

# William James Pringle

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## RESEARCH WORK EXPERIENCE

### Research Assistant Professor

Aug 2019 - Present

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

#### Duties:

- Argonne National Laboratory: Conducting 30-year long high-resolution modeling and data analysis of extreme sea levels along the US Atlantic and Gulf Coasts under historical and mid-21<sup>st</sup> century climates.
- University of Notre Dame: Continuation of projects and duties from postdoctoral work.

### 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) **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)*
  - Provided assistance on mesh design using OceanMesh2D for the proposed ESTOFS model upgrade.
  - Provided assistance for incorporating density effects in the proposed ESTOFS model upgrade.
- 2) **Coupled ice, tide, wind-wave, and storm surge modeling in Western Alaska** Sep 2018 - Present  
*Sponsors: Western Alaska LCC (\$89k); National Oceanic and Atmospheric Administration (NOAA) (\$193k)*
  - Analyzed Western Alaska storm driven surge and the effect of ice coverage [1].
  - Personally provided on-demand surge forecasts during Feb and Mar 2019 to National Weather Service Alaska Regional Forecast Offices.
- 3) **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) [2].
  - Comprehensively analyzed Hurricane Irma and Maria storm surge and waves using ADCIRC and SWAN [3].
- 4) **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 [4,5].

#### Other Duties and Achievements:

- 1) Developed [OceanMesh2D](#) [6], an automatic unstructured mesh generating toolbox implemented in MATLAB geared towards creating highly multiscale ocean meshes [7] 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 during my tenure from the following sponsors: NSF (\$1.6 million), NOAA (\$1.67 million total), FM Global Insurance (\$264k), and the U.S. Army Corps of Engineers (\$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].
- 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 [10].
- 3) The 2CLOWNS model was also used by my colleagues in a series of tsunami assessment publications [11-15].
- 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] 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
- [2] **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
- [3] 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
- [4] **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
- [5] **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
- [6] 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
- [7] 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. *EarthArXiv*, doi:10.31223/osf.io/nwde7, and accepted pending minor revisions at *Ocean Modelling*.
- [8] **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
- [9] **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
- [10] **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
- [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

## 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.**, 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.**
- 2) **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.**
- 3) **Pringle, W.**, Westerink, J. *Coupling 3D Ocean Baroclinicity into 2D Depth-integrated Coastal Ocean Models*, in: 17<sup>th</sup> Symposium on the Coastal Environment, American Meteorological Society Annual Meeting. Phoenix, AZ, USA, **Jan 2019.**
- 4) **Pringle, W.**, Westerink, J. *Incorporating 3D Baroclinic Processes for Accurate Depth-integrated Coastal Circulation Modelling*, in: 36<sup>th</sup> International Conference on Coastal Engineering, Baltimore, MD, USA, **Jul 2018.**
- 5) **Pringle, W.**, Westerink, J. *Coupling Large-scale Baroclinicity into a 2D Coastal Ocean Model*, in: 8<sup>th</sup> International Symposium on Environmental Hydraulics, Notre Dame, IN, USA, **Jun 2018.**
- 6) **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.**
- 7) **Pringle, W.**, Westerink, J. *Large-scale Tidal Dynamics Modelling in the Indian and Western Pacific Ocean Basins*, in: 4<sup>th</sup> Young Coastal Scientists and Engineers Conference – Americas. Dauphin Island, AL, USA, **Aug 2017.**
- 8) **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
- 9) 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: 15<sup>th</sup> Symposium on the Coastal Environment, American Meteorological Society Annual Meeting. Seattle, WA, USA, **Jan 2017.**
- 10) **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.**
- 11) **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.**
- 12) **Pringle, W.**, Yoneyama, N. *Development of a Hybrid 2D-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.**
- 13) **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: 35<sup>th</sup> IAHR World Congress, Chengdu, China, **Sep 2013.**
- 14) **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**

### **Reviewer for the following journals (SJR quartile ranking)**

**Jun 2017 – Present**

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

### **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”.*