

Chuxuan Li

Curriculum Vitae

CONTACT INFORMATION	Department of Earth and Planetary Sciences Northwestern University 2145 Sheridan Road Technological Institute Evanston, IL 60208-3130 <i>E-mail:</i> chuxuanli2020@u.northwestern.edu <i>Phone:</i> (919) 597-1194 <i>Orcid:</i> 0000-0001-7759-0377
EDUCATION	Ph.D., Earth and Planetary Sciences September 2020 – Present Northwestern University, IL <i>Advisor:</i> Prof. Daniel E. Horton M.S., Marine Sciences May 2020 University of North Carolina at Chapel Hill (UNC-Chapel Hill), NC <i>Master's thesis:</i> <u>Variability and predictability of cold-season atmospheric river activity in the North Atlantic</u> <i>Advisor:</i> Prof. Wei Mei <i>Committee:</i> Wei Mei, John Bane, Bin Guan (UCLA) B.S., Marine Sciences June 2016 Sun Yat-sen University (SYSU), China <i>Dissertation:</i> <u>A 3D hydrodynamic modeling study of currents in Huangmaohai estuary, Pearl River delta</u> <i>Advisor:</i> Prof. Liang-wen Jia
PUBLICATIONS	3) C. Li, A. L. Handwerger, J. Wang, W. Yu, X. Li, N. J. Finnegan, Y. Xie, G. Buscarnera, & D. E. Horton (published on 27 Jul 2022) Augmentation of WRF-Hydro to simulate overland-flow- and streamflow-generated debris flow susceptibility in burn scars. <i>Natural Hazard and Earth System Sciences</i>. https://nhess.copernicus.org/preprints/nhess-2021-345/ 2) C. Li, W. Mei, Y. Kamae (2022) A cluster analysis of cold-season atmospheric river tracks over the North Atlantic and their linkages to extreme precipitation and winds. <i>Climate Dynamics</i>. https://doi.org/10.1007/s00382-022-06297-y 1) C. Li, W. Mei, Y. Kamae (2021) Variability and predictability of cold-season North Atlantic atmospheric river occurrence frequency in a set of high-resolution atmospheric simulations. <i>Climate Dynamics</i>. https://doi.org/10.1007/s00382-021-06017-y
RESEARCH SKILLS	Numerical modeling * research methodology & design * data analysis (MATLAB and Python) * academic writing * oral presentation
RESEARCH INTERESTS	Atmosphere, ocean, and climate dynamics * atmospheric rivers * precipitation and extremes events * numerical modeling * climate change

RESEARCH
PROJECTS**Northwestern University, IL**
Research assistant, project 1

July 2020 – April 2022

A novel soil moisture calibration scheme for WRF-Hydro and its implications on rainfall-triggered hydrologic hazard prediction

- Use the state-of-the-art POLARIS soil dataset to calibrate WRF-Hydro simulated soil moisture and validate it against observational soil moisture and streamflow
- Soil moisture fidelity improves across all seven in-situ sites and KGE scores increase by 25% on average
- Streamflow fidelity does not improve by solely calibrate soil moisture
- Considering the frequent and widespread wildfires in the western U.S., taking into account the wildfire burn scar effects on hydrology facilitates a better simulation of streamflow

Research assistant, project 2

Mar 2021 – April 2022

Augmentation of WRF-Hydro to simulate overland flow- and streamflow-generated debris flow susceptibility in burn scars

- Modify WRF-Hydro source code to output overland flows at high terrain resolutions and use the augmented WRF-Hydro to simulate overland flow and channelized streamflow to assess debris flow susceptibility
- Burn scars increase the magnitude of discharge volume and peak discharge drastically and accelerate the response time of drainage basins
- Stream channels with higher discharge volume has higher susceptibility and our simulated catchments with high-to-very high susceptibility correspond well with debris flow observations
- WRF-Hydro is demonstrated to be a new compelling physics-based tool to assess debris flow hazard at regional scales

UNC-Chapel Hill, NC**Research assistant, project 1**

October 2018 – June 2020

A cluster analysis of North Atlantic wintertime atmospheric river tracks and links to extreme precipitation and winds

- Detected and tracked atmospheric rivers in the reanalysis and atmospheric simulations
- Identified four clusters of atmospheric river tracks based on genesis location and the shape of track. Each cluster has distinct life-cycle characteristics (e.g., intensity and lifetime) and dominates in different geographical areas.
- Found different phases of ENSO, North Atlantic Oscillation (NAO), and Pacific/North American (PNA) pattern favor the four clusters landfalling to different areas of the North Atlantic and causing extreme precipitation and winds.

Research assistant, project 2

June 2018 – June 2020

Variability and predictability of cold-season North Atlantic atmospheric river occurrence frequency in a set of high-resolution atmospheric simulations

- Detected and identified atmospheric rivers in 30 members of high-resolution atmospheric simulations and reanalysis
- Used empirical orthogonal function to identify three dominant modes of forced variability in the atmospheric river occurrence frequency
- Associated the forced variability to large-scale climate modes such as ENSO, NAO, and PNA and found they exert joint modulations

- Internal variability is investigated through a measure of signal-to-noise ratio

Research scientist on R/V Neil Armstrong

November 2018

Research cruise of Processes Driving Exchange at Cape Hatteras (PEACH) project on R/V Neil Armstrong, operated by Woods Hole Oceanographic Institution

- Went on a research cruise for 10 days
- Honed my skills of operation and deployment of many observational instruments, including CTD, weather balloons, and XBTs
- Measured, collected data, and updated logs

SYSU, China**Lead investigator, research training project**

July 2014 – May 2015

Evolution pattern and forecast of sandbars in wave- and tide-dominated estuaries, Pearl River Delta

- Led a research team of six, wrote a proposal, and was granted CNY 3000
- Gained in-depth knowledge by conducting research and managing team members and project budget
- Published a paper written in Chinese on the 2017 collection of theses (non-reviewed literature), edited by Department of Marine Sciences, SYSU
- Won the Excellent Award for Scientific Research & Innovation Competition in the 4th Marine Sciences Culture Event at SYSU

- PRESENTATIONS 5) **C. Li**, A. L. Handwerger, J. Wang, D. E. Horton (2022). Modeling of AR-induced Post-wildfire Debris Flow Susceptibility in California, U.S.A., Abstract AS60-A004 to be presented at 2022 Asia Oceania Geosciences Society (AOGS) Annual Meeting, virtual, 1–5 Aug, **talk**
- 4) **C. Li**, G. Yu, J. Wang, X. Li, A. L. Handwerger, D. E. Horton (2022). A novel soil moisture calibration scheme for WRF-Hydro and its application in slow-moving landslide studies. Abstract 1033140 presented by J. Wang at Frontiers in Hydrology Meeting 2022, San Juan, Puerto Rico, 19-24 Jun, **talk**
- 3) **C. Li**, A. L. Handwerger, J. Wang, W. Yu, X. Li, N. J. Finnegan, G. Buscarnera, D. E. Horton (2021). Use of WRF-Hydro to simulate runoff-generated debris flow hazard in burn scars, Abstract H55X-1006 presented at 2021 Fall Meeting, AGU, New Orleans, LA, 13-17 Dec, **poster**
- 2) **C. Li**, W. Mei, Y. Kamae (2020). A cluster analysis of the tracks of North Atlantic wintertime atmospheric rivers and links to extreme precipitation and winds, Abstract A111A-04 presented at 2020 Ocean Sciences Meeting, San Diego, CA, 16-21 Feb, **talk**
- 1) **C. Li**, W. Mei, Y. Kamae (2019). Variability and predictability of North Atlantic cold-season atmospheric river occurrence frequency in a set of high-resolution atmospheric simulations, Abstract GC43F-1325 presented at 2019 Fall Meeting, AGU, San Francisco, CA, 9-13 Dec, **poster**

TRAININGS

Introduction to the WRF-Hydro Modeling System, AMS short courses

February 2021

Current Topics in Tropical Island Hydrology: Water Hazard & Resource Prediction + the WRF-Hydro(R) Virtual Workshop, NCAR & University of Hawaii September 2020

SELECTED HONORS

Graduate Student Travel Grant, Department of Marine Sciences, UNC, 2019
 Graduate Student Transportation Grant Award, UNC, 2019
 Academic Excellence Scholarship, SYSU, 2016
 Excellent Award for Scientific Research & Innovation Competition, SYSU, 2016
 The First-Class Scholarship for excellent students, SYSU, 2015
 The Third-Class Scholarship for excellent students, SYSU, 2014
 The Third-Class Scholarship for excellent students, SYSU, 2013

OTHER PROFESSIONAL EXPERIENCES

Department of Marine Sciences, UNC-Chapel Hill Spring 2020
Teaching assistant of MASC 101 *Marine Environment*
 • Attended classes, gave lectures, prepared materials, and graded homework and exams for the instructor Prof. Scott Gifford.

Xijiang River Basin Administration, China Summer 2014
Research management intern
 • Participated in a research project – ‘*Research on changes in dynamic pattern of water flow and sediment of Pearl River Estuary and the countermeasures*’
 • Measured and collected data using ADCP and turbidity OBS in the field
 • Extracted, processed, and analyzed data using MATLAB, Fortran, Surfer, and ArcGIS