

Faruk Gürbüz

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ABOUT

I have a multidisciplinary background in data science, geospatial technologies, environmental modeling, and data visualization. My experience includes designing analytical workflows in Python, working extensively with satellite and spatial datasets, and developing tools and insights that support data-driven decision-making and strategic planning.

EDUCATION

- The University of Iowa** January 2019 - December 2020
Master of Science - Civil and Environmental Engineering (Water Resources)
Iowa City IA, USA
 - GPA: 3.61/4.00
 - Thesis Title: *Exploration of Flood Forecasting and Flood Mitigation*
- Rice University** April 2018 - September 2018
ESL English as a Second Language
Houston TX, USA
- İstanbul Technical University** September 2011 - February 2016
Bachelor of Science - Civil Engineering
İstanbul, Türkiye
 - GPA: 3.19/4.00
 - Completed degree with Honors in 3.5 years (early graduation)

EXPERIENCE

- Turkish Water Institute (SUEN) ** January 2024 - present
Engineer
İstanbul, Türkiye
 - Processed high-volume datasets using open-source tools and custom workflows
 - Gained hands-on experience with remote sensing applications for hydrological and agricultural analysis
 - Demonstrated proficiency in analysis-ready datasets such as FAO's WaPOR for evapotranspiration assessments
 - Applied analytical thinking to design scalable geospatial data workflows
 - Collected, produced and maintained environmental GIS vector datasets
 - Created scientific and print-quality maps and visualizations for communicating geospatial analysis results
 - Participated in the editorial review of two publications: one on green infrastructure and another on remote sensing
 - Prototyped UX/UI for institutional academy platform using Figma
- Turkish State Hydraulic Works (DSI) ** February 2021 - December 2023
Engineer
Ankara, Türkiye
 - Coordinated nationwide studies for establishing an observation-based flood early warning system and led routine reporting activities
 - Utilized GIS tools for spatial analysis and reporting routines in support of national streamflow monitoring
 - Developed custom tools for data parsing, watershed delineation, and geomorphological analysis
 - Participated in the organization of workshops and seminars on flood management; delivered technical presentations on hydrological modeling, flood early warning and GIS applications
- University of Iowa, IHR-Hydroscience&Engineering ** January 2019 - February 2021
Research Assistant
Iowa City IA, USA
 - Conducted hydrological modeling for flood prediction using physically based and data-driven approaches
 - Developed and validated AI-driven models for flood forecasting
 - Performed large-scale geospatial processing and model evaluation on HPC clusters
 - Utilized GIS and remote sensing to extract, analyze, and visualize environmental big data
 - Designed and implemented reproducible workflows for statistical analysis of hydrological and climatic variables
- Erzurum Technical University ** March 2017 - March 2018
Researcher
Erzurum, Türkiye
 - Conducted research on rainfall and flood frequency analysis using historical observation data
 - Developed pipelines for statistical analysis of hydro-meteorological time series
 - Participated in a project "Multivariate Flood Frequency Analysis using Copulas; a case study for The Euphrates Basin" funded by Scientific and Technological Research Council of Türkiye (TÜBİTAK) - Grant Number: 115Y673

- **Programming Languages:** Python ***, JavaScript **
- **Web Technologies:** CSS3 ***, Bootstrap **, Tailwind CSS **
- **Markup & Typesetting:** LaTeX **, Markdown ***, HTML5 **
- **Operating Systems:** Windows **, Linux **
- **Database Systems:** PostgreSQL *
- **Data Science & Machine Learning:** TensorFlow **, scikit-learn **, pandas ***, NumPy ***, Matplotlib**
- **High-Performance Computing:** HPC **, Parallel Computing **, Job Scheduling **, Bash Scripting *
- **DevOps & Version Control:** Git **, Docker *, GitHub **
- **Geographic Information Systems (GIS):** Desktop GIS: QGIS ***, ArcGIS ** | Web GIS: Leaflet ** | Geospatial Libraries: GDAL **, PyProj **, Rasterio ***, PyQGIS ***, geopandas **
- **Remote Sensing:** Google Earth Engine **
- **Design & Prototyping:** Figma ***, Adobe Illustrator **, Adobe Premiere Pro *, Adobe InDesign **, Inkspace **
- **Other Tools & Technologies:** VS Code ***, Jupyter Notebook ***, Mendeley **
- **Research Skills:** Literature Review, Data Analysis, Experimental Design, Statistical Modeling, Scientific Writing, Presentation

PROJECTS

- **Interactive Web App for Client-Side Watershed Delineation & Flow Path Tracking** 2025
Tools: Leaflet, JavaScript, HTML, CSS
 - Developed a client-side GIS web application enabling real-time watershed delineation and downstream flow path analysis from user-defined points
 - Implemented custom algorithm to polygonize raster-derived watershed extents into vector format
- **WATT - Python Library for Batch Watershed Delineation** 2024
Tools: Python, GDAL, Geopandas, NumPy
 - A tool for batch processing of pour points, allowing for the on-demand extraction of drainage areas for multiple locations.
 - Implemented GDAL and NumPy for batch watershed delineation from GeoTIFF-based Digital Elevation Models (DEMs) and vectorized pour points
 - Developed a modular, command-line-driven Python pipeline for automated data processing
- **doc2xlsx - Report Parser and docx to xlsx Automation Tool** 2023
Tools: Python, openpyxl, pandas, regular expressions, file I/O automation
 - Developed a Python-based converter to extract structured tabular data from Word (.doc-.docx) reports and export to Excel format (.xlsx)
 - Utilized python-docx and openpyxl libraries to automate the transformation of semi-structured hydrological documents into analyzable spreadsheet format
- **GRU-based-Seq2seq-Attention-Model** 2023
Tools: Python, Keras, Tensorflow
 - Developed a neural-network-based predictive model for flood prediction
- **reservoir_creator - A QGIS Plugin for Reservoir Inundation Mapping** 2021
Tools: Python, Qt Designer, PyQGIS
 - Developed a Python tool for on-the-fly calculation of inundated areas caused by real or hypothetical dams
- **pyHLM – Hillslope-Link Hydrological Model** 2020
Tools: Python, NumPy, SciPy, RK45, Genetic Algorithm, OOP, Hydrological Modeling
 - Developed a modular Python package for a physics-based, distributed hillslope-link hydrological model (HLM) using object-oriented design
 - Integrated SciPy's RK45 solver to numerically solve ordinary differential equations governing water storage and flow dynamics
 - Implemented a Genetic Algorithm module to optimize spatially distributed small reservoir operations under hydrological constraints
 - Included example workflows demonstrating hydrological simulations and GA-based optimization for water resource planning

PUBLICATIONS

C=CONFERENCE, J=JOURNAL, S=IN SUBMISSION, T=THESIS

- [S.1] Mantilla R., Barco J., Mehboob M. S., Lewkebandara K., Perez G., Gurbuz F., Xiao S. (2025). **Interpolation vs. Extrapolation in Flood Forecasting: Exploring the Predictive Capability of Conceptual and Machine Learning Tools in Non-Stationary Scenarios**. Manuscript submitted for publication in *Hydrology and Earth System Sciences (HESS)*.
- [J.6] Tofighi S., Gurbuz F., Mantilla R., Xiao S. (2025). **Advancing Machine Learning-Based Streamflow Prediction Through Event Greedy Selection, Asymmetric Loss Function, and Rainfall Forecasting Uncertainty**. *Applied Sciences*.
- [J.5] Tofighi S., Gurbuz F., Mantilla R., Xiao S. (2025). **A Data-Driven Framework for Flood Mitigation: Transformer-Based Damage Prediction and Reinforcement Learning for Reservoir Operations**. *Water*.
- [C.2] Mantilla R., Barco J., Gurbuz F., Xiao S., Muñoz D., Lewkebandara K., Sharma V. (2024). **Interpolation vs. Extrapolation in Flood Forecasting: Exploring the Predictive Capability of Conceptual and Machine Learning Tools in Non-Stationary Scenarios**. *EGU24*.
- [J.4] Gurbuz F., Mudireddy A., Mantilla R., Xiao S. (2024). **Using a physics-based hydrological model and storm transposition to investigate machine-learning algorithms for streamflow prediction**. *Journal of Hydrology*.
- [C.1] Xiao S., Mantilla R., Gurbuz F., Mudireddy A. (2021). **The role of AI algorithms in flood prediction and mitigation**. *AGU Fall Meeting*.
- [T] Gurbuz F. (2020). **Exploration of Flood Forecasting and Flood Mitigation**. M.Sc. Thesis, *The University of Iowa*.
- [J.3] Tosunoglu F., Gurbuz F., İspirli M. N. (2020). **Multivariate modeling of flood characteristics using Vine copulas**. *Environmental Earth Sciences*.
- [J.2] Tosunoglu F., Gurbuz F. (2019). **Mapping spatial variability of annual rainfall under different return periods in Turkey: The application of various distribution functions and model selection techniques**. *Meteorological Applications*.
- [J.1] Tosunoglu F., İspirli M. N., Gurbuz F., Şengül S. (2017). **Estimation of Missing Streamflow Records in the Euphrates Basin using Flow Duration Curves and Regression Models**. *Iğdır Univ. J. Inst. Sci. & Tech*.

HONORS AND AWARDS

- **YLSY Graduate Scholarship** August 2017
Turkish Ministry of Education & Turkish State Hydraulic Works (DSİ)
 - Fully funded scholarship for graduate studies abroad (2018–2021)
 - Awarded through a nationally competitive selection process
 - Granted based on the research topic: *Flood Forecasting and Early Warning*
- **Graduate Research Fellowship** March 2017
Scientific and Technological Research Council of Türkiye (TÜBİTAK)
 - Research topic: "Multivariate Flood Frequency Analysis using Copulas; a case study for The Euphrates Basin"
 - Grant Number: 115Y673

ADDITIONAL EXPERIENCE

- **2nd Executive Seminar on Water Diplomacy** 15 April 2024 – 24 April 2024
Seminar Attendee
 - Organized by the Diplomatic Academy of the German Federal Foreign Office
 - Selected through a competitive interview process by the host organization
 - Participated in an intensive seminar on transboundary river basin hydrology, flood and drought risk management, hydro-meteorological modelling, and negotiation strategies in data-scarce or conflict-affected regions
 - Included official visits to key institutions such as German governmental agencies, the UN Bonn Campus, and the International Criminal Court in The Hague, among others
- **Hydrological Advisor of Türkiye at the World Meteorological Organization (WMO)** September 2022 - September 2023
Advisor
 - Designated national representative for hydrology within the WMO framework
- **Post-Disaster Field Survey – 2021 Bozkurt Flood** August 2021 - September 2021
Field Engineer
 - Contributed to field assessment activities following the historic Bozkurt flood in Türkiye
 - Surveyed damaged hydraulic structures, floodplain changes, and sediment transport mechanisms
 - Collected geospatial data and supported documentation for technical evaluation and future mitigation planning

ADDITIONAL INFORMATION

Languages: English (Fluent), Turkish (Native)