

Tongtong Xu

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I. EDUCATION

Georgia Institute of Technology		Atlanta, GA
Ph.D.	Coastal Engineering (Advisors: Dr. Kevin Haas, Dr. Emanuele Di Lorenzo)	08/2021
M.S.	Computer Science and Engineering	08/2021
M.S.	Civil and Environmental Engineering	2015
Sun Yat-sen University		Guangzhou, China
B.E.	Hydrology Engineering	2013

II. RESEARCH INTEREST

- Ocean extremes: statistics and mechanisms of marine heatwaves
- Ocean predictability: decadal to near-real time scale, global to coastal scale
- Coastal circulation: coastal upwelling, tidal energy assessment, sediment transport
- Statistical modeling: Linear Inverse Model, Gaussian Process Model, deep learning
- Physical modeling: Regional Ocean Modeling System, Simulating WAVes Nearshore

III. RESEARCH EXPERIENCE

1. Understanding Marine Heatwaves from Observations and Statistical Simulation 2020 – Present
 - Analyzing the observed and Linear Inverse Model (LIM) simulated Northeast Pacific marine heatwave linked to the tropical/extratropical teleconnection.
 - Studying the influence of climate change on global-LIM simulated marine heatwaves.
2. Estimating Annual Energy from Short-record Tidal Currents along U.S. coastline 2020 – Present
 - Quantify the Annual Energy Production (AEP) estimated from 14-days to 1-year tidal currents and understand the range and source of uncertainty.
 - Estimate the AEP by projecting tidal currents at a long-record site to nearby 12-hour sites.
3. Empirical Dynamical Models for Assessing Coastal Predictability 2019
 - Analyzing predictability of Sea Surface Temperature anomaly (SSTa) along the North Pacific coastline through a LIM framework.
 - Quantifying the role of initial extratropical/tropical anomalies on coastal SSTa predictability.
4. Multi-scale Nesting Forecast System to Study the Inner Shelf Circulations 2017 – 2018
 - Configuring a multi-scale (3km-1km-600m-200m) Regional Ocean Modeling System (ROMS) to perform a near-real time forecast of coastal circulation around Pt. Sal, California.
 - Performing ensemble simulations with various initial, boundary and surface forcing to diagnose the dynamics underlying the forecast skill.
5. Improving Tidal Energy Resource Assessment with Multiple Numerical Techniques 2016
 - Simulating tidal currents near multiple US Coast Guards locations using ROMS.
 - Improving simulation by grid-refinement techniques, wetting and drying schemes.
6. Investigating the Influence of Obliquely Oriented Ridges on Sediment Transport 2014 – 2015

- Configuring a Simulating WAVes Nearshore (SWAN) model to simulate wave transformation and sediment transport on a synthetic bathymetry with shoreface-connected ridges.

IV. TEACHING EXPERIENCE

Teaching Assistant,	Georgia Institute of Technology
Computer Science, Machine Learning	Fall 2019, Spring 2020
College of Engineering, Statics	Fall 2016, Fall 2018
Civil and Environmental Engineering, Statistics & Applications	Fall 2017
Civil and Environmental Engineering, Coastal Engineering	Spring 2016, Spring 2017

V. PUBLICATIONS

Journal Paper

1. **Xu, T.**, Newman, M., Capotondi, A. & Di Lorenzo, E. The Continuum of Northeast Pacific Marine Heatwaves and Their Relationship to the Tropical Pacific (2021). *Geophysical Research Letters* 48, 2020GL090661, <https://doi.org/10.1029/2020GL090661>.
2. Kumar, N., Lerczak, J. A., **Xu, T.**, Waterhouse, A. F., Thomson, J., Terrill, E. J., Swann, C., Suanda, S. H., Spydell, M. S., Smit, P. B., Simpson, A., Romeiser, R., Pierce, S. D., de Paolo, T., Palóczy, A., O’Dea, A., Nyman, L., Moum, J. N., Moulton, M., Moore, A. M., Miller, A. J., Mieras, R. S., Merrifield, S. T., Melville, K., McSweeney, J. M., MacMahan, J., MacKinnon, J. A., Lund, B., Di Lorenzo, E., Lenain, L., Kovatch, M., Janssen, T. T., Haney, S., Haller, M. C., Haas, K., Grimes, D. J., Graber, H. C., Gough, M. K., Fertitta, D. A., Feddersen, F., Edwards, C. A., Crawford, W., Colosi, J., Chickadel, C. C., Celona, S., Calantoni, J., Braithwaite, E. F., III, Becherer, J., Barth, J. A., & Ahn, S. (2020). The Inner-Shelf Dynamics Experiment. *Bulletin of the American Meteorological Society*, 1-77, <https://doi.org/10.1175/BAMS-D-19-0281.1>.
3. Lerczak, J., Barth, J. A., Celona, S., Chickadel, C., Colosi, J., Feddersen, F., Haller, M., Haney, S., Lenain, L., MacKinnon, J., MacMahan, J., Melviller, K., O’Dea, A., Smit, P., Waterhouse, A., **Xu, T.**, (2019). Untangling a web of interactions where surf meets coastal ocean. *EOS, 100*, <https://doi.org/10.1029/2019EO122141>.

Report

1. **Xu, T.** & Haas, K. (pp. 66-79) in Robichaud, R. & Ingram, M. R (2018). Marine Hydrokinetic Resource Assessment for Domestic Army, Air Force, and Coast Guard Facilities. Golden, CO: National Renewable Energy Laboratory. NREL/TP-5000-70519.

Conference

1. Haas, K., **Xu, T.**, Gunawan, B., (2021, December). Tidal energy resource assessments using moving vessel measurements. In *American Geophysical Union Fall*.
2. Stevenson, S., Huang, X., Zhao, Y., Di Lorenzo, E., Newman, M., Roekel, L., Capotondi, A., **Xu, T.**, (2021, December). How Much Does Ocean Initial State Contribute to Ensemble Spread? Insights from the Energy Exascale Earth System Model Version 1 Large Ensemble. In *American Geophysical Union Fall*.
3. **Xu, T.**, Newman, M., Capotondi, A., & Di Lorenzo, E., (2020, December). The Continuum of Northeast Pacific Marine Heatwaves and Their Relationship to the Tropical Pacific. In *American Geophysical Union Fall*.

4. **Xu, T.**, Zhao, Y., Di Lorenzo, E., & Haas, K. (2020, February). Predictability in California Current System: the role of the North Pacific forcing and the asymmetric response to La Niña vs El Niño. In *Ocean Sciences*.
5. **Xu, T.** & Di Lorenzo, E., (2019, October). Assessing Predictability along the Eastern and Western North Pacific Coastlines. In *North Pacific Marine Science Organization*.
6. Di Lorenzo, E., **Xu, T.**, & Amaya, D. (2019, October). Alaska Marine Heatwave 2019. In *North Pacific Marine Science Organization*.
7. Haas, K. & **Xu, T.** (2018, August). The Effect of Oblique Shoreface-connected Ridges on Alongshore Transport and Shoreline Change. In *36th International Conference on Coastal Engineering*.
8. Haas, K., **Xu, T.**, Colby, J., & Neary, V. (2018, April). Application of the IEC Tidal Energy Resource Assessment and Characterization Technical Specification to the Roosevelt Island Tidal Energy (RITE) Site. In *Marine Energy Technology Symposium Paper*.
9. **Xu, T.**, Cai, D., Di Lorenzo, E., Haas, K., Miller, A., Edwards, C., Moore, A., & Drake, P. (2018, February). Experimental Forecasts and Predictability Dynamics of Inner Shelf Circulations: A Case Study for Pt. Sal, California. In *Ocean Sciences*.
10. Haas, K., Cai, D., **Xu, T.**, Di Lorenzo, E., Edwards, C., & Miller, A. (2018, February). Modeling Alongshore Variability of the Flow Exchange between the Surf Zone and Inner Shelf. In *Ocean Sciences*.
11. **Xu, T.**, & Haas, K., (2017, August). Exploring the influence of obliquely oriented shoreface-connected ridges on alongshore sediment transport and shoreline change. In *Young Coastal Scientists and Engineers Conference-Americas*.
12. **Xu, T.**, Haas, K. (2016, December). Improving an Assessment of Tidal Stream Energy Resource for Anchorage, Alaska. In *American Geophysical Union Fall*.
13. **Xu, T.**, Haas, K., List, J. H., & Safak, I. (2016, February). Wave Transformation and Alongshore Sediment Transport due to Obliquely Oriented Shoreface-connected Ridges. In *Ocean Sciences*.