest lecturer (online), University of Central Florida
- Mar 2022 **Undergraduate level open channel hydraulic**, Guest lecturer, University of Minnesota
- 2019 - 2021 **Undergraduate level fluid mechanics**, Teaching assistant, University of Minnesota
- 2016 - 2017 **Undergraduate level fluid mechanics & hydraulics**, Teaching assistant, Hanyang University

## Student Mentorship

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- 2024 **Jesse Koppelaar**, MS student, Utrecht University
- 2021 **Sean Keogh**, PhD student, University of Minnesota
- 2021 **Jahyun Kim**, MS student, Hanyang University
- 2021 **Youngkyu Kim**, PhD student, Hanyang University
- 2019-2020 **Mason Bichanich**, Undergraduate student, University of Minnesota

## Service and Outreach

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	<b>Peer-reviewed journals</b> , - <i>Geophysical Research Letters, Journal of Geophysical Research: Earth Surface, Water Resources Research, Earth Surface Dynamics, Experiments in Fluids, Journal of Hydraulic Engineering, Ocean Engineering, Journal of Hydroinformatics, Hydrogeology</i>	<i>Reviewer</i>
2023 - 2024	<b>Colloquium</b> , - helped organize external research seminars hosted at the Institute for Marine and Atmospheric Research Utrecht (IMAU)	<i>Committee member</i>
2022	<b>AGU fall meeting</b> , - helped organize the session EP028. Understanding bedforms across a range of scales and environments	<i>Co-convenor</i>
2022	<b>Northside Safety Neighborhoods Empowering Teens (NET)</b> , - helped ignite a passion for science in middle school students from historically underrepresented households in STEM	<i>Panel</i>
2021 - 2022	<b>Hydro-Geo Seminar Series</b> , - Initiated and arranged joint-online seminar series for early career researchers in University of Minnesota and University of Illinois Urbana-Champaign	<i>Committee Chair</i>
2021	<b>4-H Engineering Explorers: Simple Machines in Motion</b> , - helped ignite a passion for engineering in elementary and middle school students	<i>Facilitator</i>
2021	<b>CEGE Junior Mentoring Program in STEM</b> , - conducted mini research project with junior high school students during summer whose backgrounds are underrepresented in STEM	<i>Mentor</i>
2020 - 2022	<b>SAFL student council</b> , - represented graduate students and promoted the community	<i>President</i>

## References

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- Henk A. Dijkstra (Postdoc advisor)  
Professor of Dynamical Oceanography, Utrecht University, the Netherlands  
Address: Princeton Square 5, 3584 CC, Utrecht  
Email: h.a.dijkstra@uu.nl
- Michele Guala (PhD advisor)  
Professor of Civil, Environmental, and Geo- Engineering, University of Minnesota, USA  
Address: 2 3rd Ave SE, Minneapolis, MN 55414  
Email: mguala@umn.edu
- Chris Paola (PhD committee member)  
CSE Distinguished Professor of Earth Sciences, University of Minnesota, USA  
Address: 2 3rd Ave SE, Minneapolis, MN 55414  
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