

Rui Sun

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Experience

Scripps Institution of Oceanography, UC San Diego

CA, U.S.A.

ASSISTANT PROJECT SCIENTIST

Apr. 2022 – Now

- Research Interest: coupled ocean–atmosphere modeling, data assimilation, wave mechanics

Scripps Institution of Oceanography, UC San Diego

CA, U.S.A.

POSTDOCTORAL SCHOLAR

Jul. 2017 – Apr. 2022

- Project: Developing a regional coupled forecasting system for seasonal to sub-seasonal forecasts
- Collaborators: Bruce D. Cornuelle, Aneesh C. Subramanian, Matthew R. Mazloff, Arthur J. Miller

Virginia Tech

VA, U.S.A.

GRADUATE RESEARCH ASSISTANT

Aug. 2013 – Jun. 2017

- Dissertation: Particle-resolving simulations of dune migration: novel algorithms and physical insights
- Thesis Committee: Heng Xiao (Chair), Eric Paterson, Jennifer Irish, Yang Liu, Kevin Wang

Shanghai Jiao Tong University

Shanghai, China

UNDERGRADUATE STUDENT

Aug. 2008 – Jul. 2013

Education

Virginia Tech

Blacksburg, VA

PH.D. IN AEROSPACE ENGINEERING

Aug. 2013 – May. 2017

Shanghai Jiao Tong University

Shanghai, China

B.S. IN NAVAL ARCHITECTURE AND OCEAN ENGINEERING

Aug. 2008 – Jul. 2013

Publications

SUBMITTED:

2. A. Malyarenko, A. Gossart, **R. Sun**, and M. Krapp. Conservation of heat and mass in P-SKRIPS version 1: the coupled atmosphere-ice-ocean model of The Ross Sea. (Under review, available at: <https://doi.org/10.5194/egusphere-2022-1135>, 2022.)

1. **R. Sun**, A. Cobb, A.B. Villas Boas, S. Langodan, A. C. Subramanian, M. R. Mazloff, B. D. Cornuelle, A. J. Miller, R. Pathak, and I. Hoteit. Waves in SKRIPS: WaveWatch III coupling implementation and a case study of cyclone Mekunu. (Under review, available at: <https://doi.org/10.5194/egusphere-2022-1298>, 2022.)

(CITATIONS: 999; H-INDEX: 14; I10-INDEX: 15.)

21. I. Cerovecki, **R. Sun**, D.H. Bromwich, X. Zou, M.R. Mazloff, and S.H. Wang. Impact of downward longwave radiative deficits on Antarctic sea-ice extent predictability during the sea ice growth period. **Environmental Research Letters**, 17(8), 2022

20. **R. Sun**, A.B. Villas Boas, A.C. Subramanian, B.D. Cornuelle, M.R. Mazloff, A.J. Miller, S. Langodan, I. Hoteit. Focusing and defocusing of tropical cyclone generated waves by ocean current refraction. **Journal of Geophysical Research: Oceans**, e2021JC018112

19. **R. Sun**, A.C. Subramanian, B.D. Cornuelle, M.R. Mazloff, A.J. Miller, F.M. Ralph, H. Seo and I. Hoteit. The role of air–sea interactions in atmospheric rivers: Case studies using the SKRIPS regional coupled model. **Journal of Geophysical Research: Atmospheres**, 126(6), 2021

18. I. Hoteit and **Coauthors**. Towards an End-to-End Analysis and Prediction System for Weather, Climate, and Marine Applications in the Red Sea. **Bulletin of the American Meteorological Society**, 1-61, 2020

17. **R. Sun**, A.C. Subramanian, I. Hoteit, A.J. Miller, M.R. Mazloff and B.D. Cornuelle. A regional coupled ocean–atmosphere modeling framework (MITgcm–WRF) using ESMF/NUOPC: description and preliminary results. **Geoscientific Model Development**, 12(10), 4221-4244, 2019

16. A.C. Subramanian and **Coauthors**. Ocean observations to improve our understanding, modeling, and forecasting of subseasonal-to-seasonal variability. **Frontiers in Marine Science**, 6, 427, 2019

15. J.-L. Wu, H. Xiao, **R. Sun**, Q. Wang. RANS equations with Reynolds stress closure can be ill-conditioned. **Journal of Fluid Mechanics**, 859, 553-586, 2019

14. J.-L. Wu, **R. Sun**, S. Laizet and H. Xiao. Representation of Reynolds Stress Perturbations with Application in Machine-Learning-Assisted Turbulence Modeling. **Computer Methods in Applied Mechanics and Engineering**, 346, 707-726, 2019

13. **R. Sun**, H. Xiao and H.-L. Sun. Study of the hindered settling of cohesive silt particle using CFD-DEM. **Advances in Water Resources**, 111, 406-422, 2018

12. S.-L. Xu, **R. Sun**, Y.-Q. Cai and H.-L. Sun. Study of sedimentation of non-cohesive particles via CFD–DEM simulations. **Granular Matter** 20(1), 4, 2018

11. **R. Sun**, H. Xiao and H.-L. Sun. Realistic representation of grain shapes in CFD-DEM simulations of sediment transport: A bonded-sphere approach. **Advances in Water Resources**, 107, 431-438, 2017.

10. **R. Sun** and H. Xiao. Sediment micromechanics in sheet flows induced by asymmetric waves: A CFD–DEM study. **Computers and Geosciences**, 96, 35-46, 2016.

9. **R. Sun** and H. Xiao. CFD–DEM simulations of current-induced dune formation and morphological evolution. **Advances in Water Resources**, 92, 228-239, 2016.

8. **R. Sun** and H. Xiao. SediFoam: A general-purpose, open-source CFD–DEM solver for particle-laden flows with emphasis on sediment transport. **Computers and Geosciences**, 89, 207-219, 2016.

7. H. Xiao, J.-L. Wu, J.-X. Wang, **R. Sun**, and C. J. Roy. Quantifying and reducing model-form uncertainties in Reynolds averaged Navier–Stokes equations: A data-driven, physics-informed Bayesian approach. **Journal of Computational Physics**, 324, 115-136, 2016.
6. J.-X. Wang, **R. Sun**, H. Xiao. Quantification of uncertainty in RANS models: A comparison of physics-based and random matrix theoretic approaches. **International Journal of Heat and Fluid Flow**, 62, 577-592, 2016.
5. **R. Sun** and H. Xiao. Diffusion-Based Coarse Graining in Hybrid Continuum–Discrete Solvers: Theoretical Formulation and A Priori Tests. **International Journal of Multiphase Flow**, 77, 142-157, 2015.
4. **R. Sun** and H. Xiao. Diffusion-Based Coarse Graining in Hybrid Continuum–Discrete Solvers: Applications in CFD–DEM. **International Journal of Multiphase Flow**, 72, 233-247, 2015.
3. J.-H. Hu, W.-J. Chen, **R. Sun**, B. Zhao, and R.-J. Luo. Mechanical properties of ETFE foils under uniaxial cyclic tensile loading. **Journal of Building Materials**, 18(10), 69-75, 2015
2. **R. Sun** and H. Xiao. Eulerian–Lagrangian Modeling of Current-Induced Coastal Sand Dune Migration. **Geotechnical Engineering Journal of the SEAGS & AGSSEA**. 45(4), 2014.
1. J.-H. Hu, W.-J. Chen, R.-J. Luo, B. Zhao, and **R. Sun**. Uniaxial cyclic tensile mechanical properties of ethylene tetrafluoroethylene (ETFE) foils. **Construction and Building Materials**, 63, 311-319, 2014

Conference Contributions

11. **R. Sun**, A.B. Villa Boas, A.C. Subramanian, B.D. Cornuelle, M.R. Mazloff, A.J. Miller, S. Langodan and I. Hoteit. Focusing and defocusing of tropical cyclone generated waves by ocean current refraction. **Ocean Sciences Meeting**, Online. February 24-March 4, 2022
10. **R. Sun**, A.C. Subramanian, B.D. Cornuelle, M.R. Mazloff, A.J. Miller, Marty Ralph, H. Seo and I. Hoteit. The role of air-sea interactions in atmospheric river events: Case studies using the SKRIPS regional coupled model. **Ocean Sciences Meeting**, San Diego. February 16-21, 2020
9. **R. Sun**, A.C. Subramanian, I. Hoteit, A.J. Miller, F.M. Ralph and B.D. Cornuelle. Development and validation of a regional coupled forecasting system for S2S forecasts. **AGU Fall Meeting**, New Orleans. December 11-15, 2017
8. **R. Sun**, H. Xiao, K. Strom and H.-L. Sun. Particle-Resolving Simulations of Bedform Migration Over Different Hydraulic Conditions and Different Particle Shapes. **AGU Fall Meeting**, New Orleans. December 11-15, 2017
7. J. He, H. Chen, H. Yu, X. Xiong, S. Fan and **R. Sun**. Resistance Optimization of a Cruise Ship Using a Hybrid Approach. **The 27th International Ocean and Polar Engineering Conference**, San Francisco. June 25-30, 2017
6. J.-J. Huang, L. Duan, J.-X. Wang, **R. Sun**, and H. Xiao. High-Mach-Number Turbulence Modeling using Machine Learning and Direct Numerical Simulation Database. **55th AIAA Aerospace Sciences Meeting**, Grapevine, Texas. January 9-13, 2017

5. **R. Sun** and H. Xiao. Study of interactions between sediment particles in sheet flow using CFD-DEM. **68th Annual Meeting of the APS Division of Fluid Dynamics**, Boston, Massachusetts. November 22-24, 2015.

4. H. Xiao, J.-L. Wu, J.-X. Wang, **R. Sun**, C. J. Roy. Quantifying Model-Form Uncertainties in Reynolds Averaged Navier-Stokes Equations: An Open-Box, Physics-Based, Bayesian Approach. **68th Annual Meeting of the APS Division of Fluid Dynamics**. Boston, Massachusetts. November 22-24, 2015.

3. **R. Sun** and H. Xiao. CFD-DEM Simulations of Sediment Transport Based on a Novel Coarse-Graining Algorithm. **13th US National Congress on Computational Mechanics (USNCCM 13)**, San Diego, California. July 26-31, 2015.

2. H. Xiao, J.-L. Wu, J.-X. Wang, **R. Sun**, C. J. Roy. Quantifying Model Form Uncertainties in Reynolds-Averaged Navier Stokes Equations: An Open-Box, Physics-Informed, Bayesian Approach. **13th US National Congress on Computational Mechanics (USNCCM 13)**, San Diego, California. July 26-31, 2015.

1. Y. Liu, **R. Sun**, W. J. Devenport, H. Xiao. A novel rough wall boundary condition for LES of high Reynolds number flows. **North American Wind Energy Academy 2015 Symposium (NAWEA 2015)**, Blacksburg, Virginia. June 9-11, 2015.

Honors & Awards

2016	Finalist , Paul Torgersen Graduate Student Research Excellence Award	<i>Virginia Tech</i>
2015	Travel Award , The 68th Annual Meeting of the American Physics Society - Division of Fluid Dynamics	<i>American Physics Society</i>
2014	Fellowship , Graduate Student Fellowship	<i>Virginia Tech</i>
2012	Scholarship , Lloyd's Register Educational Trust Scholarship (top 5%)	<i>Shanghai Jiao Tong University</i>
2010	Scholarship , Shanghai Government Scholarship (top 2%)	<i>Shanghai Jiao Tong University</i>

Service

Reviewer of NSF proposals.

Reviewer of Journal of Climate, Journal of Physical Oceanography, Journal of Geophysical Research, Advances of Water Resources, and other Journals.

Grants

NOAA Climate Variability and Predictability (CVP) program, co-investigator, project title: Optimizing coupled boundary layer process studies in the tropical Pacific using high-resolution models and in situ observations

(recommended) ONR Arabian Sea Transition Layer (ASTraL) program, co-principle investigator, project title: High resolution coupled modeling and data assimilation for improved understanding of coupled boundary layer processes in the Arabian Sea Warm Pool Region

UC San Diego (UCSD)–King Abdullah University of Science and Technology (KAUST) collaboration program, co-investigator, project title: developing a regional coupled ocean–atmosphere model for the Red Sea region

Center For Western Weather and Water Extremes (CW3E), co-investigator, project title: studying the air–sea interaction for atmospheric river events