

# Mahmoud Osman

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Postdoctoral Fellow

Earth and Planetary Sciences,

Johns Hopkins University

## EDUCATION

- 2021 PhD** – Earth and Planetary Sciences – Johns Hopkins University – MD – USA.  
**Advisor:** Benjamin F. Zaitchik  
**Thesis:** “Flash droughts in the United States: definitions, drivers, patterns, and trends”
- 2018 MA** – Earth and Planetary Sciences – Johns Hopkins University – MD – USA.  
**GPA:** 3.67/4.00 **Advisor:** Benjamin F. Zaitchik
- 2017 ME** – Civil and Environmental Engineering – Colorado State University – CO – USA.  
**GPA:** 3.61/4.00 **Advisor:** Jose L. Chávez
- 2015 MSc** – Irrigation and Hydraulics – Civil Engineering – Cairo University – Egypt.  
**GPA:** 3.80 / 4.00 **Advisors:** Mohammed Abouelhaggag, Ahmad W. Abdeldayem  
**Thesis:** “Hydroclimate simulations over Eastern Nile basin”
- 2013 BSc** – Water and Environmental Engineering – Civil Engineering – Cairo University – Egypt.  
**GPA:** 3.75/4.00 (Distinction with honor degree) **Advisors:** Ahmed E. Hassan, Alaa ElZawahry  
**Graduation Project:** “Designing of groundwater recharge system for sustainable domestic use downstream Yeba dam at the Kingdom of Saudi Arabia”

## HONORS & AWARDS

- 2017 - 2021** Earth and Planetary Science department Fellowship, Johns Hopkins University
- 2017** Irrigation foundation E3 Program Scholarship
- 2016 - 2017** Whitney Borland Advanced Student Graduate Scholarship.
- 2016 - 2017** Bob and Joan Meroney Scholarship
- 2015 - 2016** Whitney Borland New Student Graduate Scholarship.
- 2009 - 2013** Excellence Full Tuition Fees Scholarship

## PUBLICATIONS

- 2021/22 Osman, M., Zaitchik, B., Winstead, N.:** “Atmospheric feedback of droughts on the amplification of the 2021 western United States heatwave”, *in preparation*.
- 2021/22 Osman, M., Zaitchik, B., Badr, H., Otkin, J., Zhong, Y., Anderson, M., Lorenz, D., Keenan, T., Miller, D., Hain, C., Holmes, T.:** “Diagnostic classification of flash drought events reveals distinct classes of forcings and impacts”, *conditionally accepted at the Journal of Hydrometeorology*.
- 2021 Osman, M., Zittis, G., Haggag, M., M., Abdeldayem, A., Lelieveld, J.:** “Optimizing regional climate model output for hydro-climate applications in the Eastern Nile Basin”, *Earth Syst Environ.*, <https://doi.org/10.1007/s41748-021-00222-9>.
- **Osman, M., Zaitchik, B., Badr, H., Christian, J., Tadesse, T., Otkin, J., Anderson, M.:** “Flash droughts over the Contiguous United States: Sensitivity of inventories and trends to quantitative definitions”, *Hydrol. Earth Syst. Sci.* <https://doi.org/10.5194/hess-25-565-2021>.

- 2020** **Osman, M.**, Zaitchik, B., Badr, H., Hameed, S.: “North Atlantic Centers of Action and Seasonal to Subseasonal Temperature Variability in Europe and the Eastern United States”, *Int. J. Climatol.* DOI: 10.1002/joc.6806.
- 2019** **Osman, M.**, Zittis, G., Abouelhaggag, M., Abdeldayem, A., Lelieveld, J.: “Optimizing WRF as a regional climate Downscaling Tool for Hydro-climatological Applications in the Eastern Nile Basin”. doi:10.31223/osf.io/fx7aw.
- 2015** **Osman, M.**, Abouelhaggag, M., Abdeldayem, A., Lelieveld, J.: “Hydroclimate Simulations over Eastern Nile Basin using ARW-WRF”. *MSc Thesis - Cairo University*.
- 2013** **Osman, M.**, Shabana, M., Elsayed, H., Fathi, M., Galal, M., Hassan, A., Elzawahry, A.: “Designing groundwater recharge system for sustainable domestic use downstream Yeba Dam, KSA”. *BSc Technical Report – Cairo University*.

## PRESENTATIONS & ABSTRACTS

- 2021** **Osman, M.** “Flash droughts in the United States: definitions, drivers, patterns, and trends”. University of California, Los Angeles. Invited seminar speaker at Department of Atmospheric and Oceanic Sciences.
- **Osman, M.**, Zaitchik, B., Badr, H.: “Dynamically Based Simulation of a Major Flash Drought: The Role of Vegetation” AMS, 101<sup>st</sup> Annual Meeting.
- 2020** **Osman, M.**, Zaitchik, B., Badr, H., Christian, J., Tadesse, T., Otkin, J., Anderson, M.: “Flash droughts over the Contiguous United States: Sensitivity of inventories and trends to quantitative definitions” AGU 2020, Fall meeting.
- **Osman, M.**, Zaitchik, B.: “Flash Droughts over the Contagious United States” Fall 2020 Journal Club, Johns Hopkins University, MD.
- **Osman, M.**, Zaitchik, B.: “U.S. Flash Droughts — Process and The Central Role of Vegetation in Their Evolution” Spring 2020 Journal Club, Johns Hopkins University, MD.
- **Osman, M.**, Zaitchik, B., Badr, H.: “U.S. Flash Droughts—Definitions and Dynamics” AMS, 100<sup>th</sup> Annual Meeting, Boston, MA.
- 2019** **Osman, M.**, Argamaso, S. “Establishing Rapport and Motivating Mentees”, Study Consulting Program Fall Training. Johns Hopkins University, MD.
- 2018** **Osman, M.**, Zaitchik, B., Badr, H.: “Impacts of North Atlantic Oscillation on Extreme Events over United States”, Spring 2018 Journal Club, Johns Hopkins University, MD.
- **Osman, M.**, Zaitchik, B., Badr, H.: “North Atlantic Centers of Action and Temperature Variability at Monthly and Sub-monthly Timescales in Europe and Eastern United States”, AGU 2018, Fall meeting, Washington, D.C.
- **Osman, M.**, Zittis, G., Abouelhaggag, M., Abdeldayem, A., Lelieveld, J.: “Optimizing WRF as a regional climate downscaling tool for hydro-climatological applications in the Eastern Nile Basin”, AMS, 98<sup>th</sup> Annual Meeting - Austin, TX.
- 2017** **Osman, M.**, Chávez, J., Venayagamoorthy, K.: “Aerodynamic Methods for Estimating Turbulent Fluxes Over Irrigated Crops” - Presentation - 37th Annual AGU - Hydrology Days 2017, Fort Collins, CO.
- 2016** Chávez, J., Neale, C., Howell, T., Carrasco-Benavides, M., Andales, A., and **Osman, M.**: “Remote Sensing of ET Based on Aerodynamic Temperature,” - 2016 USCID Fall meeting, Fort Collins, CO.
- 2014** Reymond, P., **Osman, M.**, “Small-Scale Sanitation in Egypt (EAWAG)” – 2014 ISSIP workshop – Cairo, Egypt.

## PROFESSIONAL EXPERIENCE

- 2021** – Full-time Postdoctoral fellow at Johns Hopkins University, MD.
- 2017–2021** Full-time Research assistant at Johns Hopkins University, MD.
- 2015–2017** Full-time Research assistant at Colorado State University, CO.
- 2013–2015** Full-time Teaching and Research assistant at Cairo University, Egypt.

### ➤ Part-time tasks:

- 2015** **Environmental Engineer:** Decentralized wastewater treatment systems selection and evaluation - Chemonics Egypt consultants, Egypt.

(Responsible for collecting and evaluating available decentralized wastewater treatment systems that are utilized as on-site wastewater solutions for technical studies and strategy development)

**2014 Project Assistant:** Egyptian-Swiss Research on Innovations in Sustainable Sanitation (ESRISS), Egypt.  
(Responsible for collecting field data and surveys from rural communities about the water supply and sanitation systems in the Egypt's Delta region for a comprehensive study on enhancing affordable decentralized wastewater treatment solutions)

**2013 Groundwater Engineer:** Dar Al-Handasah – Cairo, Egypt:  
- Groundwater resources development and control study at Dubai International Airport - UAE.  
- Dewatering system design and feasibility study for Concourse 1, 2 and 3 at Dubai International Airport UAE.  
(Responsible for designing and evaluating groundwater dewatering systems for the construction and operation of the Dubai International airport. Final written technical reports are used the main guidelines for on-site design recommendations)

— **Civil Engineer:** MMM Consultants – Cairo, Egypt:  
- Design of irrigation pipeline network for 1376 Feddan, Beni Suef.  
(Responsible for a computational hydraulic design for a pipeline network including pipes' diameter selection and pumps recommendations under different operational scenarios)  
- Design of rubble mound for protection of water level rise at Lake Qaroun, Fayoum.  
(Responsible for a complete design of protective rubble mound at the expanding lake Qaroun under different weather conditions. work included bathymetry, structural design, climate data analysis and field survey)

## RESEARCH EXPERIENCE

### ➤ Johns Hopkins University:

**2019 –** "PREEVENTS Track 2: Collaborative Research: Flash droughts: process, prediction, and the central role of vegetation in their evolution", NSF.

(I had the opportunity to be part in writing the project's proposal for \$1.3M grant from NSF. Duties include collecting and analyzing a variety of climate models and remote sensing data for the purpose of identifying the U.S. Flash droughts and quantifying events severity due to the severe of agricultural and economic losses from such events. Role included coordination between teams from JHU, USDA, UW-Madison, UC Berkeley and NASA)

**2017 – 2018** "Hazards SEES Type 2: Modeling to Promote Regional Resilience to Repeated Heat Waves and Hurricanes", NSF  
(Analysis and quantification of past, current and future heatwaves over the United States. Role included analysis of more than 3Tbytes of data from 21 climate models and 3 different carbon dioxide emission scenarios)

### ➤ Colorado State University:

**2015 – 2017** "Monitoring Alfalfa, Grass, Corn and Potato Water Use under Full and Deficit Irrigation using a Spatially Distributed Temperature Model", USDA NRCS (CO AES).

(Responsible for design of field experiments for the purpose of collecting biophysical data from multiple agricultural fields across Colorado. The role included programming and installing sensors besides leading the team for data collection and analysis)

### ➤ Cairo University:

**2014 – 2015** "Enhancement of Climate Projections in the Eastern Nile Basin" – LinkSCEEM Project in association with The Cyprus Institute Climate Change group.

(Responsible, as a part of a collaborating team, to configure and optimize a numerical regional hydroclimate model for hydrological applications in the eastern Nile Basin region)

## TEACHING EXPERIENCE

- 2021** Assistant lecturer for “Principles of Irrigation and Drainage”
- 2018** Teaching Institute 18 - Johns Hopkins University, MD.
- 2015** Credit Hours System workshop – Cairo University, Egypt.
- Effective Teaching Skills workshop – Cairo University, Egypt.
- Students’ Testing and Evaluation workshop – Cairo University, Egypt.
- 2014** Quality Standards in Teaching Process – Cairo University, Egypt.
- 2013 – 2015** Teaching assistant, Cairo University, Egypt:
- Fluid mechanics for Petroleum Engineering
  - Hydraulics for Civil Engineering
  - Introduction to water resources for Civil Engineering
  - Environmental hydraulics for Water and Environmental Engineering
  - Computational water and wastewater networks for Water and Environmental Engineering

## COMPUTER SKILLS

**Research framework:** Weather Research and Forecasting (WRF), Land Information System (LISF)

**Engineering design:** AutoCAD, HYDRUS-2D/3D, Bentley WaterCAD, Aquaveo GMS, Aquaveo WMS, Bentley Water Hammer, HEC-RAS.

**Programming languages:** R, Matlab, NCAR Command Language (NCL), Python, Fortran, Bash script.

**Remote Sensing & GIS:** ArcGIS, Global Mapper, ENVI.

**Operating Systems & Tools:** MS Windows, Linux, MacOS, MS Office, Adobe Photoshop.

## PROFESSIONAL MEMBERSHIPS

- American Geophysical Union (AGU)
- American Meteorological Society (AMS)

## SERVICE ACTIVITIES

- 2021 –** Peer reviewer for Environmental Research Letters.
- 2020 –** Peer reviewer for Journal of Hydrometeorology (JHM).
- 2019 – 2021** Graduate Assistant Study Consultant, Study Consulting Program - Johns Hopkins University, MD.
- 2018 – 2021** Study Consultant, Study Consulting Program - Johns Hopkins University, MD.
- 2017 – 2021** Earth & Planetary Sciences department Colloquium A/V Coordinator - Johns Hopkins University, MD.
- 2016 – 2017** ICFC social & youth committee coordinator - Fort Collins, CO.

## TRAININGS, CONFERENCES AND WORKSHOPS

- 2021** Joint ICTP-IUGG Workshop on Data Assimilation and Inverse Problems in Geophysical Sciences – Online – ICTP.
- 2021** Virtual MPAS-Atmosphere tutorial – online workshop – NCAR.
- Introduction to WRF-Hydro Modeling System – online workshop – NCAR.
- 2020** AGU 2020 Fall meeting – online.
- Flash Drought Workshop – online workshop – NOAA/NIDIS.
- Research Ethics – online workshop – Cairo University.
- Research Team Management – online workshop – Cairo University.
- Critical Thinking – online workshop – Cairo University.

- Crisis Management – online workshop – Cairo University.
- AWSome Day - online Conference/Tutorial.
- AMS 100<sup>th</sup> Annual Meeting, Boston, MA.
- 2019** Basic WRF Tutorial, NCAR – Boulder, CO.
- 2018** Climate & Weather Extremes Tutorial, NCAR – Boulder, CO.
- Introduction to Information Technology (IT): Security and Privacy Awareness for New Employees, NASA – Online tutorial.
- AMS Meeting 18 – Austin, TX.
- 2016** Irrigation Show & Education Conference – Las Vegas, NV.
- Improving Irrigation Water Management - Latest Methods in Evapotranspiration and Supporting Technologies - Fort Collins, CO.
- Alternative Agricultural Water Transfer Methods: Deficit irrigation monitoring – Fort Morgan, CO
- Hydrology Days, 36<sup>th</sup> Annual American Geophysical Union – Fort Collins, CO.
- 2015** A Guide to Using ReSET for Estimating Evapotranspiration – Colorado State University (CSU) – CO.
- International Publishing for Scientific Research – Cairo University, Egypt.
- Third Workshop on Water Resources in Developing Countries: Planning and Management in Face of Hydroclimatological Extremes and Variability – International Center of Theoretical Physics (ICTP) – Trieste, Italy.
- Cy-Tera/LinkSCEEM HPC Admin Workshop - The Cyprus Institute – Nicosia, Cyprus.
- 2014** Effective Presentation Skills workshop – Cairo University, Egypt.
- Climate Change modelling using WRF at The Cyprus Institute – Nicosia, Cyprus.
- 2013** Young Water Ambassadors video conference, Cairo, Egypt.
- 2012** Dar Al-Handasah, Designing of dewatering systems and groundwater modelling – Cairo, Egypt.
- Industrial training at (KSB, VAG, Duravit, Geberit), Germany and Switzerland.
- 6<sup>th</sup> World Water Forum Conference – Marseille, France.
- 2011** Chemonics Egypt, Redesigning and studying the existing pipe network at “Etay El-Barood” village, Behaira – Cairo, Egypt.
- USAID workshop for water engineers, Organized by Chemonics, Egypt.
- Interbuild Conference – Cairo, Egypt.
- 2010** Holding Company for Water and Wastewater (HCWW) 1<sup>st</sup> International conference and exhibition about sustainable water supply and sanitation – Cairo, Egypt.

## OTHER CERTIFICATIONS

**Data Science:** Foundations using R Specialization – Johns Hopkins University (*Coursera*), 5 Courses:

- Reproducible Research
- Exploratory Data Analysis
- Getting and Cleaning Data
- R Programming
- The Data Scientist’s Toolbox

Practical Machine Learning [Johns Hopkins University (*Coursera*)]

**ESRI** Cartography

## LANGUAGE SKILLS

**Arabic** – Mother tongue

**English** – Fluent

**French** – Beginner