

# Shahryar Khalique Ahmad

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## EDUCATION

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- University of Washington, Seattle** 2018–2021  
Doctor of Philosophy in Civil and Environmental Engineering  
Dissertation: *Towards Forecast-Informed Sustainable Hydropower Operations*  
Advisor: Dr. Faisal Hossain
- University of Washington, Seattle** 2016–2017  
Master of Science in Civil and Environmental Engineering  
Thesis: *Investigating the value of Weather Forecasts from Numerical Prediction Models for Hydropower Maximization*  
Advisor: Dr. Faisal Hossain
- Indian Institute of Technology, Kanpur** 2012–2016  
Bachelor of Technology in Civil Engineering

## RESEARCH EXPERIENCE

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- Research Scientist, NASA Goddard Space Flight Center** 2021-present  
Hydrological Sciences Laboratory
- Prototyping Freshwater Pilot of Earth Information System demonstrating open science and visualization capabilities to further the outreach of NASA datasets for freshwater
  - Investigating the evolution and mechanism of hydrologic extremes, such as floods and droughts using hydrological modeling and data assimilation
- Graduate Research Assistant** 2016-2021  
SASWE Research Group, University of Washington
- Management of fully automated operational web interface of South Asian Surface Water Modeling System (SASWMS) used by various operational agencies in South Asia
  - Development of cropwater demand model for an irrigation advisory for marginal scale-farmers in Southeast Asia using weather forecasts and remote sensing products such as GRACE
  - Prototyping Flood Inundation Forecast and Management system for Houston
  - Deployment and management of Variable Infiltration Capacity (VIC) hydrologic model for Mekong River Basin
  - Assessment of future volume change in Tonle Sap Lake in Mekong River Basin using climate model projections and satellite data (INFEWS project)
- Student Intern, NASA Goddard Space Flight Center** Summer 2020  
Supervisor: Dr. Sujay V. Kumar
- Developed a robust machine learning algorithm to classify flooded and permanent waters from realtime microwave remote sensing products
  - Integrated Google's cloud computing-based AI platform with Google Earth Engine's server side processing to achieve fast and computationally efficient method of flood mapping
- Student Intern, NASA Goddard Space Flight Center** Summer 2017  
Supervisor: Dr. Sujay V. Kumar

- Developed interactive state-of-the-art web based framework, **LIS Atlas**, to visualize Land Information System (LIS)-generated model output from multiple model domains and configurations at different timescales
- Programmed initial prototype for the FEWS NET project over Central Asia and Africa to monitor snow conditions and water availability, respectively
- Implemented capabilities to generate outputs from Land surface Verification Toolkit (LVT) at various spatial and temporal scales, including quantitative evaluations of model outputs compared to observations.

### MITACS Globalink Research Intern

Summer 2015

Supervisor: Prof. Anders Knudby, Simon Fraser University, Burnaby, Canada

- Applied radiative transfer model for satellite-derived bathymetry with case study of Canadian waters
- Simulated above-water reflectance to retrieve per-pixel water depth using efficient model inversion algorithms

## AWARDS AND FELLOWSHIPS

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| • ASCE EWRI Best Case Study Award in Journal of Hydrologic Engineering | 2021      |
| • NASA Space Apps Challenge <i>Best Use of Data</i> Award              | 2020      |
| • MIT Energy Hack <i>Chevron Challenge Winner</i>                      | 2020      |
| • Grow with Google Challenge Scholarship                               | 2018      |
| • Washington State AWRA Student Fellowship (\$ 2000)                   | 2017      |
| • Ivanhoe Foundation Fellowship (\$ 5000)                              | 2017      |
| • Mitacs Globalink Graduate Fellowship for Research Internship         | 2015      |
| • Academic Excellence Award at IIT Kanpur, India                       | 2016      |
| • Academic Excellence Award at IIT Kanpur, India                       | 2015      |
| • Merit-cum-Means Scholarship at IIT Kanpur, India                     | 2013–2014 |

## PUBLICATIONS

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### Refereed

1. **Ahmad, S.K.**, Hossain, F., Holt, G., Galleli, S., Pavelsky, T. (2021). Predicting the likely thermal impact of current and future dams around the world, *Earth's Future*, 9, e2020EF001916. DOI: 10.1029/2020EF001916
2. Konapala, G., Kumar, S.V., **Ahmad, S.K.** (2021). Exploring Sentinel-1 and Sentinel-2 diversity for flood inundation mapping using deep learning, *ISPRS Journal of Photogrammetry and Remote Sensing* 180:163-173. DOI: 10.1016/j.isprsjprs.2021.08.016
3. Bose, I., Jayasinghe, S., Meechaiya, C., **Ahmad, S.K.**, Biswas, N. and Hossain, F., (2021). Developing a Baseline Characterization of River Bathymetry and Time-Varying Height for Chindwin River in Myanmar Using SRTM and Landsat Data. *Journal of Hydrologic Engineering*, 26(11), p.05021030. DOI: 10.1061/(ASCE)HE.1943-5584.0002126
4. Bose, I, Hossain, F., Eldardiry, H., **Ahmad, S.K.**, Biswas, N.K., Lee, H., Aziz, M., and Kamal, M.S. (2020). Integrating Gravimetry Data with Thermal Infra-red Data from Satellites to Improve Efficiency of Operational Irrigation Advisory in South Asia, *Water Resources Research* DOI:10.1029/2020WR028654
5. Jameel, Y., Stahl, M., **Ahmad, S.K.**, Kumar, A., Perrier, G. (2020). India needs an effective flood policy. *Science* 369(6511), pp. 1575.

6. **Ahmad, S.K.**, F. Hossain, T. Pavelsky, G. Parkins, S. Yelton, M. Rodgers, S. Basile, S. Ghafoor, D. Haldar, R. Khan, N. Shawn, A. Haque and R. Biswas (2020). Estimating Volumetric Water Storage in Seasonal and Transboundary Runoff-Dominated Wetlands Using Citizen Science and Satellite Remote Sensing Data, *Water Resources Research*, p.e2020WR027989. DOI:10.1029/2020WR027989
7. Beveridge, C., Hossain, F., Biswas, R.K., Haque, A.A., **Ahmad, S.K.**, Biswas, N.K., Hossain, M.A. and Bhuyan, M.A., 2020. Stakeholder-driven development of a cloud-based, satellite remote sensing tool to monitor suspended sediment concentrations in major Bangladesh rivers. *Environmental Modelling and Software*, p.104843. DOI: 10.1016/j.envsoft.2020.104843
8. **Ahmad, S.K.**, and Hossain, F., 2020. Realizing ecosystem-safe hydropower from dams. *Renewables: Wind, Water, and Solar*, 7(1), pp.1-23. DOI: 10.1186/s40807-020-00060-9
9. **Ahmad, S.K.**, Hossain, F. (2020). Forecast-Informed Hydropower Optimization at Long and Short-time scales for a Multiple Dam Network. *Journal of Renewable and Sustainable Energy* 12. DOI: 10.1063/1.5124097
10. **Ahmad, S. K.**, Hossain, F. (2020). Maximizing Energy Production from Hydropower Dams using Short-Term Weather Forecasts. *Renewable Energy* 146, pp.1560-1577. DOI: 10.1016/j.renene.2019.07.126
11. Daly, K., Hossain, F., **Ahmad, S.K.**, Bonnema, M., Beveridge, C. Nijssen, B., Holtgrieve, G. (2020). Recent Warming of the Tonle Sap Lake, Cambodia: Implications for one of the World's Most Productive Inland Fisheries. *Lakes and Reservoirs*.
12. Hossain, F., Harsha, K.S., Goyal, S., **Ahmad, S.K.**, Lohani, B., Balaji, N., Tripathi, S. (2020). Towards Affordable and Sustainable Water-Smart Irrigation Services. AWRA Impact Jan 2020 issue
13. **Ahmad, S. K.**, Hossain, F. (2019). A generic data-driven technique for forecasting of reservoir inflow: Application for hydropower maximization *Environ. Model. Softw* 119, pp.145-167. DOI: 10.1016/j.envsoft.2019.06.008
14. **Ahmad, S. K.**, Hossain, F. (2019). A Web-Based Decision Support System for Smart Dam Operations Using Weather Forecasts. *Journal of Hydroinformatics* 21(5), pp.687-707. DOI: 10.2166/hydro.2019.116
15. **Ahmad, S. K.**, Hossain, F., Eldardiry, H., Pavelsky, T. (2019). A Fusion Approach for Water Area Classification using Visible, Near Infrared and Synthetic Aperture Radar for South Asian Conditions, *IEEE Transactions on Geoscience and Remote Sensing*, pp.1-10. DOI: 10.1109/tgrs.2019.2950705
16. <sup>1</sup> Sikder, S., **Ahmad, S. K.**, Hossain, F., Gebregiorgis, A., Lee, H. (2019). Case Study: A Rapid Urban Inundation Forecasting Technique Based on Quantitative Precipitation Forecast for Houston and Harris County Flood Control District. *Journal of Hydrologic Engineering*, 24(8), p.05019017.
17. Eythorsson, D., Gardarsson, S.M., **Ahmad, S. K.**, Hossain, F., Nijssen, B. (2019). Arctic Climate and Snow Cover Trends – Comparing Global Circulation Models with Remote Sensing Observations. *International Journal of Applied Earth Observation and Geoinformation*, 80, pp.71-81.
18. Hossain, F., Bonnema, M., Biswas, N., **Ahmad, S. K.**, Duong, B., Luong, N. (2019). When Floods Cross Borders, Satellite Data Can Help. EOS (AGU) Feb 16, 2019.
19. **Ahmad, S. K.**, Hossain, F. (2018). Generating More Hydropower Using Weather Forecasts. AWRA Impact May 2018 issue.
20. Knudby A., **Ahmad S. K.**, Ilori C. (2016). The potential for Landsat-based bathymetry in Canada. *Canadian Journal of Remote Sensing*, 42(4), pp.367-378.

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<sup>1</sup>Won Best Case Study Award

## Non-refereed

1. **Ahmad, S. K.**, Hossain, F. (2021). The hot and cold of current and future hydropower dams. *Water and Power Magazine*, May 2021 issue, pp. 35-36.
2. **Ahmad, S.K.**, Bonnema, M., Hossain, F. (2020). Can you generate more hydro with less dams? *International Water Power and Dam Construction Magazine*, January 2020 issue, pp. 38-40.

## CONFERENCES AND ORAL PRESENTATIONS

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1. **Ahmad S. K.**, F. Hossain. (Jun 2021). Ushering in a New Frontier to Meet Grand Energy Challenges: Time to Revisit Hydropower Operations for Resilient System. *World Sustainable Energy Days. 2021*.
2. **Ahmad S. K.**, F. Hossain. (Dec 2020). Predicting Thermal Impact of Future Hydropower Dams for Ecosystem-Safe Operations. *In AGU Fall Meeting Abstracts. Dec 2020*.
3. **Ahmad S. K.**, F. Hossain. (Dec 2019). Maximizing hydropower production with smart multi-dam operations using long and short-term forecasts. *In AGU Fall Meeting Abstracts. Dec 2019*.
4. Eythorsson, D., Gardarsson, S.M., **Ahmad, S.K.**, Hossain, F., Nijssen, B. (Dec 2019). Arctic Climate and Snow Cover Trends – Comparing Global Circulation Models with Remote Sensing Observations. *In AGU Fall Meeting Abstracts. Dec 2019*.
5. **Ahmad S. K.**, F. Hossain. (Dec 2018). Computationally Efficient Daily Streamflow Forecasting for Hydropower Maximization Using Artificial Neural Networks. *In AGU Fall Meeting Abstracts. Dec 2018*.
6. Knudby A., Roy D., **Ahmad S.K.**, Bird S., Ilori C., 2016. Satellite-derived bathymetry for Canada, *Canadian Hydrographic Conference, May 16-19, 2016, Halifax, Nova Scotia, Canada*.
7. **Ahmad S. K.**, Srinivasan V., Ghosh P., 2014a. Analysis of annular footings and anchors lying on elastic soil medium using finite difference technique. *5th International Congress on Computational Mechanics and Simulation (ICCMS) 2014, India*.
8. **Ahmad S. K.**, Srinivasan V., Ghosh P., 2014b. Analysis of axisymmetric foundations subjected to axial compressive or tensile static loads on Gibson soil model. *Indian Geotechnical Conference (IGC) 2014, India*.

## COMMUNITY SERVICE

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### Peer Reviews for International Scientific Journals

- Journal of Hydrologic Engineering (10)
- Environmental Modeling and Software (7)
- Water Resources Research (1)
- Journal of Hydrometeorology (1)
- Journal of Water Resources Planning and Management (1)
- IEEE Access (1)
- Stochastic Environmental Research and Risk Assessment (1)

### Capacity Building and Outreach

- Trained Bangladesh Water Development Board (BWDB) on the cloud computing platform Google Earth Engine for applications in water resource management organized by SASWE Research Group, UW, 2021.

- Trained and helped participants during 2020 and 2021 SWOT Early Adopter Virtual Hackathon organized by NASA, CNES, and UW.
- Interviewed by University of British Columbia, Vancouver BC, for sharing experiences and tips to students of atmospheric sciences course at UBC.
- Engaged in middle school science outreach for Discovery Days, an event organized by UW College of Engineering
- Trained participants during WaterHackWeek'19 on Google Earth Engine
- Organized events for UW Chapter of American Water Resources Association

## TEACHING

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- **Teaching Assistant** at University of Washington Fall 2020  
*Satellite Remote Sensing For Water Resources (CEWA 566)*
- **Teaching Assistant** at University of Washington Fall 2019  
*Satellite Remote Sensing For Water Resources (CEWA 566)*
- **Guest Lecture** at University of Washington Winter 2018  
*Quantitative Water Resources Management (CEE 599)*

## INVITED TALKS

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- **World Sustainable Energy Days (WSED)**, Virtual Jun 2021  
*Ushering in a New Frontier to Meet Grand Energy Challenges: Time to Revisit Hydropower Operations for Resilient System*
- **Second AI and Data Science Workshop by JPL**, Virtual Feb 2021  
*Energy from AI: Ushering in a New Frontier in Smart Hydropower Generation through Artificial Intelligence*
- **MIT Energy Nights**, Virtual Oct 2020  
*Ecosystem-Safe Hydropower from Existing and Future Dams in a Challenging Climate*
- **Sensing Rivers Workshop**, University of Washington Sep 2020  
*Remote Sensing of River Temperatures*

## SOCIETY AFFILIATIONS

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- American Society of Civil Engineers (ASCE), *Student Member* 2017–current
- American Geophysical Union *Student Member* 2017–current
- American Water Resources Association *Student Member* 2016–current
- Freshwater Initiative, *Steering Committee Member* 2017–2018
- American Water Resources Association *Webmaster* 2016–2017

## TECHNICAL TRAINING

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- **JPL Summer School in Climate Sciences**, Virtual Aug 2020  
*Participated in two-week virtual summer school organized by Jet Propulsion Laboratory (JPL) Center for Climate Sciences and Keck Institute for Space Studies on Satellite Observations and Climate Models.*
- **Google Earth Engine Workshop for Advanced Users**, Google, Washington DC Dec 2018  
*Two-day workshop on areal computations, optical/radar data fusion, and multi-temporal compositing and classification using Earth Engine API.*

## SKILLS

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- **Programming:** Python, C/C++, MATLAB, Bash Scripting
- **Cloud Computing:** Google Earth Engine, AWS S3
- **Version Control:** Git
- **Machine Learning/Data Analytics:** TensorFlow, Keras, Pyrenn
- **Software/Modeling:** Variable Infiltration Capacity Model (VIC), Land Information System (LIS), SWAT, HEC-RAS, WRF, StormCAD, FlowMaster, CulvertMaster, ArcGIS Online, JupyterHub, GDAL
- **Web Development:** HTML, CSS, JavaScript, PHP, SQL, WordPress