FEDERICO ANTOLINI

Hazard Geography - Informatics - Hydrology

Institute for a Disaster Resilient Texas, Houston, TX

Texas A&M University, College Station, TX

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EDUCATION

Ph.D., Geoinformatics, University of Iowa, 2022
Dissertation: "Geospatial Methods for Distributed Flood Attenuation on Riverine Catchments"

M.A., Geography, University of Iowa, 2015
Thesis: "Geospatial modeling to assess location suitability in a detention system of small reservoirs"

B.S. & M.Eng., Environmental Engineering, Università degli Studi di Udine, Udine, Italy, 2011
Concentration track: Fluvial processes and land planning

RESEARCH AND TEACHING INTERESTS

Disaster and resilience; hazard data collection, management and analysis; support for policymaking in disaster mitigation and recovery

Water and flooding: surface hydrology; distributed runoff attenuation; nature-based approaches to flood risk reduction; flood risk estimate; machine learning for real-time flood modeling

GIScience; spatial optimization; heuristic search; topology of drainage and other natural networks

Environmental modelling; spatial-temporal processes; raster-vector integration; sensitivity analysis; high-performance computing

Social vulnerability: quantitative and spatial metrics

PROFESSIONAL EXPERIENCE

Assistant Research Scientist, Institute for a Disaster Resilient Texas, Texas A&M University at Galveston, 2022-present

Lead instructor, Foundations of GIS, University of Iowa, Spring 2020

Teaching Assistant, Foundations of GIS, University of Iowa, 2018-2020

Research Assistant, Department of Geography, University of Iowa, 2016-2017

- Developed a Python program for of census data extraction, social vulnerability indicators construction and sensitivity analysis (ongoing project)
- Constructed and mapped social vulnerability for Houston, Baltimore and Chicago metro areas. 2019 National Academics of Sciences, Engineering, and Medicine report "Framing the challenge of urban flooding in the US"
- Processed flood data, built and mapped social vulnerability indicators in Rufat et al. 2019

Research consultant, Iowa Social Science Research Center, University of Iowa, 2015-2018

- Advised faculty, staff, graduate and undergraduate students on GIS, statistics, data analysis
- Designed and taught workshops on data visualization, map making in ArcMap and R

Research Assistant, IIHR – Hydroscience & Engineering, University of Iowa, 2014-2015

Teaching Assistant, Contemporary Environmental Issues, University of Iowa, 2013-2014

RECENT PUBLICATIONS

- Lee, C. C., Huang, L., **Antolini, F.**, Garcia, M., Juan, A., Brody, S. D., & Mostafavi, A. (2024). Predicting peak inundation depths with a physics informed machine learning model. Scientific Reports, 14(1), 14826.
- **Antolini, F.**, & Tate, E. (2021). Location Matters: A Framework to Investigate the Spatial Characteristics of Distributed Flood Attenuation. Water, 13(19), 2706
- **Antolini, F.**, Tate, E., Dalzell, B., Young, N., Johnson, K., & Hawthorne, P. L. (2020). Flood risk reduction from agricultural best management practices. JAWRA Journal of the American Water Resources Association, 56(1), 161-179
- **Antolini, F.**, Baron, S., Barreto, B. L., Dollan, I. J. (2019). A Study on Parsimonious Models in Catchments Generating Saturation Excess Runoff. In *National Water Center Innovators Program - Summer Institute, CUAHSI Technical Report* (pp. 45-56)
- Rufat, S., Tate, E., Emrich, C. T., & **Antolini, F.** (2019). How valid are social vulnerability models?. Annals of the American Association of Geographers, 109(4), 1131-1153

PROGRAMMING AND COMPUTING SKILLS

- **Geospatial**: ArcGIS Pro, QGIS, ERDAS Imagine, ENVI, Google Earth Engine
- Hydrology: wflow, HEC-RAS 6.3.1, CUENCAS
- **Programming** languages: Python, Java, R
  - Python geospatial: GDAL, arcpy
  - Python data analysis: pandas, SciKit-Learn, TensorFlow
- Databases: PostgreSQL, PostGIS
- High-performance computing and MPI parallel programming
- Spatiotemporal data format: NetCDF, HDF, PCRaster
- Flood risk assessment: HAZUS-MH

AWARDS AND FELLOWSHIPS

Outstanding Teaching Assistant Award 2020-2021, Council of Teaching, University of Iowa, Spring 2021

Summer Fellowship, Graduate College, University of Iowa, Summer 2020

Post-comprehensive Fellowship, Graduate College, University of Iowa, Fall 2019

OTHER RESEARCH AND EDUCATION

National Water Center Innovators Program: Summer Institute 2019, Tuscaloosa, AL, June-July 2019 (https://www.cuahsi.org/education/summerinstitute/)

- Designed and developed a spatially explicit hydrologic model from scratch in Python
- Validated model with measured data and compared to an existing generic model

Summer School on Sensitivity Analysis of Model Output, Joint Research Center, Ranco, Italy, June 2018

PROFESSIONAL SOCIETY MEMBERSHIP

American Water Resources Association (AWRA)

CONFERENCE ABSTRACTS

- "MaxFloodCast: a Surrogate Model for Real-Time Flood Forecast Applications." Water Science Conference, Saint Paul, MN. June 26, 2024
- "Geospatial methods for distributed flood attenuation." International SSPEED Conference, Houston, TX. October 13, 2023
- "Location matters: a framework to guide the siting of distributed reservoirs for flood mitigation." Virginia Water Conference, Richmond, VA. March 7, 2020
- "Flood loss reduction from agricultural best management practices." Annual Meeting of the American Association of Geographers, New Orleans, LA. April 12, 2018
- "Spatial criteria for optimal siting of distributed systems of reservoirs." Annual Meeting of the American Association of Geographers, Boston, MA. April 5, 2017
- "Distributed systems of reservoirs: a spatial approach to flood management." Annual Meeting of the American Association of Geographers, Chicago, IL. April 21, 2015