November 2025

# Tongtong Xu

Research Scientist
CIRES, University of Colorado Boulder
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## A. EDUCATION

| | | |
|---|---|---|
| Georgia Institute of Technology | | Atlanta, USA |
| Ph.D. | Civil Engineering | 2021 |
| M.S. | Computational Science and Engineering | 2021 |
| M.S. | Civil Engineering | 2015 |
| Sun Yat-sen University | | Guangzhou, China |
| B.E. | Hydrology Engineering | 2013 |

## B. ACADEMIC POSITION

| | | |
|---|---|---|
| Research Scientist | CIRES/NOAA Physical Sciences Laboratory | 2022-present |
| Postdoc Fellow | NRC Research Associateship Programs | 2021-2022 |

## C. RESEARCH INTEREST

Ocean extremes (marine heatwaves, coastal inundation)
Ocean predictability (decadal to near-real time scale, global to coastal scale)
Renewable energy (tidal energy assessment and uncertainty)
Statistical modeling (Linear Inverse Model, deep learning)
Physical modeling (Regional Ocean Modeling System, Simulating WAves Nearshore)

## D. PUBLICATIONS

### Journal Articles

1. Albers, J. R., M. Newman, M. A. Balmaseda, W. Sweet, Y. Wang & **T. Xu** (2025). Assessing subseasonal forecast skill for use in predicting US coastal inundation risk. *EGU Ocean Science*, 21, 1761–1785.
2. Hovenga, P. A., M. Newman, J. R. Albers, W. Sweet, G. Dusek, **T. Xu,** J. A. Callahan, S.-I. Shin & G. P. Compo (2025). Using stochastically generated skewed distributions to represent hourly nontidal residual water levels at United States tide gauges. *Frontiers in Marine Science*, 12:1618367.
3. Capotondi, A., R. R. Rodrigues, A. S. Gupta, J. A. Benthuysen, C. Deser, T. L. Frölicher, N. S. Lovenduski, D. J. Amaya, N. L. Grix, **T. Xu,** J. Hermes, N. J. Holbrook, M. K. Roxy, C. Martinez-Villalobos, S. Masina, A. Schaeffer, R. W. Schlegel, K. E. Smith & C. Wang (2024). A global overview of marine heatwaves in a changing climate. *Communications Earth & Environment*, 5, 701.
4. **Xu, T.,** M. Newman, M. A. Alexander & A. Capotondi (2024). Seasonal predictability of bottom temperatures along the North American West Coast. *Journal of Geophysical Research: Oceans*, 129(9): e2023JC020504.

5. Gregory, C. H., C. Artana, S. Lama, D. León-FonFay, J. Sala, F. Xiao, **T. Xu,** A. Capotondi, C. Martinez-Villalobos & N. J. Holbrook (2024). Global marine heatwaves under different flavors of ENSO. *Geophysical Research Letters*, 51(20), e2024GL110399.
6. **Xu, T.,** M. Newman, M. A. Alexander & A. Capotondi (2024). A forecast test for reducing dynamical dimensionality of model emulators. *Journal of Advances in Modeling Earth Systems*, 16(1): e2022MS003599.
7. Saenger, C., C. Jimenez-Diaz, A. Gagnon, A. Mix, A. Ross & **T. Xu** (2024). A framework for reconstructing marine heatwaves from individual foraminifera in low-resolution sedimentary archives. *Frontiers in Marine Science*, 11, 1321254.
8. **Xu, T.,** K. Haas & B. Gunawan (2023). Estimating annual energy production from short tidal current records. *Renewable Energy*, 207: 105-115.
9. Capotondi, A., S. McGregor, M. J. McPhaden, S. Cravatte, N. J. Holbrook, Y. Imada, S. C. Sanchez, J. Sprintall, M. F. Stuecker, C. C. Ummenhofer, M. Zeller, R. Farneti, G. Graffino, S. Hu, K. B. Karnauskas, Y. Kosaka, F. Kucharski, M. Mayer, B. Qiu, A. Santoso, A. S. Taschetto, F. Wang, X. Zhang, R. M. Holmes, J. Luo, N. Maher, C. Martinez-Villalobos, R. Naha, S. Stevenson, A. Sullivan, P. van Rensch, **T. Xu** (2023). Mechanisms of Tropical Pacific decadal variability. *Nature Reviews Earth & Environment*, 4, 754–769.
10. Stevenson, S., X. Huang, Y. Zhao, E. Di Lorenzo, M. Newman, L. van Roekel, **T. Xu** & A. Capotondi (2023). Ensemble spread behavior in coupled climate models: insights from the Energy Exascale Earth System Model version 1 Large Ensemble. *Journal of Advances in Modeling Earth Systems*, 15, e2023MS003653.
11. Di Lorenzo, E., **T. Xu,** Y. Zhao, M. Newman, A. Capotondi, S. Stevenson, D. J. Amaya, B. T. Anderson, R. Ding, J. C. Furtado, Y. Joh, G. Liguori, J. Lou, A. J. Miller, G. Navarra, N. Schneider, D. J. Vimont, S. Wu & H. Zhang (2023). Modes and mechanisms of Pacific decadal-scale variability. *Annual Review of Marine Science*, 15:1.
12. **Xu, T.,** M. Newman, A. Capotondi, S. Stevenson, E. Di Lorenzo & M. A. Alexander (2022). An increase in marine heatwaves without significant changes in surface ocean temperature variability. *Nature Communications*, 13, 7396.
13. Capotondi, A., M. Newman, **T. Xu** & E. Di Lorenzo (2022). An optimal precursor of Northeast Pacific marine heatwaves and central Pacific El Niño events. *Geophysical Research Letters* 49, e2021GL097350.
14. **Xu, T.,** M. Newman, A. Capotondi & E. Di Lorenzo (2021). The continuum of Northeast Pacific marine heatwaves and their relationship to the Tropical Pacific. *Geophysical Research Letters* 48, e2020GL090661.
15. Kumar, N., J. A. Lerczak, **T. Xu,** A. F. Waterhouse, J. Thomson, E. J. Terrill, C. Swann, S. H. Suanda, M. S. Spydell, P. B. Smit, A. Simpson, R. Romeiser, S. D. Pierce, T. de Paolo, A. Palóczy, A. O'Dea, L. Nyman, J. N. Moum, M. Moulton, A. M. Moore, A. J. Miller, R. S. Mieras, S. T. Merrifield, K. Melville, J. M. McSweeney, J. MacMahan, J. A. MacKinnon, B. Lund, E. Di Lorenzo, L. Lenain, M. Kovatch, T. T. Janssen, S. R. Haney, M. C. Haller, K. Haas, D. J. Grimes, H. C. Graber, M. K. Gough, D. A. Fertitta, F. Feddersen, C. A. Edwards, W. Crawford, J. Colosi, C. C. Chickadel, S. Celona, J.

Calantoni, E. F. Braithwaite III, J. Becherer, J. A. Barth & S. Ahn (2020) The inner-shelf dynamics experiment. *Bulletin of the American Meteorological Society*, 1-77.

16. Lerczak, J., J. A. Barth, S. Celona, C. Chickadel, J. Colosi, F. Feddersen, M. Haller, S. Haney, L. Lenain, J. MacKinnon, J. MacMahan, K. Melviller, A. O'Dea, P. Smit, A. Waterhouse & **T. Xu** (2019). Untangling a web of interactions where surf meets coastal ocean. *EOS*, *100*.
17. Haas K. & **T. Xu** (2018). The effect of oblique shoreface-connected ridges on alongshore transport and shoreline change. *Coastal Engineering Proceedings*, 65-65.
18. **Xu T.** & K. Haas (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 Presentations**

1. Hovenga, P., M. Newman, J. Albers, G. Dusek, W. Sweet, **T. Xu,** J. Callahan & S.-I. Shin (2025). Assessing the characteristics of nontidal residual water level distributions for high tide flooding predictions and projections. *EGU General Assembly*.
2. **Xu, T.,** S.-I. Shin, A. Capotondi, M. Newman, E. Di Lorenzo, D. Vimont & M. A. Alexander (2024). The impact of seasonality in the evolution of Northeast Pacific marine heatwaves. In *American Geophysical Union Fall.*
3. **Xu, T.,** M. Newman & J. Albers (2024). An empirical approach for assessing subseasonal-to-annual predictability of U.S. coastal inundation. In *American Geophysical Union Fall.*
4. **Xu, T.**, M. Newman, A. Capotondi, S. Stevenson, E. Di Lorenzo & M. A. Alexander (2024, September). An increase in marine heatwaves despite no significant changes in surface ocean temperature variability. In *Society of Environmental Toxicology and Chemistry.*
5. **Xu, T.** (2024, May). Linear inverse model as a diagnostic and prediction tool. In *Chinese-American Oceanic and Atmospheric Association Colorado Chapter*.
6. Capotondi, A., M. Newman, T. Xu & E. Di Lorenzo (2024, April). Large-scale drivers of Northeast Pacific marine heatwaves in a changing climate. In *EGU General Assembly Conference.*
7. **Xu, T.,** M. Newman, M. A. Alexander & A. Capotondi (2024, January). Seasonal predictability of bottom temperatures along the North American West Coast. In *American Meteorology Society*.
8. **Xu, T.**, M. Newman, A. Capotondi, S. Stevenson, E. Di Lorenzo & M. A. Alexander (2022, December). An increase in marine heatwaves despite no significant changes in surface ocean temperature variability. In *American Geophysical Union Fall.*
9. **Xu, T.,** M. Newman, M. A. Alexander & A. Capotondi (2022, December). Reduced dimension of linear empirical dynamical model to forecast Pacific sea surface temperatures. In *American Geophysical Union Fall.*
10. Haas, K., **T. Xu** & B. Gunawan (2022, March). Evaluating measurement based tidal energy resource assessment methods. In *Ocean Sciences*.
11. Capotondi, A., M. Newman, **T. Xu** & E. Di Lorenzo (2022, March). An empirical approach for understanding the origin of Northeast Pacific marine heatwaves. In *Ocean Sciences*.
12. Haas, K., **T. Xu** & B. Gunawan (2021, December). Tidal energy resource assessments using moving vessel measurements. In *American Geophysical Union Fall*.

13. Stevenson, S., X. Huang, Y. Zhao, E. Di Lorenzo, M. Newman, L. Roekel, A. Capotondi & **T. Xu** (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*.
14. **Xu, T.**, M. Newman, A. Capotondi & E. Di Lorenzo (2020, December). The continuum of Northeast Pacific marine heatwaves and their relationship to the Tropical Pacific. In *American Geophysical Union Fall*.
15. **Xu, T.**, Y. Zhao, E. Di Lorenzo & K. Haas (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*.
16. **Xu, T.** & E. Di Lorenzo (2019, October). Assessing predictability along the Eastern and Western North Pacific Coastlines. In *North Pacific Marine Science Organization*.
17. Di Lorenzo, E., **T. Xu** & D. J. Amaya (2019, October). Alaska marine heatwave 2019. In *North Pacific Marine Science Organization*.
18. Haas, K. & **T. Xu** (2018, August). The effect of oblique shoreface-connected ridges on alongshore transport and shoreline change. In *36th International Conference on Coastal Engineering*.
19. Haas, K., **T. Xu,** J. Colby & V. Neary (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*.
20. **Xu, T.**, D. Cai, E. Di Lorenzo, K. Haas, A. Miller, C. Edwards, A. Moore & P. Drake (2018, February). Experimental forecasts and predictability dynamics of inner shelf circulations: a case study for Pt. Sal, California. In *Ocean Sciences*.
21. Haas, K., D. Cai, **T. Xu,** E. Di Lorenzo, C. Edwards & A. Miller (2018, February). Modeling alongshore variability of the flow exchange between the surf zone and inner shelf. In *Ocean Sciences*.
22. **Xu, T.** & K. Haas (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*.
23. **Xu, T.** & K. Haas (2016, December). Improving the assessment of tidal stream energy resource for Anchorage, Alaska. In *American Geophysical Union Fall*.
24. **Xu, T.**, K. Haas, J. H. List & I. Safak (2016, February). Wave transformation and alongshore sediment transport due to obliquely oriented shoreface-connected ridges. In *Ocean Sciences*.

## E. FUNDING

NOAA Bipartisan Infrastructure Law Award (Lead PI) $809,182 2025-26

*Assessing subseasonal-to-annual predictability of North American coastal conditions by leveraging model resolution and observational capabilities*

## F. PROFESSIONAL EXPERIENCE

**Associate Member** 2025-present

SCOR working group on *subsurface marine heatwaves* (Scientific Committee on Oceanic Research)

**Guest Editor**, MDPI *Climate* 2025-present

*Special Issue: Coastal climate variability and predictability: challenges and emerging solutions*

**Review Activity**

Nature Communications, Science Advances, Bulletin of the American Meteorological Society, npj Climate and Atmospheric Science, Communications Earth & Environment, Geophysical Research Letter, Journal of Climate, Climate Dynamics, Journal of Geophysical Research, Frontiers in Marine Science, Geo-spatial Information Science

**Project Activity**

U.S. Bipartisan Law Infrastructure Award: Subseasonal to Annual Coast Inundation, U.S. Department of Energy: Modes of Pacific Variability and Extremes in a Changing Climate, U.S. Office of Naval Research: Inner-Shelf Dynamics Experiment.

## G. TEACHING EXPERIENCE

| **Teaching Assistant** | **Georgia Institute of Technology** |
|---|---|
| CS7641: School of Computer Science, Machine Learning | Fall 2019, Spring 2020 |
| COE2001: College of Engineering, Statics | Fall 2016, Fall 2018 |
| MATH3770: School of Mathematics, Statistics & Applications | Fall 2017 |
| CEE4225: Civil and Environmental Engineering, Coastal Engineering | Spring 2016, Spring 2017 |