

William James Pringle

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RESEARCH WORK EXPERIENCE

Research Assistant Professor / Research Scientist

Aug 2019 - Present

Joint Position (50/50) between:

Dept. Civil and Environmental Engineering & Earth Sciences, University of Notre Dame, South Bend, IN
Environmental Science Division (EVS), Argonne National Laboratory, Lemont, IL.

Projects and Duties:

1) **HEADOUT: Predictive Modeling of Potential Impacts to Energy Infrastructure** May 2020 – Present

Sponsor: Office of Cybersecurity, Energy Security, and Emergency Response, U. S. Department of Energy (\$500k)
- Incorporate coastal and inland flooding modules into the HEADOUT real-time electrical outages model.

2) **AI-based Local Downscaling of Global Coastal Flood Prediction. Sole PI.** Feb 2020 – Present

Sponsor: SEED Argonne Lab-directed Research & Development (LDRD) fund (\$25k)

- Use AI to assist in downscaling simulated storm tides to predict coastal flooding overland everywhere on Earth.
Storm tides are forecasted globally using my [GLOCOFFS](#) system [16].

3) **1.4.1.603 Offshore Wind Resource Sciences (OWRS) AOP Direct-Funded Lab Project** Feb 2020 – Present

Sponsors: Department of Energy (DOE) - CPS agreement no.: 34145

- Co-author the NOAA and DOE National Lab “Offshore Wind Forecasting Improvement Project” science plan.
Conduct Navier-Stokes wind energy model simulations incorporating wind-wave-wake coupling.

4) **EVS, Argonne National Laboratory Research Project** Aug 2019 – Present

- Conduct an analysis of winter storm-driven extreme sea levels along the northeast US seaboard under historical and mid-21st century climate conditions using down-scaled climate models [17].

5) **A Dynamic Unified Framework for Hurricane Storm Surge Analysis and Prediction Spanning across the Coastal Floodplain and Ocean** Aug 2019 – Present

Sponsors: National Science Foundation (NFS) - PREEVENTS Track 2 (\$1.20M)

- Advance and test unified capabilities for coupling storm surge and tides to ocean circulation and rivers.

6) **Development of a South Atlantic Mainland ADCIRC Mesh** Feb 2019 – Dec 2019

Sponsors: U.S. Army Corps of Engineers (USACE), Coastal and Hydraulics Laboratory (\$85k)

- Aid in mesh design and generation using OceanMesh2D according to USACE specifications.

7) **Advancing ADCIRC U.S. Atlantic and Gulf Coast Grids and Capabilities to Facilitate Coupling to the National Water Model in ESTOFS Operational Forecasting** Oct 2018 – Present

Sponsors: National Oceanic and Atmospheric Administration (NOAA) (\$344k)

- Aid in mesh design using OceanMesh2D and capabilities for global modeling to be incorporated into the new Global ESTOFS model upgrade to be put into NOAA operations by July 2020.

- Help to develop best methods to facilitate coupling between the National Water Model and ESTOFS.

7) **Sea Ice Effects on Storm Surge Prediction in the Alaska Region through NEMS Coupling Infrastructure, and Building Coupled Storm Surge and Wave Operational Forecasting Capacity for Western Alaska**

Sponsor: National Oceanic and Atmospheric Administration (NOAA) (\$193k + \$1.32M) Sep 2018 – Present

- Develop capabilities for coupling storm surge and tides to the effects of ocean circulation and sea ice.

- Personally provided on-demand surge forecasts during Feb and Mar 2019 to National Weather Service Alaska Regional Forecast Offices. Help to provide assistance in the upgrade to provide automatic forecasts.

8) **The FM Global Integrated Western North Atlantic Coastal Hazard Model** Apr 2018 – Present

Sponsors: FM Global Insurance (\$264k)

- Aid in mesh design and generation using OceanMesh2D to develop high quality and low cost coastal hydrodynamic hazard model for comprehensive catastrophic risk assessment.

Postdoctoral Research Associate with Prof. Joannes Westerink

May 2016 – Jul 2019

Dept. Civil and Environmental Engineering & Earth Sciences, University of Notre Dame, South Bend, IN.

Projects with Duties and Publications:

1) **Coupled ice, tide, wind-wave, and storm surge modeling in Western Alaska** Sep 2018 – Jul 2019

Sponsors: Western Alaska LCC (\$89k)

- Analyzed and published on the Western Alaska storm driven surge and the effect of ice coverage [2].

2) **U.S. IOOS Coastal and Ocean Modeling Testbed - Puerto Rico/U.S. Virgin Islands** Sep 2017 - Aug 2018

Sponsor: Southern Universities Research Association / NOAA (\$139k)

- Coupled density stratification into a high-resolution 2D ADCIRC model to improve the simulation of coastal water levels across the frequency spectrum (12-min to 1-yr periods) [4].
- Comprehensively analyzed Hurricane Irma and Maria storm surge and waves using ADCIRC and SWAN [5].
- 3) **Tides and Storm Surge in the Indian Ocean and South China Sea** **May 2016 - Jan 2018**
Sponsors: U.S. Office of Naval Research (\$159k); FM Global Insurance (\$52k)
- Conducted a rigorous sensitivity assessment of large-scale tidal modeling in the Indian and Western Pacific Oceans to internal dissipation, bathymetry, and ocean boundary conditions [6,7].

Other Duties and Achievements:

- 1) Developed [OceanMesh2D](#) [3], an automatic unstructured mesh generating toolbox implemented in MATLAB geared towards creating highly multiscale ocean meshes [1] that range from local to global in scale.
- 2) Integrated my [ADCIRC](#) model (coded in FORTRAN) developments into release version through GitHub and was nominated for “ADCIRC Man-of-the-year” at the 2018 ADCIRC User’s Group Meeting.
- 3) Contracts awarded with my direct assistance (advancing capabilities & writing proposals) during my tenure from the following sponsors: NSF (\$1.20M), NOAA (\$1.86M total), FM Global (\$264k), and USACE (\$85k).

Graduate Student with Dr. Nozomu Yoneyama & Dr. Nobuhito Mori **Apr 2011 – Mar 2016**
Urban Flood Control Laboratory, Disaster Prevention Research Institute, Kyoto University, Japan.

Duties, Achievements and Publications:

- 1) Developed a 2D-3D two-way coupled multiscale tsunami model ([2CLOWNS](#), coded in FORTRAN) [8,9,15].
- 2) Validated 2CLOWNS model for solitary wave shoaling and breaking on a plane beach slope [9], and used it to investigate interaction of a tsunami with a large-scale caisson breakwater [8,12].
- 3) The 2CLOWNS model was also used by my colleagues in a series of tsunami assessment publications [10-14].
- 4) Worked part-time on a \$1.45 million Japan Nuclear Regulation Authority project (Aug 2015 – Feb 2016) under which my 2CLOWNS model was used and further developed.

EDUCATION

PhD, Engineering **Mar 2016**
Department of Urban Management, Graduate School of Engineering, Kyoto University, Kyoto, Japan.
Thesis: “*Two-Way Coupled Multiscale Tsunami Modeling from Generation to Coastal Zone Hydrodynamics*”.

ME, Civil Engineering **Mar 2013**
Department of Urban Management, Graduate School of Engineering, Kyoto University, Kyoto, Japan.

BE (Hons), Civil Engineering **Dec 2010**
College of Engineering, University of Canterbury, Christchurch, New Zealand.

PUBLICATIONS

- [1] **Pringle, W.**, Wirasaet, D., Roberts, K., Westerink, J., (2020). Global Storm Tide Modeling with ADCIRC v55: Unstructured Mesh Design and Performance. *Geoscientific Model Development Discussions*, doi:10.5194/gmd-2020-123
- [2] Roberts, K., **Pringle, W.**, Westerink, J., Contreras M., Wirasaet, D. (2019). On the automatic and *a priori* design of unstructured mesh resolution for coastal ocean circulation models. *Ocean Modelling*, 144, 101509, doi:10.1016/j.ocemod.2019.101509
- [3] Joyce, B., **Pringle, W.**, Westerink, J., Wirasaet, D., van der Westhuysen, A., Grumbine, R (2019). High Resolution Modeling of Western Alaskan Tides and Storm Surge under Varying Sea Ice Conditions. *Ocean Modelling*, 141, 101421. doi: 10.1016/j.ocemod.2019.101421
- [4] Roberts, K., **Pringle, W.**, Westerink, J. (2019). OceanMesh2D 1.0: MATLAB-based software for two-dimensional unstructured mesh generation in coastal ocean modeling. *Geoscientific Model Development*, 12, 1847-1868. doi:10.5194/gmd-12-1847-2019
- [5] **Pringle, W.**, Gonzalez-Lopez, J., Joyce, B., Westerink, J., van der Westhuysen, A. (2019). Baroclinic Coupling Improves Depth-Integrated Modeling of Coastal Sea Level Variations around Puerto Rico and the U.S. Virgin Islands. *J. Geophysical Research: Oceans*, 124 (3), 2196-2217. doi:10.1029/2018JC014682
- [6] Joyce, B., Gonzalez-Lopez, J., van der Westhuysen, A., Yang, D., **Pringle, W.**, Cox, A (2019). U.S. IOOS coastal and ocean modeling testbed: Hurricane-induced winds, waves and surge for deep-ocean, reef fringed islands in the Caribbean. *J. Geophysical Research: Oceans*, 124 (4), 2876-2907. doi:10.1029/2018JC014687

- [7] **Pringle, W.**, Wirasaet, D., Suhardjo, A., Westerink, J., Kennedy, A., Nong, S. (2018). Finite-Element Barotropic Model for the Indian and Western Pacific Oceans: Tidal Model-Data Comparisons and Sensitivities. *Ocean Modelling*, 129, 13-38. doi:10.1016/j.ocemod.2018.07.003
- [8] **Pringle, W.**, Wirasaet, D., Westerink, J. (2018). Modifications to Internal Tide Conversion Parameterizations and Implementation into Barotropic Ocean Models. *EarthArXiv*. doi:10.31223/osf.io/84w53
- [9] **Pringle, W.**, Yoneyama, N., Mori, N. (2018). Multiscale Coupled Three-dimensional Model Analysis of the Tsunami Flow Characteristics around the Kamaishi Bay Offshore Breakwater and Comparisons to a Shallow Water Model. *Coastal Engineering Journal*, 60 (2), 200-224. doi:10.1080/21664250.2018.1484270
- [10] **Pringle, W.**, Yoneyama, N., Mori, N. (2016). Two-Way Coupled Long Wave - Rans Model: Solitary Wave Transformation and Breaking on a Plane Beach. *Coastal Engineering*, 114, 99-118. doi:10.1016/j.coastaleng.2016.04.011
- [11] Nagashima, H., Yoneyama, N., **Pringle, W.** (2016). Application of a Hybrid 2DH-3D Model to Salt Water Behavior Caused by a River-Runup Tsunami. *J. Japan Soc. Civ. Eng. Ser. B1 Hydr. Eng.* 72, I_385-I_390 (in Japanese). doi:10.2208/jscejhe.72.I_385
- [12] Nagashima, H., Ishido, A., Yoneyama, N., **Pringle, W.** (2016). Numerical Study on the Tsunami Reduction Factor in Matsushima Bay during the Great East Japan Earthquake. *J. Japan Soc. Civ. Eng. Ser. B3 Ocean Eng.* 72, I_151-I_156 (in Japanese). doi:10.2208/jscejoe.72.I_151
- [13] Mori, N., Yoneyama, N., **Pringle, W.** (2015). Effects of the Offshore Barrier against the 2011 off the Pacific Coast of Tohoku Earthquake Tsunami and Lessons Learned, in: Santiago-Fandiño, V., Kontar, Y.A., Kaneda, Y. (Eds.), *Post-Tsunami Hazard: Reconstruction and Restoration*. Springer International Publishing, pp. 121–132. doi:10.1007/978-3-319-10202-3
- [14] Nagashima, H., Sasaki, S., **Pringle, W.**, Yoneyama, N. (2015). Numerical Assessment of Critical Locations for Tsunami Inundation. *J. Japan Soc. Civ. Eng. Ser. B3 Ocean Eng.* 71, I_509–I_514 (in Japanese). doi:10.2208/jscejoe.71.I_509
- [15] Yoneyama, N., Tanaka, Y., **Pringle, W.**, Nagashima, H. (2015). The Development of Three Dimensional Numerical Analysis for Tsunami Driven Debris in Real Scale Scenarios and its Basic Verification. *J. Japan Soc. Civ. Eng. Ser. B2 Coast. Eng.* 71, I_1027-I_1032 (in Japanese). doi:10.2208/kaigan.71.I_1027
- [16] **Pringle, W.**, Yoneyama, N. (2013). The Application of a Hybrid 2D/3D Numerical Tsunami Inundation-Propagation Flow Model to the 2011 off the Pacific Coast of Tohoku Earthquake Tsunami. *J. Japan Soc. Civ. Eng. Ser. B2 Coast. Eng.* 69, I 306–I 310 (in Japanese). doi:10.2208/kaigan.69.I_306

In Preparation:

- [17] **Pringle, W.**, Wang, J., Roberts, K., Kotamarthi, R., (2020). Changes to 21st Century Cool-Season Cyclones and Storm Tides along the Northeastern United States Coast. In preparation.

TEACHING EXPERIENCE

- 1) “*Engineering Programming (CE-20230)*”, Course Lecturer, Civil & Env. Eng., University of Notre Dame. **Fall Semesters 2016 & 2017, Spring Semester 2018.**
- 2) “*Coastal Hazards and relation to Real Estate*”, in: Dr. Dave Hutchison, Real Estate Fundamentals (Finance 30700), Mendoza College of Business, University of Notre Dame. **Oct 2018.**
- 3) “*2010/2011 Christchurch Earthquakes*”, in: Dr. Kevin Walsh, Resiliency and Sustainability of Engineering Systems (CE-20230), Civil & Env. Eng., University of Notre Dame. **Sep 2017.**
- 4) “*Natural Hazards: Tsunamis*”, in: Dr. Sameh Kantoush, Natural Disaster Science I, Institute for Liberal Arts and Sciences, Kyoto University. **Nov 2015.**

PRESENTATIONS

Seminars:

- 1) “*High-Resolution Global Storm Tide Modeling Incorporating Density Stratification*”. Environmental Science Division, Argonne National Laboratory. **Mar 2019**
- 2) “*Two-way Multiscale Coupling for Tsunami Modeling: Application to the Kamaishi Offshore Breakwater*”. Environmental Fluid Dynamics Group, University of Notre Dame. **Sep 2017**
- 3) “*Two-way Model Coupling for Tsunamis*”. Civil Engineering Department, College of Engineering, University of Canterbury, Christchurch, New Zealand. **Sep 2015**

Conferences:

- 1) **Pringle, W.**, Wirasaet, D., Westerink, J., Roberts, K. *ADCIRC v55: Modeling the Earth, Mesh Resolution Effects, and Removing Time Step Constraints*, in: ADCIRC User’s Group Meeting. Virtual Event, **Mar 2020.**

- 2) **Pringle, W.**, Westerink, J., Roberts, K., Wirasaet, D., Contreras, M.T., Myers, E., Moghimi, S., Vinogradov, S., Van der Westerhuysen, A, Abdolali, Ali. *High-Resolution Global Coastal Flood Forecasting across the Power Spectral Density Function from 10^{-2} to 10^2 cpd*, in: 18th Symposium on the Coastal Environment, American Meteorological Society Annual Meeting. Boston, MA, USA, **Jan 2020**.
- 3) **Pringle, W.**, Roberts, K., Wirasaet, D., Contreras, M.T., Westerink, J., Myers, E., Moghimi, S., Vinogradov, S. *Force Globally, Flood Locally: Advances in High-Resolution Global Coastal Flood Modelling*, in: 2nd International Workshop on Waves, Storm Surges and Coastal Hazards, Melbourne, Australia, **Nov 2019**.
- 4) **Pringle, W.**, Roberts, K., Westerink, J. *Simulations of Global Storm Tide and Circulation using ADCIRC*, in: ADCIRC User's Group Meeting, ERDC, Vicksburg, MS, USA, **May 2019**.
- 5) **Pringle, W.**, Roberts, J., Westerink, J, Wirasaet, W. *Global Tide and Surge Modelling with Locally High Resolution Coastal Insets (keynote)*, in: 20th International Conference on Fluid Flow Problems (FEF), Chicago, USA, **Apr 2019**.
- 6) **Pringle, W.**, Westerink, J. *Coupling 3D Ocean Baroclinicity into 2D Depth-integrated Coastal Ocean Models*, in: 17th Symposium on the Coastal Environment, American Meteorological Society Annual Meeting. Phoenix, AZ, USA, **Jan 2019**.
- 7) **Pringle, W.**, Westerink, J. *Incorporating 3D Baroclinic Processes for Accurate Depth-integrated Coastal Circulation Modelling*, in: 36th International Conference on Coastal Engineering, Baltimore, MD, USA, **Jul 2018**.
- 8) **Pringle, W.**, Westerink, J. *Coupling Large-scale Baroclinicity into a 2D Coastal Ocean Model*, in: 8th International Symposium on Environmental Hydraulics, Notre Dame, IN, USA, **Jun 2018**.
- 9) **Pringle, W.**, Westerink, J. *Exploring Baroclinic Mode 2D ADCIRC to Capture Inter/Intra-annual Sea Surface Variations*, in: ADCIRC User's Group Meeting, NOAA Center for Weather and Climate Prediction, College Park, MD, USA, **Apr 2018**.
- 10) **Pringle, W.**, Westerink, J. *Large-scale Tidal Dynamics Modelling in the Indian and Western Pacific Ocean Basins*, in: 4th Young Coastal Scientists and Engineers Conference – Americas. Dauphin Island, AL, USA, **Aug 2017**.
- 11) **Pringle, W.**, Suhardjo, A., Wirasaet, D., Westerink, J., Kennedy, **May 2017**. *Tides and Storm Surge in the Indian Ocean and South China Sea*, in: ADCIRC User's Group Meeting. Norwood, MA, USA
- 12) Suhardjo, A., **Pringle, W.**, Westerink, J. *Modeling Dissipative Effects on Tides of Large Scale Coastal and Oceanic Regions in the Indian and Western Pacific Ocean*, in: 15th Symposium on the Coastal Environment, American Meteorological Society Annual Meeting. Seattle, WA, USA, **Jan 2017**.
- 13) **Pringle, W.**, Yoneyama, N. *Analysis of Flow Behavior around the Kamaishi Bay Offshore Tsunami Breakwater during the 2011 Tohoku Earthquake Tsunami*, in: Australasian Coasts and Ports Conference. Auckland, New Zealand, **Sep 2015**.
- 14) **Pringle, W.**, Yoneyama, N. *Solitary wave runup on a plane beach using a two-way coupled depth-averaged shallow water - RANS VOF model*, in: 19th IAHR-APD Congress, Hanoi, Vietnam, **Sep 2014**.
- 15) **Pringle, W.**, Yoneyama, N. *Development of a Hybrid 2DH-3D Numerical Tsunami Model and its Test Under Various Conditions*, in: 1st International Conference on Computational Engineering and Science for Safety and Environmental Problems, Sendai, Japan, **Apr 2014**.
- 16) **Pringle, W.**, Yoneyama, N. *Development of Hybrid 2D-3D Numerical Analysis and its application to the Inundation of the 2011 off the Pacific Coast of Tohoku Earthquake Tsunami in Kamaishi Bay*, in: 35th IAHR World Congress, Chengdu, China, **Sep 2013**.
- 17) **Pringle, W.**, Shahmirzadi, M., Yoneyama, N, Sumi, T, Emamgholizadeh, S. *Numerical Study of Flushing Half-cone Formation due to Pressurized Sediment Flushing*, in: ISRS: 12th International Symposium on River Sedimentation, Kyoto, Japan, **Sep 2013**.

ACADEMIC SCHOLARSHIPS AND SERVICE

Conducted Peer-Reviews for the following journals (SJR quartile ranking)

Jun 2017 – Present

- *Geoscience Letters* (Q1)
- *Continental Shelf Research* (Q1)
- *Ocean Modelling* (Q1)
- *Computer Methods in Applied Mechanics & Engineering* (Q1)
- *Journal of Waterway, Port, Coastal, and Ocean Engineering* (Q2)

MEXT Japanese Government Scholarship

Apr 2011 – Mar 2016

Japan Ministry of Education, Culture, Sports, Science and Technology. Free tuition and monthly stipend over five years during my graduate studies.

University of Canterbury Summer Research Scholarship (\$25,000)

Nov 2009 – Feb 2010

OTHER QUALIFICATIONS

Certification: Global COE (Centers of Excellence) Program, Kyoto University

Mar 2016

“Sustainability/Survivability Science for a Resilient Society Adaptable to Extreme Weather Conditions”.